Improving Climate Change Awareness in the Arafura and Timor Seas Region

13–15 September 2022 Workshop Resources

This report is prepared by Johanna Johnson, David Welch (C2O Pacific) and Ikbal Alexander (Kertabumi) for The Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project.
Bali, Indonesia, September 2022

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Suggested Citation:
Johnson, J.E., Welch, D.J., Alexander, I. (2022). Improving Climate Change Awareness in the Arafura and Timor Seas Region: Workshop Materials Report to the Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project, Bali, Indonesia. 14p.

Published by:
ATSEA-2 Regional Project Management Unit
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Denpasar 80224, Bali, Indonesia
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Printed in Denpasar, Bali, Indonesia

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BACKGROUND

The Arafura and Timor Seas (ATS) region is shared by Indonesia, Timor Leste, Australia and Papua New Guinea (Figure 1). The Arafura and Timor Seas (ATS) is part of the North Australian Shelf large marine ecosystem, which is a tropical sea lying between the Pacific and Indian Oceans. The region extends from the Timor Sea to the Torres Strait and western Papua New Guinea, and includes the Arafura Sea and Gulf of Carpentaria in northern Australia. The region is adjacent to the Coral Triangle, which hosts the world's highest marine biodiversity and contains some of the most pristine and highly threatened coastal and marine ecosystems. At the regional scale, the ecosystems of the ATS play an important economic and ecological role in the littoral nations bordering the Arafura and Timor Seas: Indonesia, Timor-Leste, Australia, and Papua New Guinea.

Figure 1. The Arafura and Timor Seas region shared by Indonesia, Timor Leste, PNG, Australia (Source: ATSEA)

ATSEA-2 is the 2nd phase of the GEF-financed, UNDP-supported ATSEA program, building upon the foundational results realized in the first phase of the ATSEA program, covering Indonesia, Timor-Leste, Papua New Guinea, and Australia. This 5-year project will support the implementation of the following governance and environmental objectives of the ATS regional Strategic Action Program: (i) Strengthening of ATS regional governance; (ii) Recovering and sustaining fisheries; (iii) Restoring degraded habitats for sustainable provision of ecosystem services; (iv) Reducing land-based and marine sources of pollution; (v) Protecting key marine species; and (vi) Adaptation to the impacts of climate change.

One of the ATSEA-2 project objectives is to improve understanding of climate change impacts on marine and coastal ecosystems, especially the impacts on fisheries that are critical for sustaining socio-economic development in the ATS region. As climate change impacts are expected to increase, affecting more and more people and disrupting infrastructure and ecosystems, it is imperative to educate national and local government planners and other decision makers, as well

as the general public, about the need to implement resilient strategies and to allocate sufficient resources for climate change adaptation and mitigation measures.

In working towards this, the ATSEA-2 project commissioned a climate change vulnerability assessment and a guide for decision-makers and facilitators (the Guide) for the ATS region in 2021. In addition, case studies applying the regional assessment results and the Guide were conducted for Oeseli Village, Rote Ndao, Indonesia and Viqueque, Timor-Leste. The case studies translated available scientific knowledge into specific and local adaptation strategies. This workshop is disseminating these outputs to ATS stakeholders to improve climate change understanding in the region and to raise awareness about the issues and relevant adaptation strategies.

WORKSHOP OBJECTIVE

Improve awareness of climate change and relevant adaptation strategies for the ATS Region.

LEARNING GOALS

The resources in this syllabus provide summary information for participants to support workshop sessions, as well as materials that will be used during interactive sessions in the 3-day workshop, which aims to deliver on four specific learning goals:

1. Improve understanding of climate change science and projections for the ATS region,
2. Raise awareness about relevant climate change adaptation strategies,
3. Disseminate results of the regional climate change vulnerability assessment and the Guide for Decision-Makers and Facilitators, and
4. Enhance capacity of participants to deliver the Guide and develop an adaptation plan.

The workshop includes a range of speakers (see Appendix A) who will deliver a progression of learning. Starting with an overview of climate change science and climate projections from the region and sub-regions, results of the regional climate change vulnerability assessment and observed changes and impacts from the sub-regions. Followed by training on the Guide for Decision-Makers and Facilitators and how it can be applied at the community level to develop an adaptation plan. The workshop agenda (see Appendix B) will be interactive and allows multiple opportunities for break-out group discussions to share knowledge and elicit feedback on the regional climate change vulnerability assessment results and the Guide.

The workshop also includes a pre- and post-test to measure participants level of awareness and knowledge about climate change science, climate projections for the ATS region and potential adaptation actions. The post-test will measure any increases in awareness and knowledge and remaining areas for future training. And a survey to elicit further input from participants about the information shared at the workshop, the effectiveness of the delivery, and any future topics for awareness training.

DAY 1: CLIMATE CHANGE SCIENCE AND PROJECTIONS FOR THE ATS REGION

BACKGROUND

One of the ATSEA-2 project objectives is to improve understanding of climate change impacts on marine and coastal ecosystems, especially the impacts on fisheries that are critical to sustaining socio-economic development in the ATS region. As climate change impacts are expected to increase, affecting more and more people and disrupting ecosystems and infrastructure, it is imperative to educate national and local government planners and other decision makers, as well as the general public, about the need to implement resilient strategies and to allocate sufficient resources for climate change adaptation and mitigation measures.

Global climate models (GCM) are the most common tool for climate change projections, however, their coarse spatial resolution (in the 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 depending on the climate variable. Projections of 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, ENSO, winds and waves, storms and cyclones at a regional scale (CSIRO Australia), and for solar radiation at a global scale (IPCC). The accuracy of these projections also varies among the different climate variables.

This workshop will provide a summary of the regional analysis of current climate change models and strategies within the ATS region and the outputs of scale-appropriate climate models for the ATS region (where available) using predicted climate variables that are expected to impact the region over the next 50 years (to 2070). Included is an overview of how coastal and ocean habitats are predicted to be influenced by climate change. The climate change projection data were used for the ATSEA-2 climate change vulnerability assessment, as a primary input for the 'exposure' component for assessing important fisheries and supporting habitats in the ATS region (covered on Day 2).

LEARNING GOALS

1. Improve understanding of climate change science and projections for the ATS region
2. Increase awareness of country efforts to tackle climate change in marine and fisheries sectors

WORKSHOP MATERIALS

- Pre-workshop test
- Presentations from climate technical specialists
- Breakout group worksheets

FURTHER RESOURCES

ATSEA [Arafura and Timor Seas Ecosystem Action] program (2012) Transboundary Diagnostic Analysis for the Arafura and Timor Seas Region. Indonesia

Hennessy, K., Lawrence, J., Mackey, B. (2022) IPCC Sixth Assessment Report (AR6): Climate Change 2022-Impacts, Adaptation and Vulnerability: Regional Factsheet Australasia.

IPCC [Intergovernmental Panel on Climate Change] (2022) Climate change 2022: Impacts, adaptation and vulnerability. IPCC Sixth Assessment Report [Pörtner, H.O., Roberts, D.C., Adams, H., Adler, C., Aldunce, P., Ali, E., Begum, R.A., Betts, R., Kerr, R.B., Biesbroek, R., Birkmann, J. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA.

IPCC [Intergovernmental Panel on Climate Change] (2019) IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, 755 pp. https://doi.org/10.1017/9781009157964

DAY 2: REGIONAL CLIMATE CHANGE VULNERABILITY ASSESSMENT AND RELEVANT CLIMATE CHANGE ADAPTATION STRATEGIES

BACKGROUND

Climate change is expected to have profound effects on the status and distribution of coastal and pelagic habitats, the fish and invertebrates they support and, as a result, the communities and industries that depend on them in the ATS region. To prepare for and respond to these impacts it is necessary to understand the sources of vulnerability and identify effective and targeted adaptation actions.

The vulnerability assessment focused on marine and coastal habitats and species in the ATS region important to communities, industries and governments of coastal nations in the region. There are four government jurisdictions in the ATS project region, and goal of the ATSEA-2 project is to deliver activities to those requiring regional support, namely Indonesia, Timor-Leste and PNG. The vulnerability assessment was conducted for five spatial sub-units in the ATS region – Indonesia-Arafura, Timor-Leste, western PNG, Gulf of Carpentaria and northwest Australia (Figure 2) – to deliver results relevant to the habitats, species and fisheries in those sub-units.

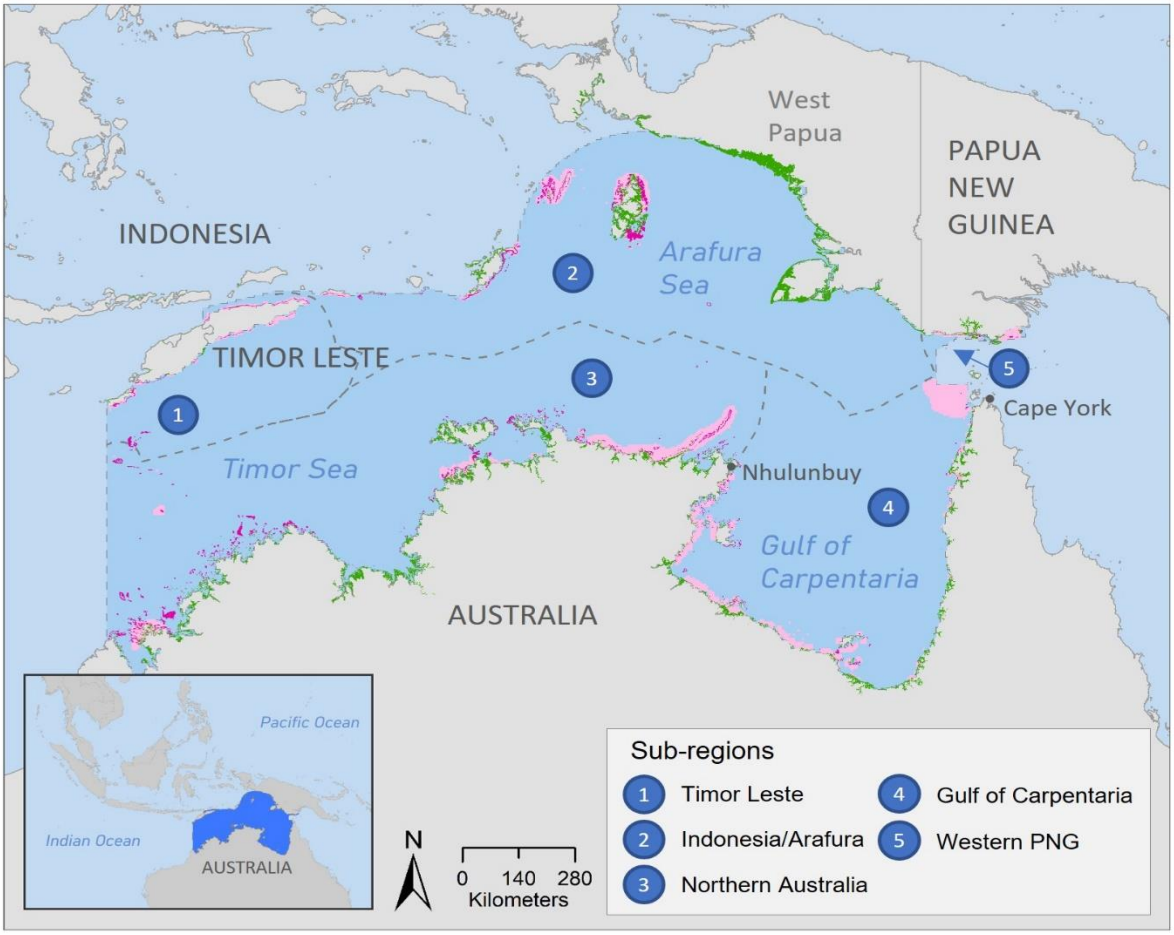

Figure 2. Five sub-units of the ATS region used for the climate change vulnerability assessment

Regional results of the climate change vulnerability assessment were spatially variable and identified coral reefs (shallow) as highly vulnerable to climate change, particularly in the Timor-Leste and Indonesia-Arafura sub-regions, with hotspots around Manatuto and Barique Municipality, Timor-Leste and Tual in the Arafura Sea. Drivers of this vulnerability are poor habitat condition, non-climate pressures, particularly land-based pollution that impacts water quality, and lack of management. Seagrass meadows were most vulnerable in the Gulf of Carpentaria due to a hotspot of sea surface temperature increase, Indonesia-Arafura due to low connectivity and other non-climate pressures, and Timor-Leste due to increases in sea temperatures, sea level rise and lack of formal management. Mangroves and estuarine habitats were most vulnerable in Timor-Leste and western PNG, with sea level rise, rainfall declines, poor current condition, low species diversity, low connectivity and lack of management key drivers of this vulnerability.

Species vulnerability was also spatially variable, with highly vulnerable and high priority species identified for each sub-region. A key driver of species vulnerability was their stock status, with many species in Timor-Leste, western Papua New Guinea and Indonesia, and several in northern Australia, either overfished or potentially overfished due to a lack of information. Lack of management in the northern sub-regions of the ATS, as well as other pressures such habitat loss, poor water quality and illegal, unregulated and unreported fishing were other key drivers. Species of conservation concern also tended to be assessed as highly vulnerable to climate change impacts, driven by their already threatened status and that they tend to be low productivity species that take many years to recover from impacts.

LEARNING GOALS

1. Disseminate results of the regional climate change vulnerability assessment
2. Increase awareness of relevant climate change adaptation strategies
3. Improve the use of information and enhance the ability to choose appropriate adaptation actions and policies

WORKSHOP MATERIALS

- Presentations from regional specialists
- Breakout group worksheets

FURTHER RESOURCES

Brugére, C., De Young, C. (2015) Assessing climate change vulnerability in fisheries and aquaculture: Available methodologies and their relevance to the sector. FAO Fisheries and Aquaculture Technical Paper 597. Food and Agricultural Organization of the United Nations, Rome, Italy.

Johnson, J.E., Welch, D.J., Tracey, D., van Hooidonk, R. (2021) 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.

Johnson, J.E., Welch, D.J. (2016) Climate change implications for Torres Strait fisheries: Assessing vulnerability to inform adaptation. Climatic Change, DOI: 10.1007/s10584-015-1583-z

Pacifici, M., Foden, W.B., Visconti, P., Watson, J.E., Butchart, S.H., Kovacs, K.M., Scheffers, B.R., Hole, D.G., Martin, T.G., Akçakaya, H.R., Corlett, R.T. (2015) Assessing species vulnerability to climate change. Nature Climate Change, 5(3), 215-224. DOI: 10.1038/NCLIMATE2448.

Pecl, G.T., Ward, T.M., Doubleday, Z.A., Clarke, S., Day, J., Dixon, C., Frusher, S., Gibbs, P., Hobday, A.J., Hutchinson, N., Jennings, S., Jones, K., Li, X., Spooner, D., Stoklosa, R. (2014) Rapid assessment of fisheries species sensitivity to climate change. Climatic Change, 127(3-4), 505-520.

Schroëter, D., Polsky, C., Patt, A.G. (2005) Assessing vulnerabilities to the effects of global change: an eight step approach. Mitigation & Adaptation Strategies Global Change, 10, 573-96.

Welch, D.J., Johnson, J.E. (2013) Assessing the vulnerability of Torres Strait fisheries and supporting habitats to climate change. Report to the Australian Fisheries Management Authority. C2O Fisheries, Australia, 114pp. DOI 10.13140/2.1.4002.3846.

Welch, D.J., Saunders, T., Robins, J., Harry, A., Johnson, J.E., Maynard, J., Saunders, R., Pecl, G., Sawynok, B., Tobin, A. (2014) Implications of climate change on fisheries resources of northern Australia. Part 1: Vulnerability assessment and adaptations. FRDC Project No: 2010/565 Report. James Cook University, Townsville, 236pp.

DAY 3: GUIDE FOR FACILITATORS AND DECISION-MAKERS TO SUPPORT ADAPTATION PLANNING

BACKGROUND

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 (see details for Day 2). 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.

The Guide provides decision-support tools for practitioners and NGOs as facilitators working with communities to incorporate climate change into local planning. This Guide provides processes to use the regional vulnerability results and apply these at local scales. Thereby facilitating targeted and appropriate adaptation actions for implementation at the community level.

The 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 management coastal and marine resources, minimise climate impacts and maximise community wellbeing.

The Guide includes 5 steps to link climate change vulnerability to local threats, identify adaptation actions that address the main drivers of vulnerability, and to develop a Community Action Plan. It also provides an overview of the main elements of successful implementation of the Community Action Plan including awareness and education, enforcement, monitoring and review.

The Guide was applied to two case studies – ecosystem-based fisheries management in Viqueque, Timor Leste, and community adaptation planning in Rote Ndao, Indonesia (Figure 3) – that will be shared. In Rote Ndao, the Guide supported a participatory planning process with the community of Oeseli Village. 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.

LEARNING GOALS

1. Disseminate results of the Guide for Decision-Makers and Facilitators and case studies
2. Enhance capacity of participants to use the Guide and develop an adaptation plan
3. Share best practices and lesson learned from the implementation of the Guide in Viqueque and Rote Ndao

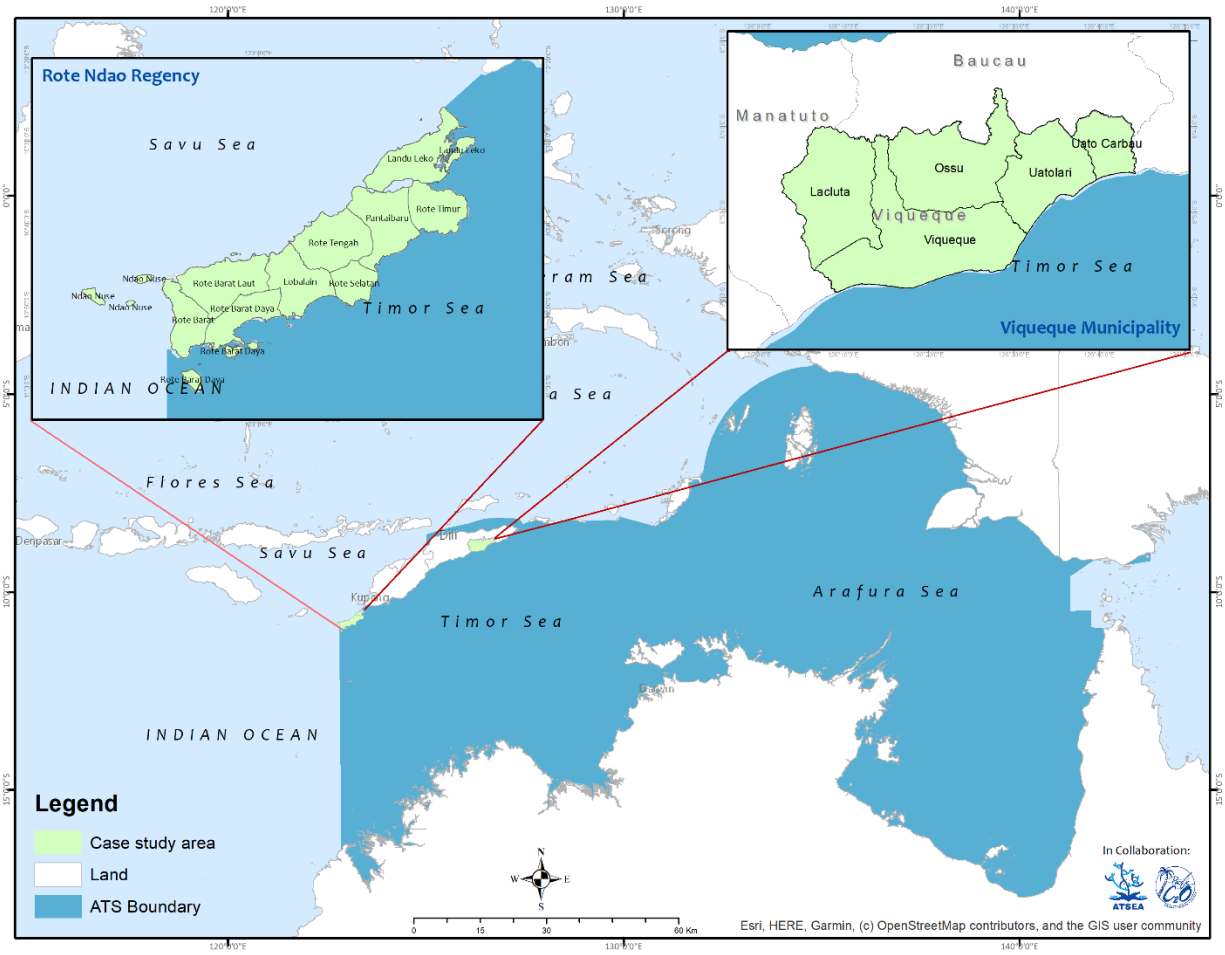

Figure 3. Map of ATS region and location of the two (2) Guide for Facilitators and Decision-Makers case study sites

WORKSHOP MATERIALS

- Presentations from technical specialists
- Guide for Facilitators and Decision-Makers templates
- Videos of Oeseli's community action plan
- Post-workshop test
- Workshop survey

FURTHER RESOURCES

Fishwell Consulting (2021) Ecosystem Approach to Fisheries Management (EAFM) Plan for Timor-Leste South Coast Red Snapper Fishery. (ATSEA-2) Project, Bali, Indonesia. 51pp.

Johnson, J.E., Hooper, E., Welch, D.J. (2020) Community Marine Monitoring Toolkit: A tool developed in the Pacific to inform community-based marine resource management. Marine Pollution Bulletin, 159, 111498.

Kertabumi (2021) Appendix 1: How Kertabumi used the Guide for Decision Makers. Supplement to Oeseli village, Rote Ndao, Indonesia, Community Action Plan.

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

APPENDIX A: WORKSHOP SPEAKERS

Speakers include technical climate, fisheries and resource managers who will present the latest climate science for the ATS region, observed climate change impacts in the region, and regional adaptation actions in progress or planned.

Climate and regional specialists:

- Reny Puspasari – BRIN (National Research and Innovation Agency) (Indonesia)
- Dr Bea Pena-Molina, CSIRO Oceans & Atmosphere (Australia, remote speaker)
- Domingos Lequi Siga Maria, UNDP Timor-Leste (Timor-Leste)
- Jacob Ekinye, CCDA Papua New Guinea (PNG, remote speaker)
- Dr Johanna Johnson, C2O Pacific (regional projections) (Australia)

Fisheries specialists:

- Matt Fox, Fishwell Consulting (Australia, remote speaker)
- David Welch, C2O Pacific (regional fisheries results) (Australia, remote speaker)

Guide for Decision-Makers and Facilitators:

- Dr Johanna Johnson, C2O Pacific (overview) (Australia)
- Ikbal Alexander, Kertabumi (community application of Guide) (Indonesia)

APPENDIX B: WORKSHOP AGENDA

Time (GMT+8)	Agenda	Lead	Duration
DAY 1: Tuesday 13th September 2022			
08.30 - 09.00	Registration	ATSEA-2	30 min
09.00 - 09.10	Welcome and Introductions	Handoko Susanto, ATSEA-2 RPMU	10 min
09.10 - 09.40	• Introduction of participants • Workshop overview and background • Objectives • Agenda	Casandra Tania, ATSEA-2 RPMU	30 min
09.40 -10.00	Pre-workshop test & ice breaker	Ikbal Alexander, Kertabumi Institute	20 min
10.00 -10.15	**MORNING BREAK**		
10.15 - 10.45	Climate change 101: introduction to climate change projections and global models	Johanna Johnson, C2O Pacific	30 min
10.45 - 11.30	Climate change projections for the ATS region	Bea Pena-Molina, CSIRO	45 min
11.30 - 12.00	Q&A session	Johanna Johnson	30 min
12.00 - 13.00	**LUNCH**		
13.00 - 13.30	Country efforts to tackle Climate Change in Marine and Fisheries Sector (Monitoring, Projections, Collaboration) - Indonesia	Reny Puspasari – BRIN (National Research and Innovation Agency)	30 min
13.30 - 14.00	Country efforts to tackle Climate Change in Marine and Fisheries Sector (Monitoring, Projections, Collaboration) - Timor-Leste	Domingos Lequi Siga Maria – UNDP Timor-Leste	30 min
14.00 - 14.30	Country efforts to tackle Climate Change in Marine and Fisheries Sector (Monitoring, Projections, Collaboration) - PNG	Jacob Ekinye, CCDA Papua New Guinea	30 min
14.30 - 15.15	Q&A session	Ikbal Alexander	45 min
15.15 - 15.30	**AFTERNOON BREAK**		
15.30 - 16.15	Regional climate change projections as inputs for the vulnerability assessment	Johanna Johnson	30 min
16.15 - 16.45	Group Discussions: How (much) has climate change been incorporated into your work/organisation and projects?	Facilitated by Johanna Johnson	45 min
16.45 - 17.00	Close of Day 1	Casandra Tania	15 min

Time (GMT+8)	Agenda	Lead	Duration
DAY 2: Wednesday 14th September 2022			
08.30 - 09.00	Registration	ATSEA-2	30 min
09.00 - 09.15	Welcome and recap Day 1	Deti Triani, ATSEA-2 RPMU	15 min
09.15 – 09.30	Introduction to day 2 objectives and format (ice breaker)	Ikbal Alexander	15 min
09.30 – 10.15	Research/project work in Indonesia for documenting observed climate impacts or tackling climate issues	Indonesian participants (10-15 min per person)	45 min
10.15 -10.30	**MORNING BREAK**		
10.30 – 11.15	Research/project work in Timor-Leste for documenting observed climate impacts or tackling climate issues	Timor-Leste participants (10-15 min per person)	45 min
11.15 – 12.00	Research/project work in PNG for documenting observed climate impacts or tackling climate issues	PNG participants (10-15 min per person)	45 min
12.00 - 13.00	**LUNCH**		
13.00 – 13.40	Results of the regional climate change vulnerability assessment: habitats	Johanna Johnson	40 min
13.40 – 14.20	Results of the regional climate change vulnerability assessment: fisheries	David Welch, C2O Pacific	40 min
14.20 – 14.50	Q&A session	Johanna Johnson	30 min
14.50 – 15.10	**AFTERNOON BREAK**		
15.10 – 15.45	Group Work Part 1: what adaptation and mitigation options are available/have been used to minimise climate impacts?	Ikbal Alexander	35 min
15.45 – 16.20	Group Work Part 2: what adaptation and mitigation options are needed to minimise climate impacts, and what supporting strategies or policies exist?	Ikbal Alexander	35 min
16.20 – 16.50	Groups report back: ● Current effective adaptation/ mitigation actions ● Adaptations needed in the future ● Supporting strategies or policies needed for effective adaptation	Ikbal Alexander	30 min
16.50 – 17.00	Close day 2	Deti Triani	10 min
19.00 - 21.00	Workshop dinner (Mecure Resort Sanur)		

Time (GMT+8)	Agenda	Lead	Duration
DAY 3: Thursday 15th September 2022			
08.30 - 09.00	Registration	ATSEA-2	30 min
09.00 - 09.10	Welcome and Introductions	Deti Triani	10 min
09.10 – 09.20	Introduction to day 3 objectives and format (ice breaker)	Johanna Johnson	10 min
09.20 – 10.00	Training on using the Guide for Decision-Makers and Facilitators	Johanna Johnson	40 min
10.00 – 10.30	Case Study: Oeseli Village, Rote Ndao community action plan and Q&A	Ikbal Alexander	30 min
10.30 – 11.00	**MORNING BREAK**		
11.00 – 12.00	Group Work about Guide for Decision-Makers and Facilitators	Johanna Johnson	60 min
12.00 – 12.30	Group Work Q&A	Johanna Johnson	30 min
12.30 - 13.30	**LUNCH**		
13.30 – 13.50	Case Study: Applying regional climate vulnerability to Ecosystem Approach to Fisheries Management (EAFM) in Viqueque, Timor-Leste	Matt Fox, Fishwell Consulting	20 min
13.50 – 14.30	Group Work about Guide for Decision-Makers and Facilitators cont.	Johanna Johnson	40 min
14.30 – 15.00	Group work report	Ikbal Alexander	30 min
15.00 - 15.15	**AFTERNOON BREAK**		
15.15 – 15.45	Group discussion: ● Wrap-up of Guide ● Feedback on the Guide ● How the Guide can be applied more widely in the ATS region?	Johanna Johnson	30 min
15.45 – 16.15	Post-test and survey	Ikbal Alexander	30 min
16.15 – 16.30	Close of Workshop	Handoko Susanto	15 min

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