



# Zone Design 0.0

Seychelles Marine Spatial Planning Initiative

14 January 2015

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TNC Canada

*This document and the statements within have not been formally reviewed or approved by the Government of Seychelles. They are presented for discussion purposes only, and are subject to change upon formal review and revision.*



Seychelles Marine Spatial Planning Initiative  
[www.seychellesmarinespatialplanning.com](http://www.seychellesmarinespatialplanning.com)

# Planning for the Future

Blue Economy

Protected Area Targets and CBD

Demersal Fishery Management Plan (in progress, 2015)

Fisheries Act (2014)

Protected Area Policy (2013)

...and other National Policies and strategies



# Visioning – Workshop Feb 2014

## Example – Fisheries, Tourism

Fisheries	
Effective sustainable EAF fisheries management through management planning, enforcement & compliance	High
Set targets at maximum economic yield instead of MSY	High
Review of the capitalisation of the sector- capacity, economic efficiency and subsidies whilst ensuring equity across the fleets and ensuring local fleets are not disadvantaged	High
Food nutrition and security for the Seychelles Nation	High
Capacity building and professionalization within the local fishing sector- including improved organisational and operational capacity (e.g. associations)	High
Promote maritime safety and security (e.g. against piracy)	High
Increase and improve public awareness and education on fisheries role and issues	High
Eliminate IUU fishing	High
Socio-economic impact assessment of small scale and semi industrial fisheries	High
Assessment of the implications of conservation and management on socio-economics of the industrial fishery sector	High
Fishermen part of the decision making / governance processes	High
Meet international standards of best practise for sustainable fisheries (e.g. FAO fisheries standards) to open new markets	High
Promote sustainable mariculture and diversification in resources and markets	Medium
Continue efforts on by-catch reduction minimising fisheries impacts on endangered or threatened species (e.g. as in FAD management plan)	Medium (Avg. across fisheries)
Tourism	
Achieve full integration and implementation of the Seychelles Sustainable Development Strategies through improved coordination and support	High
Double the revenue per visitor for conservation activities based on average over the last five years	High
Create more financial incentives for private business to adopt Sustainable Tourism related norms	High
Improve and update policies, regulations, and laws pertaining to marine tourism and other maritime traffic in order to reduce the negative environmental impacts including those of self-sail and private	



# Multi-objective Marine Planning

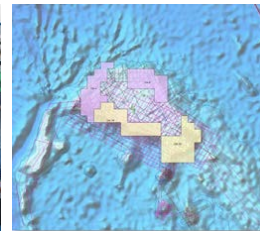
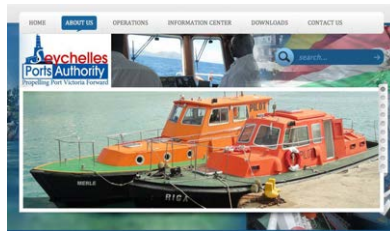
Zone A – *Food Security and Fisheries*

Zone B – *Biodiversity*

Zone C – *Industrial and Public Utilities*

Zone D – *Non-Renewable Resources*

Zone E – *Tourism and Recreation*

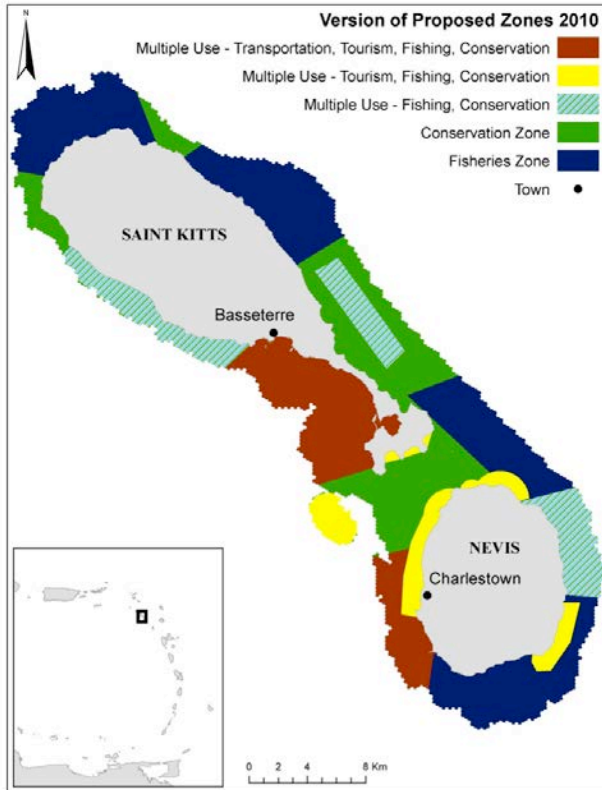


# The Goal

Create an integrated spatial data set that depicts, for any given location (planning unit), the different zone types that were identified as priorities for that location.

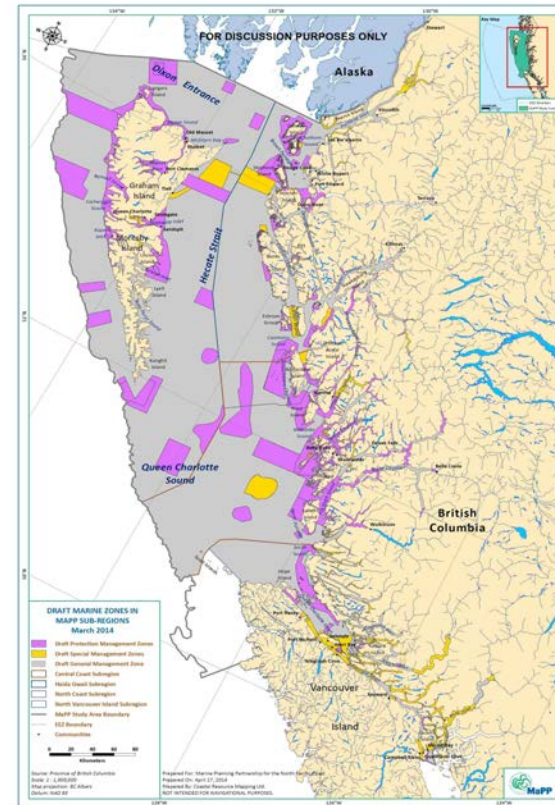
This is expressed as a 'map' that displays for any given location the unique combinations of potential zones that were discussed.

# Zoning Examples



St. Kitts and Nevis, Caribbean

Source: The Nature Conservancy (Agostini et al. 2014)

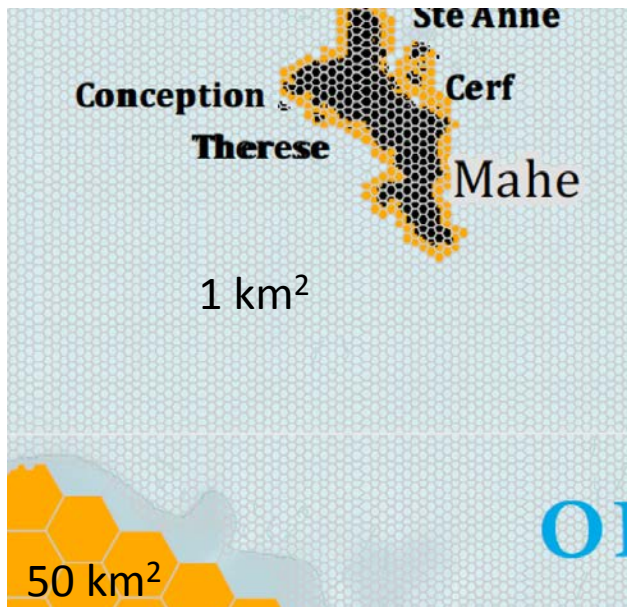


North Coast British Columbia, Canada

Source: Marine Planning Partnership 2014

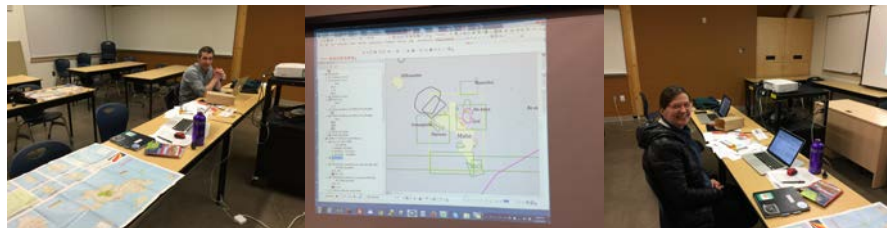
# Developing a Zoning Design

- Inventory and evaluate all spatial information
- Address challenges of geographic scale
- Methodology for a “Planning Unit Approach”



# Planning Unit Approach

- Some data used for zone boundary definition
- Some data tagged for special management considerations in specific areas → “Zone Specific Management Areas”.
- Develop a stakeholder preference for each zone
- Identify unique combinations of zones



# Zone A

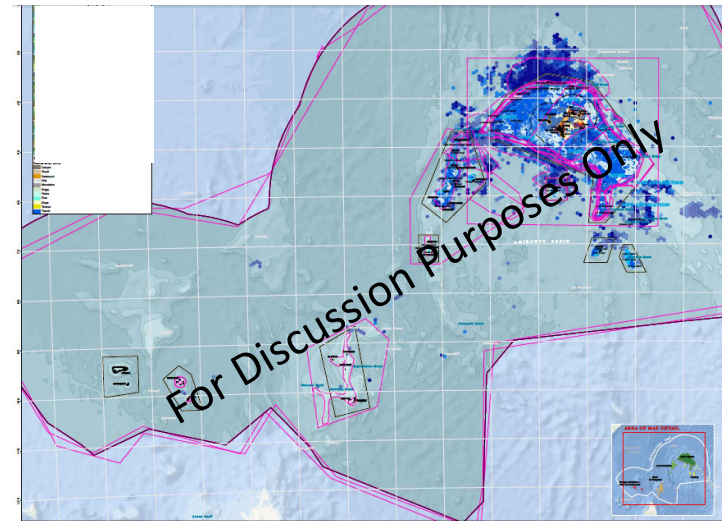
## *Food Security and Fisheries*



Photo: Safety4sea.com

### Data Layers

- Industrial fisheries restricted zones (<200 m depth)
- Lobster fishing areas – Inner Islands
- Sea cucumber survey
- Sea cucumber dive sites
- SFA Industrial longline 2003-2012
- SFA Industrial purse seine 2003-2012
- VMS Artisanal local vessel 2009-2013 (-2010)
- VMS Semi-industrial fishing 2009-2013
- SFA Potential Aquaculture Farms
- Social Survey for Density of fishing effort (Tim Daw); Inner Islands
- GeoMarks from WS3 and TWG2



Source: Seychelles MSP Initiative January 2015. Information is presented for discussion purposes only. Subject to change upon review and revision.

Photo: wikipedia.com

# Zone A

## Food Security and Fisheries

Integrated Habitat Classification, Deep

Marin et al. 2014



For Discussion Purposes Only  
Source: Seychelles MSP Initiative January 2015.  
Subject to change upon review and revision.

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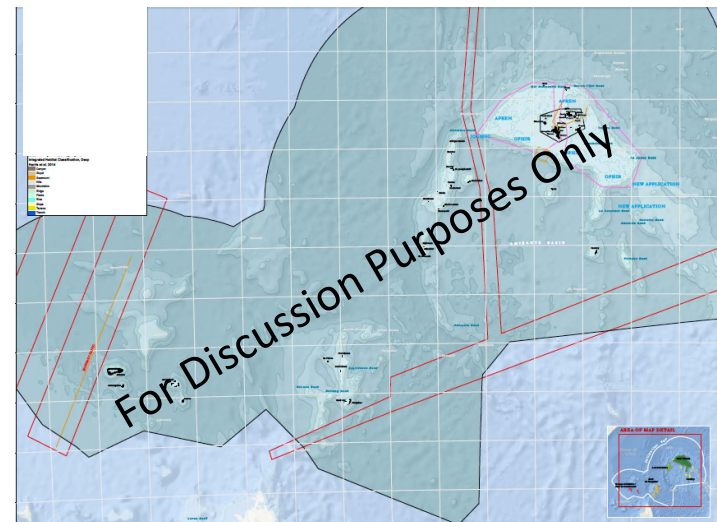
# Zone C

## *Industrial and Public Utilities*



### Data Layers

- Areas to be Avoided for IMO shipping, British Admiralty Chart No721 (TNC)
- Halpern et al. 2008 shipping data
- Highest shipping values (TNC)
- Port of Victoria boundary
- Reclamation areas on Mahe
- GeoMarks from WS3 and TWG2



Source: Seychelles MSP Initiative January 2015. Information is presented for discussion purposes only. Subject to change upon review and revision.

# Zone C

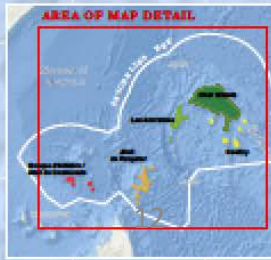
## Industrial and Public Utilities

Integrated Habitat Classification, Deep  
Harris et al. 2014

- Coastline
- Deep
- Assessment
- High
- Medium
- Low
- Very Low
- Very High
- Very Low
- Very High

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# Zone D

## *Non-renewable Resources*

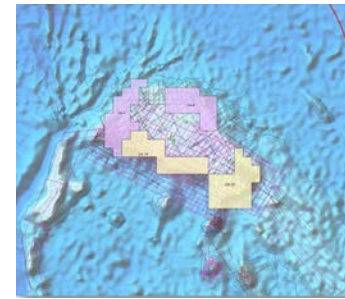
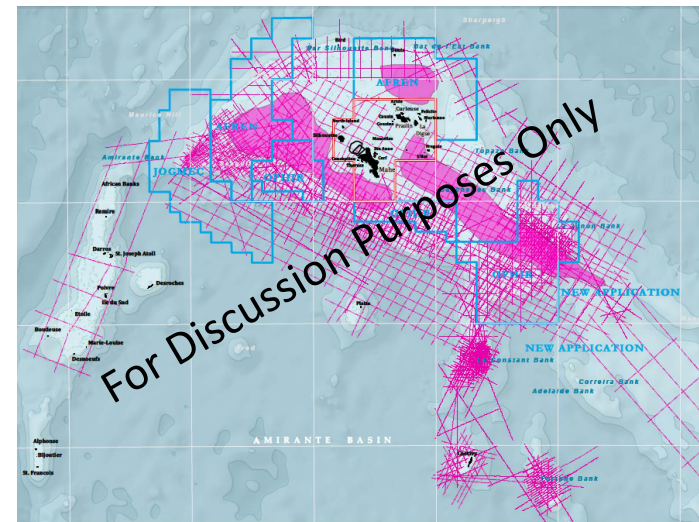


Photo: PetroSeychelles

### Data Layers

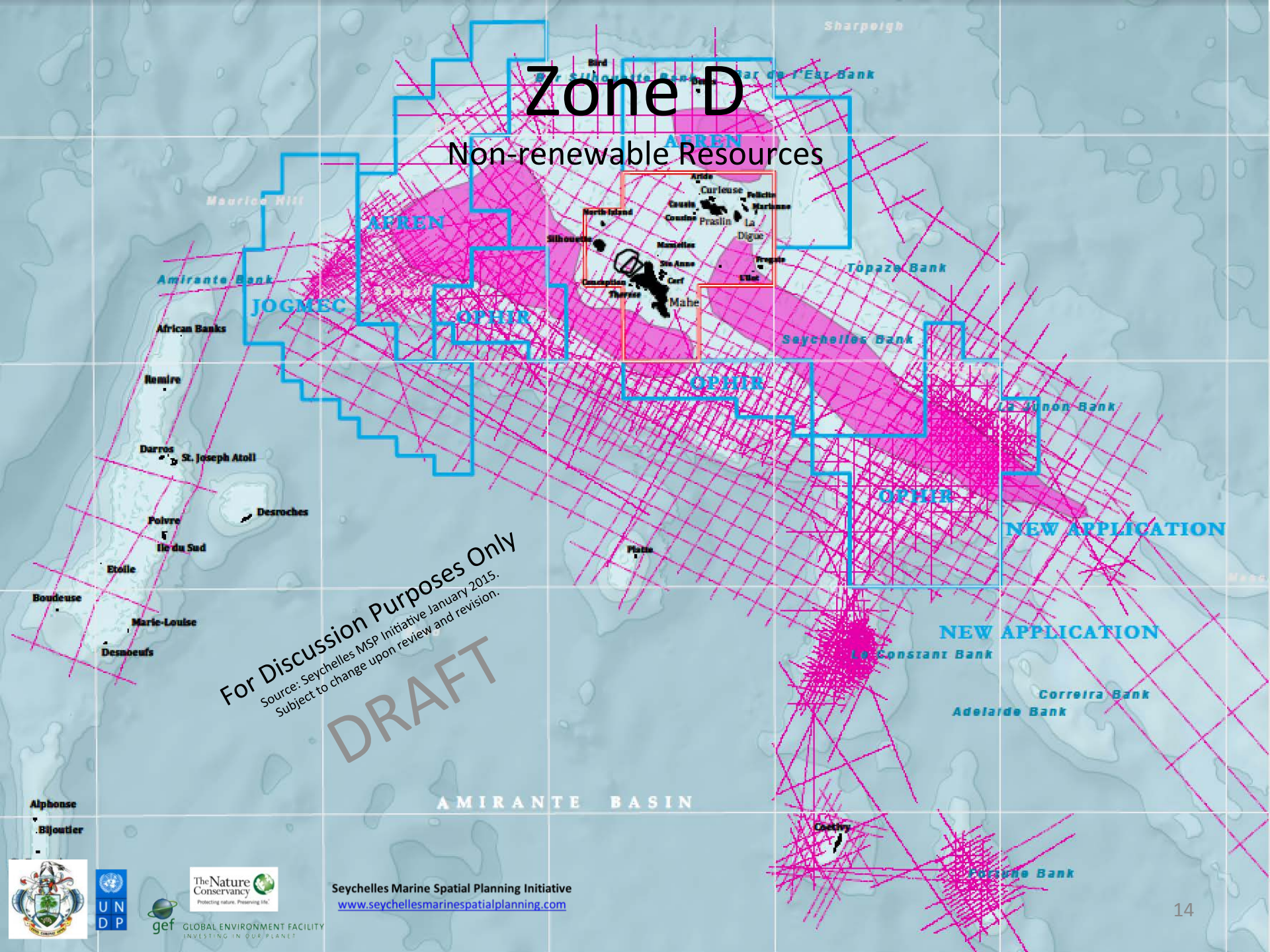
- Licensed Blocks (including new applications in 2014)
- Restricted Area (on Mahe Plateau)
- Seismic Surveys
- PetroSeychelles Technical Atlas Low Gravity areas, page 11 (TNC)
- Well locations from previous drilling



Source: Seychelles MSP Initiative January 2015. Information is presented for discussion purposes only. Subject to change upon review and revision.

# Zone D

## Non-renewable Resources



For Discussion Purposes Only  
Source: Seychelles MSP Initiative January 2015.  
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# Zone E

## *Tourism and Recreation*



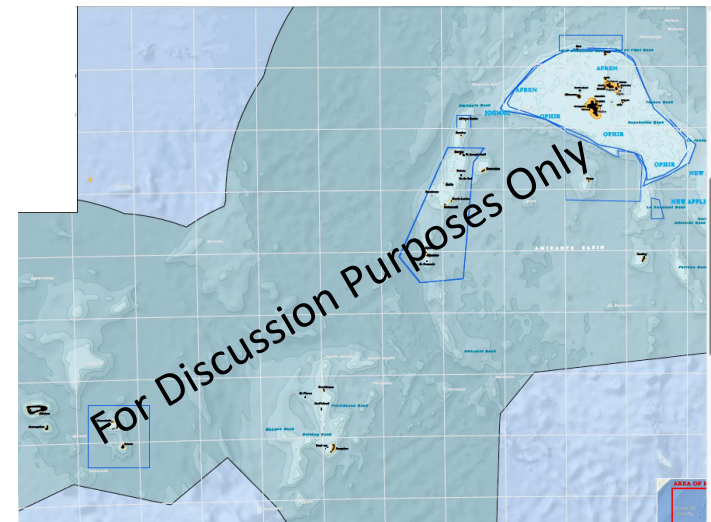
Photo: Frontiers Travel



Photo: JustSeychelles.com

### Data Layers

- Anchorages
- Areas of outstanding beauty (terrestrial)
- Beaches (swimming)
- Dangerous swimming beaches (surfing)
- Distance from hotels (TNC)
- Distance from beaches (TNC)
- Distance from dive sites (TNC)
- Distance from Areas of Outstanding Beauty (TNC)
- Distance from coastline (TNC)
- Hotels
- Hotels classified by size (# of beds)(TNC)
- View Points
- GeoMarks from WS3 and TWG2



Source: Seychelles MSP Initiative January 2015. Information is presented for discussion purposes only. Subject to change upon review and revision.

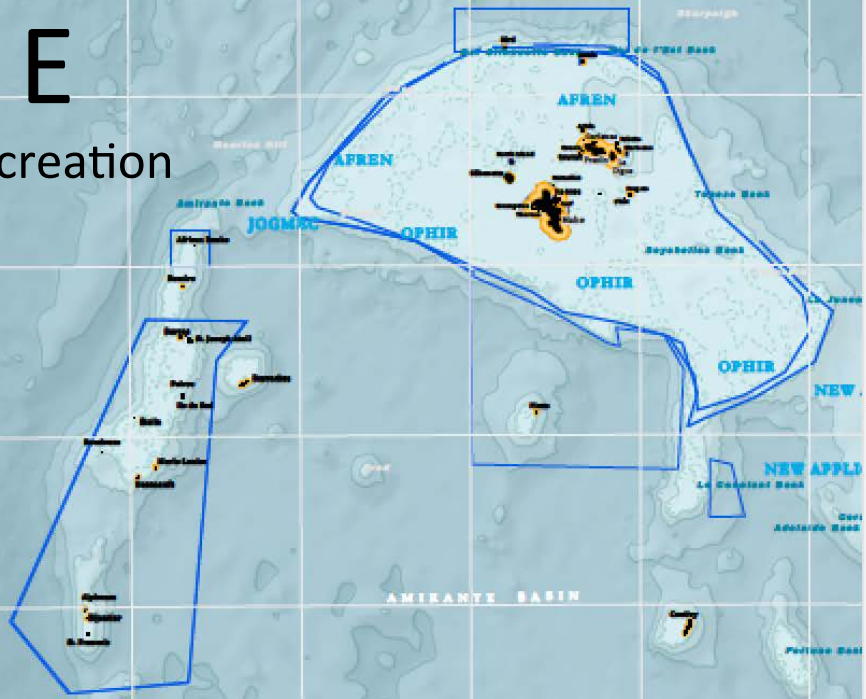


# Zone E

## Tourism and Recreation

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# Review of Stakeholder Preferences

## GeoPDF



Photo: Joanna Smith

# Legend

## *Participatory Mapping Data*

Zone Preferences Identified  
in Workshops



 General stakeholder zoning preferences

# Legend

## ***ZONE A, Food Security and Fisheries***



Fisheries restricted zones



Above median total catch, 2003-2012  
Purse seine / Long line



Potential aquaculture sites

- Artisanal / Semi Industrial  
VMS locations 2009 - 2013

### **Fishing Banks**



Deep Areas



Shallow Areas



Reef

### ***Sea cucumber survey (CSIRO)*** ***Number per hectare***



6 - 65



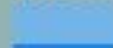
65 - 215



215 - 550

### **Vessel Monitoring System location representation analysis**

#### **Areas of high use across all years analyzed**




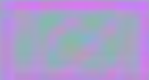

Least used



Most used

# Legend


## ***ZONE B, Biodiversity and Replenishment***


-  Existing protected areas or Reserves
-  Proposed protected areas
-  Ramsar site


# Legend

## *ZONE C, Multi-use, Marine Services and Infrastructure*


- Landing sites


 High use areas for ships

 Port of Victoria

 Areas of avoidance

### *Shipping traffic (Halpern08)*


 High


 Low, or none


# Legend

## ***ZONE C, Multi-use, Marine Services and Infrastructure***


- Landing sites

 High use areas for ships

 Port of Victoria

 Areas of avoidance

*Shipping traffic (Halpern08)*


 High  
Low, or none

 Reclaimed areas  
Settlements  
Development Zones (Praslin)  
Landfills

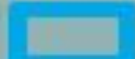
 Side drains

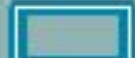
## ***ZONE D***

### ***Non-renewable Energy***

 Areas of low gravity

 Restricted area




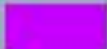



 Licensed blocks

 New applications




# Legend

## ZONE E

### *Multi-use, Tourism, Recreation and Culture*

- |   |                          |   |   |
|---|--------------------------|---|---|
|  | Dangerous swimming areas |  | Beaches                                 |
|  | Anchorage                |  | Areas of Outstanding Natural Beauty     |
|  | Dive sites               |  | Areas within 1 km of beaches and hotels |
|  | Glassbottom boat sites   |   |   |

### *Hotels*

- |   |               |
|---|---------------|
|    | Self Catering |
|   | Small Hotel   |
|  | Large Hotel   |



Farthest (max)

Closest

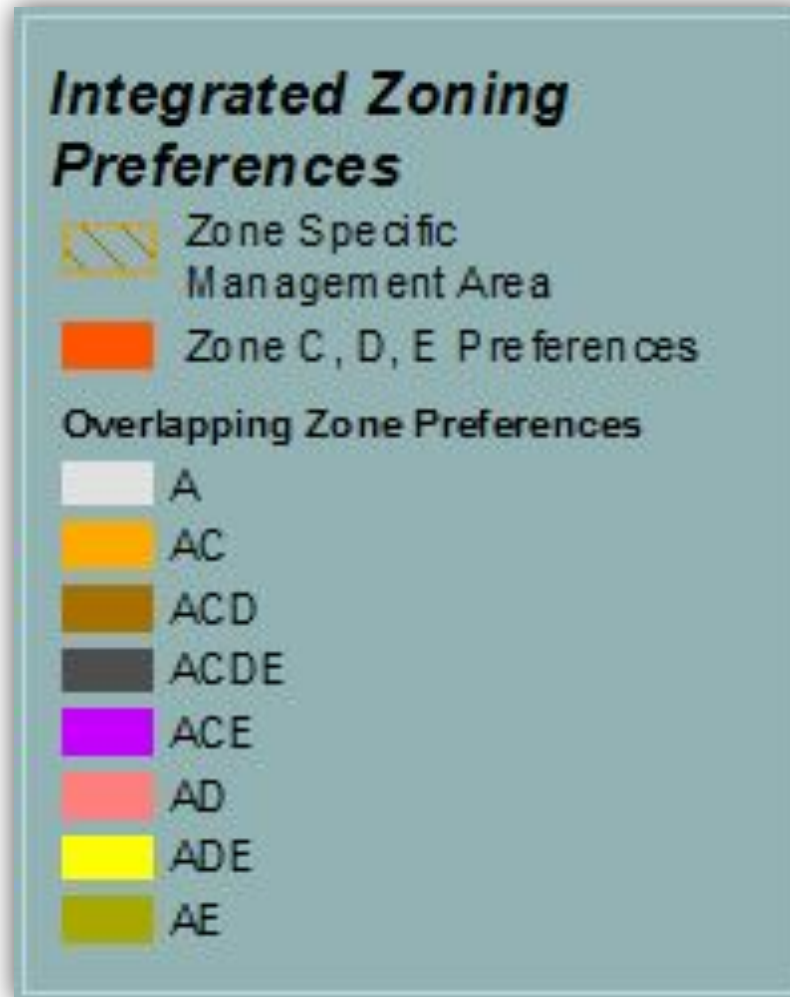
Distance from:

Beaches (1km max)

Hotels (1km max)

Areas of Outstanding Natural Beauty (5km max)

# Legend



# Compatibility Matrix

version 4.0 Date: 8 Jan 2015  
 This draft has not been approved by the Seychelles MSP Initiative.  
 New cell numbers - January 2015

ID	Zones and Suggested Names	Targeted Uses in each zone (f = future) (* = added use, Nov/Dec)	A	B	C	D	F	E	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	
			Artisanal	Industrial tuna	Mariculture	Semi-industrial	Fisheries Replenishment	Biodiversity	Strict Nature Reserve (IUCN Ia)	Ecological Reserve (IUCN IV)	National Park (IUCN II)	Protected Landscape/Seascape (IUCN V)	Sustainable Use Area (IUCN VI)	Disposal-at-sea Sites	Ferries	Ports, Harbours, Marinas	Reclamation	Renewable Energy: wind	Shipping: International	Minerals and Aggregates	Natural Gas Exploration	Shipping: Petroleum	Petroleum Exploration: seismic	Petroleum extraction	Recreation (motorised)	Recreation (non-motorised)	Seychelles Culture	Sport fishing	Tourism (motorised)	Tourism (non-motorised)	
1	A - Food Security & Fishing	Artisanal																													
2	A - Food Security & Fishing	Industrial tuna	1																												
3	A - Food Security & Fishing	Mariculture	2	28																											
4	A - Food Security & Fishing	Semi-industrial	3	29	54																										
5	A - Food Security & Fishing	Fisheries replenishment	4	30	55	79																									
6	B - Biodiversity	Biodiversity protection	5	31	56	80	103																								
7	B - Biodiversity	Strict Nature Reserve (IUCN Ia)	6	32	57	81	104																								
8	B - Biodiversity	Ecological Reserve (IUCN IV)	7	33	58	82	105																								
9	B - Biodiversity	National Park (IUCN II)	8	34	59	83	106																								
10	B - Biodiversity	Protected Landscape/Seascape (IUCN V)	9	35	60	84	107																								
11	B - Biodiversity	Sustainable Use Area (IUCN VI)	10	36	61	85	108																								
12	C - Industrial & Public Utility	Disposal-at-sea Sites	11	37	62	86	109	126	142	158	174	190	206	222	238	254	270	286	302	318	334	350	366	382	398	414	430	446	462	478	
13	C - Industrial & Public Utility	Ferries	12	38	63	87	110	127	144	161	178	195	212	228	245	262	279	296	312	329	346	363	380	397	414	431	448	465	482	499	516
14	C - Industrial & Public Utility	Ports, Harbours, Marinas	13	39	64	88	111	128	145	162	179	196	213	230	247	264	281	298	315	332	349	366	383	400	417	434	451	468	485	502	519
15	C - Industrial & Public Utility	Reclamation	14	40	65	89	112	129	146	163	180	197	214	231	248	265	282	299	316	333	350	367	384	401	418	435	452	469	486	503	520
16	C - Industrial & Public Utility	Renewable Energy: wind (f)	15	41	66	90	113	130	147	164	181	198	215	231	246	260	273														
17	C - Industrial & Public Utility	Shipping: International	16	42	67	91	114	131	148	165	182	199	216	232	247	261	274	286													
18	D - Non-renewable Resources	Mining: Minerals and Aggregates (f)	17	43	68	92	115	132	149	166	183	200	217	233	248	262	275	287	298												
19	D - Non-renewable Resources	Natural Gas Development (f)	18	44	69	93	116	133	150	167	184	201	218	234	249	263	276	288	299	309											
20	D - Non-renewable Resources	Shipping: Petroleum (f)	19	45	70	94	117	134	151	168	185	202	219	235	250	264	277	289	300	310	319										
21	D - Non-renewable Resources	Petroleum Exploration: seismic*	20	46	71	95	118	135	152	169	186	203	220	236	251	265	278	290	301	311	320	328									
22	D - Non-renewable Resources	Petroleum Development (f)	21	47	72	96	119	136	153	170	187	204	221	237	252	266	279	291	302	312	321	329	336								
23	E - Tourism & Recreation	Recreation (motorised)	22	48	73	97	120	137	154	171	188	205	222	238	253	267	280	292	303	313	322	330	337	343							
24	E - Tourism & Recreation	Recreation (non-motorised)*	23	49	74	98	121	138	155	172	189	206	223	239	254	268	281	293	304	314	323	331	338	344	349						
25	E - Tourism & Recreation	Seychelles Culture	24	50	75	99	122	139	156	173	190	207	224	240	255	269	282	294	305	315	324	332	339	345	350	354					
26	E - Tourism & Recreation	Sport fishing	25	51	76	100	123	140	157	174	191	208	225	241	256	270	283	295	306	316	325	333	340	346	351	355	358				
27	E - Tourism & Recreation	Tourism (motorised)	26	52	77	101	124	141	158	175	192	209	226	242	257	271	284	296	307	317	326	334	341	347	352	356	359	361			
28	E - Tourism & Recreation	Tourism (non-motorised)*	27	53	78	102	125	142	159	176	193	210	227	243	258	272	285	297	308	318	327	335	342	348	353	357	360	362	363		

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# SC Discussion

- What are suggestions to improve the preliminary design and zone boundary locations?
- What are the additional layers or uses we can consider?
- What data layers would you not recommend we use to inform a zone boundary?

# Next Steps

- Incorporate SC 3 advice
- Incorporate UNDP – GEF Protected Area Marxan outputs and advice
- QA/QC for all spatial data in the GIS product
- Examine compatibilities or conflicts
- Develop ‘Decision Tree’ to propose priority objectives.

# Developing Map 1.0

- Goal is for non-overlapping zones
- TNC will prepare design options with pros and cons
- Evaluate possible trade-off analysis
- Management considerations drafted
- Recommended Uses for each Zone location

# Thank you



Photo: Joanna Smith