



Arafura and Timor Seas Ecosystem Action



# GUIDE FOR FACILITATORS & DECISION-MAKERS

Incorporating regional climate change results into local action planning

This report is prepared by C2O Pacific for The Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project

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# GUIDE FOR FACILITATORS & DECISION-MAKERS: APPLYING REGIONAL CLIMATE CHANGE RESULTS TO LOCAL ACTION PLANNING

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## SECTION 1: ABOUT THIS GUIDE

The Arafura and Timor Seas (ATS) region is shared by Indonesia, Timor-Leste, Australia and Papua New Guinea. The ATS region is within two Large Marine Ecosystems; the Indonesian Sea and the North Australian Shelf, and is situated at the convergence of the Pacific and Indian Oceans. The ATS region has high biodiversity but is also under pressure due to unsustainable fisheries, habitat degradation, marine and land-based pollution, loss of biodiversity and increasing human populations. Climate change is expected to exacerbate these impacts and have profound effects on the status and distribution of coastal and marine habitats, the species they support and, as a result, the communities and industries that depend on them for food and livelihoods.



*The Arafura and Timor Seas region shared by Indonesia, Timor-Leste, PNG, Australia (Source: ATSEA)*

This Guide for Facilitators and Decision-Makers was developed as part of Phase 2 of the Arafura and Timor Seas Ecosystem Action program (ATSEA-2). It supplements the regional climate change vulnerability assessment that focused on marine and coastal ecosystems in the ATS region (Johnson et al. 2021). The assessment results provide details on the vulnerability of marine and coastal habitats, species of conservation interest and marine species important for fisheries in the region. This Guide provides tools for understanding climate vulnerability at a local scale and helps managers and communities to prepare for and respond to climate-driven impacts and identify effective and targeted adaptation measures.

### 1.1 OBJECTIVES OF THE GUIDE

This Guide includes a summary of the main regional climate change vulnerability assessment results for the ATS region. The Guide provides decision-support tools and processes for practitioners and NGOs, using a series of steps, to work with communities to incorporate climate change into local planning, thereby facilitating targeted and appropriate adaptation actions for implementation at the community level.



## 1.2 WHO CAN USE THE GUIDE?

This Guide is designed to be used by facilitators to support and empower communities that are dependent on their coastal and marine resources to incorporate regional climate change information into local assessments and adaptation planning. It has been developed for use by community groups, NGOs and practitioners who are involved in conservation and management efforts, policy development, planning and other processes that seek to sustainably manage coastal and marine resources, minimise climate impacts and maximise community wellbeing.



*Community market place selling crops and fish products that are essential for food, income and wellbeing in many rural communities (Photo by: Rizqan Adhima)*

## 1.3 HOW TO USE THE GUIDE

The Guide is divided into discrete sections that provide different interconnecting guidance and knowledge for users, in developing and implementing local plans that effectively address climate and related threats. Users should utilise each of the different sections to achieve plans that are appropriate to the local context, working closely with the communities they are intended for. The Guide has five main parts; the first three sections provide the necessary background knowledge that informs the use of this Guide and the development of action plans, while the final two sections guide the user in the development and implementation of the plan.

More specifically: **Section 1** provides background information for the Guide. **Section 2** provides the key climate projections for the ATS region. **Section 3** summarises the key findings of the regional vulnerability assessment by species, habitats and identified hotspots, and provides an overview of the main implications of these for food security and livelihoods. **Section 4** provides a series of steps to link climate change vulnerability and local threats to identify adaptation actions that address the main drivers of vulnerability, to develop a Community Action Plan. Finally, **Section 5** provides an overview of the main elements of successful implementation of the Community Action Plan including awareness and education, enforcement, monitoring and review.



Focus group discussions in Oeseli village, Rote Ndao, Indonesia

PHOTO BY KERTABUMI



Coastal resources in the ATS region are important for communities and are vulnerable to climate change

PHOTO BY IKBAL ALEXANDER, KERTABUMI

## SECTION 2: REGIONAL CLIMATE CHANGE PROJECTIONS

### 2.1 BACKGROUND

Global climate models (GCM) deliver climate change projections, however, their large spatial resolution (hundreds of km) mean GCM outputs are inadequate for sub-national or local assessments. Therefore, downscaling techniques are needed to provide more regional and local information. The latest downscaled climate model outputs for 2070 in the ATS region are available through different sources. Climate change is expressed as projections for specific key variables: rainfall and air temperature are available at 20 km resolution (BMKG Indonesia), sea surface temperature and ocean chemistry (pH) at 5 km resolution (NOAA), sea-level rise, El Nino Southern Oscillation (ENSO), winds and waves, storms and cyclones at a regional scale (CSIRO Australia), and for solar radiation at a global scale (IPCC).

Global climate models consider a range of possible futures, known as ‘emissions scenarios’, that are based on different futures of what society will do to curb greenhouse gas emissions (IPCC 2014). The climate change projections in this Guide are for moderate emissions scenario (RCP4.5) and high emissions (RCP8.5) scenarios. This high emissions scenario is often referred to as “business as usual”, suggesting that is the likely outcome if society does not make strong efforts to cut greenhouse gas emissions in the next decade.

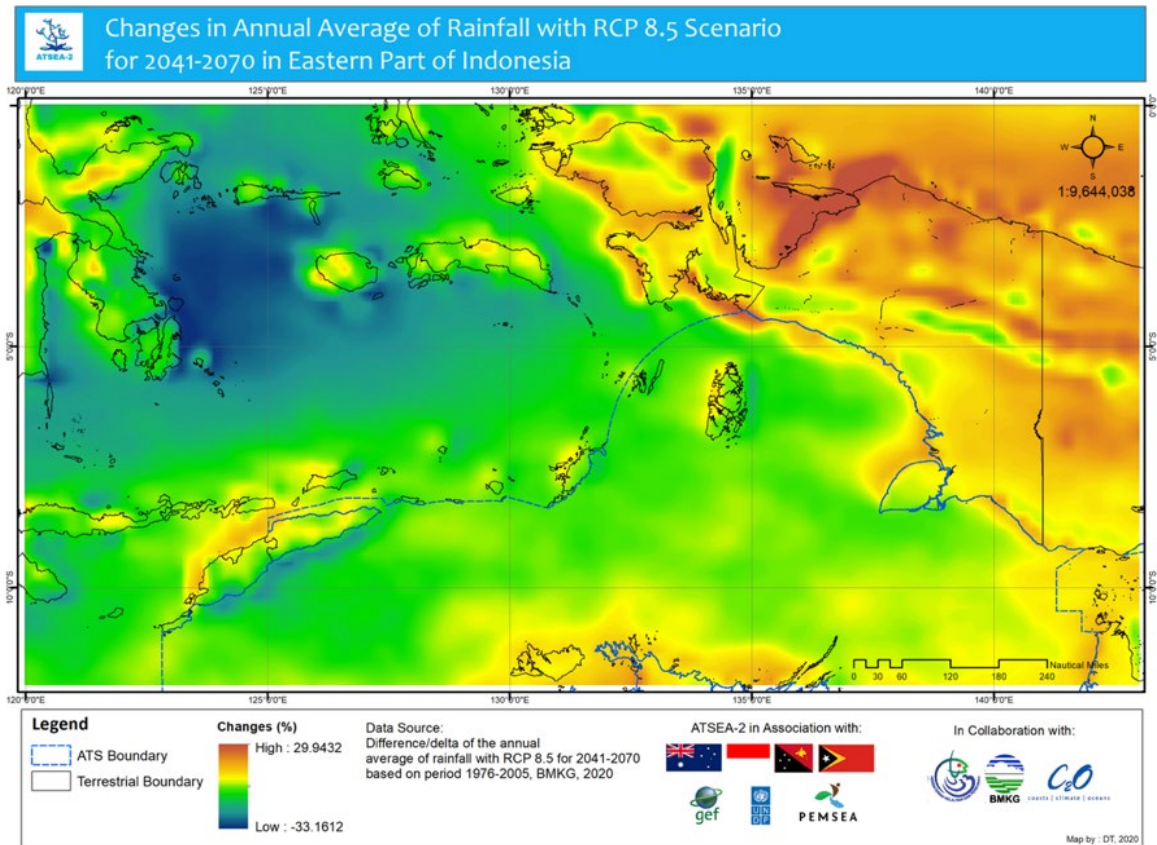
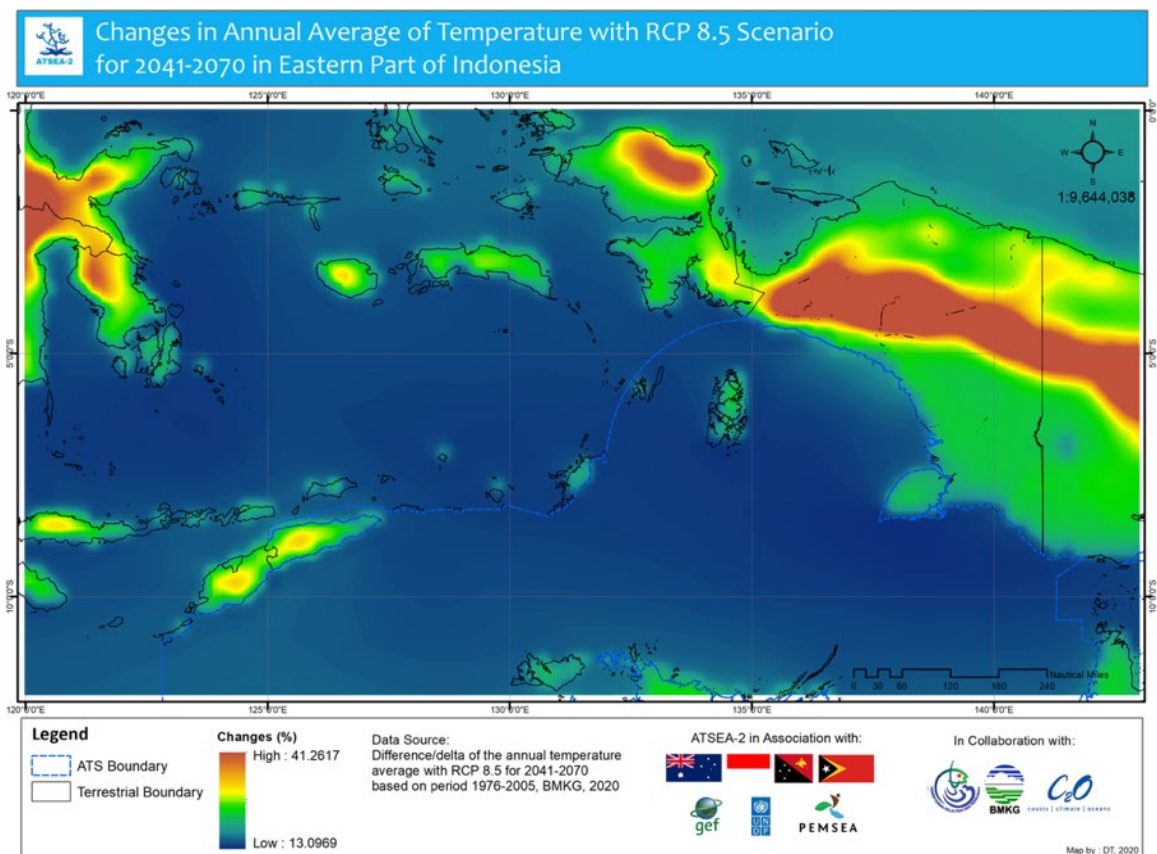
### 2.2 HOW TO INTERPRET THE CLIMATE CHANGE PROJECTIONS

The climate change projections for the ATS region are provided either as maps showing how a particular climate variable will change between the current period and 2070, or as a numerical range showing change into the future. The maps use colour to represent change, generally on a scale from a large change to a smaller change. For some variables, such as rainfall, the projected change ranges from negative (reduced rainfall) to positive (increased rainfall) and therefore the colours cover this full range of change. Each map caption explains what change the colours represent.

The maps are used to view the projected climate change that is expected to occur throughout the ATS region and inform local vulnerability assessments and adaptation planning.

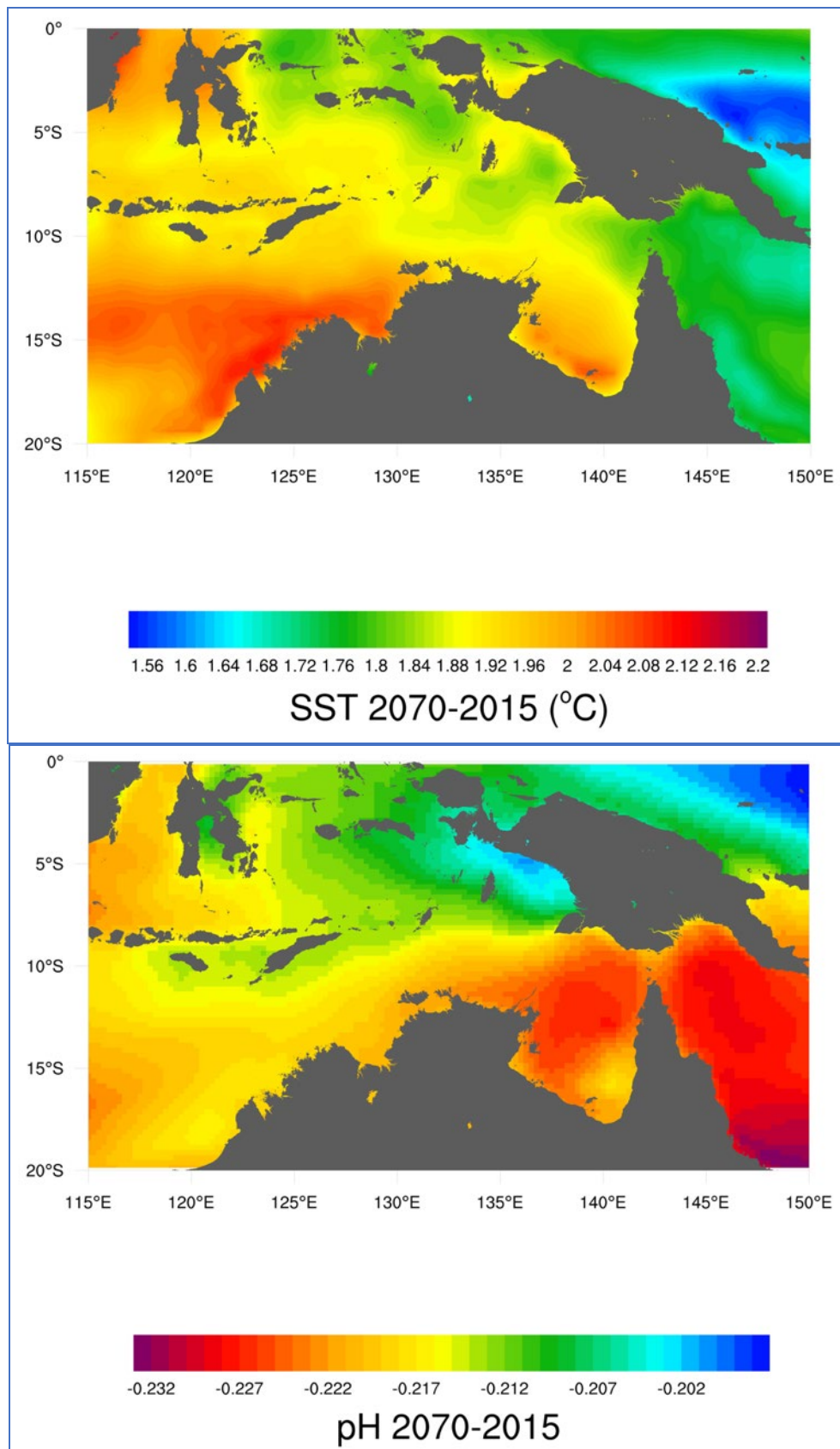


## 2.3 AIR TEMPERATURE AND RAINFALL





## 2.4 SEA SURFACE TEMPERATURE AND OCEAN CHEMISTRY (pH)



**ARAFURA AND TIMOR SEAS CLIMATE CHANGE PROJECTIONS BY SUB-REGION UNDER A HIGH EMISSIONS SCENARIO (RCP8.5 OR SSP5-8.5) TO 2070**

VARIABLE	ARAFURA SEA (INDONESIA)	TIMOR SEA	PNG (WESTERN PROVINCE)	NORTHWEST AUSTRALIA	GULF OF CARPENTARIA
<b>Air temperature</b>	+3.6 to +3.8 °C (land)	+3.6 to +3.8 °C (land)	+3.8 to +4 °C (land)	+2.7 to +4.9 °C (2090)	+2.7 to +4.9 °C (2090)
<b>Rainfall change</b>	+20 to +30% (coastal); 0 to –5% (open ocean)	–25 to –33% (coastal); 0 to –5% (open ocean)	+15 to +20%	–30 to +25%	–30 to +25%
<b>Sea surface temperature<sup>1</sup></b>	29.4 to 29.8 °C (+1.8 °C)	30.9 to 31.3 °C (+1.88 °C)	29.4 to 29.8 °C (+1.76 °C)	30.9 to 31.3 °C (+2.12 °C)	29.7 to 30.1 °C (+2.04 °C)
<b>Ocean chemistry (pH)</b>	–0.212 to –0.20	–0.217 to –0.212	–0.227 to –0.222	–0.222 to –0.217	–0.227 to –0.222
<b>Storms and cyclones<sup>2</sup></b>	+3 to +21% maximum intensity; –6 to –34% frequency				
<b>Sea level rise</b>	+0.5 to +0.6 m	+0.5 to +0.6 m	+0.4 m	+0.45 m	+0.4 m
<b>El Niño Southern Oscillation (ENSO)</b>	Continued source of inter-decadal variability in the region				
<b>Solar radiation</b>	–1.10%				
<b>Wind and waves<sup>3</sup></b>	Mean wave height –7%; wave energy flux –20%				

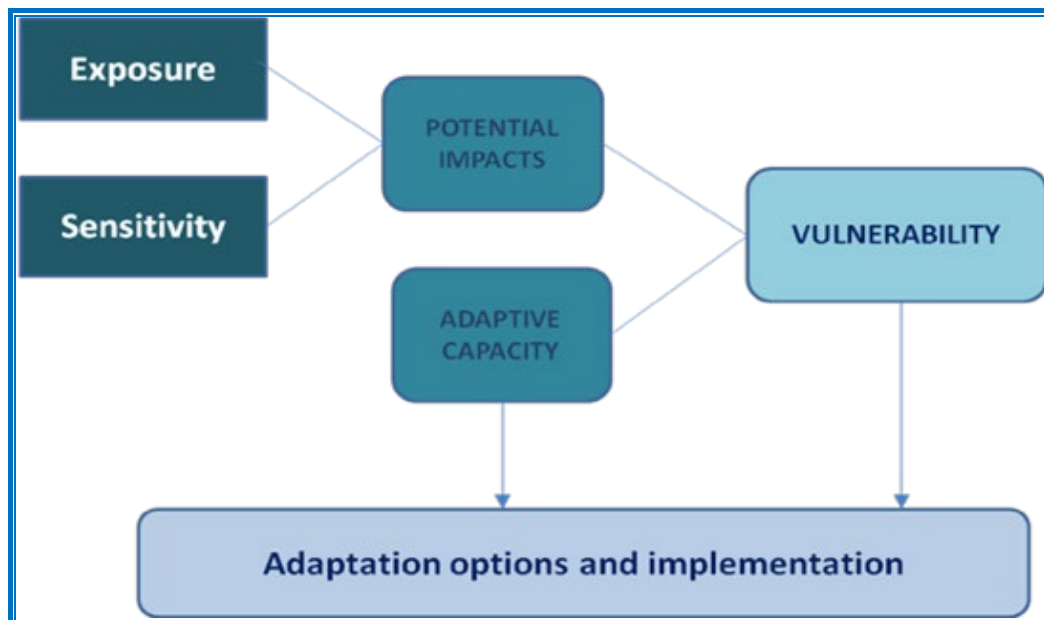
1 . Increase relative to 2015 baseline; 2. Global projections for 2100; 3. Regional projections for 2050

## SECTION 3: REGIONAL VULNERABILITY OF THE ARAFURA AND TIMOR SEAS

### 3.1 BACKGROUND

To prepare for and respond to climate change impacts it is necessary to understand the vulnerability (or risks) that climate change poses. For different elements of a system (e.g. species and habitats), vulnerability is driven by exposure to climate hazards, their sensitivity and adaptive capacity. Understanding the sources of vulnerability is particularly important so effective and targeted adaptation actions can be identified.

The Intergovernmental Panel on Climate Change (IPCC) has defined vulnerability as the propensity or predisposition [of a system] to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity [or susceptibility to harm] and lack of capacity to cope and adapt (IPCC 2014). The results of the regional climate change vulnerability assessment provide information on the drivers of climate change vulnerability (or risk) for the ATS region that considers exposure, sensitivity, and adaptive capacity.



*Framework for assessing vulnerability based on the combination of exposure, sensitivity and adaptive capacity (Source: adapted from Schroter et al. 2004)*

### 3.2 HOW REGIONAL VULNERABILITY WAS ASSESSED

The regional vulnerability assessment was conducted using a structured approach based on a widely-adopted framework that includes the elements of exposure, sensitivity and adaptive capacity proposed by the IPCC and United Nations Framework Convention on Climate Change (UNFCCC) (adapted from Schroter et al. 2004). In the IPCC framework, exposure to climate hazards combines with sensitivity to determine potential impacts, which are tempered by adaptive capacity to determine vulnerability to climate change. The ATS regional assessment used indicators for exposure, sensitivity and adaptive capacity based on standard operational

descriptions (see box), and criteria to conduct a comprehensive analysis of marine habitats and key species (see Johnson et al. 2021 for detailed methods).

OPERATIONAL DEFINITIONS FOR INDICATORS OF EXPOSURE, SENSITIVITY AND ADAPTIVE CAPACITY	
COMPONENT	OPERATIONAL DEFINITION
Exposure	Indicators that quantify the intensity or severity of physical environmental conditions that drive changes in state of the system
	Indicators aim to capture the expected influence of climate hazards
	Indicators may include future state and may be derived from the analyses of historic, long-term trends and possible future conditions
Sensitivity	Indicators that describe the system's present state for specific properties that respond to 'exposure' factors arising from changes in climate
	While the present state is clearly the result of past processes and events, the indicators should be easy to observe, measure and monitor
	Some indicators are easier to measure using maps or specific methods
Adaptive Capacity	Indicators that characterise the ability of the system to cope with impacts associated with changes in climate
	Characteristics or processes that renew, replenish or replace conditions affected by 'sensitivity'
	Intrinsic characteristics or properties inherent to biophysical or socio-ecological systems

The framework provides a structured approach for determining the potential impacts of climate change on habitats and species, their relative level of vulnerability and drivers of vulnerability. The assessment focused on five spatial sub-units within the ATS project region – Timor Sea, Arafura Sea, western PNG, Gulf of Carpentaria, northern Australia – to deliver sub-regional results. The framework provides transparency for stakeholders since it identifies drivers of vulnerability that can inform the selection of suitable adaptation measures.

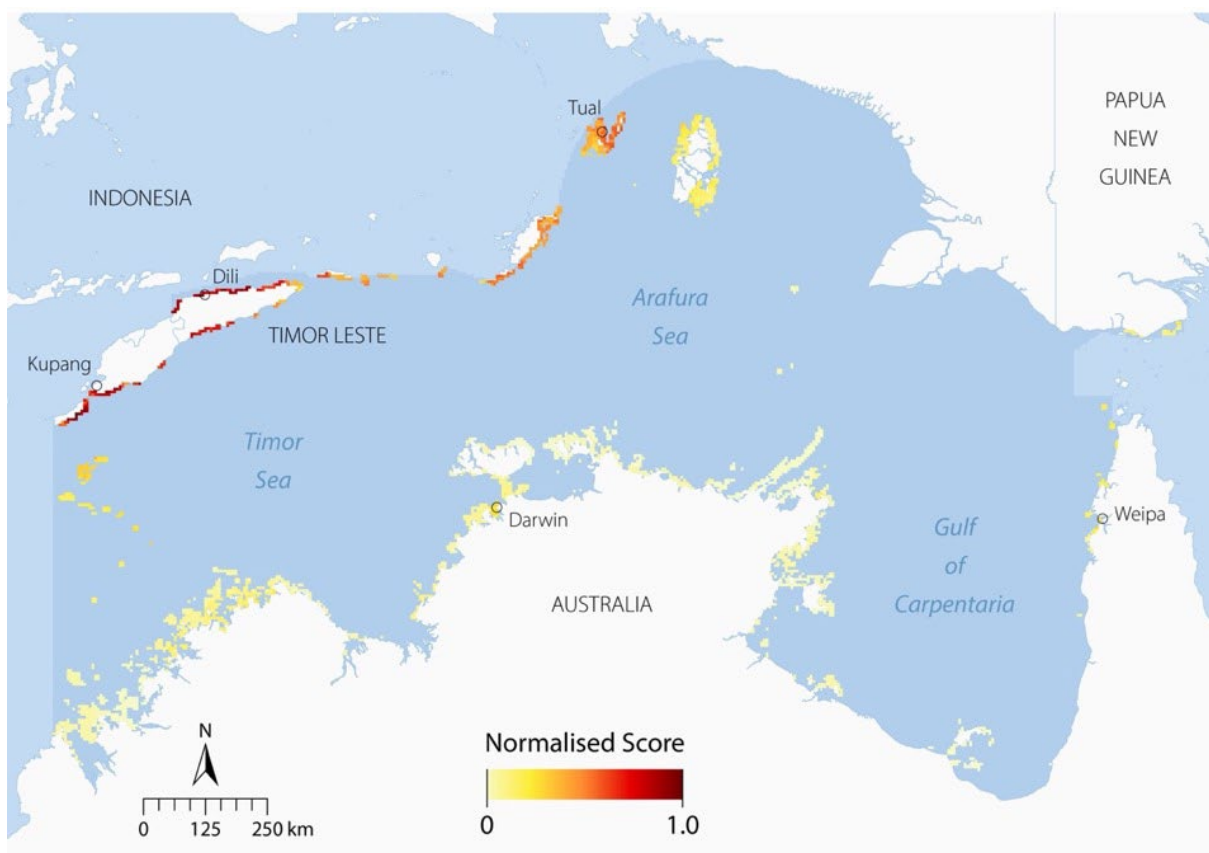
### 3.3 VULNERABILITY OF HABITATS

Vulnerability of all marine habitats assessed in the ATS region varies spatially, with the Indonesia-Arafura, Timor-Leste and western PNG sub-regions having higher habitat vulnerability than the Gulf of Carpentaria and northern Australia.



Results of the regional vulnerability assessment identified **coral reefs (shallow)** as highly vulnerable to climate change, particularly around Timor-Leste, Rote Ndao and Tual in the Arafura Sea.

The range of potential impacts resulting from future climate change means that shallow coral reef habitats are predicted to change, with coral cover expected to decline and macroalgae (fleshy and turf algae) likely to become more dominant (Hoegh-Guldberg et al. 2011, Johnson et al. 2020). Similarly, coral diversity is projected to decline with ocean acidification and increasing SST (Fabricius et al. 2011), resulting in simpler reef habitats. This will have implications for reef-dependent species, such as fish and some invertebrates, since habitat disturbance has been shown to cause declines in reef fishery catches (Pistorius and Taylor 2009).



*Regional relative vulnerability of shallow coral reefs (< 40m) in the ATS region. Colours represent vulnerability scores from 0 (white; not vulnerable) to 1.0 (dark red; very high vulnerability).*

The main sources of vulnerability in the different sub-regions vary, noting that a proxy was used for ‘coral condition’ and better information on reef condition and local-scale coral diversity would greatly improve understanding of sensitivity and hence vulnerability to climate change.

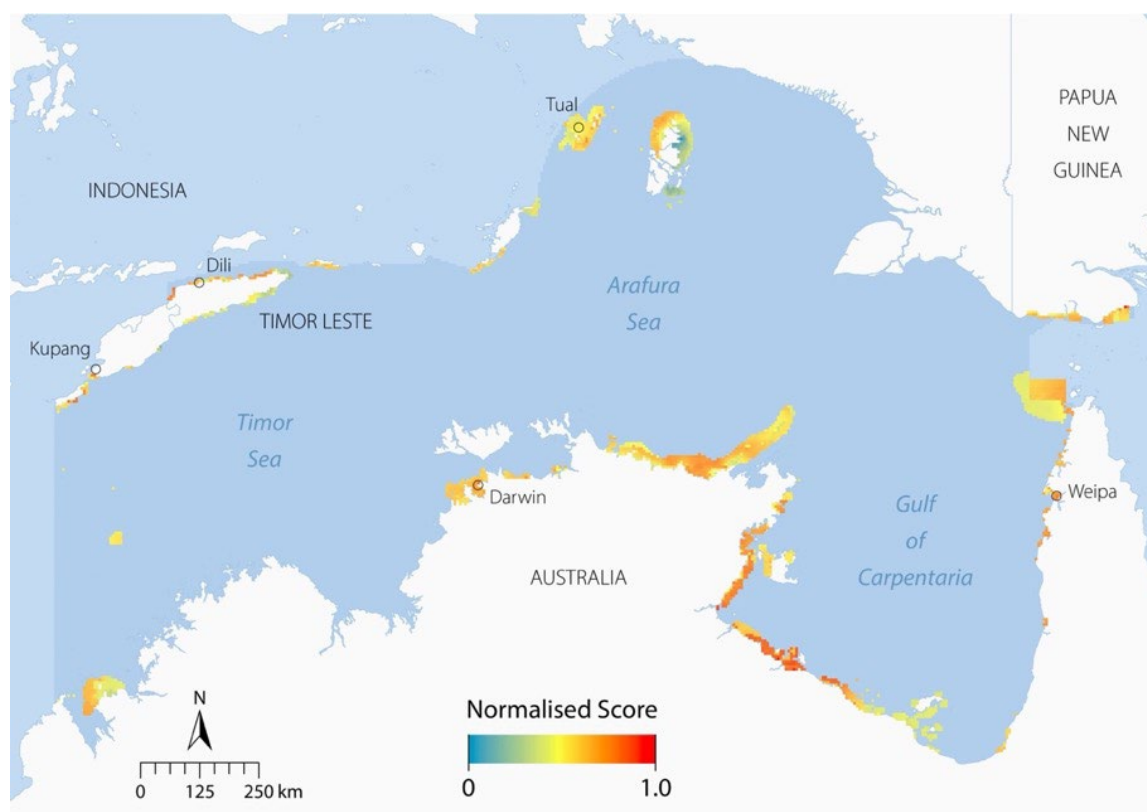
#### VULNERABILITY OF SHALLOW CORAL REEFS (<40 m) AND DRIVERS IN THE ATS REGION

SUB-REGION	DRIVERS OF VULNERABILITY	EXPECTED IMPACTS
Timor-Leste	Projected SST+; poor current condition; limited formal management	Declining condition, diversity and area
Indonesia/Arafura	Poor current condition; other non-climate pressures, particularly pollution	Decline in condition, diversity and area
Western PNG	Low diversity; lack of management	Decline in condition and area
Northwest Australia	Projected SST+	Stable to declining



*Coral reefs in the ATS region have been under pressure from unsustainable fisheries, habitat degradation, marine and land-based pollution, loss of biodiversity and increasing human populations  
(Photo by: Rizqan Adhima)*

**Seagrass meadows** in the western PNG and Indonesia/Arafura sub-regions are most vulnerable to future climate change. Particularly, increasing SST, rainfall changes that will drive more land-based sediment and nutrient runoff to coastal areas, and sea-level rise. The Gulf of Carpentaria has high vulnerability due to the shallow bathymetry and circulation patterns that drive historic high SST and increasing SST in the future.



Regional relative vulnerability of seagrass in the ATS region. Colours represent vulnerability from 0 (white; not vulnerable) to 1.0 (dark red; very high vulnerability).

Seagrass vulnerability is driven by a range of factors in each sub-region. Ultimately, these climate-driven changes are expected to impact the condition and area of seagrass.

#### VULNERABILITY OF SEAGRASS MEADOWS AND DRIVERS IN THE ATS REGION

SUB-REGION	DRIVERS OF VULNERABILITY	EXPECTED IMPACTS
Western PNG	Historic SST+ exposure; rainfall increase/coastal runoff; low diversity; no management	Decline in condition and area
Indonesia/Arafura	Rainfall increase/coastal runoff; sea-level rise; low connectivity; non-climate pressures	Decline in condition and area
Timor-Leste	SST+; sea-level rise; limited formal management	Decline in area
Northwest Australia & Gulf of Carpentaria	SST+; historic SST+ exposure; low species diversity	Stable

**Mangrove forests** are most vulnerable to future climate change in the western PNG and Timor-Leste sub-regions. Key environmental drivers of this vulnerability include sea-level rise, rainfall changes, and more intense storms and cyclones. This vulnerability is driven by their poor current condition, low species diversity and lack of management in western PNG, and low connectivity and limited formal management in Timor-Leste. Mangrove forests in the Indonesia/Arafura sub-region are also vulnerable to climate change, with sea-level rise and poor current condition the main drivers of this vulnerability. In Indonesia and Timor-Leste, where coastal development and infrastructure are extensive, there will be physical barriers to mangrove inland migration as sea level rises, further exacerbating vulnerability. Ultimately, these climate-driven changes are expected to impact the future condition and area of mangrove forests in these sub-regions.

#### VULNERABILITY OF MANGROVE FORESTS AND DRIVERS IN THE ATS REGION

SUB-REGION	DRIVERS OF VULNERABILITY	EXPECTED IMPACTS
Western PNG	Poor current condition; low species diversity; lack of management	Decline in condition and area
Timor-Leste	Rainfall declines; sea-level rise; low connectivity; limited formal management	Decline in condition and area
Indonesia/Arafura	Sea-level rise; poor current condition	Decline in condition and area
Northwest Australia & Gulf of Carpentaria	Sea-level rise	Stable



*Mangrove forests are found throughout the ATS region and are under pressure from clearing for timber and coastal development, which will be exacerbated by climate change (Photo by: Ikbal Alexander, Kertabumi)*



The implications of climate change for **deep reefs** are not well understood and are expected to be driven by changes to ocean chemistry (acidification), stratification that will influence temperatures and oxygen levels in deeper waters and changing ocean circulation. Similar to shallow coral reefs, the current condition and diversity of deep reefs and non-climate pressures will be important drivers of climate change vulnerability.

Projected changes in ocean circulation are expected to alter the timing, location, and extent of upwelling processes that support **pelagic ocean habitats** primary productivity. Changes in ocean temperature and the thermocline can also impact the availability of nutrients, affecting phytoplankton at the base of oceanic food webs and in turn, production of organisms at higher trophic levels in the food web, e.g. tuna.

### 3.4 VULNERABILITY OF SPECIES

Species relative vulnerability was spatially variable in the ATS region, with different species assessed in each sub-region and the top 10 most vulnerable species for each sub-region different.

TOP 10 MOST VULNERABLE SPECIES IN EACH ATS SUB-REGION FROM HIGHEST TO LOWEST				
INDONESIA/ ARAFURA	TIMOR-LESTE	WESTERN PNG	GULF OF CARPENTARIA	NORTHERN AUSTRALIA
Black teatfish	Green turtle	Mud crab	King threadfin	Golden snapper
Barramundi	Flowery cod	Dugong	Green turtle	Green turtle
Green turtle	Mangrove red snapper	Green turtle	Dugong	Dugong
Hawksbill turtle	Octopus	Barramundi	Barramundi	King threadfin
Mangrove red snapper	Dugong	Black jewfish	Golden snapper	Black jewfish
Wedgefish	Striated surgeonfish	Black teatfish	Mud crab	Mud crab
Mud crab	Ruby snapper/ Crimson snapper	Whitetip reef shark	Brown tiger prawn	Brown tiger prawn
Dugong	Moonfish		Mangrove red snapper (jack)	Mangrove red snapper (jack)
Yellowspotted rock cod	Spotted sardinella		Blue threadfin	Grey mackerel
Trochus	Whitetip reef shark		Grey mackerel	Barramundi

Note: Seven (7) species were assessed in the Western PNG sub-region and all are listed in vulnerability order

Using these species vulnerability rankings can inform species for action at local scales. Where species identified for action are likely to be part of a stock shared by adjacent jurisdictions, cooperative inter-jurisdictional management should be explored. For example, two species that are highly vulnerable in all five sub-regions – green turtle and dugong – are likely to be part of inter-connecting populations shared across large areas of the ATS region. In addressing these species' vulnerability to climate change, the individual sub-regional assessment results can be used to identify the drivers of vulnerability, and therefore inform the most appropriate management actions at sub-regional and regional scales.

#### VULNERABILITY OF MARINE SPECIES AND NON-CLIMATE DRIVERS IN THE ATS REGION

SUB-REGION	DRIVERS OF VULNERABILITY	EXPECTED IMPACTS
Western PNG	Currently overfished or undefined status; lack of management; poor water quality and IUU	Population declines; livelihoods and food security compromised
Timor-Leste	Currently overfished or experiencing overfishing; reliance on key habitats projected to decline; many species have low productivity; lack of management	Population declines; livelihoods and food security compromised
Indonesia/Arafura	Currently overfished or experiencing overfishing; reliance on key habitats projected to decline; many species have low productivity; ineffective or lacking management; high reliance as local food and income sources; multiple other non-climate stressors (IUU, development, pollution)	Population declines with some extinction risks; livelihoods and food security compromised
Northwest Australia & Gulf of Carpentaria	Altered rainfall and water extraction; reliance on key habitats projected to decline; many species have low productivity	Variable among species; largely uncertain due to high uncertainty in rainfall projections



Many fishery species are targeted in the ATS region for food and income and their vulnerability to climate change will influence their sustainability in the future (Photo by: Rizqan Adhima)

### 3.5 IMPLICATIONS FOR FOOD SECURITY AND LIVELIHOODS

Due to global climate change, the oceans are getting warmer, more acidic, and oxygen content is declining. These changes are driving large-scale effects on marine biodiversity (Portner et al. 2014) and are expected to continue to alter patterns of marine primary productivity (Bopp et al. 2013) and biodiversity (Jones and Cheung 2015). This will have consequences for fisheries catches in many parts of the world, including the ATS region, impacting food security and livelihoods (Cheung et al. 2016, Golden et al. 2016, Lam et al. 2016).

For many of the fisheries species assessed, a consistent driver of vulnerability across sub-regions was their status as overfished or undefined, meaning they may also be overfished. Some of the species that were consistently assessed across multiple sub-regions as being highly or moderately vulnerable to climate change are mangrove red snapper, barramundi and mud crab. These species, as well as others that were assessed as vulnerable in one or two sub-regions, are important for food and income, and changes to their productivity will impact food security and livelihoods.

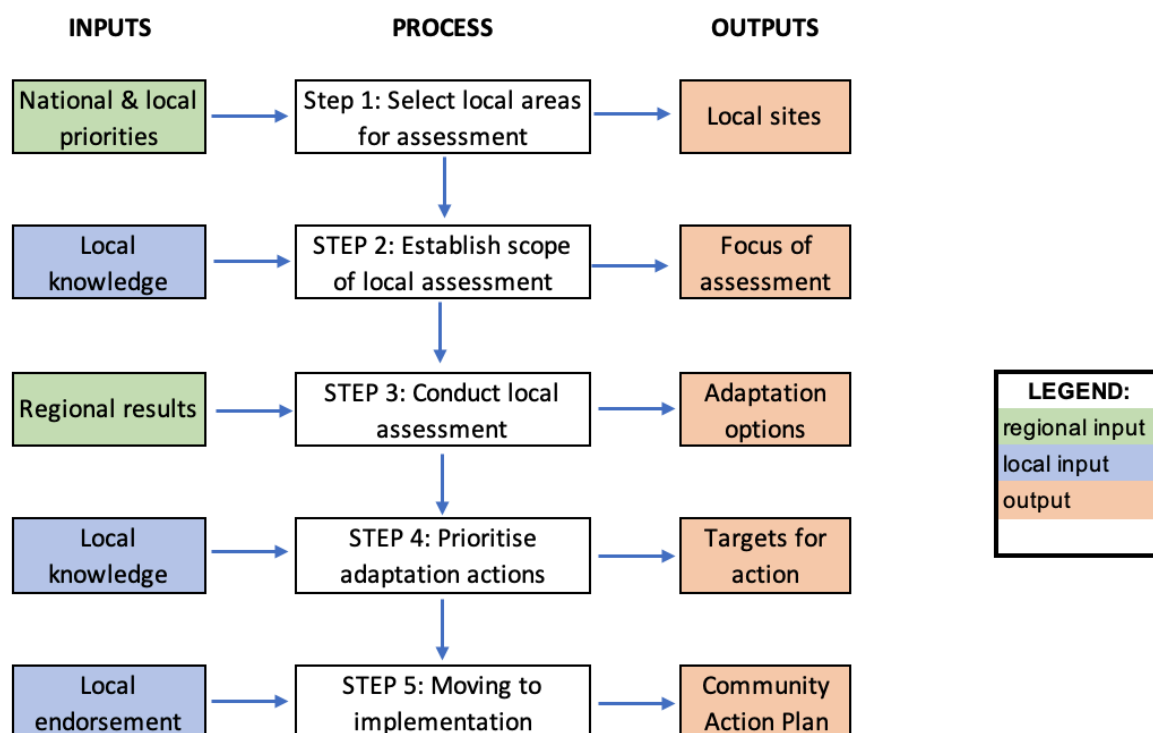
Marine ecosystems in the ATS region also support internationally important megafauna, such as cetaceans and marine turtles, as well as species of sharks and rays, fish and invertebrates that are important for industries that provide jobs and income for local people, including demersal fisheries (e.g. coral trout and snappers), near-shore pelagic fisheries (e.g. grey mackerel and tuna), invertebrates fisheries (e.g. black teatfish and trochus), and tourism (e.g. reef scuba diving and whale watching). Maintaining the structure and function of marine ecosystems is vitally important to the continuation of these industries supporting local livelihoods, and therefore understanding the implications of climate change at a local level is key to future sustainability.



*Mangrove forests are part of the coastal mosaic of habitats that include seagrass meadows and coral reefs, and support fish and invertebrates that are important for fisheries (Photo by: Ikbal Alexander, Kertabumi)*

## SECTION 4: LINKING REGIONAL RESULTS TO LOCAL ASSESSMENTS

The high spatial variability in ecosystem status and trends, and their exploitation in the ATS region means that regional-scale assessments of species and habitats need to be translated to local scales. The process of conducting a local assessment transfers much of the ownership and responsibility to relevant local stakeholders, thereby enabling more appropriate and sustainable adaptation actions. This process should involve a facilitator and a participatory local-level approach. The process has five simple steps that are best applied in order but can be flexible to accommodate the local context. The Guide allows for facilitators to use a range of participatory methods depending on the local context, which is important for meeting community needs and capacity in different locations.



*Linking regional climate change vulnerability results to local outputs and the steps in the process of conducting a local assessment and developing an action plan for implementation.*





## STEP 1: SELECT AREA FOR ASSESSMENT

The first step is to identify the local area or site to be assessed for action. A site can be a village, cluster of villages or community of practice (e.g. fishers association) that uses the same marine/coastal resources and has the capacity to work together to implement management rules and changes to practices. Selecting the local area can be done in a number of ways, including selecting a site to supplement existing community planning (e.g. fisheries management), due to national or regional priorities, or due to current threats and impacts. The principles provided below can assist in this selection process.

### PURPOSE

Identify suitable local area for assessment and to develop a community action plan where urgent action is needed and success is likely.

### RATIONALE

Resources for conducting local assessments are limited and should be focused where there is the greatest need, and incorporating climate change will benefit existing initiatives, national or regional priorities or addressing current threats.

### PROCESS

This step is not always required, if there is existing management planning that could benefit from the inclusion of climate change vulnerability, or there is a national priority to work in a particular local area. However, if this is not the case, the selection of a suitable site to conduct the local assessment and planning uses a set of principles outlined below.

#### PRINCIPLES FOR SELECTING LOCAL AREA/SITE FOR ASSESSMENT AND PLANNING

DESCRIPTION	RESPONSE
1 <b>Local stewardship</b> – are local communities already actively engaged in management and conservation, or are readily able to and willing to participate in an assessment process?	Yes=3 Likely/Possible=2 No=1
2 <b>Existing management</b> – is the site already the focus of national or sub-national management initiatives that can be complemented by the local assessment (e.g. ICZM, EAFM, MPA)?	Yes=3 Likely/Possible=2 No=1
3 <b>Values</b> – is the site listed internationally, regionally or nationally due to its value as a migratory corridor, nesting/breeding site, or World Heritage Area?	Yes=3 Likely/Possible=2 No=1
4 <b>Current threats</b> – is the site experiencing a range of threats currently that are impacting ecosystems and people?	Yes=3 Likely/Possible=2 No=1
5 <b>Climate change exposure</b> – is the site exposed to multiple climate drivers (based on projections of future climate change, see Section 2) or in a global climate hotspot?	Yes=3 Likely/Possible=2 No=1
6 <b>Community motivation</b> – is there a desire from the local community to address key threats to food security and livelihoods?	Yes=3 Likely/Possible=2 No=1

## OUTPUTS

Ideally, the response for each site selection principle should be ‘yes’ or ‘likely’, indicating that the site has the characteristics necessary for undertaking a local assessment and the community is willing and able to participate in both planning and implementation. Community stewardship and motivation is essential for the long-term success of action implementation. If there is more than one local area/site being considered, then each principle can be scored for all sites with the highest score being the most suitable site where urgent action is needed and success is likely.



*Squid fishing boat (Photo by: Ikbal Alexander, Kertabumi)*

## STEP 2: ESTABLISH SCOPE OF LOCAL ASSESSMENT

Establishing the scope of the local assessment ensures that the assessment is locally relevant, focused and can deliver information useful for decision-making. This step includes defining the local context that will focus the assessment, including the main goal and objectives, the area to be assessed, the timeframe of interest, who will participate and be responsible, and the data and local knowledge to be used. This step recognises the importance of including local traditional knowledge in the assessment and empowering communities to co-lead the action planning.

### PURPOSE

Focus the vulnerability assessment and action planning on the local context, particularly the management questions or issues, spatial area (boundaries), timeframes that bound the assessment, and local knowledge and participation.

### RATIONALE

Setting the objectives and scope is critical for delivering outputs that effectively support decision-making and support subsequent implementation and governance responsibilities.

### PROCESS

- Identify the main goal of the local assessment.
- Identify key local issues of concern and explore details of people's experiences trying to address these issues.
- Specify the spatial area of interest and any jurisdictional boundaries. For example, is the assessment for a single village or a single fishery exploited by many villages?
- Identify the timeframe for the assessment and actions. What short-term, medium- or long-term (5+ years) decisions and actions are the results going to inform?
- Identify who should be involved in the assessment and co-lead the process.
- Identify the information needs for the assessment and available data sources.

### OUTPUTS

The main output of this step is a clear process overview (see template below) that includes:

- A concise statement of the main goal for the assessment and timeframe for actions.
- Who will lead the assessment and when it is being conducted.
- Identification of current issues, spatial area and site boundaries.
- Willing participants and available local knowledge and data.

The template can be used to document these components for the local context. Each field should be filled in through a collective and participatory approach with local stakeholders, and led by a facilitator who is experienced in conducting local engagement processes.

## LOCAL ASSESSMENT: GOALS & SCOPE (STEP 2)

**Local community/ area name:**

**Dates of assessment:**

**District/suco:**

**Organization leading assessment:**

**Goal of assessment:**

**Main contact person:**

**Contact number/email:**

**Main issues for community:**

1
2
3
4

**Area being assessed (boundaries):**  
(draw map on separate sheet)

**Timeframe for actions:**

Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (5+ years)
---------------------------	----------------------------	----------------------

**Who is involved in assessment:**

(list all groups or people; a separate sign in sheet can be used for large groups)


**Information used:**  
(select all that apply)

Local knowledge	Published reports	Unpublished reports
Expert judgement	Other (please list)	

**List dates of meetings, workshops and consultations:**




### STEP 3: CONDUCT LOCAL ASSESSMENT

Assessing the vulnerability of a local area considers the habitats, species and target fisheries at a local scale. It draws on the regional climate change vulnerability results and local knowledge of non-climate threats and impacts to select suitable adaptations. These adaptations are aimed at addressing the combined drivers of climate change as well as other pressures at a local scale.

#### PURPOSE

Focus communities on what marine resources are important locally for food, income or livelihoods, their vulnerability to climate change as well as other current threats, and identify potential adaptations to specifically target these climate and non-climate pressures.

#### RATIONALE

Local assessments and planning to manage marine resources often focus only on localised and current threats, and don't consider the implications of climate change. This step is key for integrating climate change vulnerability into local planning and identifying adaptations that address both climate and non-climate pressures.

#### PROCESS

This step integrates the regional-scale results for habitats and species in the decision-support tools in Tables A1 and A2 (species tables for other sub-regions in Appendix A), to:

- Identify the habitats that are important locally for food, income or livelihoods, or have conservation importance (Table A1). The habitat assessment should also consider ecological roles in supporting marine resource life cycles, e.g. providing nursery grounds for important fisheries species.
- Identify the species that are important locally for food, income or livelihoods, or have conservation importance (Table A2). It may be necessary to provide photos of each species or use a participatory process to document local names before completing Table A2.
- Discuss the range of potential adaptations provided from the regional assessment, and select (circle) those most relevant to the local context.

#### OUTPUTS

- List of potential adaptations that minimise climate change vulnerability on important local habitats.
- List of potential adaptations that minimise climate change vulnerability on important local species (fishery or conservation).

**Table A1. HABITATS: STEP 3**

Complete the tables below to document the **local importance of habitats** and note their vulnerability (high, medium or low) regionally. Based on local knowledge on the condition of and threats to these habitats, review the potential adaptations that address the source of vulnerability. Discuss and circle those that warrant further consideration to implement locally, and/or use the last column to identify other possible adaptations with the local community (example in red).

Is this habitat locally important?	Habitat	Regional vulnerability	Potential adaptation actions			
yes	Coral reef	high	Restrict activities that physically damage the reef	Address land-based pollution and marine litter	Habitat restoration - coral planting	
	Coral reef	high	Restrict activities that physically damage the reef	Address land-based pollution and marine litter	Habitat restoration and/or protection	
	Seagrass meadows	high	Minimise run-off of land-based sediments	Restrict activities that directly clear or damage seagrass	Habitat restoration and/or protection	
	Mangroves	moderate	Avoid/remove barriers to landward growth of mangroves	Restrict activities that directly clear or damage mangroves	Habitat restoration and/or protection	
	Open ocean	low-mod	Address land-based pollution, particularly nutrients	Restrict activities that unbalance food webs (e.g. overfishing predators)		
	Deep reef	undefined	Restrict activities that physically damage deep reefs (e.g. bottom trawling)	Address marine litter and debris (e.g. ghost nets)	Address land-based pollution	

**TABLE A2. SPECIES: Indonesia-Arafura (STEP 3)** Complete the table below, selecting the species that are important to local people and businesses, or with high conservation importance. Additional species can be added at the bottom but there willand adaptation options should be no vulnerability information to assist adaptation selection.considered for the most similar species included in the regional assessment. Review the potential adaptation options, discuss and circle those that warrant further consideration to implement locally (note, potential adaptations provided for each species are derived from results of the regional-scale assessment), and/or use the last column to identify other possible adaptations with the local community (example in red). Only consider those species identified as locally important.

Is this species important locally?	Common name	Local name	Regional vulnerability rank	Potential adaptations		
yes	EXAMPLE SPECIES		1	Size limits to reduce harvest of juveniles	Restore and/or protect critical habitat	Target alternative species
	Black teatfish		1	Primary fisheries management	Education on the effects of fishing and need for management	Restore and/or protect reef habitats
	Barramundi		2	Restore and/or protect estuarine habitats	Explore alternative species and/or livelihoods	Size limits to reduce harvest of juveniles
	Green turtle		3	Total ban on harvest	Minimise incidental catch	Protect nesting beaches
	Hawksbill turtle		4	Total ban on harvest	Minimise incidental catch	Protect nesting beaches
	Mangrove red snapper/Mangrove jack		5	Primary fisheries management	Size limits to reduce harvest of juveniles	Restore and/or protect estuarine habitats
	Wedgefish		6	Total ban on harvest	Minimise incidental catch	Address IUU fishing
	Mud crab		7	Restore and/or protect estuarine habitats	Address land-based runoff (pollution)	Potential for ranching to enhance wild population
	Dugong		8	Total ban on harvest	Minimise incidental catch	Restore and/or protect seagrass habitats
	Yellowspotted rockcod		9	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
	Trochus		10	Restore and/or protect coral reef habitats	Education on the effects of harvest and need for management	Potential for ranching to enhance wild population
	Green (Grooved) tiger prawn		11	Restore and/or protect seagrass habitats	Primary fisheries management	Target alternative species

Saddletail snapper	12	Primary fisheries management	Restore and/or protect reef habitats	Address land-based runoff (pollution)
Red emperor	13	Primary fisheries management	Restore and/or protect reef habitats	Address land-based runoff (pollution)
Coral trout - common	14	Size limits to reduce harvest of juveniles	Restore and/or protect reef habitats	Primary fisheries management
Coral trout - passionfruit	15	Size limits to reduce harvest of juveniles	Restore and/or protect reef habitats	Primary fisheries management
Scalloped spiny lobster	16	Primary fisheries management	Restore and/or protect estuarine habitats	Address land-based runoff (pollution)
Common blacktip shark	17	Address IUU fishing	Restore and/or protect reef habitats	Minimise incidental catch
Whitetip reef shark	18	Address IUU fishing	Restore and/or protect reef habitats	Minimise incidental catch
Silky shark	19	Address IUU fishing	Minimise incidental catch	
White banana prawn	20	Restore and/or protect mangrove habitats	Primary fisheries management	
Painted sweetlip	21	Primary fisheries management	Restore and/or protect reef habitats	
Ruby snapper	22	Primary fisheries management	Restore and/or protect reef habitats	
Indian Ocean squid	23	Primary fisheries management	Target alternative species	
Crimson snapper	24	Primary fisheries management	Restore and/or protect reef habitats	
Blue-lined emperor	25	Primary fisheries management	Restore and/or protect reef habitats	
Mackerel scads	26	Primary fisheries management	Target alternative species	
Seaweed	n/a			



## STEP 4: IDENTIFY & PRIORITISE LOCAL ACTIONS

This step identifies local actions to deliver the potential adaptations identified during Step 3 and prioritises them. The extent and scope that actions are implemented will be determined by how effective the action is at delivering the adaptation, local resourcing (personnel, funds and time), and the level of social acceptability or support. Prioritisation provides a system to focus implementation on actions most likely to be effective and locally feasible to succeed, and be sustained in the long-term.

This step uses a consensus-based approach to assess each potential adaptation and identify local actions and then prioritise them. This process should be participatory and inclusive, with representation from different community groups and interests to ensure it is comprehensive. The results and final outputs should be discussed with the entire community to ensure there is support and endorsement, and to finalise the agreed actions and a plan for implementation (prepared in Step 5).

### PURPOSE

Apply a structured and consistent approach to reduce the number of adaptation actions to be included in the Community Action Plan, and focus local action on effective and feasible actions.

### RATIONALE

Implementing local actions requires time and resources, and communities generally cannot deliver a large number of actions at the same time, or highly technical or expensive actions. Therefore, this step provides a way to identify the most important actions and those that the community can successfully implement.

### PROCESS

- List the selected adaptation options identified from Step 3 in Table A3 (habitats) and Table A4 (species).
- Work through each table separately and list the range of **specific** local actions that could be used to implement each adaptation. This list can include multiple actions, and often multiple actions are required, but does not mean all actions will be included in the Community Action Plan or implemented.
- Assess the likely Effectiveness of each action to deliver the desired adaptation as High (H), Moderate (M) or Low (L): the likelihood that the action will address the underlying issue (driver of vulnerability). If effectiveness is low, the action is low priority.
- For each action that has high or medium effectiveness, assess as High (H), Moderate (M) or Low (L), against the following criteria:
  - Effectiveness – the likelihood that the action will address the underlying issue (driver of vulnerability). Expert guidance by the facilitator will be needed here.
  - Acceptability – the community support for the action and how compatible it is with local cultural, governance and/or attitudes/beliefs.
  - Feasibility – how much technical capacity is needed to effectively implement the action and does the community have this capacity. For example, does it require technical

skills, training and/or equipment? Expert guidance by the facilitator will be needed here, as well as community input.

- Use the matrix provided below Table A4 to ‘map’ each action against the above criteria and determine the priority of the action for implementation based on the legend. Actions prioritised as first or second for action should be the focus of the Community Action Plan.
- Local actions that are determined to be third or fourth order priorities can still be included in the Community Action Plan, providing the reason for their lower priority is addressed. For example, an awareness campaign to raise community acceptance, or additional training if the action requires technical skills.

## OUTPUTS

Identified local actions for each potential adaptation, which are prioritised based on whether they can be implemented using local activities, with local support and knowledge, and the available resources.



*Seaweed farming is an important livelihood in many ATS communities, however, productivity declines mean that actions are needed to support seaweed growth or alternative livelihoods (Photo by: Ikbal Alexander, Kertabumi)*

**TABLE A3. HABITAT ADAPTATION ACTIONS (STEP 4)**

Transfer the list of potential habitat adaptations that are being considered from Table A1 and fill in with community input (examples in red).

Selected Adaptations	Potential local actions	Likely effectiveness	REVIEW	Community acceptance	Feasibility (technical skills, equipment)	Priority for implementation
<i>Restrict activities that physically damage the reef</i>	<i>Ban dynamite fishing</i>	<i>H</i>	<b>Only medium (M) and high (H) effective actions proceed</b>	<i>M</i>	<i>H</i>	<i>HIGH</i>
	<i>Ban reef walking</i>	<i>M</i>		<i>L</i>	<i>M</i>	<i>MODERATE</i>
<i>Restore and/or protect mangrove habitat</i>	<i>Introduce a mangrove protected area</i>	<i>H</i>		<i>M</i>	<i>H</i>	<i>HIGH</i>
	<i>Implement a coral planting program</i>	<i>L</i>		<i>-</i>	<i>-</i>	<i>LOW</i>

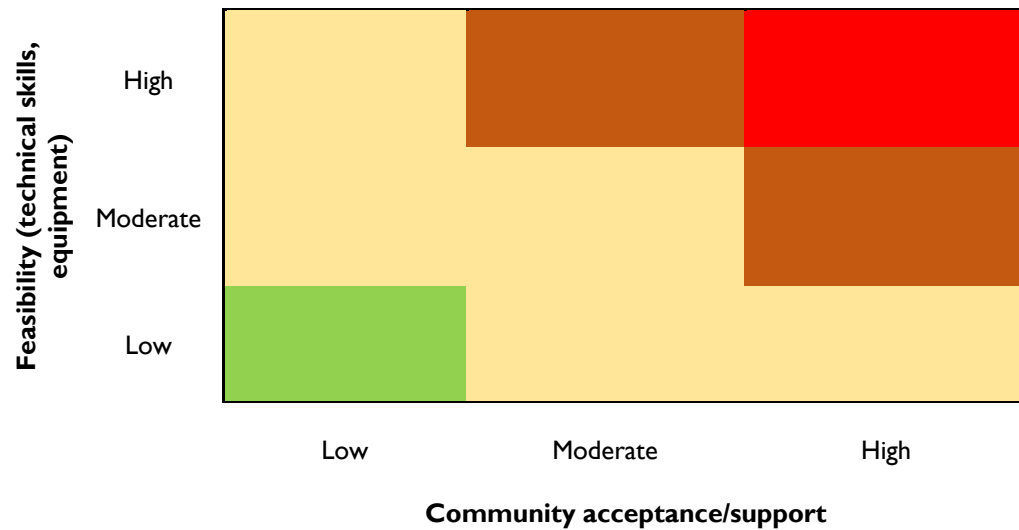
**TABLE A4. SPECIES ADAPTATION ACTIONS (STEP 4)**

Transfer the list of potential species adaptations that are being considered from Table A2 and fill in with community input (examples in red).

Selected Adaptations	Potential local actions	Likely effectiveness	REVIEW	Community acceptance	Feasibility (technical skills, equipment)	Priority for implementation
<i>Introduce primary fisheries management</i>	<i>Introduce a minimum hook size or minimum mesh size</i>	<i>H</i>	<i>Only medium (M) and high (H) effective actions proceed</i>	<i>H</i>	<i>M</i>	<i>HIGH</i>
	<i>Implement minimum size limits for vulnerable species</i>	<i>H</i>		<i>M</i>	<i>M</i>	<i>MODERATE</i>
	<i>Ban damagingdestructive fishing gears (e.g. dynamite, poisons)</i>	<i>H</i>		<i>H</i>	<i>M</i>	<i>HIGH</i>
<i>Educate on the effects of fishing and importance of management</i>	<i>Run expert-led community awareness sessions</i>	<i>H</i>		<i>H</i>	<i>M</i>	<i>HIGH</i>
	<i>Produce and display educational posters</i>	<i>M</i>		<i>H</i>	<i>H</i>	<i>VERY HIGH</i>
	<i>Start a tourism business</i>	<i>L</i>				<i>LOW</i>



## MATRIX FOR DETERMINING PRIORITY FOR IMPLEMENTING LOCAL ACTIONS



**LEGEND:**

	<b>very high priority for action</b>	First priorities
	<b>high priority for action</b>	Second priorities
	<b>moderate priority for action</b>	Third priorities
	<b>low priority for action</b>	Only include if time and funds allow

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## STEP 5: DEVELOP A COMMUNITY ACTION PLAN

Steps 2 to 4 provide participatory tools for facilitators to work with communities to include regional climate change vulnerability into their local assessment and identifying locally relevant adaptation options. Step 5 focuses on developing an action plan for implementing the local actions identified in Steps 3 and 4 so that communities can document and endorse the local actions they plan to implement, identify resources and timelines, and who will be involved.

### PURPOSE

Develop a Community Action Plan that documents the local actions that the community will implement to sustainably manage their coastal and marine habitats and species, considering climate change and other pressures, and how they will be implemented.

### RATIONALE

A locally developed Community Action Plan demonstrates a clear commitment by the community to work together and collaboratively with other groups/agencies to sustainably manage their marine resources, and brings together the actions needed in a coherent and strategic manner. It is also important to document community endorsement of the actions.

### PROCESS

The Community Action Plan brings together outputs from Steps 2 to 4 using implementation tables (templates below; Tables A5 and A6). These should be developed through a consultative and participatory process and include some brief explanatory text. The Community Action Plan should provide clear actions to address the threats, and outline how those actions will be implemented, including possible funding sources.

The process for developing the Community Action Plan starts in Step 2, with all steps requiring facilitated participation from relevant local stakeholders to:

- Identify the local importance of habitats and species for the community, and current pressures or impacts on those resources (Step 2).
- Identify and discuss potential adaptations (Step 3), the local actions to deliver them and their priority for implementation (Step 4).
- Complete implementation tables for habitats and species (Tables A5 and A6 respectively) to document how the community will implement the actions.
- The final Community Action Plan should comprise of copies of the Tables A1-A6, with explanatory notes as required, enough so that the development process is accessible and understood, and so that the Plan can be referred to regularly as local actions progress.
- Outline how implementation will be monitored and evaluated for success (Section 5).

### OUTPUTS

A single Community Action Plan that informs the implementation of local actions and should be reviewed annually.

**Table A5. HABITAT ACTION IMPLEMENTATION (STEP 5)**

Transfer the list of adaptations selected for your local area and fill in the details of how they will be implemented and what is needed for delivery (example in red).

Adaptation option	Local actions	Estimated cost	<b>Who</b> will deliver the action & what groups are needed to support the action?	<b>Location:</b> <u>where</u> will this action be done?	<b>Timeline:</b> when will the action start (short-term=1 year; medium- =2-5 yrs; long-term=5+ yrs)?	<b>Support needed:</b> what training, equipment or other support is needed?	<b>Possible Funding Source(s)</b>
Restrict activities that physically damage the reef	Ban reef walking and dynamite fishing	Low-moderate	Village officials with support from District government	All intertidal reefs around village	short-term (1 year)	Signs to inform people about rule; monitoring training	Village funds or NGO grant

**TABLE A6. SPECIES ACTION IMPLEMENTATION (STEP 5)**

Transfer the list of potential adaptations that are being considered for your local area and fill in the details of how they will be implemented and what is needed for delivery

Adaptation option	Local actions	Estimated cost	Who will deliver the action & what groups are needed to support the action?	Location: where will this action be done?	Timeline: when will the action start (short-term=1 year; medium- =2-5 yrs; long-term=5+ yrs)?	Support needed: what training, equipment, materials or other support is needed?	Possible funding source(s)
Reduce harvest of juvenile fish	Ban small mesh nets and small hooks	Low-moderate	Fishers with support from youth	East shore	mid-term (2-5 year)	Larger mesh nets and hooks; monitoring training	District funds



## NOTES FOR FACILITATORS

The flexibility of this Guide is important, in terms of who can use it to facilitate a participatory process and the ability of facilitators to tailor the steps to the local context and select participatory approaches that are most suitable. It is recommended that the facilitation team take time to become familiar with the Guide and each step, so they can easily follow the process and support communities to develop an appropriate local action plan.

The time required to complete all the steps in the Guide depends on the circumstances in each village, the participatory processes used, the number of people and groups involved in development of the action plan, and the willingness of participants. Therefore, each action plan development process is unique and facilitators should be aware of the local circumstances and not rush the process.

There are some other general factors worth noting for facilitators:

- The facilitation team would benefit from being familiar with the local site or District so they can relate to the community, and include members who are fluent in the main local language to avoid a translator that would disrupt the flow of the participatory process.
- The facilitation team should be experienced at conducting community participatory processes whereby they support the community but do not prescribe answers or solutions. It is important for community ownership of the Action Plan that it reflects their issues, needs and solutions and not something that was imposed.
- To assist with discussions about important local species for the community in step 3, and ensure that the same species are being discussed, flash cards can be used at the beginning of step 3 to document local names in Table A2 (see Appendix B for flash card resources for each sub-region).
- Facilitators should be familiar with the natural resources in the area and possible causal links between issues/impacts and solutions. This assists communities to identify and prioritise local actions that will specifically address issues. If the facilitators do not have this expertise in all topics (e.g. fisheries, aquaculture, eco-tourism) they can draw on external specialist support or resource materials to assist them during the discussions with communities (see Appendix C for example resources).
- It is important that any participatory process is inclusive of different community groups including underrepresented groups (e.g. women, youth, people with a disability), and that facilitators seek consent for voluntary participation in the process.
- Facilitators need to be aware of group power dynamics to ensure equitable participation and that everyone can share their perspectives without reprisal or negative responses. Facilitators should manage this power dynamic (e.g. between adults and youth, villagers and village officials) to ensure inclusive participation and that everyone has a voice.
- Participants might disagree during the process but respectful debate and negotiation is good for reaching a compromise that suits multiple interests and achieves general agreement. There is a risk that innovative or novel actions will not proceed if there isn't enough community support, so respectful debate can allow for full exploration of innovative and new ideas as they may be an effective adaptation action.

## SECTION 5: COMMUNITY ACTION PLAN IMPLEMENTATION

While developing a Community Action Plan is a significant and important achievement, a number of barriers to successful implementation exist, including difficulty in monitoring success of actions, limited community awareness of issues or actions, lack of funding for implementation of actions, poor community compliance with management rules, and limited enforcement. There may also be some level of planning required to implement each specific action. For example, funding to implement actions is important to ensure success and some actions will need external funding support. Communities may need to identify possible funding sources and collaborate with district governments and other partners (e.g. NGOs and CSOs) to implement such actions. This should be considered as part of initial implementation and is individual to each community action plan.

This section provides an overview of the main elements of successful implementation of the Community Action Plan including: community involvement, awareness and education, enforcement, monitoring and review.

### 5.1 COMMUNITY INVOLVEMENT

Critical to the success of a Community Action Plan is the involvement of the whole community in all stages of the process. If communities are part of the process, they become more aware about why local management is important, have greater ownership of the local actions, and are much more likely to respect any rules. Community involvement significantly helps ensure that Community Management Plans are effective. Importantly, adjacent villages may share the same resources and need to be engaged either during the planning process or at the start of implementation so they are aware of the local actions and rules and will hopefully respect them. Although challenging, this will be critical to the success of local actions in the future, and is likely to also deliver benefits for these adjacent villages.

### 5.2 EDUCATION AND AWARENESS

Education and awareness about the Community Action Plan is as critical as community involvement in its development. Once a Plan is developed, it is important that community leaders and those responsible for implementation start sharing information on the goal, objectives and actions in the Action Plan. This will raise awareness in the wider community (and potentially adjacent villages) about current issues for marine resources, why the Action Plan has been developed and the reason for the actions. This education and awareness raising will be key to ensuring people are not only aware of each action but also understand why they have been implemented, and don't unintentionally compromise local actions or deliberately break the rules. Education and awareness should be ongoing throughout Action Plan implementation, so communities can also see progress and share in positive results.

Education and awareness raising is best achieved by multiple local leaders and groups (e.g. women's groups, fisher cooperatives) reaching out to their family, friends, and peers so the messages are far-reaching. It can be done through a range of media, including posters, videos, noticeboards, meetings and casual discussions with a range of community members. Women groups, youth and fishers are well-placed to share information with their respective groups.

Village officials and the District government can also disseminate information about the Action Plan through official meetings and websites. Thus, responsibility for education and awareness is shared by different groups. A range of example materials are provided in Appendix B.

Other groups external to the community who currently or previously worked in the community on sustainable ecosystem management and conservation, such as NGOs and CSOs can also support education and awareness by providing resource materials, training or other activities to raise awareness and understanding of the main messages in the Action Plan.

### 5.3 ENFORCEMENT

While ownership of the Community Action Plan is key to ensuring understanding of and voluntary compliance with any rules in the Action Plan, there are occasions where enforcement is needed. The rules and penalties should be included in the Action Plan, and a system of community-based enforcement is important to ensure the success of local actions. If the community doesn't comply with the rules, the Action Plan is likely to be ineffective. The best way to ensure there is respect for rules, is to ensure that the above two elements are done effectively. Successful implementation of a Community Action Plan engenders a sense of pride in the community, particularly if the process is participatory and consultative.

If there is a history of not following local rules or lack of enforcement of agreements and plans, there may need to be discussions with village officials to take leadership and enforce the rules through formal village laws. An example of local issues, actions (rules) and fines is shown below and a similar system should be developed with the community for any Community Action Plan.

EXAMPLE RULES FOR A COMMUNITY ACTION PLAN		
LOCAL ISSUE	LOCAL ACTION (RULES)	FINES
Takes longer to catch a fish and fewer fish are caught	Ban the use of fish poisoning	1 cow or 3 sheep
Turtle numbers are declining, fewer nesting on local beaches	Ban turtle harvesting (adult hunting and egg collection)	Rp. 1,000,000
Coral reefs are damaged and in poor condition	Ban dynamite fishing	1 cow or 3 sheep
Takes longer to catch a fish and fewer fish are caught	Ban the use of compressor for fishing	Prison for one month



#### 5.4 MONITORING AND REVIEW

As the actions in a Community Action Plan are implemented, it is important to monitor whether they are effective at addressing the issue they are targeting. This involves measuring the local issue (e.g. harder to catch a fish, coral reefs are damaged by dynamite fishing), to determine whether actions are effective in achieving their objectives. For example, if the target local issue is that coral reefs are damaged by dynamite fishing, monitoring of reef health will be important to determine if reef condition improves over time. If there are still signs of recent dynamite damage, then the action is not being effective and more education or awareness with local and adjacent fishers may be needed. Over a longer period, if reef health does not improve, then other actions may be needed, such as increased enforcement and fines, to promote healthy coral reefs.

Monitoring is an important and sometimes technical activity, that may require communities to either be trained in monitoring techniques or to collaborate with NGOs or other agencies conducting monitoring. There are many different methods for monitoring coastal and marine resources, and simple methods that can target the specific species or habitat being managed will be most practical and useful. Training communities in simple monitoring techniques, for example, reef health, fish catches or mangrove health, can support the Community Action Plan and empower communities. Methods for communities to carry out their own monitoring and use results to inform local actions are ideal and can demonstrate the success of the Action Plan as another way to strengthen community support. An example of the indicators to monitor to check if an Action Plan is relevant and impactful is shown below, and monitoring should be tailored and developed with the community to the specific local context and Community Action Plan.



### EXAMPLE MONITORING FOR A COMMUNITY ACTION PLAN

INDICATOR OF SUCCESS	CURRENT CONDITION	TARGET RESULT
Increasing quantity and quality of seaweed	1 rope produces 1–7 kg dry seaweed	1 rope produces 5–10 kg dry seaweed
Increasing sustainability of fisheries	Fishers catch small (juvenile) fish and need to catch more to have enough for food or to sell	Fishers only catch adult fish only that provide more food and sell for higher prices
Increasing number of tourists visiting for eco-activities (e.g. mangrove tours, snorkeling)	20% of tourists visiting participate in eco-activities	> 50% of tourists visiting participate in eco-activities
Establish reef nursery that is growing diverse coral species	Coral reef degraded by dynamite fishing – low coral cover and diversity	Coral reef sites are replanted and have higher coral cover and diversity
Healthy mangrove forest due to conservation	Mangroves forest in poor condition due to clearing and other activities	Mangrove forest is formally protected, and clearing has been reduced to less than 10% of current levels
Marine turtle populations are protected from hunting and egg poaching	Marine turtle numbers are declining, and fewer are nesting on local beaches	All villages are aware of turtle conservation and respect rules by not hunting or egg poaching

As the Community Action Plan is implemented and monitoring provides information on whether local actions are effective at addressing issues, it is recommended that the actions and implementation are reviewed annually. First, to see if there have been changes in the condition of the resources being monitored (e.g. fish catch, reef health) and determine if and what actions need to be updated or changed. Second, to identify any issues with implementing the local actions in the Action Plan. For example, a review would help to determine if people are respecting the ban on marine turtle harvesting, and if not, if the education and awareness is reaching everyone, including neighbouring villages. If not, it may need to be repeated in neighbouring villages and signs installed at all nesting beaches.

It is recommended that the community reviews the monitoring results and local actions in the Community Action Plan together each year, and there is representation from different community groups and interests to ensure it is comprehensive. This provides an opportunity for the community to get together and share their experiences and monitoring results, identify challenges, and look for ways to work together to improve local management.



*Community members meeting to discuss local fisheries resources and possible local actions, this should be repeated each year as part of a review process of the Community Action Plan (Photo by: Rizqan Adhima)*

### **CASE STUDY EXAMPLE: OESALI VILLAGE, ROTE NDAO, INDONESIA**

The Guide for Facilitators and Decision-Makers was used for a participatory planning process with the community of Oeseli Village in Rote Ndao. The community has a high dependence on marine resources, such as red snapper, black teatfish and seaweed, for food and income; local government has prioritised conservation programs in the area supported by BKKPN Kupang (national Ministry of Marine Affairs and Fisheries); and capture fisheries and seaweed production data show declines. The Oeseli case study demonstrated the utility of the Guide to facilitate active participation in each step to create a Community Action Plan that addresses climate and non-climate pressures.

A facilitation team that included Rote Ndao locals applied all steps of the Guide and used a range of participatory approaches to develop a Community Action Plan. The Community Action Plan was developed through participation by a range of community groups, including women and seaweed farmers, fishers, youth, fish buyers and village officials. The main local issues from the community perspective were: (1) seaweed farming is declining; (2) poor access to markets due to road condition; (3) impacts of the 2009 oil spill on seaweed resources; (4) drought / lack of water resource; (5) undeveloped potential for tourism; (6) coral reefs have been destroyed by misuse of dynamite fishing and fish poisons; (7) fishers illegally catch black teatfish; (8) marine turtles are discreetly (illegally) hunted; and (9) the climate is changing, e.g. less rain and more storms.

A range of actions were included in the Community Action Plan to ensure that current issues the community faces are being addressed. The community prioritised adaptation actions to be implemented with three actions voted as the highest priorities: (i) develop eco-tourism in the village; (ii) enact village law banning fish poisoning; and (iii) produce an awareness video about protecting marine turtles (from illegal harvest and egg collection).

The facilitation team undertook two visits and immersive community engagement using the tools and templates in the Guide to effectively facilitate a local assessment process and develop a Community Action Plan. This case study demonstrated that participatory methods are essential to facilitate a successful community-driven (bottom-up) planning process and this should be an integral component of all future applications of the Guide.

The community has committed to implement the priority actions, and to monitor their success in addressing local issues. The community members responsible for the Action Plan are also committed to education, socialisation and information sharing in the broader community about the actions. There is also recognition that while the Action Plan timelines are reasonable, additional resources and support may be needed for some actions and for monitoring.

Village officials, Rote Ndao's District Government and local NGOs were engaged in the latter stages and are committed to sharing the outcomes of the process, and supporting Action Plan implementation. The District Government will also share the process and results with other villages in Rote Ndao, which may generate interest for a similar process in neighbouring villages. BKKPN Kupang have officially received the Community Action Plan and support the process and actions, noting that this process shows how local people are experts about their own resources and can contribute to their own solutions. With such multi-lateral support, the Guide has the potential to scale up to provincial level or conservation areas such as Savu Sea Marine National Park.

THE COMMUNITY ACTION PLAN AND VIDEOS CAN BE FOUND [HERE](#).

## RESOURCES & FURTHER READING

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Oeseli village Community Action Plan (2021) Developed with the support of Kertabumi and the Arafura and Timor Seas Ecosystem Action program Phase 2 (ATSEA-2). Indonesia

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Australia. Part 1: Vulnerability assessment and adaptations. FRDC Project No: 2010/565 Report. James Cook University, Townsville, 236pp.



## APPENDIX A: SPECIES TABLES FOR TIMOR-LESTE & PNG WESTERN PROVINCE

**TABLE A2. SPECIES: Timor-Leste (STEP 3)** Complete the table below, selecting the species that are important to local people and businesses, or with high conservation importance. Additional species can be added at the bottom and adaptation options should be considered for the most similar species included in the regional assessment. Review the potential adaptation options, discuss and circle those that warrant further consideration to implement locally (note, potential adaptations provided for each species are derived from results of the regional-scale assessment), and/or use the last column to identify other possible adaptations with the local community (example in red). Only consider those species identified as locally important.




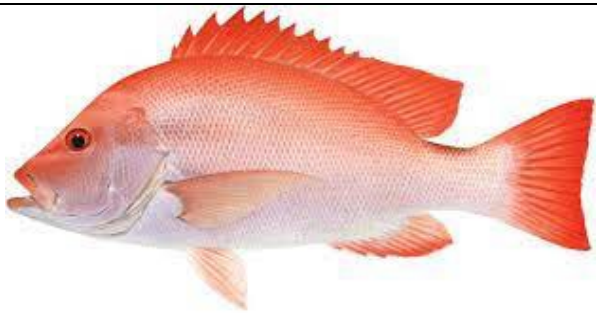

Is this species important locally?	Common name	Local name	Regional Vulnerability	Potential adaptations			
yes	EXAMPLE SPECIES	Blue fish	1	Size limits to reduce harvest of juveniles	Protect/rehabilitate breeding habitat	Target alternative species	Minimise incidental catch
	Green turtle		1	Total ban on harvest	Minimise incidental catch	Protect nesting beaches	
	Flowery cod		2	Primary fisheries management	Restore and/or protect coral reef habitats	Size limits to reduce harvest of juveniles	
	Mangrove red snapper/ Mangrove jack		3	Primary fisheries management	Size limits to reduce harvest of juveniles	Restore and/or protect estuarine habitats	
	Octopus		4	Primary fisheries management	Target alternative species		
	Dugong		5	Total ban on harvest	Minimise incidental catch	Restore and/or protect seagrass habitats	
	Striated surgeonfish		6	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles	
	Ruby snapper/Crimson snapper		7	Primary fisheries management	Restore and/or protect reef habitats		
	Moonfish		8	Primary fisheries management	Target alternative species		
	Spotted sardinella		9	Primary fisheries management	Target alternative species		

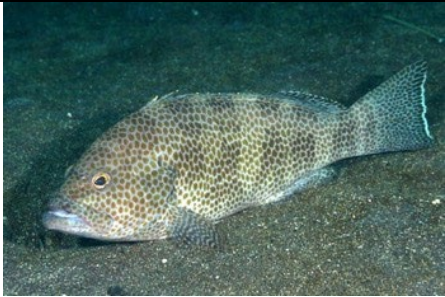




Whitetip reef shark	10	Address IUU fishing	Restore and/or protect reef habitats	Minimise incidental catch
Short-bodied mackerel	11	Primary fisheries management	Target alternative species	
Reef Manta ray	12	Total ban on harvest	Minimise incidental catch	Restore and/or protect seagrass habitats
Yellow lined snapper	13	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Blubberlip snapper/Maori snapper	14	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Black-tipped rockcod	15	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Yellowfin tuna	16	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Ornate emperor	17	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Frigate tuna	18	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Midnight snapper/Black & white snapper	19	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Fusiliers	20	Primary fisheries management	Restore and/or protect reef habitats	
Narrow-barred Spanish mackerel	21	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Bluefin trevally	22	Primary fisheries management	Restore and/or protect reef habitats	Size limits to reduce harvest of juveniles
Forktail rabbitfish/Orange-spotted spinefoot	23	Primary fisheries management	Restore and/or protect reef habitats	
	n/a			

**TABLE A2. SPECIES: Western PNG (STEP 3)** Complete the table below, selecting the species that are important to local people and businesses, or with high conservation importance. Additional species can be added at the bottom and adaptation options should be considered for the most similar species included in the regional assessment. Review the potential adaptation options, discuss and circle those that warrant further consideration to implement locally (note, potential adaptations provided for each species are derived from results of the regional-scale assessment), and/or use the last column to identify other possible adaptations with the local community (example in red). Only consider those species identified as locally important.







Is this species important locally?	Common name	Local name	Regional Vulnerability	Potential adaptations			
yes	EXAMPLE SPECIES	Blue fish	1	Size limits to reduce harvest of juveniles	Protect/rehabilitate breeding habitat	Target alternative species	Minimise incidental catch
	Mud crab		1	Restore and/or protect estuarine habitats	Address land-based runoff (pollution)	Potential for ranching to enhance wild population	
	Dugong		2	Total ban on harvest	Minimise incidental catch	Restore and/or protect seagrass habitats	
	Green turtle		3	Total ban on harvest	Minimise incidental catch	Protect nesting beaches	
	Barramundi		4	Restore and/or protect estuarine habitats	Explore alternative species and/or livelihoods	Size limits to reduce harvest of juveniles	
	Black jewfish		5	Primary fisheries management	Restore and/or protect coral reef habitats	Size limits to reduce harvest of juveniles	
	Black teatfish		6	Primary fisheries management	Education on the effects of fishing and importance of management	Restore and/or protect coral reef habitats	
	Whitetip reef shark		7	Address IUU fishing	Restore and/or protect coral reef habitats	Minimise incidental catch	







## APPENDIX B: EXAMPLE SPECIES FLASH CARDS (STEP 3)





INDONESIAN SPECIES FLASH CARDS		
Species name	Common name	Photo
<i>Dugong dugon</i>	Dugong	
<i>Chelonia mydas</i>	Green turtle	
<i>Eretmochelys imbricata</i>	Hawksbill turtle	
<i>Lutjanus malabaricus</i>	Saddletail snapper	
<i>Lutjanus sebae</i>	Red emperor	

<i>Epinephelus areolatus</i>	Yellowspotted rockcod	
<i>Diagramma labiosum</i>	Painted sweetlip	
<i>Lethrinus laticaudis</i>	Blue-lined emperor	
<i>Scylla serrata</i>	Mud crab	
<i>Triaenodon obesus</i>	Whitetip reef shark	













<i>Holothuria whitmaei</i>	Black teatfish	
<i>Lates calcarifer</i>	Barramundi	
<i>Plectropomus areolatus</i>	Coral trout – passionfruit	
<i>Plectropomus leopardus</i>	Coral trout – common	
<i>Trochus niloticus</i>	Trochus	
<i>Fenneropenaeus merguensis</i>	Banana prawn	

<i>Penaeus semisulcatus</i>	Green (Grooved) tiger prawn	
<i>Lutjanus argentimaculatus</i>	Mangrove red snapper/ Mangrove jack	
<i>Uroteuthis duvaucelii</i>	Indian Ocean squid	
<i>Rhynchobatus australiae</i>	Wedgefish	
<i>Carcharhinus falciformis</i>	Silky shark	
<i>Carcharhinus limbatus</i>	Common blacktip shark	






<i>Lutjanus erythropterus</i>	Crimson snapper	
<i>Etelis carbunculus</i>	Ruby snapper	
<i>Panulirus homarus</i>	Scalloped spiny lobster	
<i>Decapterus spp.</i>	Mackerel scads	













TIMOR-LESTE SPECIES FLASH CARDS		
Species name	Common name	Photo
<i>Rastrelliger brachysoma</i>	Short-bodied mackerel	
<i>Amblygaster sirm</i>	Spotted sardinella	
<i>Pterocaesio tile</i> / <i>Caesio teres</i> / <i>C. luris</i> / <i>Paracaesio xanthura</i>	Fusiliers	
<i>Etelis carbunculus</i>	Ruby snapper	
<i>Pristipomoides filamentosus</i>	Crimson snapper (jobfish)	

<i>Aphareus rutilans</i>	Rusty jobfish	
<i>Mobula alfredi</i>	Reef Manta ray	
<i>Auxis thazard</i>	Frigate tuna	
<i>Scomberomorus commerson</i>	Narrow-barred Spanish mackerel	
<i>Dugong dugon</i>	Dugong	



<i>Chelonia mydas</i>	Green turtle	
<i>Triaenodon obesus</i>	Whitetip reef shark	
<i>Caranx melampygus</i>	Bluefin trevally	
<i>Macolor macularis</i>	Midnight snapper	
<i>Macolor niger</i>	Black & white snapper	

<i>Epinephelus fuscoguttatus</i>	Flowery cod	
<i>Siganus argenteus</i>	Forktail rabbitfish	
<i>Siganus guttatus</i>	Orange-spotted spinefoot	
<i>Epinephelus fasciatus</i>	Black-tipped rockcod	
<i>Thunnus albacares</i>	Yellowfin tuna	

<i>Lethrinus ornatus</i>	Ornate emperor	
<i>Lutjanus rufolineatus</i>	Yellow lined snapper	
<i>Lutjanus argentimaculatus</i>	Mangrove red snapper/ Mangrove jack	
<i>Ctenochaetus striatus</i>	Striated surgeonfish	
<i>Mene maculata</i>	Moonfish	






*Lutjanus rivulatus*

Blubberlip snapper/  
Maori snapper







## WESTERN PNG SPECIES FLASH CARDS

Species name	Common name	Photo
<i>Dugong dugon</i>	Dugong	
<i>Chelonia mydas</i>	Green turtle	
<i>Scylla serrata</i>	Mud crab	
<i>Triaenodon obesus</i>	Whitetip reef shark	
<i>Holothuria whitmaei</i>	Black teatfish	



<i>Lates calcarifer</i>	Barramundi	
<i>Protonibea diacanthus</i>	Black jewfish	

## APPENDIX C: EXAMPLE AWARENESS AND EDUCATION MATERIALS

Turtle Foundation: Indonesia Program: <https://www.turtle-foundation.org/en/program-indonesia/>  
And turtle shell trade campaign: <https://youtu.be/pbc5HaDofb8>

Coral Reef Restoration Program Indonesia: <https://www.ser-rrc.org/project/nusa-islands-coral-reef-restoration-project-bali-indonesia/> Nusa Penida restoration project:  
<https://www.youtube.com/watch?v=loTISiTCqXo>

Coastal Conservation and Sustainable Livelihoods through Seaweed Aquaculture in Indonesia: A Guide for Buyers, Conservation Practitioners, and Farmers  
[https://www.nature.org/content/dam/tnc/nature/en/documents/Indonesia\\_Seaweed\\_Guide\\_FINAL.pdf](https://www.nature.org/content/dam/tnc/nature/en/documents/Indonesia_Seaweed_Guide_FINAL.pdf)

## MANGROVES & ECOTOURISM

Mangrove-based ecotourism is being applied to generate income and employment for local communities and for outreach and education purposes. Mangrove ecotourism activities include a guided tour in the Mangrove Education Centre, boat tours, board walks, bird watching, historic and cultural walks, fishing, meeting with locals, etc.

Mangroves in Suriname host many of these unique species and provide a great opportunity to develop eco nature-based tourism.

### What a unique experience to have!!



*Eco-tour guides are increasing their skills in order to attract nature tourists to explore the fascinating and tranquil mangrove ecosystem and its wildlife*



## The Centre of It All



The Mangrove Education Centre in Coronie is the focus of many activities, such as eco-tour guide training, or helping children, students, tourists, researchers understand the true value of this wonderful ecosystem.



*A taste of Coronie's culture: blending the old with the new!*

Please join our Coronie Mangrove Tours and enjoy the activities.

Tour Options: Half or full day tours

CONTACT INFO:  
Mangrove Education Centre Coronie  
Tel.: 0235238



The SRJS Programme is financially supported by the Dutch Ministry of Foreign Affairs (DGIS)

## MANGROVES

"Givers of Life"



Supporting & Sustaining  
Our Coastal Community in Coronie





# Are we finding it hard to catch fish

Is there a problem with our marine resources?



**O**ur marine resources provide our homes with food and money. Many communities have overharvested their marine resources. What about us?

Are we catching less?

Are we catching only smaller sizes because the bigger ones have disappeared?

Are commercially important marine animals hard to find?



## MAJOR CAUSES OF REDUCED CATCHES INCLUDE:

- More people fishing and catching too many fish
- Using modern or illegal fishing gear that catch small fish or make it too easy
- Catching fish before they have had time to breed
- Destroying areas that are important to fish such as coral reefs, seagrass beds and mangroves
- Activities on land such as logging or farming that can affect the sea through rivers and runoff

## HOW CAN WE START?

We should discuss in our communities whether we can see signs of overfishing. If so are there things we can DO NOW? What about the management rules to the right?

We must get everyone in the community involved.

We also need to make other people aware of the need to manage and protect our marine resources and important marine habitats. We can distribute this poster and other information in clinics, schools, churches and other places where people congregate. We can discuss common problems – say in radio interviews and at public meetings. We can also seek assistance from national authorities or NGOs.

**The most effective management of our marine resources (including mangroves, lagoons and coral reefs) will need us to all work together and take action!**



## WE MUST ACT NOW BEFORE IT IS TOO LATE

Most of the reductions in fish catch are caused by humans – that is why we have to manage our marine resources. We have to have rules or regulations to protect our marine life and the places in which they live. National fisheries authorities and departments impose rules to help keep this important food and income coming in and we must support them. A marine ecosystem that collapses is difficult to revive again.

**Some rules can be made by our local communities. We can:**

### ▶ Protect plant-eating fish

Some fish, such as parrotfish, unicornfish and surgeonfish eat seaweeds that would otherwise over grow coral reefs.

### ▶ Protect watershed areas

Seek government support to reduce sediments and nutrients running off the land; these cause damage to many marine habitats.

### ▶ Protect habitats

All species need places to eat, live and grow. Some species use different habitats in different parts of their lives. Important habitats include coral reefs, seagrass beds and mangroves.

### ▶ Leave sleeping fish

Ban underwater torches and spears at night when fish are sleeping.

### ▶ Leave small fish & shellfish

Allow individuals to breed at least once before they can be caught.

### ▶ Leave some big fish & shellfish

Larger individuals produce many more eggs. Protect or leave some of the large fish so they can continue to reproduce and provide fish for us to catch.

### ▶ Establish no-take areas

Set up areas to protect fish habitat (coral reefs, seagrass beds and mangroves). No-take areas may allow fish catches in nearby areas to eventually improve.



When you want a coconut, you don't chop down the whole tree.



So, when you want a fish, DON'T kill the whole reef.

### ▶ Ban damaging fishing methods

People using poisons and explosives are destroying our coral reefs and the marine life which depends on them.

### ▶ Ban or reduce fishing on spawning fish

Ban fishing at times and in areas where fish are known to gather to spawn.

### ▶ Ban small mesh net fishing

Restrict the length of gill nets used. Limit the number of fish traps or fish fences.



There are many other actions we can take. Not all of the above measures are appropriate for all species. A series of information sheets produced by SPC ([www.spc.int](http://www.spc.int)) and LMMA ([www.lmmanetwork.org](http://www.lmmanetwork.org)) is available. Each individual information sheet should be consulted for the management options that are appropriate for specific species.



For further information, or to obtain copies of this poster and the SPC/LMMA Information kit for fishing communities, contact:







# Why do we have size limits in fisheries?

- To allow fish and marine species to breed before they are caught, so that we have more to catch, sell, share and eat



**Don't fish!**



**Let it grow!**

**OK!**

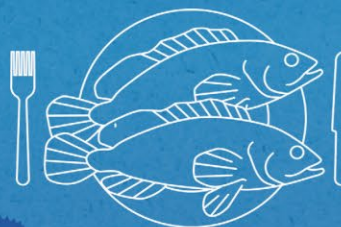


Minimum size limit

For some species, protecting the smaller fish from fishing allows them to get large enough to spawn



Catching the right size means more fish for tomorrow



- To keep our fisheries sustainable, respect rules and regulations

Fisheries agencies develop management regulations to ensure that the marine life you are dependent on continues to sustain your communities.

Community action through co-management arrangements with fisheries agencies can assist in ensuring that your marine environments remain productive for you and your community.



Pacific  
Community  
Communauté  
du Pacifique







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