



# MAINSTREAMING CLIMATE CHANGE INTO LOCAL ASSESSMENTS AND PLANNING

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## Local Case Studies

This report is prepared by Johanna Johnson, C2O Consulting for The Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project.  
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# MAINSTREAMING CLIMATE CHANGE INTO LOCAL ASSESSMENTS AND PLANNING

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# PART A: APPLICATION OF THE GUIDE FOR FACILITATORS TO LOCAL MANAGEMENT

## INTRODUCTION

Understanding vulnerability to climate change provides insight into which parts of the system are most likely to change, what is driving these potential changes, and how conservation and management actions can minimise impacts and maximise resilience. Assessing the vulnerability of species, ecosystems and resource-dependent industries to climate change is a critical step to identify effective adaptations and prioritise management that enhances resilience.

The vulnerability of communities, particularly those dependent on natural resources such as fishing communities, is driven by a combination of external and internal factors. Not all these factors are climate related, and many relate to social, economic, biophysical, institutional, and governance factors that can limit people's ability to be resilient in the face of change and maintain food security and sustainable livelihoods. Climate change projections are often at larger spatial scales, such as the ATS region, are focused decades in the future, and exacerbate existing pressures. Therefore, the ability to localise climate change information in a useful way that can inform community-level decisions and planning is critical for effective adaptations that support community resilience.

The Arafura & Timor Seas (ATS) regional climate change vulnerability assessment (Johnson et al. 2021a) identified species, habitats and fisheries that are vulnerable to future climate change, and hotspot locations of vulnerability. The ATS region however is large with high spatial variability in vulnerability, ecosystem goods and services and resource use, meaning that regional-scale assessments need to be translated or down-scaled to local scales. A Guide for Facilitators (Johnson et al. 2021b) was developed to provide decision-support tools for managers and/or NGOs as facilitators working with communities to use the regional results to inform local assessments.

Two case study sites were selected to test the Guide for Facilitators at a local scale and determine its effectiveness at down-scaling the regional climate change vulnerability assessment results to local planning and management. The sites were Oeseli village in Rote Ndao District, Indonesia (Figure 1) and Viqueque on the south coast of Timor-Leste (Figure 2). Oeseli village was a full case study that applied all steps from the Guide for Facilitators, used the templates provided and developed a community action plan (see Part B). While Viqueque was a 'light touch' case study, where the results of the regional climate change vulnerability assessment were integrated into the red snapper Ecosystem Approach to Fisheries Management (EAFM) Plan developed for the south coast of Timor-Leste (Fishwell Consulting 2021).

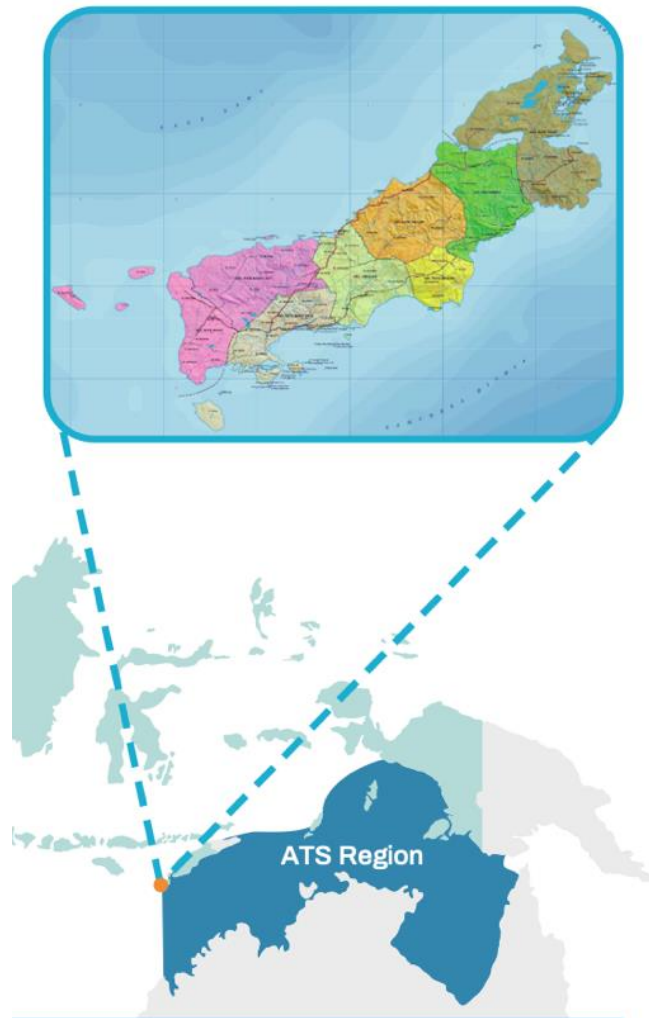


Figure 1. Rote Ndao case study site in Indonesia (Source: ATSEA2 Project)



Figure 2. Viqueque case study site on the south coast, Timor-Leste (Source: ATSEA2 Project)

## OBJECTIVES

The regional assessment of climate change vulnerability provided the foundation for understanding and mainstreaming climate considerations into local planning and management. However, the results cannot be easily downscaled or localised to provide location-specific information. Therefore, the Guide for Facilitators (the Guide) was developed to provide clear steps and tools for practitioners to facilitate a community process that draws on the regional results to inform local management and planning.

The objectives of this project were to trial the Guide in two different ways, to:

1. determine how effectively it can facilitate a local assessment process to develop a community action plan,
2. evaluate how easy the tools and templates provided are for NGOs and practitioners to use, and
3. suggest improvements to the Guide for future application.

## APPROACH TO THE CASE STUDIES

The two case studies were conducted using different methods, based on the current circumstances and activities of the ATSEA-2 Project at the sites. Due to the extensive fisheries management planning in south coast Timor-Leste (including Viqueque) to develop an EAFM Plan for red snapper and a rights-based approach to small-scale red snapper fisheries management (Fox et al. 2021), it was decided that a 'light touch' approach would be used. While for Oeseli village in Rote Ndao, Indonesia, current national and sub-national management initiatives were established and could complement the local assessment. Therefore, Oeseli was selected as the primary case study site and the approach was a full trial of the Guide.

### Viqueque case study

The results of the regional climate change vulnerability assessment were interpreted for Timor-Leste as an abbreviated Step 2 of the Guide to provide a summary of results and key recommendations (Attachment A) specific to habitats and coastal fisheries in south coast Timor-Leste (Figure 3). This enabled the regional information to be down-scaled and incorporated into the south coast Timor-Leste EAFM red snapper planning process and informed the development of several actions in the plan, which was an adapted Step 3 (Fishwell Consulting 2021). For example:

- The impacts of climate change on the red snapper fishery in Timor-Leste were directly drawn from the regional assessment and were a priority issues to be addressed by the EAFM Plan.
- The second objective of Ecological Goal 1 focused on climate change impacts.

**Ecological Goal 1:** Marine and coastal ecosystems in the Timor Sea under Timor-Leste's jurisdiction are protected.

Objective: Maximise resilience of the fishery against climate change impacts.

- The inclusion of overfishing indicators in the EAFM Plan based on the regional recommendations, with a consistent approach to existing initiatives in Indonesia (e.g. Mous et al. 2021).



Figure 3. Red snapper fisheries in south coast Timor-Leste, with mainly local small-scale fishers (Source: Fishwell Consulting 2021)

- The inclusion of high priority specific management measures focused on climate change impacts on coastal ecosystems and fisheries.

G1O2M1: Review and assessment of habitat status in relation to climate change vulnerability

G1O2M2: Assess possible impacts of climate change on agricultural production to understand where fishing pressure is likely to increase (e.g. as a result of reduced crop productivity)

G1O2M3: Develop local management actions for species with high vulnerability to climate change impacts

In addition, the Timor-Leste Ministry of Fisheries (MAF) were collaborators on the EAFM Plan and were very supportive of incorporating long-term climate change implications. The Timor Leste summary climate change vulnerability assessment results were shared with MAF and fishing communities during the planning process, and general agreement was reached that the relevant recommendations would be included in the EAFM Plan. While prioritisation and implementation of actions in the EAFM Plan are yet to be defined and confirmed (Steps 4 and 5 in the Guide),

there is ownership of the climate change actions by government and fishers, and an opportunity for effective and coordinated implementation under the ATSEA-2 Project.

The scaling up of the rights-based approach did not have the scope to draw on the regional climate change vulnerability assessment results specifically, and this could be enhanced in the future. However, the initial engagement with the Viqueque fishers provides a foundation for participatory planning using the Guide to include local climate change actions when meaningful discussions on implementation commence.

Notably, both the red snapper EAFM Plan for the south coast of Timor-Leste and Rights-Based Approach Plan for small-scale red snapper fisheries have been able to incorporate the regional climate change vulnerability assessment results and make them meaningful at a local scale. In particular, there are specific objectives and actions in the EAFM Plan that were informed directly by the regional recommendations and provide a climate and long-term focus for the plan. This could not have been possible without the down-scaled summary interpretation of these for south coast Timor-Leste. A continued focus on the climate change implications for fisheries in Timor-Leste and specifically Viqueque can support effective implementation of local actions that build resilience of fisheries and communities to climate change. Given the foundational engagement that has occurred in Viqueque, it could be a suitable site for applying the Guide for Facilitators more comprehensively, particularly the final Steps 4 and 5.

### Oeseli case study

A local consultant team, Kertabumi, was appointed to trial the Guide in Oeseli village by applying all steps and developing a community action plan (Attachment B) with communities, which is detailed in Part B. This full application of the Guide has provided important insights into how effective and easy the Guide is for local facilitators to work with communities, and identified important improvements and supplements. Notably, the Kertabumi team demonstrated that with two visits and strong community engagement, the Guide is effective at facilitating a local assessment process to develop a community action plan, and the tools and templates are relatively easy to use. The 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.

A number of improvements and supplements were identified by Kertabumi, including the need for specialist expert support once issues are identified by community (Step 3) to ensure they can be guided through solutions identification, and the addition of a monitoring step to the Guide to support communities evaluate whether their action plan is being effective at minimising impacts and enhancing resilience. These, as well as other improvements, are detailed in the section below.

## LESSONS LEARNT

The application of the Guide at Oeseli village provided a range of lessons that will be used to reflect on the utility of the Guide for developing local community action plans that draw on the regional results, and to improve the Guide. The detailed results of the Oeseli case study are provided in Part B, and the main output, the draft community action plan is at Attachment B. Some general learnings are outlined below.



While Step 1: site selection is included in the Guide as part of the process that local facilitators will follow, the trial demonstrated that it most likely will occur at a strategic or higher-level and therefore before a local NGO or consultant are involved. For example, the selection of Oeseli village and Viqueque as case study sites was conducted by the ATSEA-2 Project team prior to Kertabumi being engaged. This needs to be clearly explained in the updated Guide.

And important component of applying the Guide is the selection of suitable local consultants to facilitate the planning process with communities, which needs to consider a number of important factors. Primarily, the consultants should be **familiar with the local site or District** so they can relate to the community and are able to spend extended periods in the community conducting immersive and assessment processes. Secondly, the local consultants should be **experienced at conducting community participatory processes** whereby they guide 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. Thirdly, while ideally the local consultants would have **knowledge of and expertise in a relevant field**, such as fisheries, natural resource management or climate change adaptation, it is not essential for successful application of the Guide. Step 3 provides a suitable selection of example actions and any information gaps can be addressed using external expertise or the additional resources that will be included in the updated Guide.

## RECOMMENDATIONS

The recommendations below reflect the observations of the Oeseli case study research team:

- Technical advisor: Dr Johanna Johnson
- Team leader: Ikbal Alexander
- Co-team leader: Rizqan Adhima
- Team members: Enci, Fikro, Adit, Roland, Rosana
- Documentary team: Sabila Nurbayani, Ferdi Prawiradinata

As well as discussions and debriefs held with the ATSEA-2 Project team, and with Fishwell Consulting for the Viqueque ‘light touch’ case study. They will be reflected in the updated Guide and supplementary material.

### Improving the Guide

The following improvements to the Guide are proposed:

- Step 1 is strategic and high-level and may occur before local NGO/consultant are involved. This should be clearly stated in the Guide as well as the inclusion of a definition of a site being 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 on management”*.
- An element of revisiting or refreshing results after each step and before beginning the next step will be added to guide facilitators to make links between steps. This is particularly important between Steps 3 and 4 and Steps 4 and 5, where each subsequent step builds on the previous and its important that communities are comfortable and familiar with the outcomes of the previous step before proceeding.

- A level of expert guidance or resources are needed once issues and adaptations are identified in Step 3 and prioritised in Step 4 by community. The local facilitators may not always have this expertise in all topics (e.g. fisheries, marine resource management) and therefore information will be added to Steps 3 and 4 suggesting that facilitators have access to technical expertise or resource materials to assist them during the discussions with communities in this step. The additional resources are detailed below in Supplementing the Guide.
- The flexibility of the Guide in terms of the order that steps are applied and the participatory methods used is a key strength and this will be highlighted and explained further. The ability of facilitators to tailor the steps and methods to the local context and select participatory approaches that are most suitable is an important element to include in the explanatory notes.

### Supplementing the Guide

To support local facilitators, **awareness materials on common issues** and themes will be added to the Guide as appendices to be used when relevant. These include fact sheets on the summary climate change vulnerability results for Timor-Leste and Indonesia, marine turtle conservation, importance of seagrass and mangrove habitats for fisheries, sustainable fishing practices, seaweed farming, eco-tourism and other relevant materials. These resources are already available for the ATS region and will provide options for future facilitators to support Steps 3 and 4. In addition, a link to the videos from Oeseli village as an example of how the Guide is applied and the development of a community action plan will be provided.

**Monitoring** to assess whether the community action plan is achieving its objectives and local actions are addressing impacts is an important element of implementing any plan. This is a significant activity, that may require communities to either be trained in monitoring techniques or to collaborate with NGOs conducting monitoring (e.g. Reef Check). While developing a community action plan is a significant and important process, a number of barriers to successful implementation exist, including difficulty in monitoring success of actions because of low capacity and large areas, and poor community compliance with management rules and enforcement. This is therefore not a simple addition to the Guide but likely a supplementary component that either draws on existing monitoring initiative in the local area where they exist or provides simple methods for communities to carry out their own monitoring and use results to determine management success (e.g. Community Marine Monitoring Toolkit). So while the updated Guide will refer to monitoring the success of community actions, it will not prescribe how.

Another important element of successfully implementing a community action plan is raising awareness through the community and nearby communities that share the same natural resources so they know about the management actions and respect the rules. **Education and awareness programs** are consistently identified as an important support mechanism in strengthening community management efforts. Such programs will require support from government and other agencies, or may be incorporated into existing awareness campaigns. The updated Guide will refer to education and awareness about the community action plan, but it will not prescribe how.

## CONCLUSIONS

The application of the Guide for Facilitators to local management through two case studies has shown that it can supplement existing planning initiatives (e.g. EAFM) or can be used as a complete process to develop a community action plan. The results of the regional climate change vulnerability assessment are able to be down-scaled to be meaningful at local scales and inform the participatory community process. While many of the actions that communities identify aim to address current issues that are the consequence of overexploitation, development or other non-climate stressors, the fact that climate change will exacerbate these existing issues is a key consideration for incorporating climate information now. The Guide provides a tool for both climate and non-climate pressures to be considered together and actions that address both identified. Importantly, with some minor improvements and additions, the Guide has utility to be applied in other sites of the ATS region and potentially more broadly.

## PART B: LOCAL CASE STUDY: ROTE NDAO

The Arafura and Timor Seas (ATS) region is shared by Indonesia, Timor-Leste, Australia and Papua New Guinea (Figure 4). 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 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.



Figure 4. Map of the Arafura and Timor Seas region shared by Indonesia, Timor-Leste, PNG and Australia. (Source: ATSEA)

An analysis under ATSEA-1 (ATSEA 2012) found that the combined pressures of climate change, unsustainable harvesting, destructive fishing practices, illegal unreported unregulated (IUU) fishing, and bycatch are having significant impacts on marine habitats and species in the ATS region. Particularly on globally threatened coastal marine megafauna including migratory, rare, and threatened species of turtles, dugongs, seabirds, shorebirds, sea snakes, cetaceans, sharks and rays. Almost 78% of fisheries in the Northern Australian LME are considered fully exploited and 18% overexploited (Sherman 2014). Marine pollution is also a threat to ecosystems in the region, with sources of marine pollution in the region including marine debris, inputs from oil and gas activities, land-based runoff from coastal development (Brodie et al. 2019), and waste from fishing and shipping vessels.

Due to global climate change, the Arafura and Timor Seas 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 (Cheung et al. 2016, Golden et al. 2016, Lam et al. 2016), including around Rote Ndao, which is impacting food security and livelihoods.

The regional climate change vulnerability assessment (Johnson et al. 2021a) found that for many of the fisheries species assessed, a consistent driver of vulnerability in the Indonesia/Arafura and Timor Sea sub-regions was their status as overfished or undefined (potentially overfished). Some of the species that were assessed as highly or moderately vulnerable to climate change were black teatfish, mangrove red snapper, barramundi and mud crab. These species, as well as species of conservation interest also assessed as vulnerable (e.g. marine turtles, wedgefish and dugong), are important for food, income, ecosystem function and local culture, and changes to their populations will impact local communities.

In the Oeseli area, mangrove forests, seagrass meadows, shallow coral reefs, deep reefs (> 25 m) and pelagic ocean habitats are present. Communities depend on marine resources for food and livelihoods, with many people working as fishers, seaweed farmers and tour guides for local tourism (e.g. sightseeing, snorkelling and diving). Fishers target a wide range of fish and invertebrate species, but prefer to target black teatfish, lobster and red snapper as they have high market value. While fishing pressure is high on these high-value species, they are not protected, and only marine turtles, wedgefish, trochus and sharks are protected species. Maintaining the structure and function of marine ecosystems is vitally important to the continuation of these industries supporting local livelihoods, as well as local food security and therefore understanding the implications of climate change at a local level is key to future sustainability.



Village hall in Oeseli, Rote Ndao, the site of the local climate change case study

PHOTO BY IKBAL ALEXANDER, KERTABUMI



Drying seaweed in Oeseli village, Rote Ndao, before selling at market

PHOTO BY IKBAL ALEXANDER, KERTABUMI

## CASE STUDY SITE

The Guide for Facilitators has a five-step process for developing a community management (or action) plan. In step 1, Oeseli village was selected as the primary case study site based on the following factors:

- Local stewardship – local communities had established local wisdom called “Hoholok/Papedak” to monitor agriculture and fisheries activities and are willing to participate in a local assessment process.
- Local management readiness – the site was already the focus of national (Savu Sea National Park) and sub-national (monitoring and evaluation of ecosystem and effective management are conducted by the MPA authority) management initiatives that can complement the local assessment.
- Local values – the site has migratory corridors, including a potential area of ocean manta ray migration and in the south of Rote Ndao an area for whale migration, which are also internationally listed species.
- Current threats – Oeseli had experienced a range of recent threats, including an oil spill in 2009 and cyclone Seroja in early 2021 that have impacted ecosystems and people.
- Climate change exposure – with Rote Ndao being a hotspot for coral reef vulnerability and many species of fish and invertebrates that communities depend on for food and income, e.g. red snapper, black teatfish.
- Local motivation – strong desire from the community to address key threats to food security and livelihoods, particularly seaweed that is important for livelihoods and marine capture fisheries that are important for food security.

Other factors that were also considered when selecting the site include the high dependence of communities on marine resources, such as red snapper and seaweed; local government has prioritized programs in the area and is supported by BKKPN Kupang (national Ministry of Marine Affairs and Fisheries); and capture fisheries production and seaweed production data show declines. This case study will test the utility of the Guide in Oeseli village to develop a community action plan, and improve the practical tools in the Guide.

## SUMMARY OF CLIMATE CHANGE VULNERABILITY FOR OESELI, ROTE NDAO

Climate change is affecting the Arafura and Timor Seas region. Warmer air and sea temperatures, ocean acidification, sea-level rise, changing rainfall patterns, and more intense storms are starting and will continue. These climate-driven changes will impact marine ecosystems, species and fisheries that communities depend on.

Coral reefs, seagrass meadows and mangrove forests are all expected to be impacted by climate change. Vulnerability of all marine habitats in the region varies by location. Hotspots of vulnerability to climate change were identified around Rote Ndao with poor management and many non-climate pressures exacerbating this vulnerable and therefore immediate local action is important.

Coral reefs on the south coast of Rote Ndao have high to very high vulnerability to future climate change, particularly sea surface temperature increase and ocean acidification (Figure 5). Around Oeseli, coral reefs have high vulnerability. The range of potential impacts means that shallow coral reefs are expected to change, with declining coral cover and diversity and more macroalgae, resulting in less habitat for fisheries species, such as reef fish and sea cucumbers. Changing conditions may also impact seaweed farming, particularly increasing sea temperatures and stronger storms.

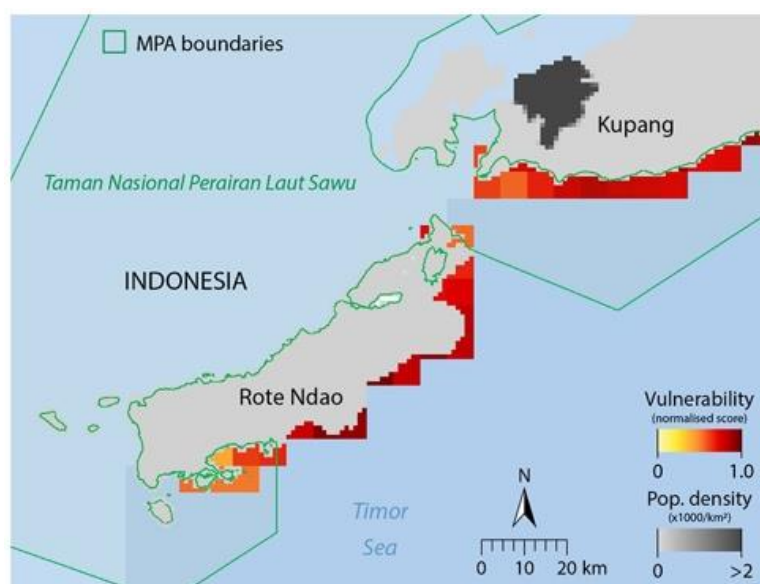


Figure 5. Map of the coral reef climate change vulnerability hot spot around Rote Ndao and Oeseli (Source: Johnson et al. 2021a)

In the region, increasing sea temperature, rainfall changes that will drive more land-based sediment and nutrient runoff to coastal areas, and sea-level rise will drive seagrass vulnerability and change (Figure 6). Around Oeseli, seagrass are moderately vulnerable to climate change, and climate-driven changes are expected to impact the condition and area of seagrass and the fish and invertebrates they support.



Figure 6. Map of the seagrass climate change vulnerability hot spot around Rote Ndao and Oeseli (Source: Johnson et al. 2021a)

Future sea-level rise and poor current conditions are the main drivers of vulnerability. There will be physical barriers to mangrove inland migration in locations with widespread coastal development and infrastructure as sea level rises. Ultimately, these climate-driven changes are expected to impact the condition and area of mangrove forests in the region.

Many species of fish, invertebrates and megafauna are vulnerable to climate change. Vulnerability of species in the region varies by location. Species currently overfished or with poor management and many non-climate pressures are most vulnerable and need immediate local action. In the Arafura Sea-Indonesia region, black teatfish, barramundi, green turtle, hawksbill turtle, mangrove red snapper, wedgefish, mud crab, dugong, yellow-spotted rock cod, and trochus are the most vulnerable to climate change.

### LINKING THE REGIONAL RESULTS TO THE CASE STUDY

Understanding the sources of vulnerability can help managers and communities to prepare for and respond to climate-driven impacts and identify effective and targeted adaptation measures. Regional vulnerability results were combined with local knowledge to identify targeted local actions through the steps in the Guide (Figure 7). Habitats and species important for local food and income were a key focus for local action. Developing the community action plan for Oeseli village involved extensive discussions by community groups to identify and agree on local actions that can minimise the vulnerability of marine resources that they depend on for food and livelihoods.



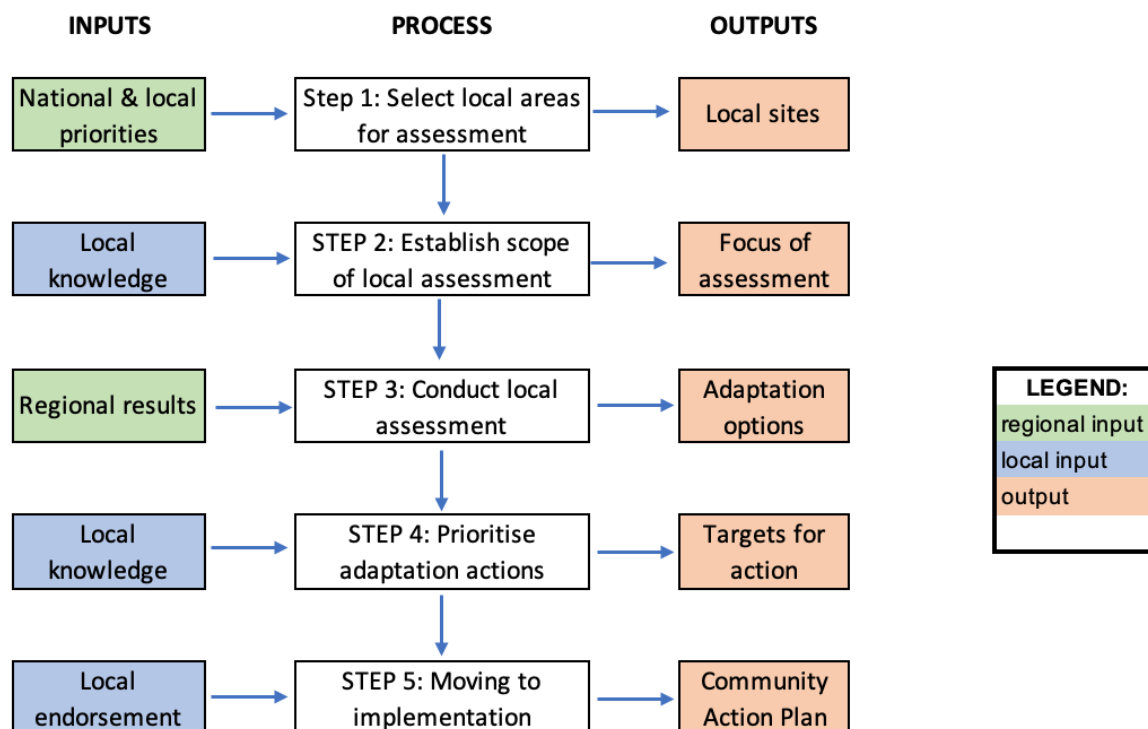


Figure 7. The links between the regional results and local assessment for all steps in Guide to conduct a local assessment and develop a community action plan.

The regional assessment results for habitats were used as discussion points for community participatory activities, where those habitats existed in the local area and were considered important or damaged. For example, in Oeseli, communities recognised that coral reefs have been damaged by dynamite fishing and are now degraded and do not provide shelter for fish. The regional vulnerability assessment had identified coral reefs as highly vulnerable to climate change, with one of the main drivers being poor current management and poor condition. Local knowledge validated this finding, and provided greater detail on what had caused much of the damage (dynamite fishing), as well as some of the challenges in implementing effective management. For example, there was anecdotal evidence of people from outside the village not respecting local resources or rules, and a reluctance of people to report poor fishing or other practices because they are family. These local insights were linked to the regional results, confirming the findings, and used to identify suitable actions that can address the specific issues.

Similarly, using the sub-regional species vulnerability rankings helped identify species to focus on for local action, with the highly vulnerable species being the focus of community discussions and planning. The sub-regional assessment results provided discussion points for community participatory activities, supplemented by local knowledge about fishing practices that are driving vulnerability (e.g. poaching), fishery species status (i.e. fishers have to travel further to catch those particular fish, which could indicate a declining stock), and used to identify suitable actions that can address the specific issues (Figure 8). The more vulnerable species from the regional assessment were also those that are high-value for fishers, so this helped prioritised them for local action in the community plan.

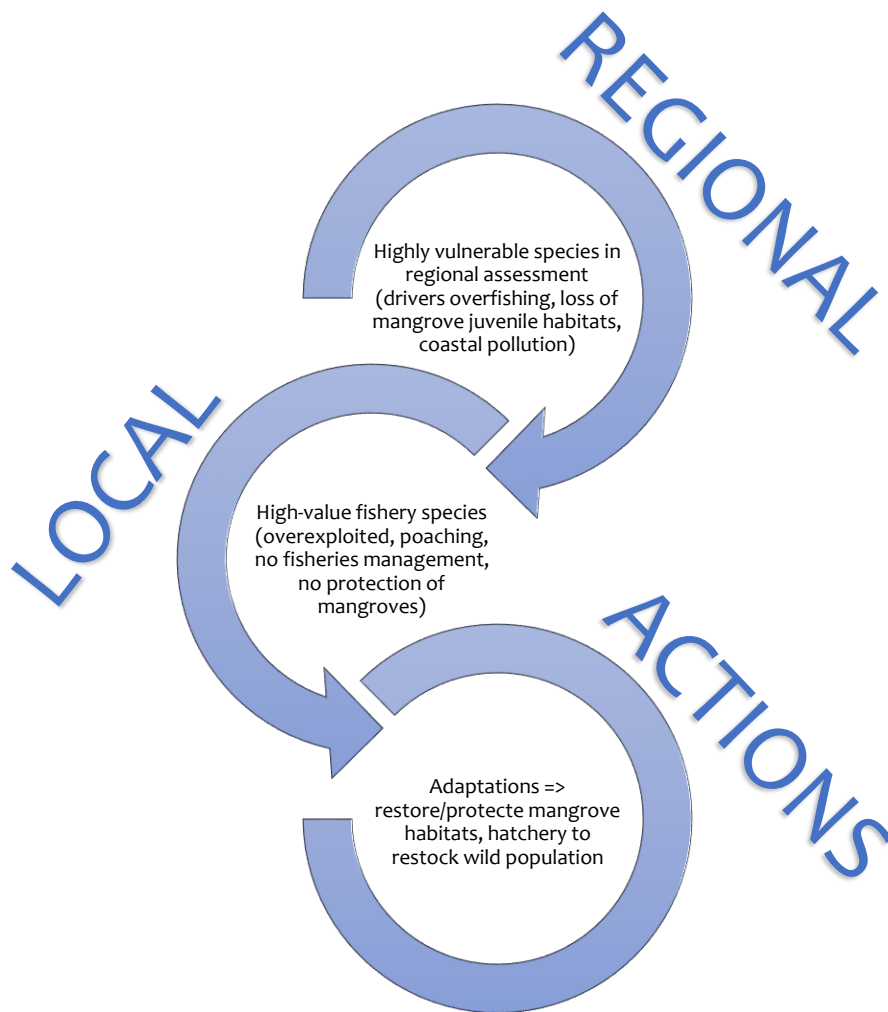


Figure 8. Links between regional results, local knowledge, and adaptation actions

## CASE STUDY METHODS

While the regional climate change vulnerability assessment provides insight into the potential impacts and vulnerability of habitats and species to climate change, and has provided some spatial results, local actions are best founded on local information. Assessing the vulnerability of a local area considers the habitats, species and target fisheries at the local scale and their importance for community food security and livelihoods. It draws on the regional results and local knowledge to select targets for action (adaptations) that address the drivers of climate change vulnerability at a local scale. The local actions particularly focus on natural resources (habitats and species) that are both vulnerable to climate change (from the regional results) and important to the community (based on local knowledge) for food, income and culture.

A Guide for Facilitators (Johnson et al. 2021b) provides a non-technical summary of the main regional climate change vulnerability assessment results and decision-support tools for managers and/or NGOs as facilitators working with communities to use to inform local assessments. The Guide provides processes for users to understand and share the regional vulnerability results and apply these at local scales. Thereby facilitating targeted and appropriate actions for implementation at the community level. For the Oeseli case study, the Guide was used by a local NGO – Kertabumi – over two visits to apply each step and develop a community action plan.

**Step 1** was the selection of Oeseli as the case study site and is outlined above.

**Step 2** established the scope of the assessment using a range of techniques – immersion, preliminary focus group discussions (FDG), visualisation, observations and surveys. During this step, the local context and scope of the assessment were completed in the Guide template, based on:

- Key local issues from the community perspective: (1) seaweed is infertile; (2) road is poor; (3) impact of an oil spill in 2009 on marine resources; (4) drought / lack of water source; (5) undeveloped potential for tourism; (6) reef has 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.
- Spatial area for the community action plan (and which habitats are important): Oeseli village covers a big area, including inland areas where people work as crop farmers. Based on the main issues identified and the needs of the community, the action plan focused on the coastal community and families that depend on marine resources (fishers, seaweed farmers, and tour guide) for their livelihoods.
- Participants for community planning process: Engagement with community members identified interested and willing participants, and established groups for the focus group discussions based on livelihoods – women seaweed farmers, fishers, youth, fish buyers and village officials. The discussions in step 2 to identify participants provided insight into how to design the assessment for the different group in step 3. The principle of the local assessment was the same for each group, but the focus and depth of discussions were adjusted based on each groups' knowledge and experiences.
- Timescale for the community action plan: This was not discussed as it was felt it would be different for different issues and would be considered during the planning process.

**Step 3** was conducting the local assessment to identify the vulnerable species and habitats that are relevant to local communities and inform adaptation options. It was the most in-depth and time-consuming step and used a range of techniques – participatory mapping, habitat vulnerability assessment, species vulnerability assessment, focus group discussions to identify actions for addressing key issues.

During this step, the local assessment was completed using the regional results and Guide templates to localise information to Oeseli village to:

- Identify the main habitats and species that are vulnerable to climate change and important for food or income, from each groups' perspective.
- Establish how the climate change impacts on habitats and species are relevant to people lives in Oeseli to propose potential local actions that would minimise impacts.
- Connect the actions from the different groups to review how aligned the community is and their willingness to implement local actions. This information supported facilitators to prepare for step 4 where local actions were prioritised.

**Step 4** was prioritising the adaptation actions identified in Step 3 based on effectiveness, acceptability, resource needs (cost and equipment), and feasibility (based on technical capacity needs). A range of techniques were used – ideation, clustering adaptations, effectiveness and acceptability matrix, resources and technical matrix, group selection of local actions and focus group discussions to choose priority actions.

During this step, prioritisation of adaptation actions was completed using the results of Step 3 and the Guide templates to:

- List actions from each group and evaluate the requirements for implementation based on effectiveness, acceptability, estimated cost and technical capacity.
- Prioritise adaptation actions to be implemented by community in a joint focus group discussion. While three actions were 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), all actions were included in the community action plan and Step 5.
- Identify local support and available resources for implementing actions. For example, youth will produce an awareness video to protect turtles with their own resources; village officials need technical support from district government to enact Village Law; and people have raised their interest to support eco-tourism (i.e. join socialisation and training, doing business, promotion).

**Step 5** was the development of a community action plan that outlines the vulnerability of habitats and species in the local area and how adaptation actions will be implemented. This step draws on all the outputs of Steps 2, 3 and 4. Additional follow-up using focus group discussions and fieldwork was used to develop the draft community action plan.

During this step, engagement with community focused on:

- Supporting the community and different interest groups in the village to create a detailed action plan that identified all actions to address current and future issues, key leaders and collaborators, place and time for actions, and resources needed. The community action plan also included monitoring, review and enforcement to strengthen implementation of the actions.
- Disseminating the results of the community action plan to district government and ATSEA-2 Project team for endorsement and implementation.

## CASE STUDY RESULTS

The Oeseli case study successfully trialled all steps in the Guide and developed a draft community action plan (Attachment B). The local consultants, Kertabumi, identified a number of benefits and challenges when implementing the different steps, and they are outlined in Table 1. Notably, a debrief or refresher was conducted between steps and between the two village visits, to ensure that all messages are clear and there are links between the steps. While specific participatory methods were used by Kertabumi, e.g. immersion, visualisation, focus groups, there are other suitable methods that could be equally as successful to facilitate the steps in the Guide. The flexibility of the Guide in allowing the specific participatory methods to be selected depending on the local community context is important for successful implementation and its utility in different locations and communities.

Table 1. Results of the case study in terms of the benefits and challenges for each step (Adapted from Kertabumi 2021)

OESELI CASE STUDY RESULTS		
GUIDE COMPONENT	BENEFITS	CHALLENGES
Step 1	Strategic process that draws a range of local and regional expertise and can be inclusive of a range of program staff, experts and local knowledge.	Likely to occur before the local consultants who will lead the facilitation are engaged and could exclude their input.
Step 2	<p>Immersion provides rich and deep contextual insights emerge from informal interaction; people have opportunity to ask about the objectives of the assessment and share their local context.</p> <p>Focus groups and visualization allow for insightful discussion – especially on challenges and issues with habitats and species. Opportunity to introduce climate change into the local context and show how its relevant to livelihoods, food and culture.</p> <p>Field surveys provide information on the current status and trends of natural resources (e.g. coral reefs, fish populations) and the scale of impacts.</p>	<p>Local consultants need to be fluent in local language (preferably) or national language (e.g. Bahasa Indonesia) and avoid a translator that would disrupt the flow of the process.</p> <p>Need to seek consent for voluntary participation.</p> <p>Field surveys can be time consuming and costly if they are to be representative of all the habitats and locations.</p>
Step 3	<p>Participatory mapping provides an interactive tool for participants that allows for debate and different perspectives.</p> <p>Map is used to tell the local story where dependencies, challenges, issues and opportunities can be shown.</p> <p>Habitat and species assessments led group to identify main challenges and share stories and observations.</p> <p>Using flash cards helps participants become familiar with all species and habitats, identify their importance through story and group similar issues or impacts (leads into Step 4).</p> <p>Translate main challenge into “How Might We” questions to ignite ideas for action.</p>	<p>Need to seek consent for voluntary participation.</p> <p>Facilitators need to be aware of group power dynamics to ensure equitable participations and that everyone can share their perspectives, with no individuals dominating discussion.</p> <p>Facilitators need to be familiar with natural resources in the area and possible links between issues/impacts and solutions (or have resources) to help guide participants.</p>
Step 4	<p>Focus group discussions in Step 3 can be shared to identify and discuss interconnectedness of issues.</p> <p>Ideation allows participants to share actions that they think will address each challenge/issue and encourages participants be creative and open to new ideas from others.</p> <p>Facilitators can add potential adaptations to enrich the discussion, making sure participants understand what it is if the action is new / unknown to their context.</p> <p>Matrix (effectiveness x acceptability; cost x technical capacity) provides an objective way to prioritise adaptations without any group or opinion being favoured.</p> <p>Participants sharing their reflections on the process and outcomes increases ownership.</p>	<p>Facilitators need to be familiar with natural resources in the area and possible links between issues/impacts and solutions (or have resources) to help guide prioritisation.</p> <p>Risk that unusual or ‘outlier’ actions will not proceed if other actions are more popular, need to ensure not to alienate new or unusual ideas as they may be a good potential adaptation.</p> <p>Participants might disagree when completing the matrix but debate is good to find the middle ground and seek general agreement.</p> <p>Facilitators have to manage the power dynamic between adult and youth, villagers and village officials to ensure equitable participation and that everyone has a voice.</p>

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Step 5	<p>Visualisation and planning implementation allows participants to revisit all possible adaptations to ensure they address challenges and ensure they are achievable.</p> <p>Field surveys with community can show any gaps between ideas and implementation in the field, and allow community to share their stories and experiences about the actions.</p> <p>Having government and NGO representatives participate in the discussion provides community with assurance that their voices are being heard and they can collaborate to implement actions.</p>	<p>Different village groups and government officials might have different ideas for potential adaptations, which need to be discussed and negotiated.</p> <p>Ensure selected adaptations address the main challenges that participants identified. Facilitators should highlight causality between problems and solutions.</p>
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An additional step that was added during the second visit to Oeseli village was the review of the three initial actions prioritised to consider a larger suite of local actions. The initial three actions did not necessarily address the eight main issues identified by the community, and therefore they needed to be revisited to ensure there were clear links between the issues and the actions that would be included in the community action plan.

An additional activity that is not in the Guide is engagement with children. The local consultants noticed that children (less than 10 years old) had been observing the sessions and asked them for their observations and opinions. The childrens' insights were surprising (and honest) and were represented in picture form (Figure 9).



Figure 9. Children’s drawings depicting their view of the issues in their village, including the recent cyclone, fathers leaving for a long time to fish far away and the impacts of storms on fishing (Source: Kertabumi)

**DISCUSSION & CONCLUSIONS**

A reflection on the community action plan developed for Oeseli using the Guide against the universal actions recommended in the regional climate change vulnerability assessment show some clear links and synergies. For example, the following actions were included in the Oeseli community action plan and were also recommendations for the ATS region:

1. Actions to address chronic pressures that compromise habitat condition and fishery populations, e.g. unsustainable fishing, IUU.
2. Protection of species of conservation interest (SOCI) requires special attention since some species of marine turtle were assessed as highly vulnerable in all sub-region.
3. Measures that restore, conserve and protect critical habitats, including coral reefs, mangroves and seagrass that are used by multiple species during their life cycles. Such measures may include: establishing protected areas, restoration of damaged habitats, prohibiting damaging practices and minimising clearing.

There remain strategic adaptations that are recommended at a regional or national scale, such as national fishery reforms for primary fisheries management, cross-jurisdictional management, standardised monitoring, and assessing potential land-use change implications on downstream marine environments. However, having actions across scales that are implemented locally, nationally and regionally are essential for long-term success in maintaining sustainable management in the face of climate change. A key role for regional programs such as ATSEA-2 will be coordinating a consistent approach for these strategic and spatially extensive actions.

For example, 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.

The full application of the Guide for Facilitators at Oeseli village in Rote Ndao District demonstrated how the Guide can link the regional climate change assessment results to local planning, and deliver a participatory and practical community action plan. All steps in the Guide were followed and tools used, although in some cases they were completed in different order and some steps had to be revisited with communities to ensure all information was considered and that actions addressed all local issues. The ability to reorder or revisit steps is a strength of the Guide, which allows facilitators to tailor the approach to the local context. Similarly, the Guide does not prescribe which specific participatory methods facilitators should use for each step but instead remains flexible and allows them to tailor the methods to the local context. This increases the utility of the Guide in a range of circumstances and local settings.

The lessons learnt from the application of the Guide in Oeseli as well as Viqueque in Timor-Leste have identified some important improvements and additions to the Guide (see Part A). These will not change any fundamental steps or outputs of the Guide but will improve its useability and ensure the community planning process is as comprehensive as possible.

## **RECOMMENDATIONS FOR APPLICATION OF THE GUIDE**

The updated Guide has great utility to be used in other local areas in the ATS region and potentially more broadly. Providing the criteria for selection or collaborating with local facilitators are followed, it can be incorporated into existing initiatives or be a targeted participatory process with communities. The Guide provides an effective tool for a bottom-up approach to local natural resource management, and integrates climate change implications with non-climate pressures. This allows for a range of adaptation actions to be identified that can address existing issues and minimise future vulnerability to climate change.

It is recommended that the Guide is best applied in local areas supported by existing resource management initiatives by provincial or district governments, and has an engaged community managing their resources. Implementation requires a committed community and support from government, and these foundational elements are key to selecting a suitable site (Step 1), developing a community action plan (Steps 2–4), and successfully implementing the plan (Step 5). Notably, monitoring the success of the community actions requires capacity building in communities or an existing monitoring program, and this should also be considered during the process. Consistent and standardised monitoring methods can support communities to measure



the effectiveness of their action plan. A suite (or toolkit) of standardised monitoring methods for a range of different ecological components would provide options for communities to select those components most relevant to their action plan (e.g. fish catch, reef health). Such a toolkit of monitoring methods would have utility throughout the ATS region and would be a useful addition to the Guide and the ATSEA-2 Project.

## REFERENCES

- ATSEA [Arafura and Timor Seas Ecosystem Action] program (2012) Transboundary Diagnostic Analysis for the Arafura and Timor Seas Region. Indonesia
- Bopp, L., Resplandy, L., Orr, J.C., Doney, S.C., Dunne, J.P., Gehlen, M., Halloran, P. et al. (2013) Multiple stressors of ocean ecosystems in the 21st century: projections with CMIP5 models. *Biogeosciences*, 10(10): 6225–6245. Available <https://doi.org/10.5194/bg-10-6225-2013>
- Brodie, J., Johnson, J.E., Waterhouse, J., Erdmann, S. (2019) Wastewater Pollution and Coral Reefs: Supporting Science. C2O (Coasts Climate Oceans) for the United Nations Environment Programme (UNEP).
- Cheung, W.W.L., Reygondeau, G., Frölicher, T.L. (2016) Large benefits to marine fisheries of meeting the 1.5°C global warming target. *Science*, 354(6319): 1591–1594. Available: <https://doi.org/10.1126/science.aag2331>
- Fishwell Consulting (2021) EAFM Plan for Timor-Leste South Coast Red Snapper Fishery. (ATSEA-2) Project, Bali, Indonesia. 51pp.
- Fox, M., Hidayat, T., Knuckey, I., Greenberg, N., Koopman, M., Ribeiro, L. (2021) Scaling up RBM in the ATS: Taking a rights-based approach to the management of small-scale red snapper fisheries in the ATS region. Report to the Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project, Bali, Indonesia. 68pp.
- Golden, C.D., Allison, E.H., Cheung, W.W.L., Dey, M.M., Halpern, B.S., McCauley, D.J., Smith, M. et al. (2016) Fall in fish catch threatens human health. *Nature*, 534: 317–320. Available: <https://doi.org/10.1038/534317a>
- Johnson, J.E., Welch, D.J., van Hooendonk, R., Tracey, D. (2021a) Assessing the vulnerability of the Arafura and Timor Seas region to climate change. Report to the Arafura and Timor Seas Ecosystem Action Program (Phase 2). C2O Consulting, Australia. 111pp.
- Johnson, J.E., Welch, D.J., Tracey, D., Susanto, H., Tania, C., Triani, D. (2021b) Guide for Facilitators: Using the Arafura & Timor Seas Climate Change Vulnerability Assessment Results. C2O Consulting, prepared for the Arafura & Timor Seas Ecosystem Action Phase II Program. Bali, Indonesia. 41pp.
- Jones, M.C., Cheung, W.W.L. (2015) Multi-model ensemble projections of climate change effects on global marine biodiversity. *ICES Journal of Marine Science*, 72(3): 741–752. Available: <https://doi.org/10.1093/icesjms/fsu172>
- Kertabumi (2021) Appendix 1: How Kertabumi used the Guide for Decision Makers. Supplement to Oeseli village, Rote Ndao, Indonesia, draft Community Action Plan.
- Lam, V.W.Y., Cheung, W.W.L., Reygondeau, G., Sumaila, U.R. (2016) Projected change in global fisheries revenues under climate change. *Scientific Reports*, 6: art:32607 [online] <https://doi.org/10.1038/srep32607>

Mous, P.J., Wawan B.I., Gede, Jos S. Pet (2021) Guide to length-based assessments of fisheries targeting snappers, groupers and emperors in Indonesia, with size composition of sampled fish. Yayasan Konservasi Alam Nusantara and People and Nature Consulting, Jakarta Indonesia.

Pörtner, H.-O., Karl, D.M., Boyd, P.W., Cheung, W.W.L., Lluich-Cota, S.E., Nojiri, Y., Schmidt, D.N., Zavialov, P.O. (2014) Ocean systems. In: C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee et al., eds. Climate Change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, USA, Cambridge University Press. pp. 411–484. (also available at [http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap6\\_FINAL.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap6_FINAL.pdf))

Sherman, K. (2014) Adaptive management institutions at the regional level: the case of large marine ecosystems. *Ocean & Coastal Management*, 90, 38-49.

## **ATTACHMENT A: TIMOR-LESTE RESULTS SUMMARY & RECOMMENDATIONS**

[See attached](#)

## ATTACHMENT B: OESELI COMMUNITY ACTION PLAN

[See attached](#)



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