

Solomons ESRAM

PEBACC Client-Consultants Meeting

Brisbane – November 2016



(Dr Beth Toki - beth.toki@bmtwbm.com.au)

Overview

- BMT WBM team
- Broad approach & methodology
- Work to date
- Key EbA issues at project sites
- Highlights & challenges
- Process issues emerging
- Next steps



Who is BMT WBM?

BMT:

'A leading international design, engineering, science and risk management consultancy with a reputation for excellence'



Locations

Australia	Hong Kong	Malaysia	UK
Belgium	India	Netherlands	United Arab
Brazil	Indonesia	Singapore	Emirates
Canada	Kazakhstan	Switzerland	USA

BMT ARGOSS	BMT JFA Consultants
BMT Asia Pacific	BMT NavCon
BMT Cadence	BMT Nigel Gee
BMT Consultants India	BMT Oceanica
BMT Cordah	BMT Reliability Consultants
BMT Defence Services	BMT Scientific Marine Services
BMT Design & Technology	BMT Ship & Coastal Dynamics
BMT Designers & Planners	BMT SMART
BMT Fleet Technology	BMT Surveys
BMT Fluid Mechanics	BMT WBM
BMT Group Ltd	Verweij & Hoebee
BMT Hi-Q Sigma	

BMT WBM:

'A a leading edge consultancy in mechanical, maritime, water, environmental engineering and science'

Water and Environment

BMT WBM has expert knowledge of all aspects of environmental consulting and are committed to using their skills and experience to the benefit of clients, communities and the environment.



BMT WBM specialises in:

- Environmental Assessment and Management
- Flood Modelling and Management
- Coastal Modelling and Management
- Urban Water Management
- Catchment and Receiving Waters
- Climate Change Impacts and Planning
- Specialist Field Investigations and Data Collection
- Information, Spatial and Data Solutions
- Expert Witness Legal Services

Consultant Team



(key personnel)



A I T H E R



Local consultants



BMT WBM

Project Management, ecosystems, ecosystem services, climate change, GIS & mapping

UQ

SI Expertise, Ecology and climate change
Dr Simon Albert, Patrick Pikacha (UQ/ESSI)

Aither

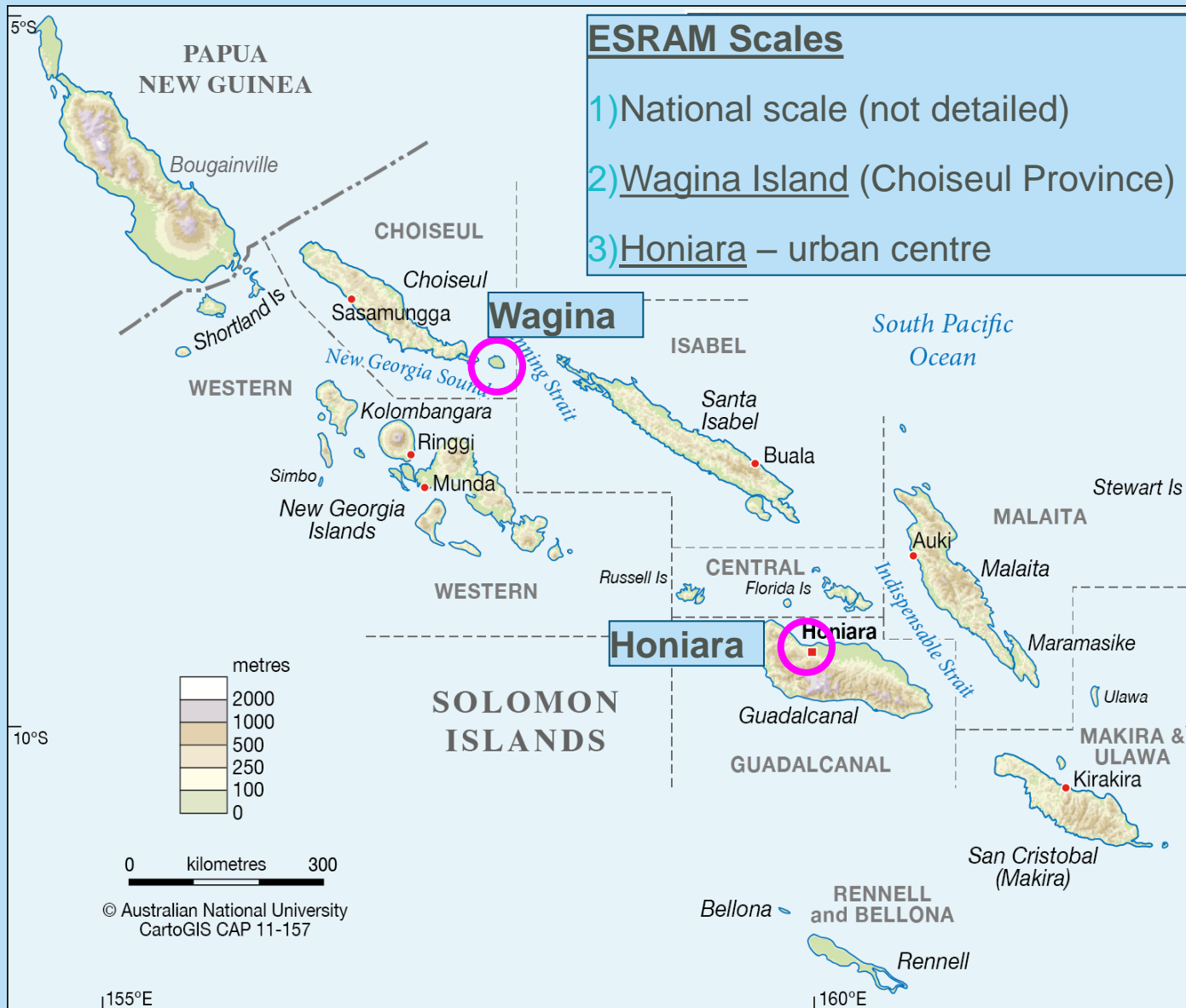
Economics
Rod Coulton, Joseph Lorima

Key Local Advisers

David Boseto (ESSI) – Ecology & ecosystems
Dr Tammy Tabe – Wagina Is. (Socio-cultural, socio-economic, ecosystem services and marine ecosystems)
Donald Kudu – Stakeholder consultation, planning, settlements, governance

Approach & Methodology

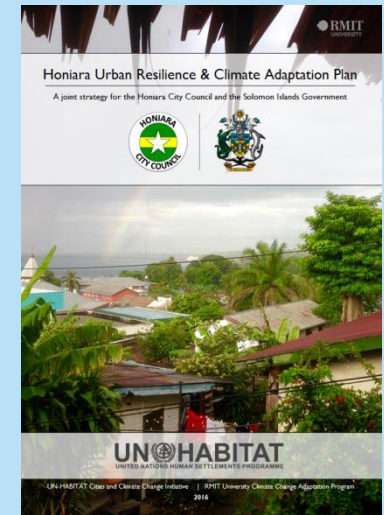
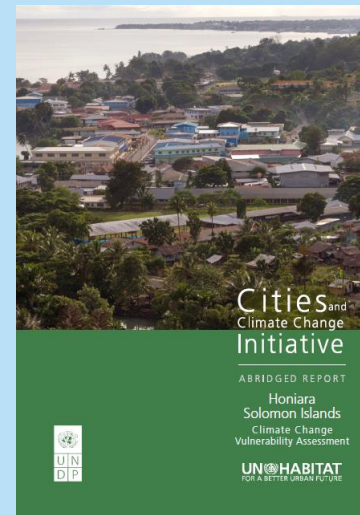
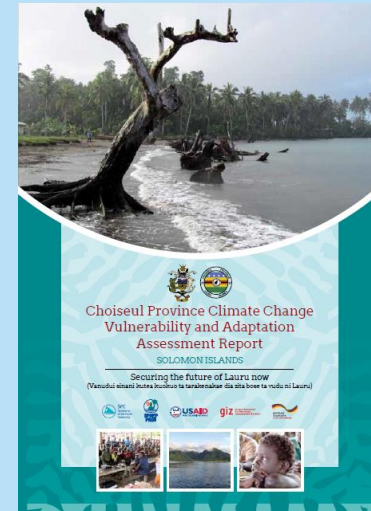




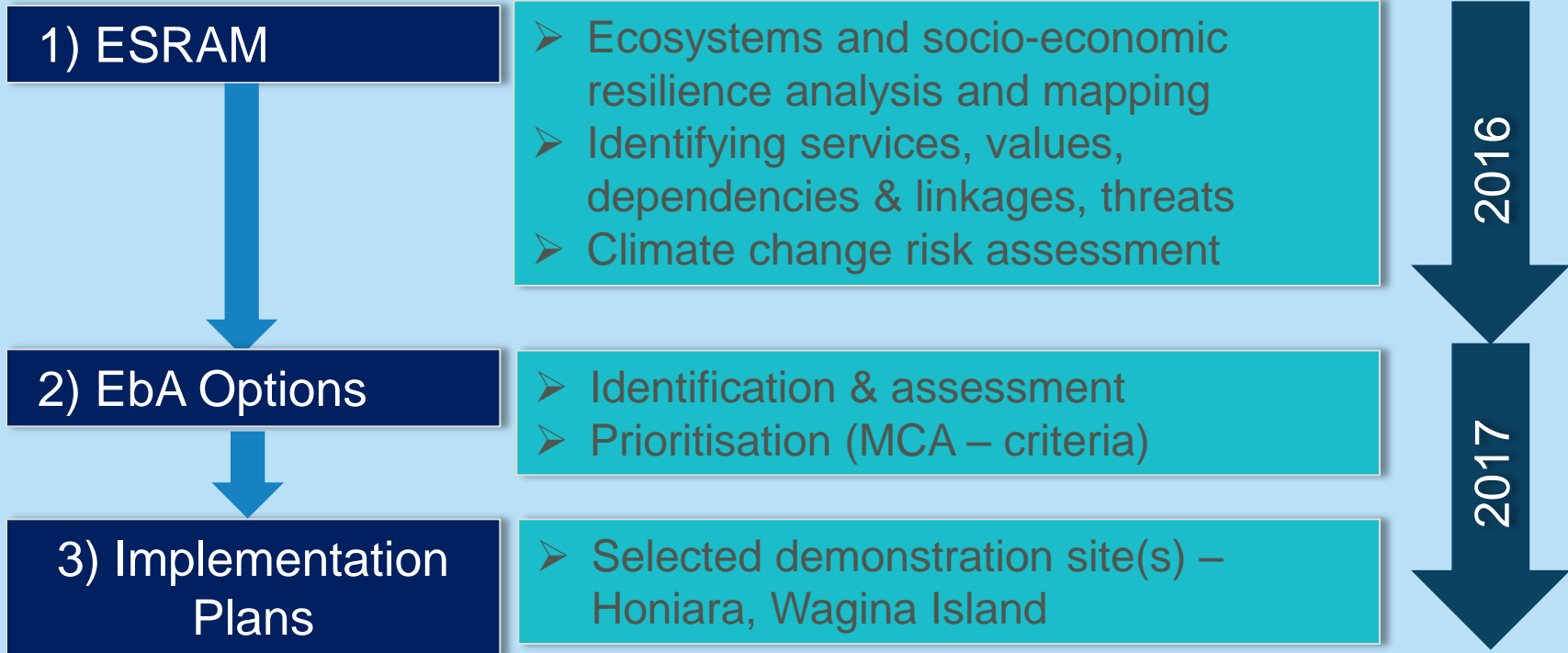
Project Sites & EbA

Building on existing EbA recommendations and initiatives:

- Choiseul Province Vulnerability and Adaptation Assessment 2013
- Choiseul - Existing EbA Implementation (SPREP / USAID)
- Honiara Vulnerability Assessment 2014
- Honiara Urban Adaptation Plan 2016



Project Steps



In-country Components

Scale	ESRAM	EbA Options
National	<p><u>Consultation:</u> Workshop with key stakeholder representatives, primarily national government, to identify key ecosystems, services and threats at a broad national scale, ongoing liaison with key stakeholders</p> <p><u>Field component:</u> nil</p>	Detailed consultation/field work not planned
Honiara	<p><u>Consultation:</u> Workshop with key stakeholder representatives (e.g. national government, community and key local project representatives) to identify ecosystem services and ecosystem threats, interactive mapping activities, ongoing liaison with key stakeholders.</p> <p><u>Field component:</u> Site inspection of communities along Mataniko River, Vura district, White River, Independence Valley and Win Valley, waterfront areas, and other points of interest.</p>	<p><u>Consultation:</u> Workshop to refine EbA options identification and prioritisation with key stakeholder representatives (e.g. national government, community and key local project representatives); identify preferred demonstration sites</p> <p><u>Field component:</u> Inspect selected number of potential EbA demonstration sites, incorporating basic community consultation at most likely demonstration sites.</p>
Wagina Island	<p><u>Consultation:</u> Workshops with each of the four communities to identify ecosystem services and ecosystem threats, interactive mapping activities</p> <p><u>Field component:</u> Most detailed field component (next slide).</p>	<p><u>Consultation:</u> Refine EbA options identification and prioritisation with communities on Wagina Island; identify preferred demonstration sites</p> <p><u>Field component:</u> Inspect selected number of potential EbA demonstration sites</p>

National - Workshop Objectives

- Inputs and advice from representative key stakeholders
- Identify focus - key ecosystem services: what are they and where most important?
- Identify threats
- Identify available information



ESRAM In-country - Honiara

- Workshop with representative key stakeholders
- Site inspections at communities and key points of interest
- Informal community level discussions (opportunistic)



Honiara - Workshop Objectives

- Inputs and advice from representative key stakeholders
- Refine ESRAM extent?
- Three activities:
 1. Identify values & supporting ecosystem services
 2. Mapping – indicative spatial maps
 3. Identify linkages & threats



ESRAM In-country - Wagina

- Detailed community level consultation
- Site inspections and guided tours each village
- Field surveys to map critical locations and qualitatively assess ecosystem condition, particularly at high use areas
- Mapping and water quality (EC/pH) at village wells and other key water sources



Phase 1 (2016)– ESRAM

a) ESRAM – Inventory & Mapping



- Identify ecosystem services
- Ecosystem dependencies & linkages
- Existing threats

Mapping:

- Existing GIS
- Stakeholder/ community mapping outputs
- Remote sensing

b) Ecosystem Services Valuation

c) Climate Change Risk Assessment

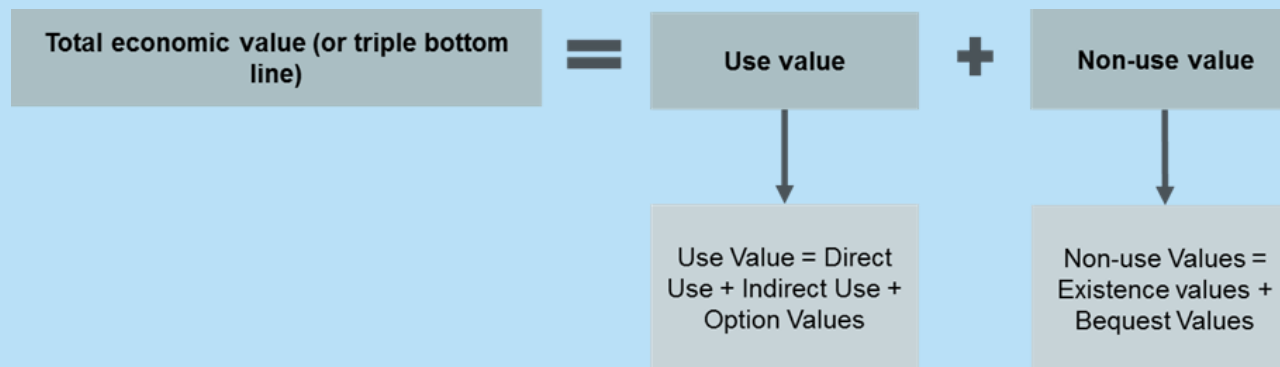
- Climate change impacts – allocation of risks for each service



Phase 1 (2016)– ESRAM

b) Valuing Ecosystem Services

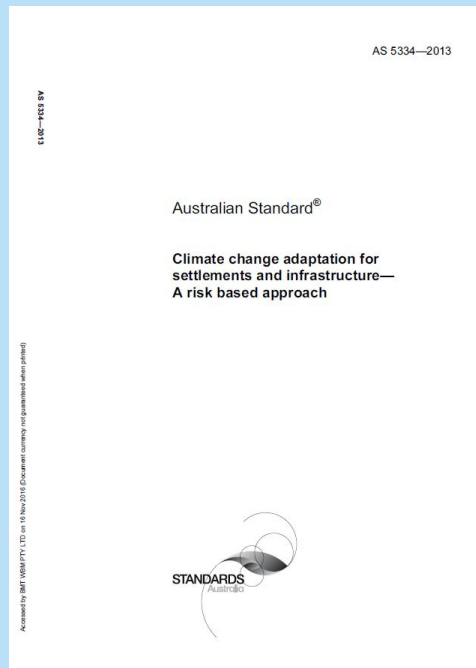
- **Total Economic Value:** full economic value, difficult to execute for services not traded on market (no market value) or with limited data
- **Benefit Transfer:** next best option, utilised the Environmental Valuation References Inventory (EVRI) which is a recognised inventory for benefit transfer
- de Groot et al 2012 Global estimates of the value of ecosystems and their services in monetary units



Phase 1 (2016)– ESRAM

b) Climate Change Assessment

- Risk based approach
- Established frameworks as a guide



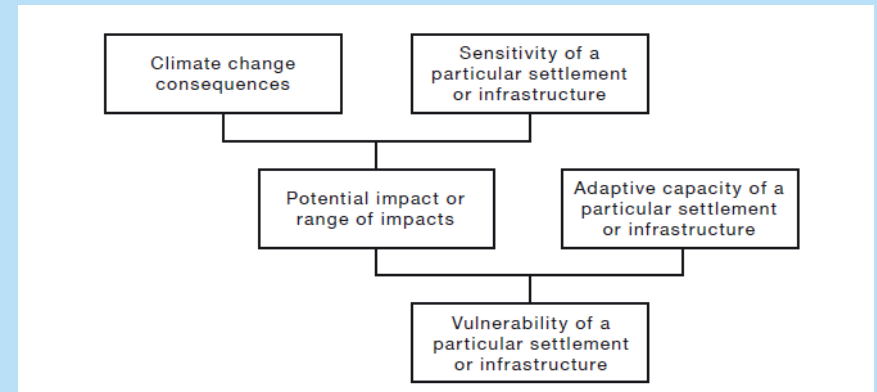
- AS/NZS ISO 31000:2009 ‘Risk Management Principles and Guidelines’
- Australian Standard AS 5334—2013: ‘Climate Change Adaptation for Settlements and Infrastructure – a risk based approach’



Phase 1 (2016)– ESRAM

b) Climate Change Assessment

- Select future climate scenarios, projections and parameters
- Identify hazards
- Define climate variables and select data
- Risk identification
- Risk analysis and Vulnerability Assessment
- Spatial indication of high risk services / locations



	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	medium	medium	high	extreme	extreme
Likely	low	medium	high	high	extreme
Possible	low	medium	medium	high	high
Unlikely	low	low	medium	medium	medium
Rare	low	low	low	low	medium

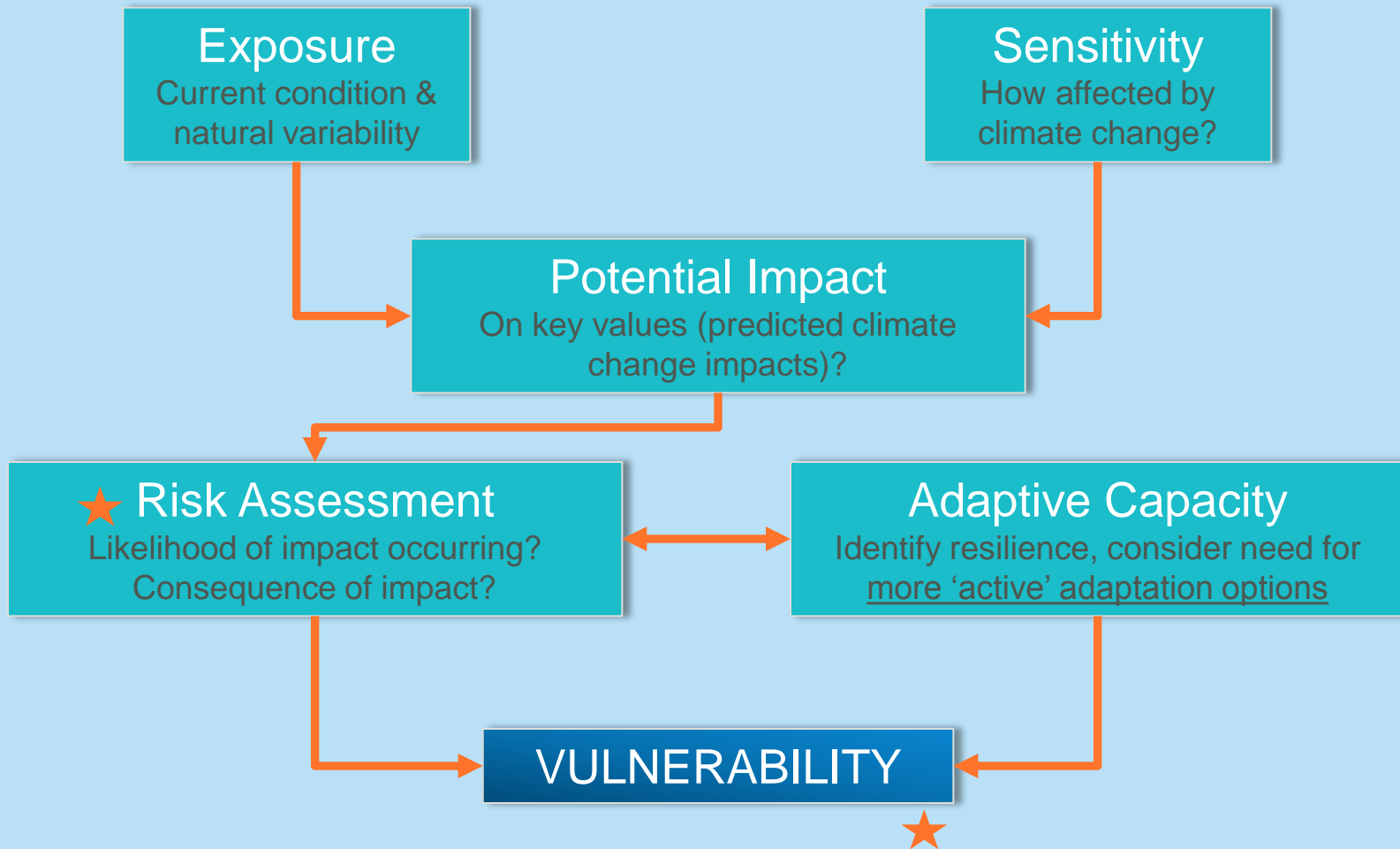
Phase 1 (2016)– ESRAM

b) Climate Change Assessment

➤ Identification of key hazards (Honiara, Wagina)

Honiara	Wagina
<ul style="list-style-type: none">• Hot days• Landslides• Flooding / drought• Tides/storm surge (which increase with SLR)• Cyclones	<ul style="list-style-type: none">• Tides/storm surge causing inundation and saltwater intrusion (which increase with SLR)• Drought / decreased rainfall• Flooding / increased rainfall• Coastal erosion (exacerbation of coastal processes)• Hot days• (ocean acidification)

Vulnerability Assessment Framework



Phase 2 (2017)– Options Assessment

'Multi-criteria analysis':

- Tool for considering multiple aspects/criteria
- Transparent record of decision making
- Criteria e.g. :

- | | |
|--------------------------|---------------------|
| ➤ Land tenure | ➤ Cost |
| ➤ Feasibility | ➤ Added benefits |
| ➤ Effectiveness | ➤ Risk |
| ➤ Logistical constraints | ➤ Existing programs |



Cost-benefit?

• Consider “do nothing” vs “adaptation”

• Long term benefit > cost!

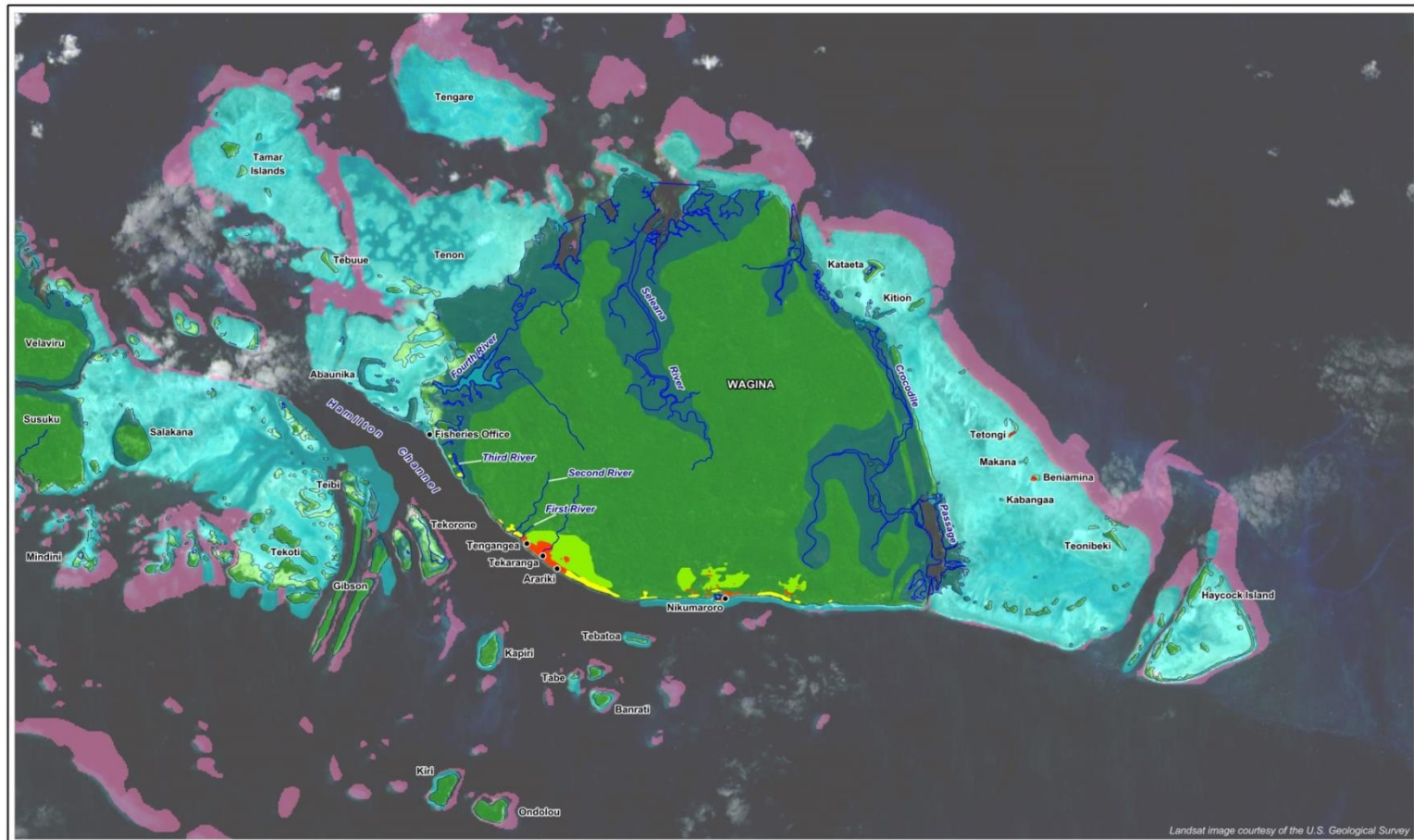
Progress to Date



Schedule & Progress

Tasks/Milestones	Jul'16	Aug'16	Sep'16	Oct'16	Nov'16	Dec'16	Jan'17	Feb'17	Mar'17	Apr'17	May'17	Jun'17
Task 1: Project Initiation	█											
Task 2: Information Collation and Review	█	█										
Deliverable 1: Project Inception Report		█										
Task 3: Establish Criteria for Defining Key Environmental and Social Values and Initial Scope/Methods Statement (Project Inception Report)		█										
Task 4: Draft Environmental Values, Sensitivity and Threats			█	█								
Task 5: In country Consultation and Field Work		ESRAMs							EbA Options			
Task 6: Ecosystem Economic Valuations			█	█								
Task 7: EbA Options Identification and Assessment							█	█	█			
Task 8: Development of Implementation Plans for demonstration sites										█	█	
Deliverables 2-5: ESRAM Report, ESRAM Synthesis Report, EbA Options Assessment and Implementation Plans					Draft ESRAMs		Final ESRAMs			EbA Options		Implement. Plans
Task 9: Final project presentation / training												█
Deliverables 6-7: Data Dictionary and Capacity Building Report												█
Project Management	█	█	█	█	█	█	█	█	█	█	█	█

Example Outputs (Wagina Is.)



Landsat image courtesy of the U.S. Geological Survey

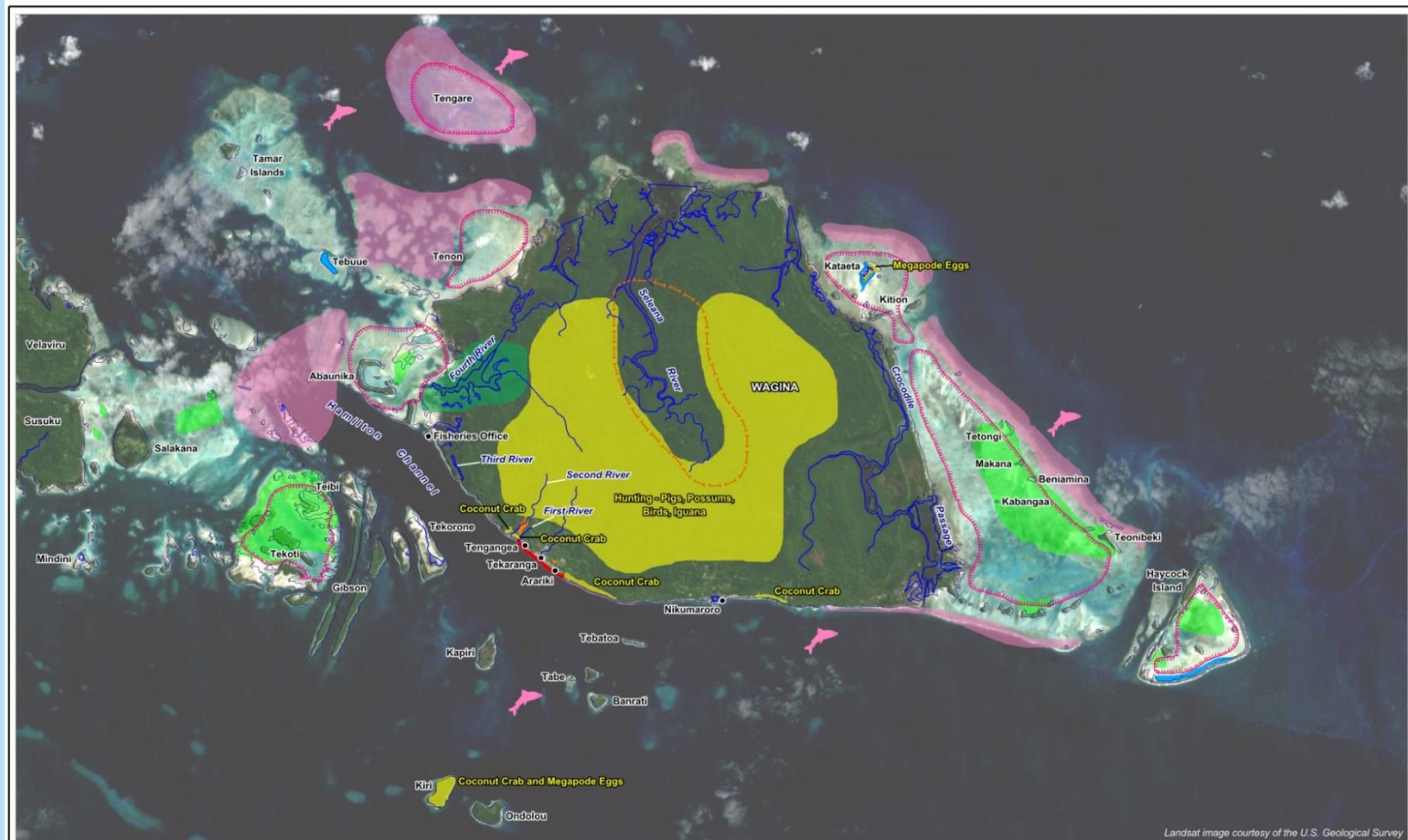
	<p>LEGEND</p> <ul style="list-style-type: none"> Built Settlement Terrestrial - Cultivated (Plantation) Terrestrial - Cultivated (Gardens) Terrestrial - Forest Mangroves Coral Reefs Marine Lagoons Rivers and Estuaries Coastline <p><i>Note: Remaining area not mapped is Open Marine.</i></p>	<p>Title: Broad Ecosystem</p> <p>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</p> <div style="text-align: right;"> </div> <p>Filepath : I:\B22031_GMI_Solomons_ESRAM_BTDRG\ECO_002_161103_Wagina Island Broad Ecosystem WOR</p>	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Figure ??-??</td> <td style="width: 50%;">Rev. A</td> </tr> <tr> <td colspan="2" style="text-align: center;"> <p>BMT WBM www.bmtwbm.com.au</p> </td> </tr> </table>	Figure ??-??	Rev. A	<p>BMT WBM www.bmtwbm.com.au</p>	
Figure ??-??	Rev. A						
<p>BMT WBM www.bmtwbm.com.au</p>							

Summary of Key Ecosystem Services

Community-derived key ecosystems & ecosystem services

Key Ecosystems	Food (land)	Food (sea, river)	Water (drinking)	Water (other)	Building materials	Timber (fuel)	Timber (other)	Mats and other materials	Toilet/sanitation	Transport service	Waste disposal	Industry (seaweed)	Industry (other) / commercial	Medicine	Recreation
Terrestrial forest	✓				✓	✓	✓		✓				✓		
Lowland swamps	✓				✓										
Gardens	✓												✓		
Beaches and sand islands	✓				✓					✓					
Other substrates					✓										
Rivers, streams and freshwater springs	✓	✓	✓	✓	✓	✓			✓	✓	✓				
Mangroves		✓			✓	✓	✓					✓			
Marine lagoons		✓										✓	✓		
Groundwater			✓	✓											
Reefs		✓			✓								✓		
Marine (other)		✓											✓	✓	
Terrestrial (Pandanus)	✓				✓			✓						✓	
Terrestrial Plantations	✓				✓			✓					✓		
Terrestrial (other)	✓				✓					✓				✓	✓
Seashore									✓	✓	✓				✓
Other (rainfall)			✓												

Spatial Representation



Landsat image courtesy of the U.S. Geological Survey



LEGEND	
	Side Sea Sanitation and Pig Pens
	Land Food Source - Non-Domesticated Animals
	Lowland Swamp - Cultivated
	Timber - Canoe Trees
	Timber (Mangrove) and Mangrove Shells
	Rivers and Estuaries
	Coastline
	Turtle Nesting
	Seaweed Farming
	Fishing - Net
	Fishing - Reef (Line and Diving)
	Fishing - Open Water (Shark and Pelagics)

<p>Title: Ecosystem Services</p> <p>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</p> <p>Filepath : I:\B22031_GML_Solomons_ESRAM_BTDRG\ECO_003_161115_Wagina Island Ecosystem Services.WOR</p>		<p>Figure ??-??</p>	<p>Rev: A</p>
<p>N</p> <p>0km 2 4 Approx. Scale</p>			

Additional Ecosystem Services

Service category	Service
Provisioning services	Food
	Water
	Raw materials
	Genetic resources
	Medicinal resources
	Ornamental resources
	Supporting industry
Regulating services	Air quality regulation
	Climate regulation
	Disturbance moderation
	Regulation of water flows
	Waste treatment
	Erosion prevention
	Nutrient cycling
	Pollination
Biological control	
Habitat services	Biodiversity
	Nursery service
	Habitat connectivity
Cultural services	Aesthetic information
	Education
	Recreation
	Inspiration
	Spiritual experience
	Cognitive development

Service Valuation – Mangrove Example

Local Values

Ecosystem good	Estimate value SBD2008\$	Standardised \$ values	Source	Method	Additional information
Firewood	\$2275 – 4550 per household p.a.	SI\$ or US\$ 2016	Warren Rhodes et al (2011)	Based on a range of market prices and the cost of purchasing the same amount of goods.	This value constitutes 38%-76% of the average annual cash income.
Building materials	SBD2008 \$110 per household p.a.	SI\$ or US\$ 2016	Warren Rhodes et al (2011)	Based on a range of market prices and the cost of purchasing the same amount of goods.	
Fishing in mangroves	\$4012 per household p.a.	SI\$ or US\$ 2016	Warren Rhodes et al (2011)	Based on a range of market prices and the cost of purchasing the same amount of goods.	Includes total for fish traded and consumed.

Global Values

Service category	Service	Int.\$/ha/year, 2007	Standardised \$ values
Provisioning services	Water	\$1,217.00	SI\$ or US\$ 2016
	Genetic resources	\$10.00	SI\$ or US\$ 2016
	Medicinal resources	\$301.00	SI\$ or US\$ 2016
Regulating services	Climate regulation	\$65.00	SI\$ or US\$ 2016
	Disturbance moderation	\$5,351.00	SI\$ or US\$ 2016
	Waste treatment	\$162,125.00	SI\$ or US\$ 2016
	Erosion prevention	\$3,929.00	SI\$ or US\$ 2016
	Nutrient cycling	\$45.00	SI\$ or US\$ 2016
Habitat services	Nursery service	\$10,648.00	SI\$ or US\$ 2016
	Genetic diversity	\$6,490.00	SI\$ or US\$ 2016
Cultural services	Recreation	\$2,193.00	SI\$ or US\$ 2016
Total	-	\$192,374	SI\$ or US\$ 2016

Key EbA Issues at Project Sites



Wagina Island

Water Supply (esp. drinking water)

- Limited rainwater tanks, rely on springs + wells
- Wells in narrow coastal strip – saline intrusion
- Catchment degradation

Waste Management & Sanitation

- Interactions with water supply
- Habitat degradation



Wagina Island

Pressures on forests (esp. mangroves)

- Require sustainable management of timber resources - for building material, seaweed tables, firewood (plus external harvesting of canoe trees)

Adaptation of garden crops / agricultural practices

- i.e. to changes in water supply, temperatures, extreme climate events



Wagina Island

Overharvesting of marine resources)

- esp. sharks, turtles, fish (?)
- (compounded by mining proposal?)

Sea level rise

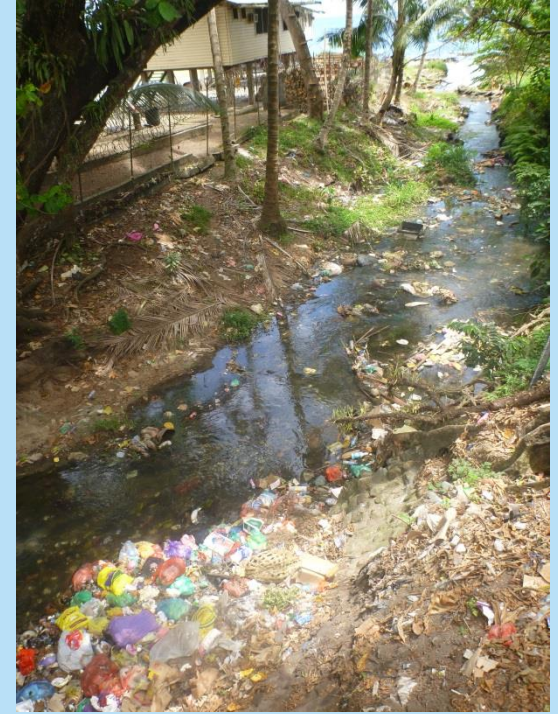
- Coastal inundation / storm surge
- Localised shoreline erosion (limited sandy shores)



Honiara

Waste Management

- Excellent landfill facility
- Human health risks
- Degradation and contamination of aquatic and marine habitats and biota
- Plastic



Honiara

Water Supply

- (for communities with poor or no access to utilities)
- Interactions with waste management - human health risks (drinking, cooking, fishing, recreation)
- Drought risks



Honiara

Erosion

- Landslides and gully erosion where informal settlements established
- Riparian erosion – bank destabilisation
- Coastal (around settlements)
- Inadequate or problematic protection measures



Highlights and Challenges



Highlights

- People – ground-level community interactions and field collaborations
- Value-add benefits of ESRAM project to communities
- Proving how much can be achieved with limited time on the ground (i.e. relying on years of local knowledge, rather than ‘spot’ surveys)



Challenges

- Data & information: balancing quality vs quantity
- Valuing ecosystem services with limited data, and not all ecosystem services can be valued
- Complexity of considering ecosystem services in climate change risk assessment
- Managing time allocation for Phase 1 (i.e. baseline inventory + ecosystem valuations + climate change assessment)

Process Issues Emerging



Process Recommendations

- **Data & information:-** suggest SPREP have a 'data and information package' ready to transfer to future consultants on commencement
- **Data & Information:-** pre-arranged access agreement with key GIS data sources (e.g. national governments)
- **Time schedule (Milestones):-** suggest greater proportion of timeframe allocated to ESRAM component (as opposed to Options Assessment & Implementation Plan)

Next Steps



Solomons next steps ...

2016:

- **Completion of ESRAM reports!** (... economic valuations and climate change risk assessments, in particular, still underway)

2017:

- Options Assessment, including consultations
- Implementation Plan