

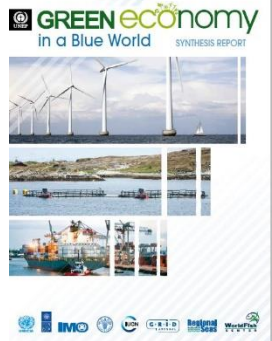
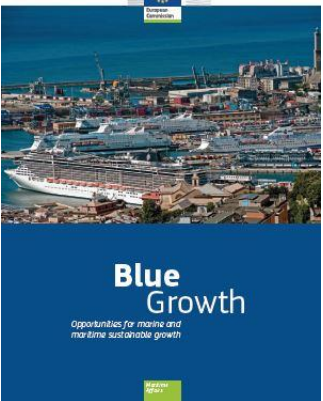
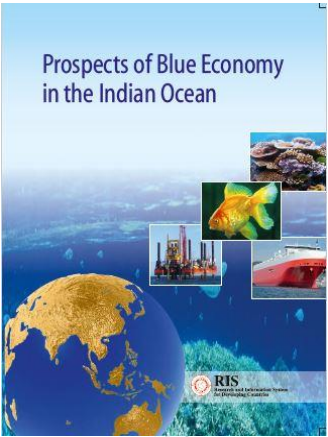
Oceans Economies, Blue Economies and Ocean Governance in the Indian Ocean Rim Association



Prof Ken Findlay
Research Chair: Oceans Economy
Cape Peninsula University of Technology
South Africa



Global increase in Ocean Economies as nations or regions turn to new opportunities to foster economic growth and food and energy security



Includes SA's Operation Phakisa

Note the difference in terms particularly OCEAN and BLUE ECONOMIES

Oceans Economy - “that proportion of the economy which relies on the ocean as an input to the production process or which, by virtue of geographical location, takes place on or under the ocean” Colgan (2004)

Fisheries



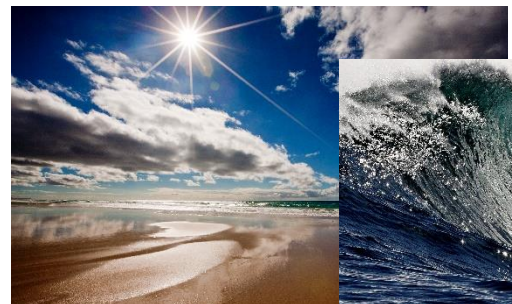
Tourism



Oil & Gas



Regulatory Services



Recreation and Cultural Services



Transport




Humans derive numerous “market” and “non-market” benefits from ocean systems through Oceans Economies.....

Ecosystem Services


Environmental Services

HUMAN ECONOMIES, INDUSTRY AND CONSUMPTION


PROVISIONING ECOSYSTEM SERVICE



REGULATORY ECOSYSTEM SERVICE



CULTURAL ECOSYSTEM SERVICE



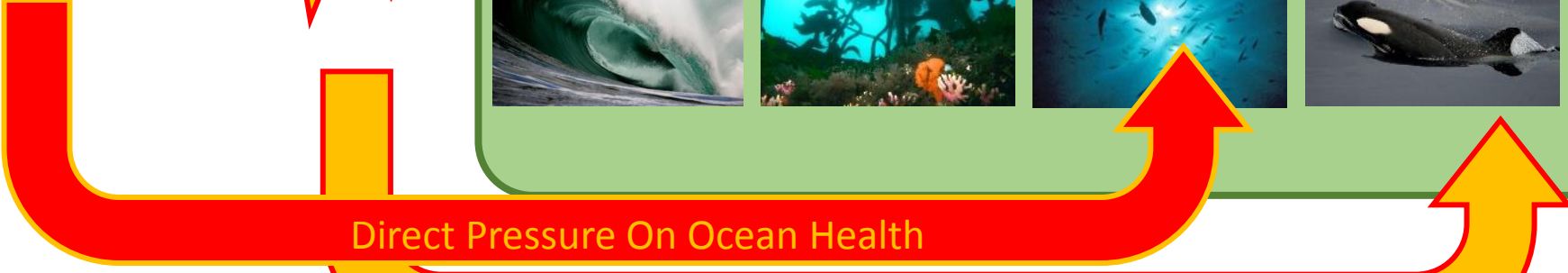
ENVIRONMENTAL SERVICE



DIRECT IMPACTS

EXTERNALITIES
INDIRECT IMPACTS

SUPPORT SERVICES
= FUNCTIONAL ECOSYSTEMS
= OCEAN HEALTH



Direct Pressure On Ocean Health

Indirect Pressure On Ocean Health

OCEANS ECONOMY

The terminology, definition, classification standard and scope of the ocean economy differ by country.
Park and Kildow, 2014

Upstream and Downstream Sectors, Public Goods

BLUE ECONOMY

1. Gunther Pauli's book

“The Blue Economy: 10 years - 100 innovations - 100 million jobs” – (Pauli, 2010)

Advocates innovative solutions to sustainable development, including the fostering of entrepreneurship to create sustainability

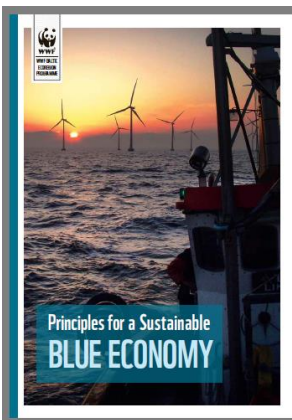
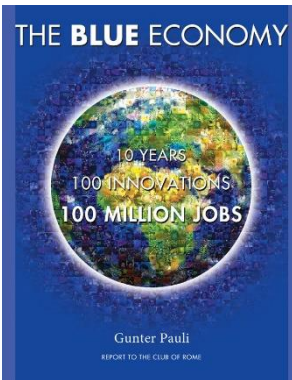
This concept is not specific to oceans.

2. Ocean Resource Use

A. The use of the sea and its resources for sustainable economic development.

B. Any Economic activity in the maritime sector, whether sustainable or not.

WWF – “Principles for a sustainable blue economy”



OCEANS or BLUE ECONOMY needs to be contextualized in terms of
African Integrated Maritime Strategy (AIMS);
The AU 2063 Agenda;
“Africa's Blue Economy: A policy handbook” (UNECA, 2016)
SDG 14 and other SDGs;
Nairobi Convention 8th COP meeting;
The Two IORA Blue Economy Declarations (Mauritius 2015 and Jakarta 2017);

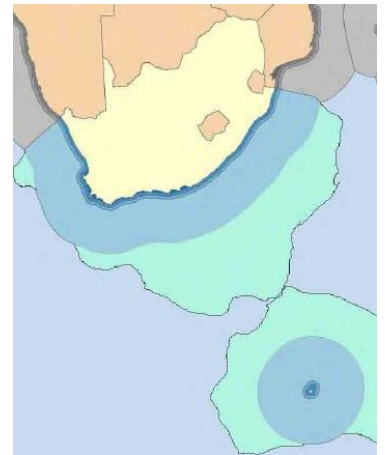
Sustainable use; Ecosystem approach; Science based; Socio-economic benefit; Informed decision making; Equitable growth; Research; Governance; Capacity Building; Sound Environmental Management; Management and conservation; Equity; Resource Efficiency, Social inclusion; Regional cooperation; Integrated ecosystem services; Environmental, Economic, and Social Sustainability; Socially inclusive; Environmentally Sustainable Economic Growth and Social Wellbeing; Global Environmental Externalities; Blue Growth

REGARDLESS OF THE “BLUE” OR “OCEANS” ECONOMY TERMINOLOGY, THERE IS CONSENSUS THAT EXPANSION OF OCEANS ECONOMIES REQUIRES SCIENCE-BASED ECOSYSTEM APPROACHES TO GOVERNANCE





Support services drive ecosystem function and ocean integrity



- VALUE**
- Fisheries
 - Tourism
 - Energy
 - Bioprospecting
 - Climate Regulation
 - Carbon Sink
 - Hydrological Cycle
 - Spiritual
 - Aesthetic
 - Bequest
 - Mining
 - Transport

POTENTIAL FOR CONFLICT

- USER - USER
- USER - ENVIRONMENT

Ocean Governance Tools

Governance as a **Process** or a **Product** goes beyond Legislation

1. Ocean System Monitoring and Research
2. Data Systems , Information and Knowledge
3. Knowledge and Standards Development
4. Strategic Environmental Assessment and Marine Spatial Planning (MSP)
5. Marine Protected Areas (MPAs) and other stewardship programmes
6. Legislation and Regulation
7. Regulation, Compliance Monitoring and Enforcement, including MDA



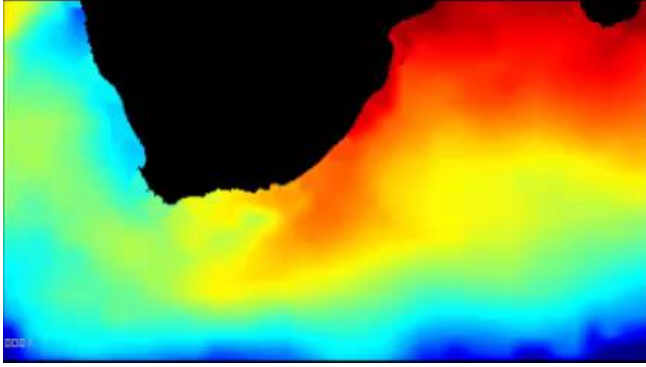
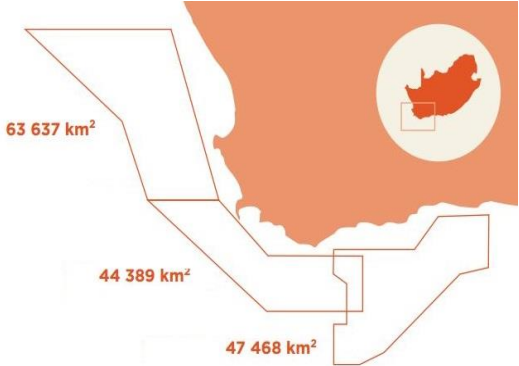
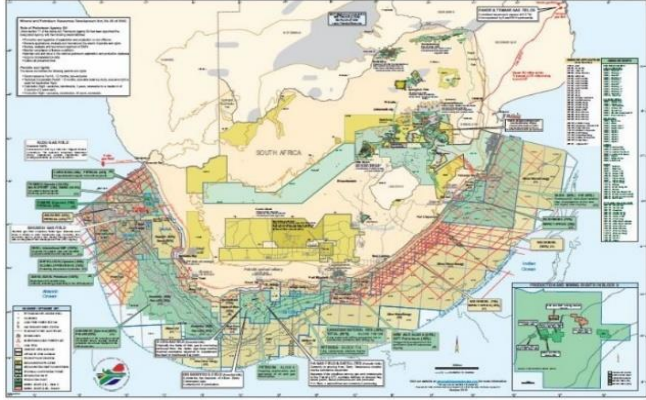
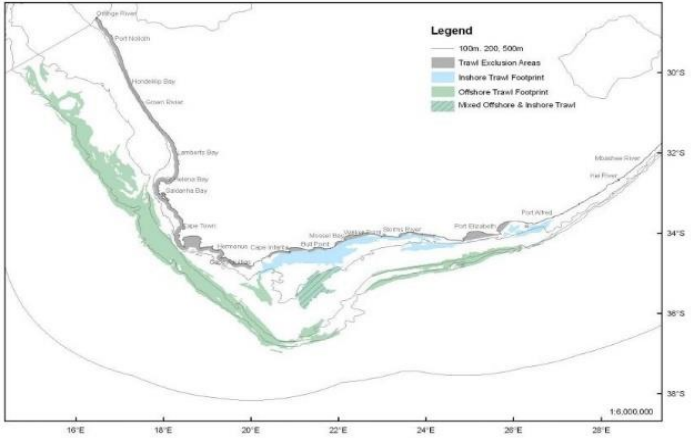
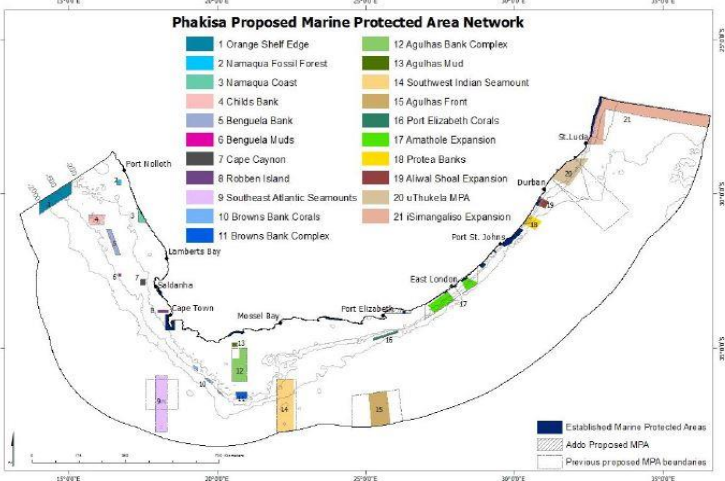
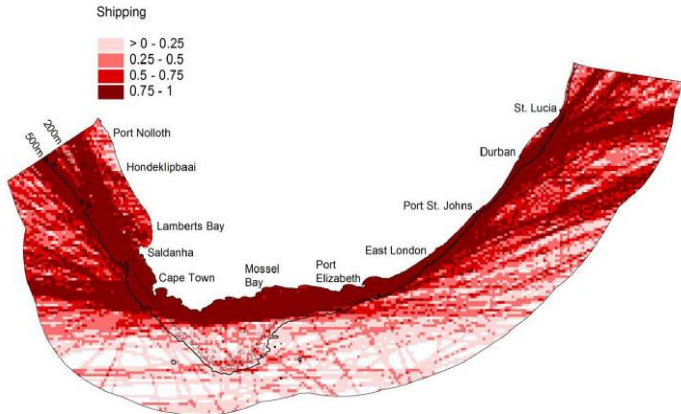
IORA

Ocean or Blue Economy

Status of Ocean or Blue Economy by Member State

Ocean Governance protocols by Member State

User – User Conflicts across multi-sectors are self explanatory in the context of limited ocean space



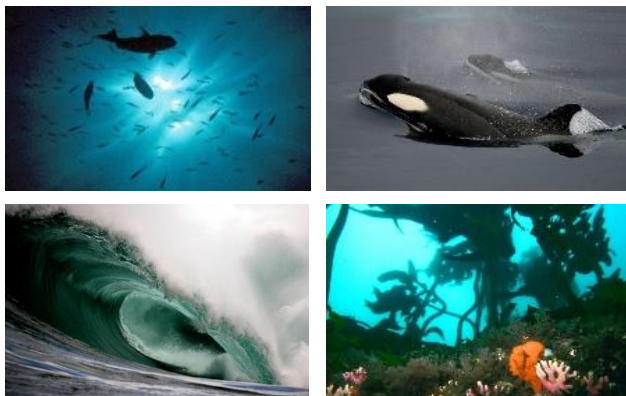
Direct User – Environment Conflicts from Ocean Economy Industry

- Unsustainable extraction of marine resources,
- Pollution from marine sources (including acoustics),
- Impacts of alien invasive species, and
- Physical alteration and destruction of marine habitat.

Indirect Externalities of Human Industry and Consumption

- Pollution from land-based sources (e.g. plastics)
- Ocean acidification and climate change impacts



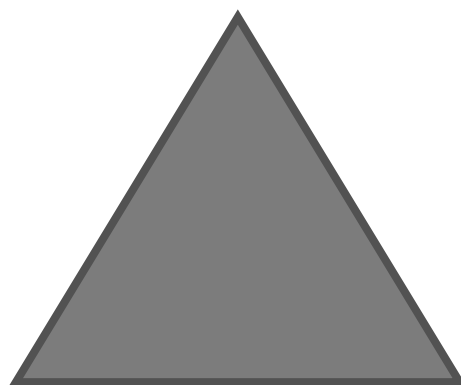
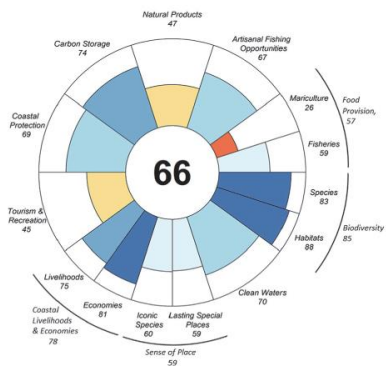


OCEAN HEALTH

OCEAN ECONOMIES ARE DEPENDENT ON FUNCTIONAL OCEAN SYSTEMS (OCEAN HEALTH)



HUMAN BENEFITS & WELL-BEING



Optimise Human Benefits and Well-Being without compromising Ocean Health

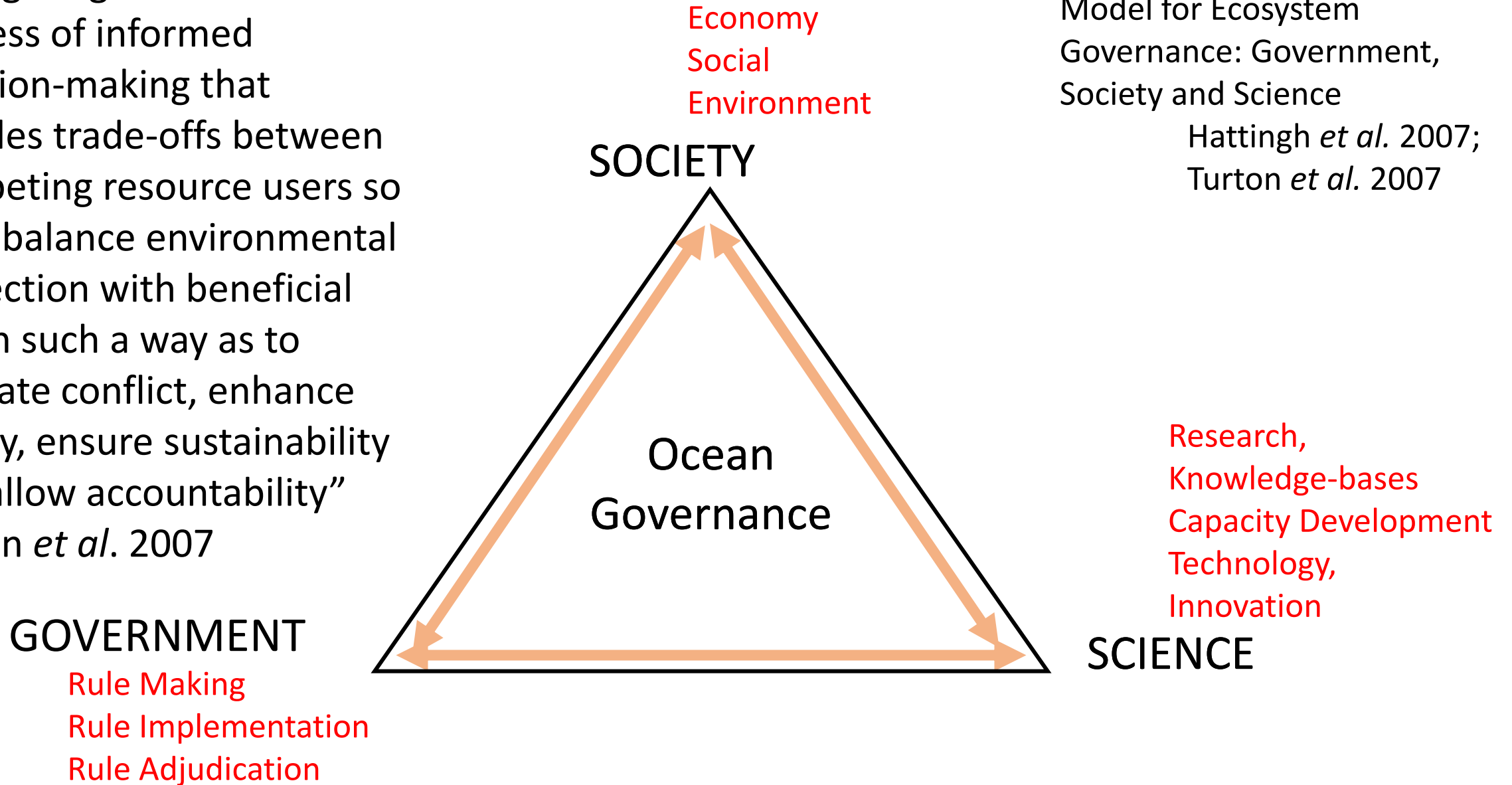
CONSTITUENTS OF WELL-BEING	
<p>Security</p> <ul style="list-style-type: none"> PERSONAL SAFETY SECURE RESOURCE ACCESS SECURITY FROM DISASTERS 	<p>Freedom of choice and action</p> <p>OPPORTUNITY TO BE ABLE TO ACHIEVE WHAT AN INDIVIDUAL VALUES DOING AND BEING</p>
<p>Basic material for good life</p> <ul style="list-style-type: none"> ADEQUATE LIVELIHOODS SUFFICIENT NUTRITIOUS FOOD SHELTER ACCESS TO GOODS 	
<p>Health</p> <ul style="list-style-type: none"> STRENGTH FEELING WELL ACCESS TO CLEAN AIR AND WATER 	
<p>Good social relations</p> <ul style="list-style-type: none"> SOCIAL COHESION MUTUAL RESPECT ABILITY TO HELP OTHERS 	

Source: Millennium Ecosystem Assessment

Ocean Governance To Balance Human Benefits and Ocean Health

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

Falkenmark’s Triologue Model for Ecosystem Governance: Government, Society and Science
Hattingh *et al.* 2007;
Turton *et al.* 2007





OCEAN ECONOMIES ARE DEPENDENT ON FUNCTIONAL OCEAN SYSTEMS



SCIENCE-BASED ECOSYSTEM APPROACHES TO GOVERNANCE

GOVERNANCE IS AN INFORMED DECISION MAKING PROCESS

GOVERNANCE IS ABOUT TRADE-OFFS

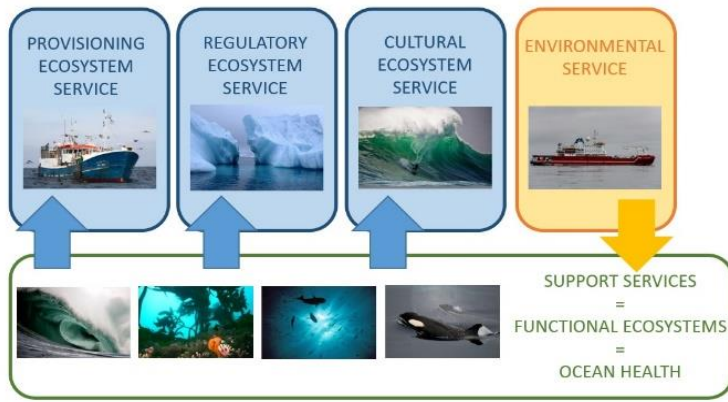
TRADE-OFFS REQUIRE VALUATION

“IMPOSSIBLE TO MANAGE WHAT WE DO NOT VALUE”

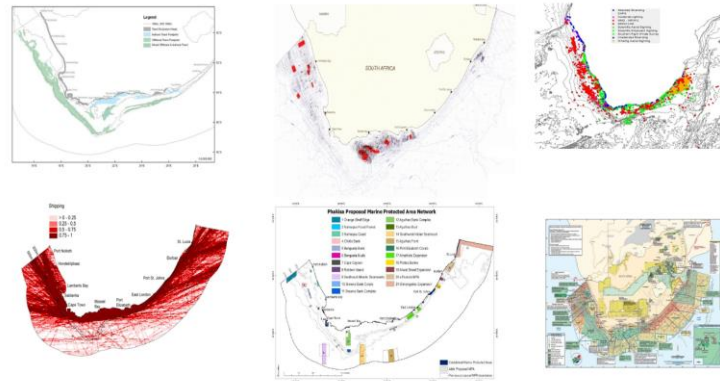
REQUIRED INFORMATION FOR GOVERNANCE IS VALUATION ACROSS ECONOMIC, SOCIAL AND ENVIRONMENTAL DOMAINS

ECOSYSTEM SERVICES VALUATION (ESV)

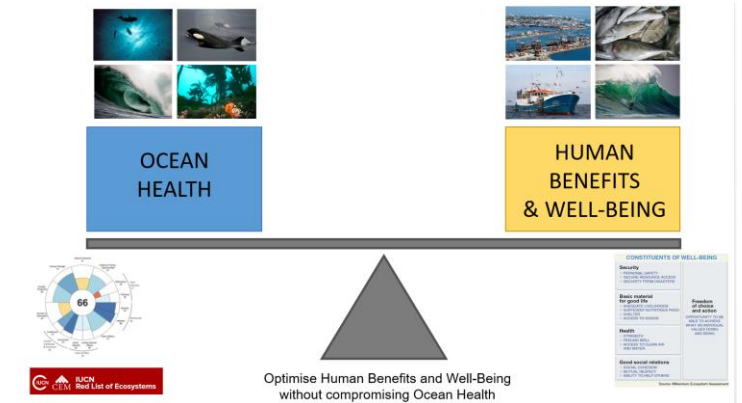
ESV IS THE PROCESS OF ASSESSING THE CONTRIBUTIONS OF ECOSYSTEM SERVICES TO SUSTAINABLE SCALE, FAIR DISTRIBUTION AND EFFICIENT ALLOCATION



ECOSYSTEM SERVICE AND OCEAN HEALTH EVALUATION



IN A SPATIALLY EXPLICIT FRAMEWORK



TO ALLOW THE BALANCE OF SUSTAINABLE OCEAN ECONOMIES AND OCEAN HEALTH



Operation Phakisa aims to accelerate execution of the National Development Plan

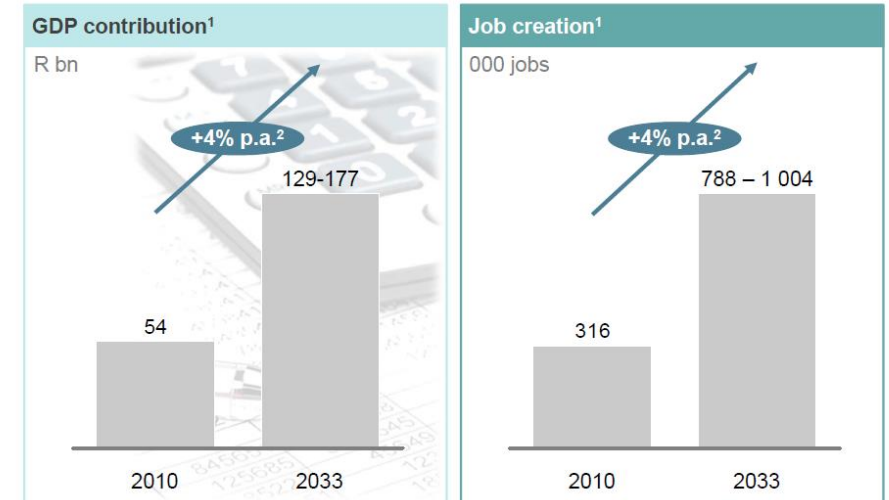
Poverty Eradication
Job creation
Redistribution

“The first implementation of Operation Phakisa will focus on unlocking the economic potential of South Africa’s oceans, which are estimated to have the potential to contribute up to one hundred and seventy seven billion rand to GDP by 2033 compared to fifty four billion rand in 2010.”

Based on the Government of Malaysia's Big Fast Results Methodology


Phakisa - to hurry in Sesotho

South Africa’s ocean economic potential ranges between R129 and R177 bn by 2033, with between 800 000 to 1 million jobs created



¹ Only direct potential (i.e. multiplier effect ignored) from the Exclusive Economic Zone (EEZ) considered; ² Growth rate per annum (p.a.) is based on the projected base 2033 value

9 sectors were analysed as key priorities for South Africa's ocean economy

 Selected new growth areas

	GDP, R bn			Jobs, 000	
	2010	2033	CAGR, %	2010	2033
Marine transport and manufacturing	16	42-61	6%	15	40-56
Tourism	15	25-35	4%	90	150-225
Offshore oil and gas	4	11-17	9%	0.4	0.8-1.2
Construction	8	20-21	4%	162	390-407
Renewable energy	0	14-17	25%	0	0.9-1.1
Fisheries and aquaculture	7	10-16	4%	30	170-250
Communication	4	7-10	4%	19	35-52
Desalination	0	0.1-0.1	1%	0	1.6-1.6
Marine protection services	0	TBD	-	0	TBD
Total	54	129-177		316	788-1 004



Marine Protection Services and Ocean Governance

Integrated Ocean Governance and Protection

Integrated framework and governance



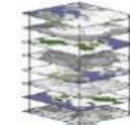
- 1 Ministerial Committee and Secretariat to govern activities
- 2 Enhancement of legislation for the Integrated Coastal and Oceans Management Act or Oceans Act
- 3 Review of ocean-related legislation
- 4 Accelerated capacity-building intervention in ocean governance

Ocean protection



- 5 Enhanced and coordinated enforcement programme
- 6 National ocean and coastal information system and extending earth observation capacity
- 7 National ocean and coastal water quality monitoring programme
- 8 Creation of a Marine Protected Area (MPA) representative network
- 9 MPA/MSP discovery, research and monitoring programme

Marine spatial planning (MSP)



- 10 Marine Spatial Planning (MSP) process

Operation Phakisa to fast-track delivery of the NDP 2030 – Eradication of poverty, unemployment and inequality.

Governance to optimise Human Benefits and Well-being without compromising Ocean Health

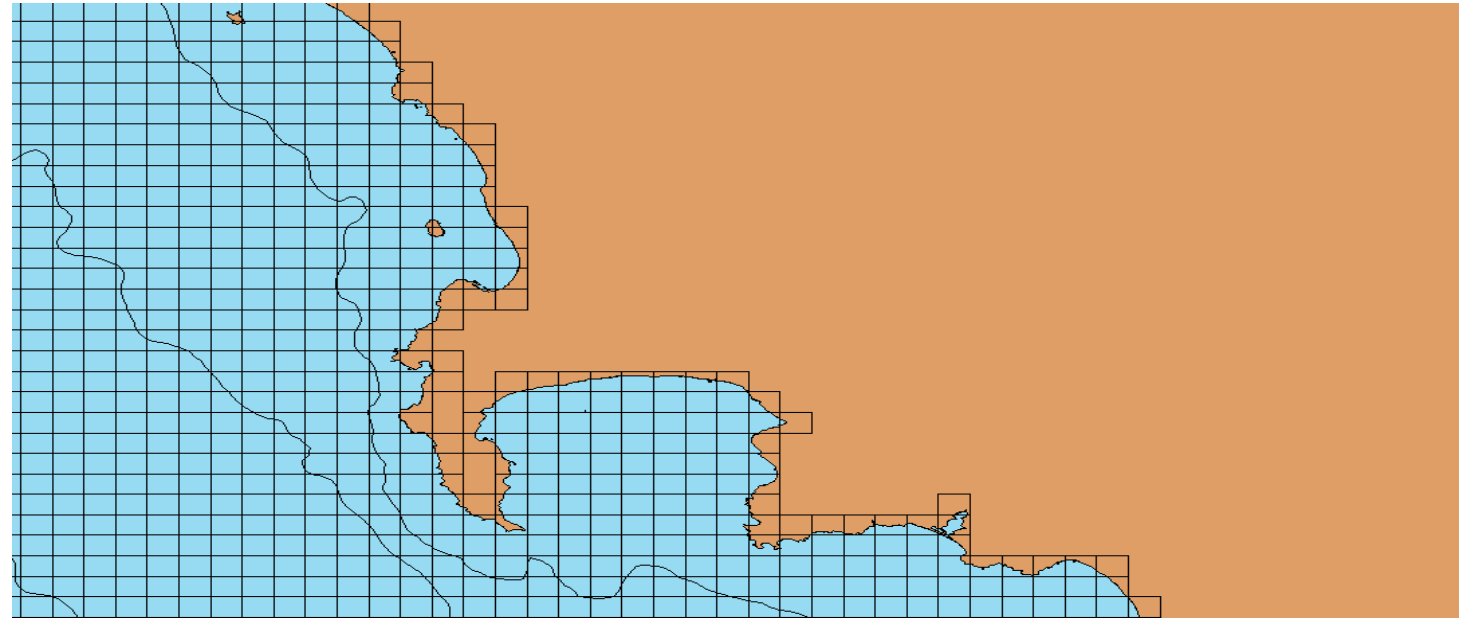
The roles of Society, Science and Government in the Operation Phakisa Ocean Governance Framework

Stepwise Process of Ecosystem Service Evaluation for Trade-offs between competitive sectors or industries (including the environment) in Spatial Ocean Governance – Work in Progress

1. The identification of the spatio-temporal interactions between sectors by a Marine Spatial Planning process across temporal scales and ecosystems.
2. The development of a intersectoral compatibility / conflict matrix which through stakeholder engagement identifies the economic, social or environmental conflicts that arise through interactions between sectors.
3. The merging of the spatio-temporal interactions between sectors identified in 1, with the extent of compatibility / conflict identified in 2 to identify spatio-temporal conflicts metrics.
4. The evaluation of the ecosystem services (provisioning, regulatory, cultural or support services) that are included within the spatio-temporal conflicts identified in 3. Such an ESV needs to be carried out through economic, social and environmental lenses to allow for trade-off analyses to be developed.
5. Prioritisation of sectors (including all of the components of the environmental, economic or social externalities of the sectors) to allow for the maximisation of benefits, goods and services from the environment without compromising environmental integrity - the development and implementation of adequate decision support tools including (for example multi criteria decision frameworks, scenario planning and composite indicators) in a detailed trade-off planning and decision making process
6. Continued review and adaptive management of the prioritisation process.

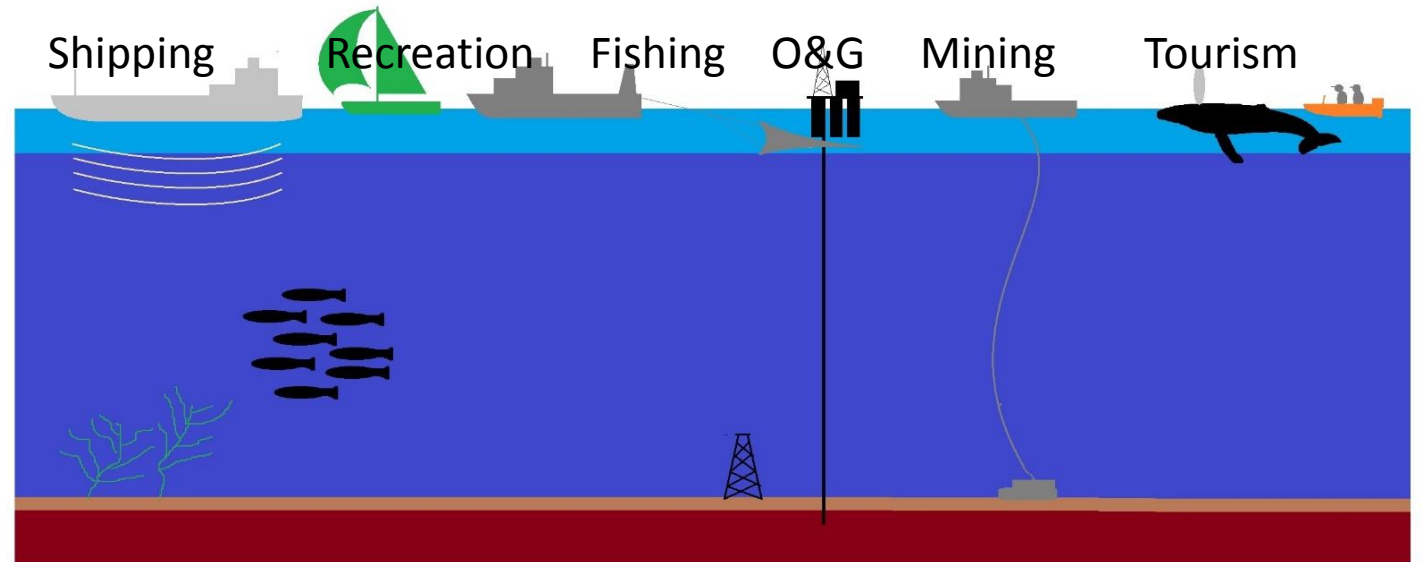
Proposed model of Horizontal Basic Spatial Units of 5nm x 5nm

Require human activity and biophysical spatial layers within Basic Spatial Units



Aggregations Across 4 Vertical Layers

1. Ocean Surface
2. Water Column
3. Seafloor
4. Sub-Seafloor



FISHERIES
Abalone
Hake Handline
Squid Handline
Traditional Handline
KZN N Oysters
KZN S Oysters
Port Elizabeth Oysters
Seaweed
Southern Cape Oysters
White mussel
Hake Longline
Patagonian Tooth-fish Longline
Tuna and swordfish longline
Horse mackerel
False Bay haarder Net
False Bay Yellowtail Net
West Coast haarder Net
West Coast St Joseph Net
Tuna Pole
Anchovy Purse seine
Horse Mackerel Purse seine
Sardine Purse seine
Octopus Trap
South Coast rock lobster Trap
West Coast rock lobster inshore Trap
West Coast rock lobster offshore Trap
Agulhas Sole Trawl
Demersal shark Trawl
Hake inshore Trawl
Hake offshore Trawl
Prawn Trawl

TRANSPORT & INFRASTRUCTURE
Harbours
Shipping
Dredging
Harbour
Lighthouse
Roads and anchorage
Shipping
Small harbour
Outfall

OIL & GAS
Disbanded Facility
Exclusion Zone
Exploration
Pipeline
Production Facility
Seismics

MINING
Diamond
Phosphate
Salt
Sand
Titanium

ENERGY
Energy Currents
Energy Tidal
Energy Wave
Energy Wind

RECREATIONAL
Beach sailing
Beach-going
Birding
Day walks
Dedicated Swim
Jetski
Kite surfing
Motor Cruising
Offshore and sail cruising
SCUBA
Snorkel
SUP
Surfing
Surfski and kayak

RECREATIONAL FISHING
Bait
East coast lobster
Estuary
Intertidal
Spearfishing
Surf and Rock
West coast lobster dive
West coast lobster trap
Boat

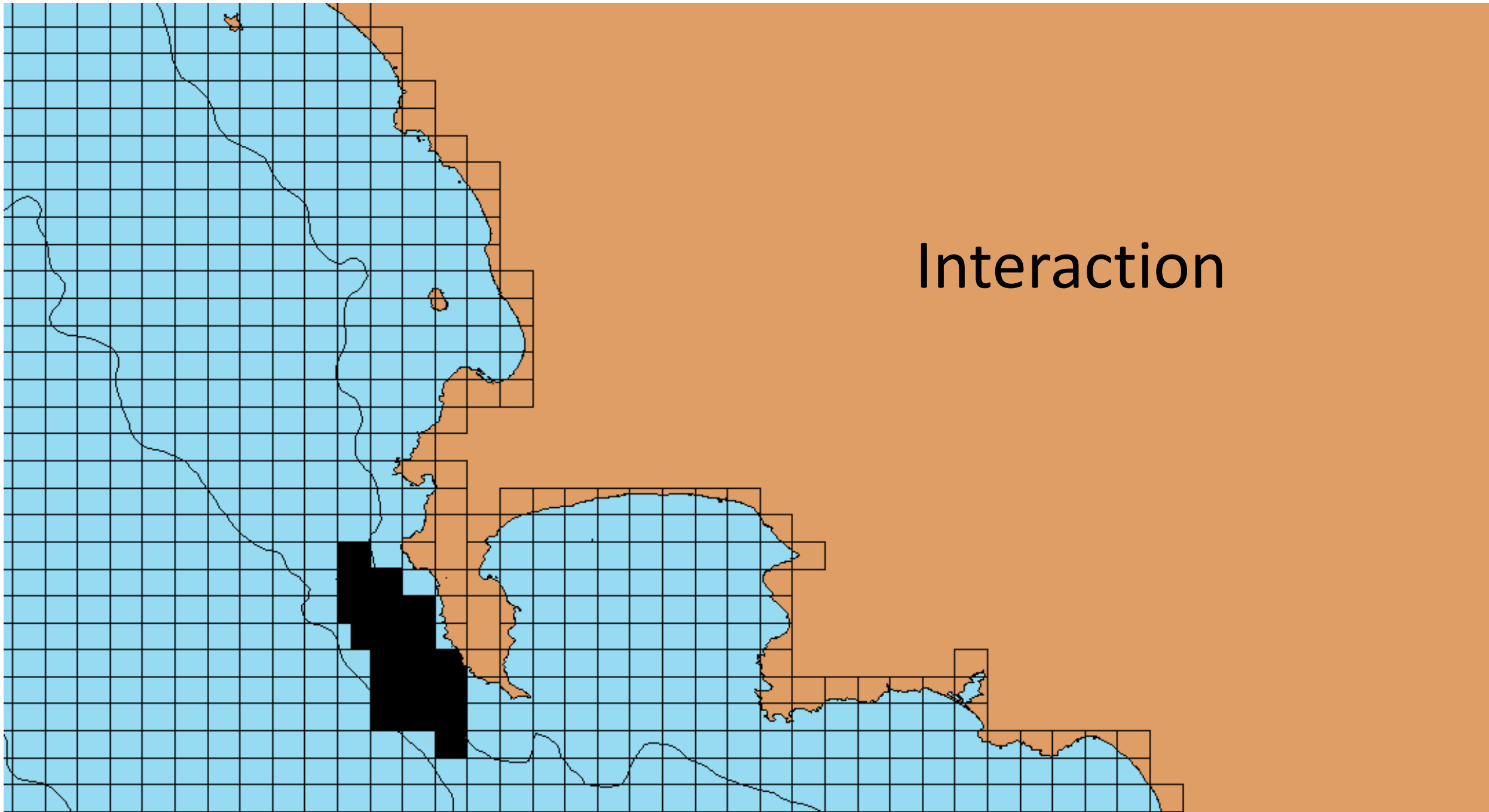
TOURISM
Seal diving
Shark diving
Whale watching
Aquariums
Ports and Harbours
Protected Area Use
SCUBA diving
Seal cruises
Boat cruises
Caravan and camping
Holiday home
Hotels
Overnight hikes

ENVIRONMENTAL
EBSA
Important Bird Area
Important Mammal Area
MPA
Species Significant Area
World Heritage Area
Special Protected Area
Ramsar Site

AQUACULTURE
Onshore Aquaculture
Abalone Ranching
Cage Aquaculture
Raft Aquaculture
Seaweed Aquaculture

CULTURAL
Aesthetic Site
Bequest Site
Cultural Site
National Monument
Historic Site
Spiritual Site

Interaction



Prioritise Interactions as

1. Synergistic

2. No Effect on each other

3. Incompatible

Requires Trade – Off

Trade – Offs require

Model

Valuation (ESV)

Scenario planning

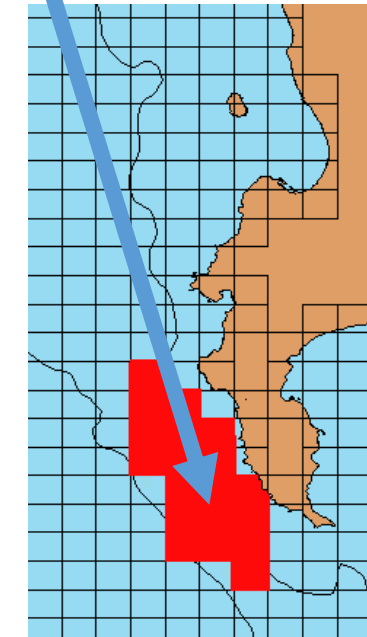
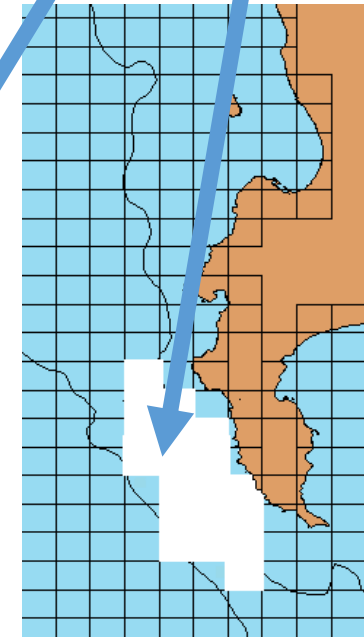
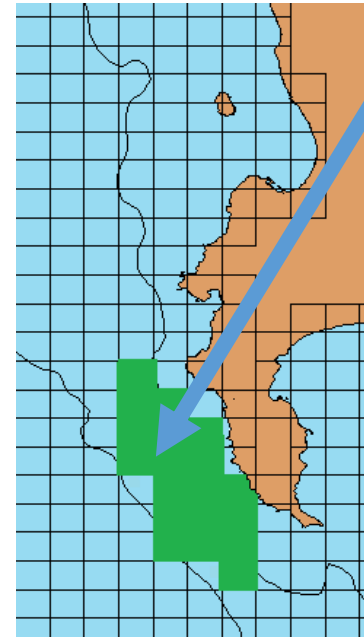
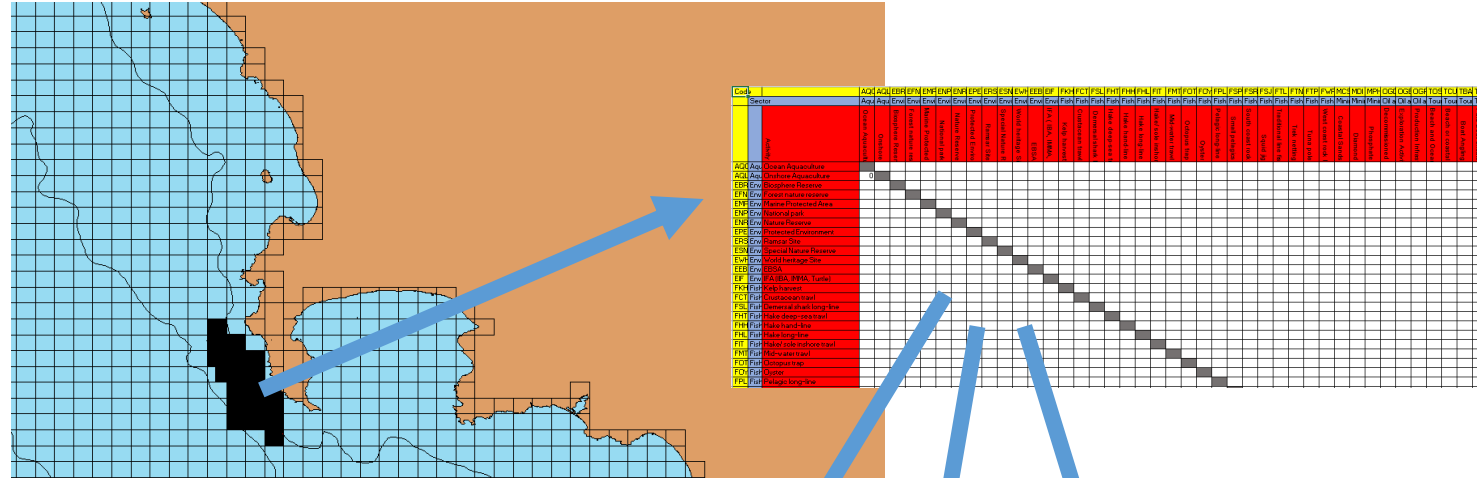
Sensitivities of alternatives

A MCDA approach

Exclusion or mitigation

PLANNERS ARE NOT DECISION MAKERS

Need to provide alternatives.....

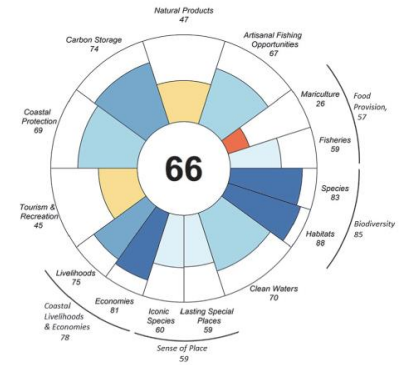


Composite Indicators Models

e.g. Ocean Health Index (Halpern et al. 2012)

Environmental Performance Indicator (Hsu et al. 2014)

Sustainability Society Index (van der Kerk et al. 2014)



Means of aggregating multiple indicators to track and communicate complex systems.

Mathematical combination of a set of indicators that have no common meaningful unit of measurement.

Increasingly used for decision making in a range of sectors (business statistics, economics, health).

see Burgass *et al.* 2017

DECISION SUPPORT TOOL

Decision Support Tool: Ecosystem Service Indicator

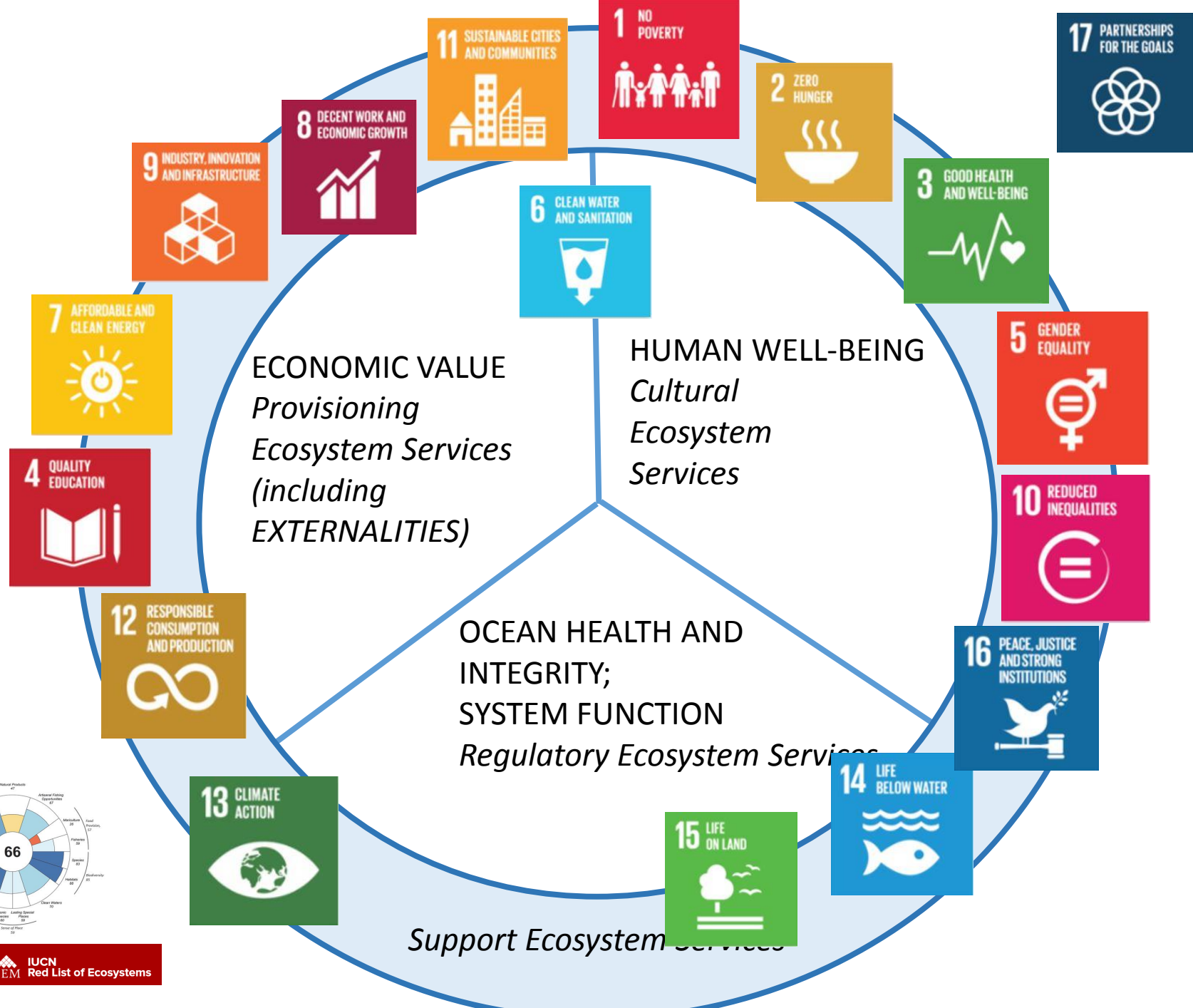
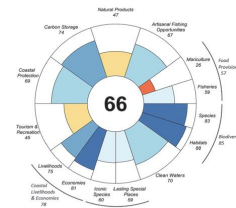
Objective: To Maximise Economic Value without Compromising Ocean Health

Underlying premise: Ecosystem Services are dependent on Ocean Health

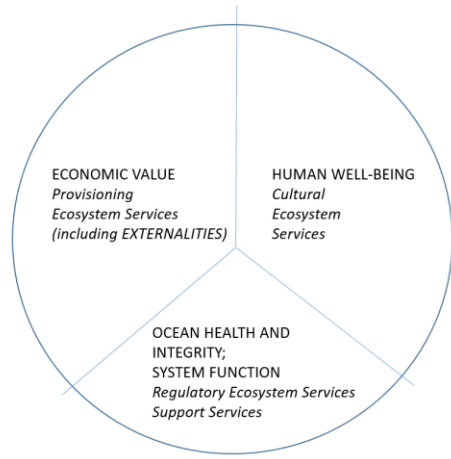
Both Direct and Indirect Values and Costs

Weightings?

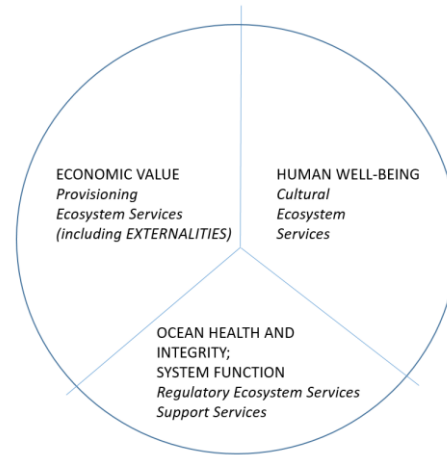
=> Composite Index Score per Sector



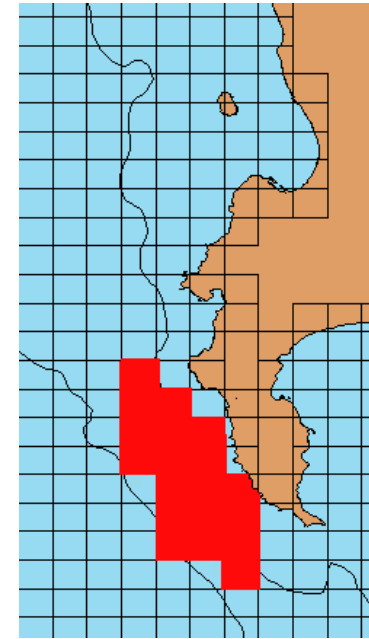
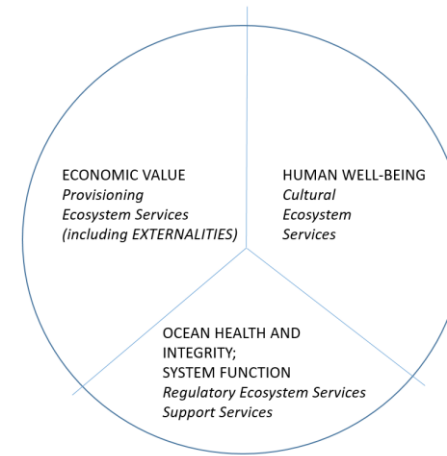
Fisheries



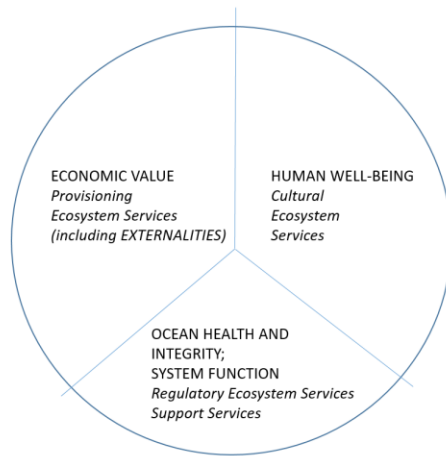
Mining



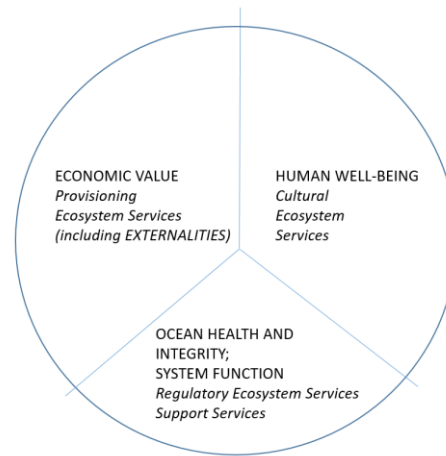
Tourism



Recreation



MPAs



Compatibility
Mitigation measures
Exclusion

Decision Support Tools for Trade Off Analyses in Coupled Human and Natural Systems (CHANS) or Social Ecological Systems (SES) Frameworks

DeSTs currently under review



1. Multiscale Integrated Model of Ecosystem Services (MIMES) and the Marine Integrated Decision Analysis System (MIDAS) used in the Massachusetts Ocean Planning Process (Altman et al. 2014; White et al. 2012; Boumans et al. 2015)
2. Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) – Natural Capital Accounting Project Artificial
3. Artificial Intelligence for Ecosystem Services (ARIES) within a Bayesian framework

Outputs are Scenarios

Description of possible future states - not forecasts

Each scenario is one alternative image of how the future can unfold

Scenarios are critical in alternative plans for MCDA





Thanks to numerous colleagues for valuable discussions over last couple of months
And to those who have allowed the use of their map images in this talk