WORKSHOP REPORT

IMPROVING CLIMATE CHANGE AWARENESS IN THE ARAFURA & TIMOR SEAS REGION

September 2022

This workshop report is prepared by the Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) Project based on the training workshop in Bali, Indonesia from 13 to 15 September 2022

SUMMARY

The Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) project commissioned the development of a Guide for Facilitators and Decision-Makers (the Guide). The Guide is for government and NGOs to assist communities to apply regional climate change information to develop a local community action plan. The Guide is supported by the ATSEA-2 regional climate change vulnerability assessment for marine ecosystems and species in the Arafura and Timor Seas (ATS) region (Johnson et al. 2021).

In addition, case studies applying the regional climate change vulnerability 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 local adaptation strategies. This climate change awareness workshop disseminated the outputs from the regional vulnerability assessment and the Guide to ATS stakeholders to improve climate change understanding in the region, raise awareness about the issues and relevant adaptation strategies, and provide an opportunity to trial the Guide.

The workshop was attended by 18 participants from three countries: Indonesia, Timor Leste and Papua New Guinea. The 3-day workshop was held from 13th September 2022 to 15th September 2022 at the Mercure Sanur Hotel, Bali, Indonesia. The workshop agenda is provided in Appendix A.

The first day provided an introduction to climate change projections and global climate models. Speakers included Dr Johanna Johnson from C2O Pacific, Dr Bea Pena-Molina from CSIRO in Australia, Dr Reny Puspasari from the Indonesia National Research and Innovation Agency, and Domingos Lequi Siga Maria from UNDP Timor-Leste. There was also group work for participants to discuss how climate change is currently integrated into their work plans and organisations, and whether this will change in the future.

The second day started with presentations from each of the represented countries providing an overview of research or projects that have documented observed climate impacts or addressing climate change issues. Followed by presentations about the results of the regional climate change vulnerability assessment from Dr Johanna Johnson and David Welch from C2O Pacific. There was also group work for participants to identify current successful climate change adaptations and future adaptations that will be needed.

The third day focused on training on how to use the Guide, an overview of the two case studies that applied the Guide, and an opportunity for participants to trial the Guide during group work. The speakers were Dr Johanna Johnson from C2O Pacific, Matt Fox from Fishwell Consulting, and Ikbal Alexander from Kertabumi Institute.

RINGKASAN

Arafura and Timor Seas Ecosystem Action Phase 2 (ATSEA-2) telah mengembangkan *Guide for Facilitators and Decision-Makers* (Panduan). Panduan ini ditujukan bagi pemerintah dan NGO untuk membantu masyarakat menerapkan informasi perubahan iklim regional dalam upaya mengembangkan rencana aksi masyarakat. Panduan ini didukung oleh penilaian kerentanan perubahan iklim regional ATSEA-2 untuk ekosistem dan spesies laut di wilayah Perairan Arafura dan Laut Timor (ATS) (Johnson et al. 2021).

Selain itu, studi kasus yang menerapkan hasil penilaian kerentanan perubahan iklim regional dan Panduan telah dilakukan di Desa Oeseli, Rote Ndao, Indonesia dan Viqueque, Timor-Leste. Studi kasus ini menerjemahkan pengetahuan ilmiah ke dalam strategi adaptasi lokal. Pelatihan kesadaran perubahan iklim ini menyebarluaskan hasil dari penilaian kerentanan regional dan Panduan kepada pemangku kepentingan di ATS dalam rangka meningkatkan pemahaman perubahan iklim di wilayah tersebut, meningkatkan kesadaran tentang isu-isu dan strategi adaptasi yang relevan, dan memberikan kesempatan untuk menguji Panduan tersebut.

Pelatihan ini diikuti oleh 18 peserta dari tiga negara: Indonesia, Timor Leste dan Papua Nugini. Pelatihan 3 hari ini diadakan dari 13 September 2022 hingga 15 September 2022 di Hotel Mercure Sanur, Bali, Indonesia. Agenda pelatihan terdapat pada Lampiran A.

Hari pertama adalah pengenalan tentang proyeksi perubahan iklim dan model iklim global. Pembicara-pembiacara nya antara lain Dr Johanna Johnson dari C2O Pacific, Dr Bea Pena-Molina dari CSIRO di Australia, Dr Reny Puspasari dari Badan Riset dan Inovasi Nasional Indonesia (BRIN), dan Domingos Lequi Siga Maria dari UNDP Timor-Leste. Terdapat juga kerja kelompok bagi peserta untuk mendiskusikan bagaimana perubahan iklim saat ini diintegrasikan ke dalam rencana kerja dan organisasi mereka, dan apakah iperubahan iklim akan merubah masa depan.

Hari kedua dimulai dengan presentasi dari masing-masing negara yang memberikan gambaran tentang proyek yang mendokumentasikan dampak iklim ataupun menangani masalah perubahan iklim. Dilanjutkan dengan presentasi tentang hasil kajian kerentanan perubahan iklim regional dari Dr Johanna Johnson dan David Welch dari C2O Pacific. Terdapat juga kerja kelompok bagi peserta untuk mengidentifikasi keberhasilan adaptasi perubahan iklim saat ini dan adaptasi di masa depan yang akan dibutuhkan.

Hari ketiga berfokus pada pelatihan tentang cara menggunakan Panduan, gambaran umum tentang dua studi kasus yang menerapkan Panduan, dan kesempatan bagi peserta untuk menguji Panduan dengan kerja kelompok masing-masing. Pembicaranya adalah Dr Johanna Johnson dari C2O Pacific, Matt Fox dari Fishwell Consulting, dan Ikbal Alexander dari Kertabumi Institute.

TABLE OF CONTENTS

BACKGROUND

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 (PNG), and includes the Arafura Sea and Gulf of Carpentaria in northern Australia (Figure 1). 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 PNG.

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

One of the Arafura and Timor Seas Ecosystem Action Phase 2 (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 Facilitators and Decision-Makers (the Guide) for the ATS region in 2021. In addition, case studies applying the regional climate change 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 adaptations. This workshop is disseminating these outputs to ATS stakeholders to improve climate change understanding in the region and to raise awareness about issues and relevant adaptation strategies.

WORKSHOP OBJECTIVES

The workshop was conducted over 3-days with the main objective to improve awareness of climate change and relevant adaptation strategies for the ATS Region.

The workshop also aimed to deliver four specific learning goals:

1. To improve climate change understanding in the region,
2. To raise awareness about climate change and relevant adaptation strategies,
3. To disseminate CCVA results and the Guide for Facilitators and Decision-Makers, and
4. To enhance capacity of the participants to effectively deliver the Guide and develop an adaptation plan.

DAY 1: CLIMATE CHANGE SCIENCE AND PROJECTIONS FOR THE ATS REGION, 13 SEPTEMBER 2022

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 common tool for climate change projections, however, their coarse 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 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.

Day 1 of the workshop provided 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). 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

Climate Change 101: Introduction to climate change projections and global models

Dr Johanna Johnson introduced climate change by explaining the terminology and concepts related to climate change, including weather, climate, climate variability, climate change, climate projections, and global climate models. Global climate models use complex mathematics to represent the four major climate system components (atmosphere, land, ocean, sea ice) to project possible future climate scenarios based on the known physics of the climate system and social behaviour in relation to energy use, development, and population growth. At the end of the presentation, it was highlighted the importance of addressing climate change by minimising greenhouse gases entering the atmosphere – reducing burning of fossil fuels (factories, transport, and energy), protecting or replanting forests, and rethinking livestock farming.

Climate change projections for the ATS region

Dr Bea Pena-Molina started the presentation by explaining the 'best tool' to prepare society for future climate change is climate change projections using models that represent elements of the climate system and social behaviour (e.g. Representative Concentration Pathways in the Intergovernmental Panel on Climate Change [IPCC] AR5, Shared Socio-economic Pathways in the IPCC AR6). She then shared the highlights from IPCC AR6 (2022), which projected that the frequency and intensity of extreme climate – marine heatwaves, heavy precipitation and floods, storms and cyclones – will increase, and how the tools (models) work to provide information that can be used to minimise future risks. At the end of the presentation, it was highlighted that there is a lack of critical data to downscale climate projections at a regional and local level, which the new generation of global climate models are aiming to address.

Country efforts to tackle Climate Change in Marine and Fisheries Sector – Indonesia

Dr Reny Puspasari started the presentation by delivering highlights from the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2019), including the excess heat in the climate system, ocean warming, ocean acidification due to the absorption of carbon dioxide by oceans, and the increasing frequency and intensity of heatwaves. In tackling these challenges, she introduced the 2030 scenario from the Nationally Determined Contribution (NDC) as a mitigation that will be implemented for five sectors to reduce carbon emission: energy, waste, forestry and other land use (including mangrove forests), agriculture, and industrial processes and product use. She then explained the key programs and efforts in Indonesia to reduce carbon emission, especially in the marine and coastal sector, such as identifying potential blue carbon in marine and coastal ecosystem to support NDC implementation, and coastal ecosystem rehabilitation and conservation. This will enhance climate resilience in the marine and coastal sector of Indonesia.

Country efforts to tackle Climate Change in Marine and Fisheries Sector – Timor-Leste

Domingos Lequi Siga Maria shared the current situation and projected climate change impacts in Timor-Leste, particularly from heavy rainfall, increasing temperature, and sea level rise. He took a deep dive into marine ecosystems and aquaculture in Timor-Leste and the impacts of climate change on fisheries and marine habitats. He explained the primary focus of Timor-Leste's policy adaptation in the fisheries and aquaculture sectors with strategies such as: (1) Enhancing the adaptive capacity of the fishing and aquaculture sectors; (2) Enhancing protection and conservation of coastal and marine ecosystems from the impacts of climate change; and (3) Reducing vulnerability to climate change and supporting alternative livelihood initiatives for coastal communities. At the end of the presentation, he highlighted future challenges for Timor-Leste that can be tackled by increasing capacity building, resource mobilization, legal and institution strengthening, and collaborations and partnerships.

Regional climate change projections as inputs for the vulnerability assessment

Dr Johanna Johnson provided an overview of the ATS region in the context of issues identified by the ATSEA program and climate change as a key threat. She explained the method used to assess the climate change vulnerability of marine species and habitats and how regional climate change projections were downscaled for rainfall, air and sea temperature and ocean acidification (pH). These downscaled projections were used as data inputs for the vulnerability assessment, as indicators of exposure. The full results of the regional vulnerability assessment for the ATS region are available in Johnson et al. 2021.

Group Work 1

Participants were divided into three groups for discussions, and each group identified the ways climate change information is currently incorporate in their work plans, projects, and organizations. Key messages from this group work were:

- Climate has already been observed to change and is impacting marine ecosystems and resources in the ATS region.

- Many projects and organisations incorporate climate change considerations into their work plans, however, they are focused on current conditions and responding to impacts (e.g. mangrove replanting) and not planning for future projections of change.
- There are climate change awareness activities undertaken by government and NGOs in their respective countries, but more knowledge and information are needed to make these more effective.
- It is difficult to distinguish between the impacts from current human activities (e.g. overfishing) and climate change, and most activities focus on immediate management needs (e.g. primary fisheries management). This is important for building the resilience of marine ecosystems to future climate change, and a valid adaptation action.
- In order to minimise the risks from future climate change, more information and consideration is needed of how conditions will change into the future (20+ years) to plan and prepare for these changes and impacts.

DAY 2: REGIONAL CLIMATE CHANGE VULNERABILITY ASSESSMENT AND RELEVANT CLIMATE CHANGE ADAPTATION STRATEGIES, 14 SEPTEMBER 2022

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. 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.

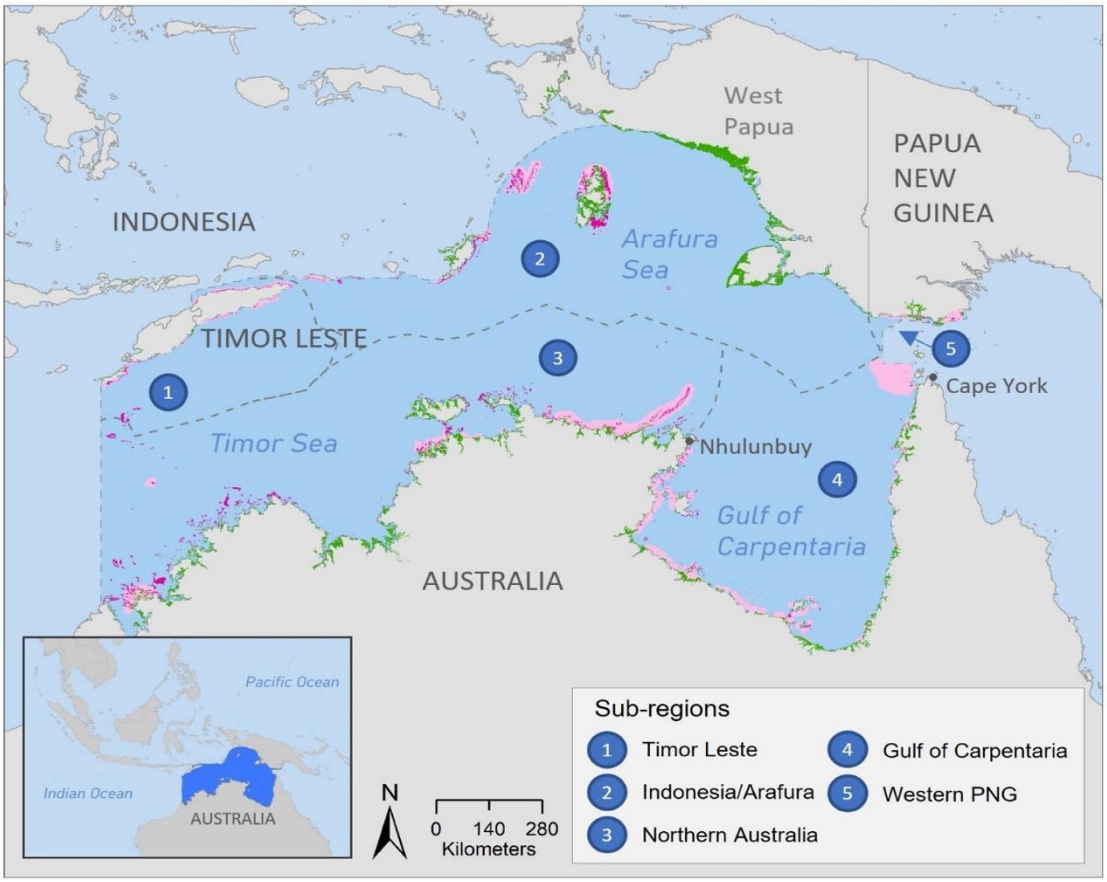


Figure 2. Five sub-units of the ATS region used for the climate change vulnerability assessment

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

Group Sharing 1 – Research/project work in PNG for documenting observed climate impacts or tackling climate issues

Participants from PNG presented an overview of research/project work in minimising the impacts of climate change in their country. During the presentation, they shared their current plans and projects tackling the impacts of climate change, which included an EAFM Plan for the South Fly District, rights-based fisheries management, and community-based monitoring, compliance and surveillance (MCS). The focus is to protect coastal villages from the sea-level rise, frequent high tides causing erosion, loss of mangrove habitats due to clearing, and salination of potable water wells and barramundi wetland habitats.

Group Sharing 2 – Research/project work in Timor-Leste for documenting observed climate impacts or tackling climate issues

Participants from Timor-Leste presented an overview of research/project work in minimising the impacts of climate change in their country. Their strategies include improving the capacity of the community to be resilience through: alternative livelihoods such as Minano soap-making, seaweed farming, mangrove coffee, and seaweed cakes; habitat restoration (mangroves and coral reefs); and establishing co-management between district and village government to promote regulation for integrate coastal management. The plans and strategies in Timor-Leste are focused on the mitigation of variable and unpredictable rainfall, Seroja storm, and longer dry seasons.

Group Sharing 3 – Research/project work in Indonesia for documenting observed climate impacts or tackling climate issues

Participants from Indonesia presented an overview of research/project work in minimising the impacts of climate change in their country. The Indonesian government is planning to build 20,000 climate villages (ProKlim program) with the aim to strengthen government and community

capacity, enhance partnerships, encourage leadership at the local level, engage with stakeholders to reaffirm their commitments, improve the development and application of appropriate technology, and drive potential optimization sources of funding. Through this program, Indonesia is focusing on increasing drought, flood and landslide control; food security; innovative plant cultivation techniques; climate-related disease control; improved waste management (solid and liquid wastes), the use of renewable energy, and agricultural cultivation to lower Greenhouse Gas (GHG) emissions.

Results of the regional climate change vulnerability assessment: habitats

Dr Johanna Johnson provided an overview of the regional climate change vulnerability assessment results for habitats in the ATS region. A structured framework was used for the assessment with indicators for the sensitivity and adaptive capacity of habitats, for example, current condition, ecological connectivity, non-climate pressures, and current formal management. 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. Adaptations that target these drivers of vulnerability are key for future adaptation.

Results of the regional climate change vulnerability assessment: fisheries

David Welch provided an overview of the regional climate change vulnerability assessment results for species in the ATS region. Species assessed included finfish and invertebrates targeted by fisheries, and species of conservation interest. A structured framework was used for the assessment with indicators for the sensitivity and adaptive capacity of species, for example, current stock status, species life history traits, non-climate pressures, and current formal management. 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 PNG 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. Adaptations that target these drivers of vulnerability are key for future adaptation.

Group Work 2

Participants were divided into three groups for discussions, and each group discussed how they adapt to and mitigate climate impacts in their work, and the supporting strategies or policies required to support their efforts. Key messages from this group work are summarised below.

Group Work Part 1: What adaptation and mitigation options are available/have been used to minimise climate impacts?

- The most common and effective adaptation and mitigation option that has been implemented in the three countries is *restoration of mangrove ecosystems*. Restored and healthy mangrove ecosystems support many marine species and provide important ecological, economic, and social values for coastal communities.
- *Ecosystem Approach to Fisheries Management* (EAFM) has started in some ATS countries but at small scale. For example, Timor-Leste has developed a draft EAFM plan to support sustainable livelihoods, local income and food security, while ensuring the sustainability of marine resources, especially red snapper, but has not started implementation.
- Integrated Coastal Management (ICM) is also an approach that has been applied in all three countries. For example, Indonesia has been implementing ICM in Savu Sea to reduce overfishing, habitat degradation and protect endangered species, such as marine turtles.
- All three countries have started engaging with local communities to *increase understanding about climate change*, identify impacts at a community level and create climate resilient communities. However, more focus is needed in this area to comprehensively raise awareness and increase local capacity to address climate change impacts.

Group Work Part 2: What adaptation and mitigation options are needed to minimise climate impacts, and what supporting strategies or policies do exist?

- *Integrated watershed management* that involves both coastal communities and upland communities needs to be applied more widely. This will protect natural resources from land to sea but requires collaboration from all communities so that everyone can benefit from a healthy environment. This will be particularly important as rainfall becomes more variable to land degradation, soil erosion and runoff that impacts coastal and marine ecosystems.
- Identification and use of *climate resilient agricultural commodities,* i.e. crops that can grow under future projected climate conditions such as longer drought periods, more intense rainfall, and higher temperatures. Climate change is disrupting the supply of agricultural commodities and causing price fluctuations, thus developing crops that can thrive under future climate conditions will be crucial to support food security.
- *Nature-based solutions* that address climate change impacts. Developing actions to protect, sustainably manage and restore natural ecosystems particularly coastal habitats that support fisheries and aquaculture (e.g. seaweed farming) can minimise climate change impacts on marine resources and provide human well-being and biodiversity benefits.

- Addressing climate change impacts is often not about direct drivers but more about indirect drivers. For example, increasing sea surface temperature (SST) will have direct impacts but to address this requires global action on reducing GHG emissions, while many of the key drivers of vulnerability are current state and human pressures, such as overfishing and poor water quality. Thus, future adaptations will still need to focus on non-climate pressures and *sustainable habitat and species management*.

DAY 3: GUIDE FOR FACILITATORS AND DECISION-MAKERS TO SUPPORT ADAPTATION PLANNING, 15 SEPTEMBER 2022

BACKGROUND

This Guide for Facilitators and Decision-Makers was developed as part of ATSEA-2 project. It supplements the regional climate change vulnerability assessment that focused on marine and coastal ecosystems in the ATS region (presented on 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. The 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 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 were shared during Day 3. 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 Facilitators and Decision-Makers 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

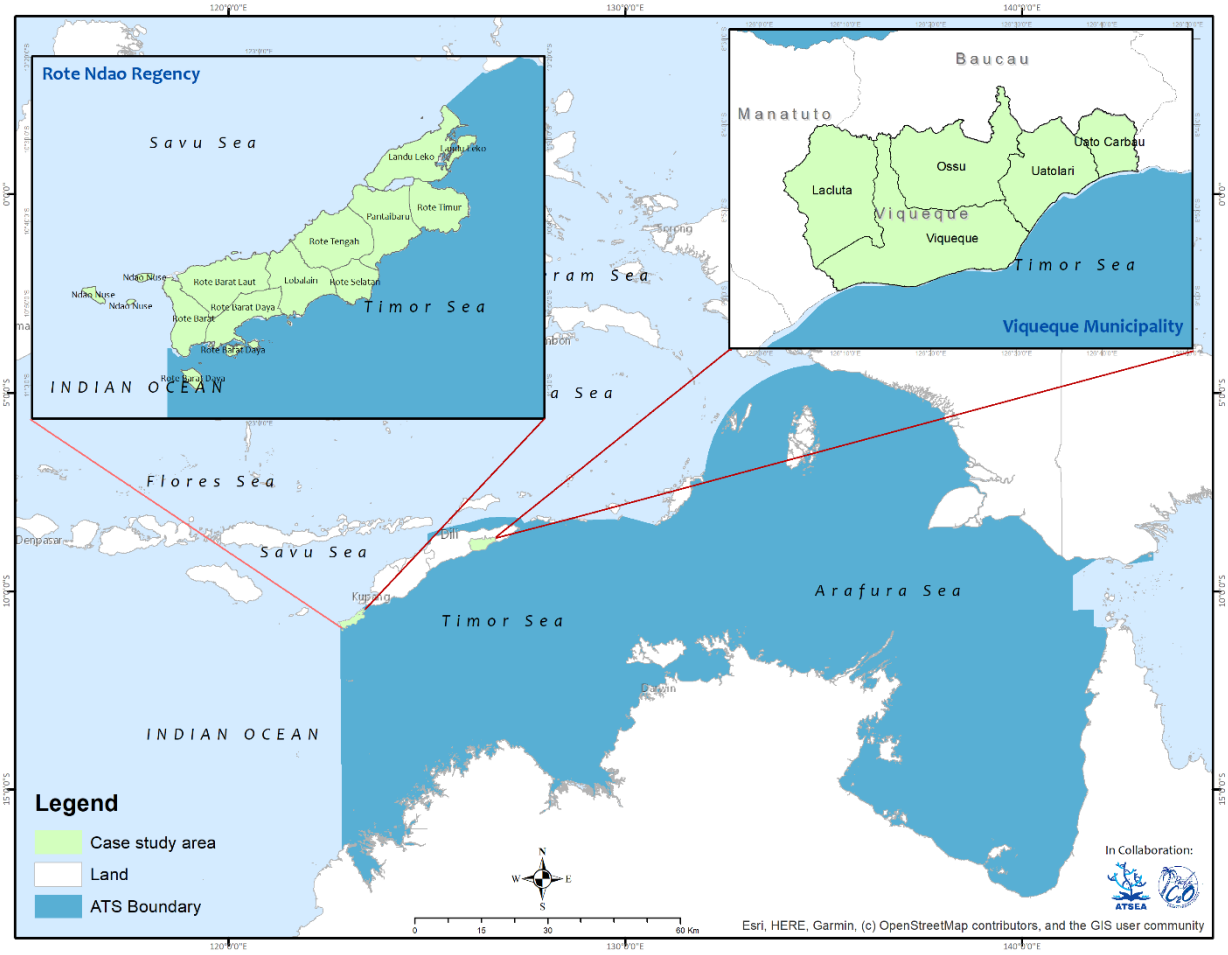


Figure 3. Map of ATS region and location of the two (2) Guide for Facilitators and Decision-Makers case study sites

Training on using the Guide for Facilitators and Decision-Makers

Dr Johanna Johnson started the session by explaining the challenges for local communities to use the regional results of the vulnerability assessment for local planning and actions. The Guide was therefore developed to help communities to identify issues on a local level and deliver relevant actions and mitigation and strengthen the local community's capacity to adapt to current and future climate change impacts. 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.

Case Study: Oeseli Village, Rote Ndao community action plan and Q&A

Ikbal Alexander described the case study site of Oeseli village in Rote Ndao on the southern coast of Indonesia, showing a short video about the current condition of marine resources and local issues (mainly from seaweed farmers and fishers) in Oeseli village. During the case study, the team found that climate change is having a direct impact on the livelihoods of fishers and farmers from Oeseli village with seaweed productivity declining and fish being harder to catch in the nearby lagoon (where fishers mostly fish). Another video showed the surveillance of marine biodiversity implemented by the local communities and leaders. The case study methods were explained and participatory approaches to apply the Guide and identify targeted solutions to the issues faced by people in the village. A final video showed how the Oeseli community responds to and mitigates the impacts of climate change.

Case Study: Applying regional climate vulnerability to Ecosystem Approach to Fisheries Management (EAFM) in Viqueque, Timor-Leste

Matt Fox explained the relevant climate change vulnerability inputs from the regional assessment, and how they were intended to be included in the Viqueque EAFM plan. He explained that integrating climate change into the EAFM using the Guide was not fully completed and may be part of the approach in the future. He recommended adaptations that focus on addressing the source of vulnerability, which are most likely to be effective. Specifically, he recommended establishing local protected areas for coral reefs to promote recovery and improve habitat condition; implementing management of non-climate pressures on fisheries (e.g. overfishing, destructive fishing practices); and conducting stock status assessments as required.

Group Work 3

Participants were divided into three groups to conduct a role-play exercise as a regional coastal village with high marine resource dependence to trial using the Guide for Facilitators and Decision-Makers to develop a local action plan. Key feedback from this group work is provided below and will inform updates to the Guide.

FEEDBACK ON THE GUIDE FOR FACILITATORS AND DECISION-MAKERS

Day 3 was focused on the Guide for Facilitators and Decision-Makers, with a detailed overview of how to use the Guide, case studies where the Guide had been applied, and working group sessions for participants to practice applying the Guide. The feedback session on the Guide followed two breakout group sessions where participants applied the steps of the Guide in a role-play situation to develop an action plan for a coastal community in the ATS region. The feedback session allowed for general impressions and experiences from any participants after practicing applying the Guide, as well as written feedback to three main questions around their experiences using the Guide:

1. What worked well?
2. What was challenging or difficult?
3. What improvements would you suggest?

Successful elements of the Guide

Generally, the feedback on the Guide was positive, and participants agreed that it was a useful tool for linking regional climate change vulnerability to local adaptation and identifying habitats and species that are at risk and require urgent local action.

Specific elements of the Guide that participants identified as effective and made the Guide a useful tool for climate change action planning were:

- Easy to use and the steps are easy to follow for facilitators to develop local actions*,
- The examples provided in the templates for each step can assist communities when completing the steps*,
- Inclusion of local knowledge and information in the steps to develop objectives and a community action plan,
- Linking regional climate change vulnerability to the local assessment (step 3) and developing a relevant and targeted action plan for the community,
- Structure or order of the steps in the Guide*, and
- Ability to identify habitats that are locally degraded and at risk from climate change so communities can take immediate action.

Some of these benefits of the Guide were identified by multiple participants (denoted by an asterisk), reinforcing the utility of the Guide for local action planning.

Challenging elements of the Guide

Participants also identified what was challenging or difficult about applying the Guide in the role-play situation, recognising that for most participants, this was the first time they had learnt about the Guide or used it. Also, the working group sessions provided only 2 hours to use the Guide, when

in a community, it would take many weeks over an extended period, to work through all the Guide steps and develop a community action plan. Nevertheless, participants were asked what challenges or difficulties they had in practicing to apply the Guide.

Specific elements of the Guide that participants identified as challenging or difficult were:

- The prioritisation matrix in step 4 can be confusing and complex to use*,
- The need to have access to local data or knowledge to fully inform the planning process*, and
- In step 3, identifying important habitats is difficult as habitats support species and species are part of the ecosystem, so deciding importance separately is a challenge.

Some of these challenges in using the Guide were identified by multiple participants (denoted by an asterisk), reinforcing some of the improvements that are needed.

Suggested improvements

Participants also identified what improvements they would suggest for the Guide to make it more user-friendly and extend its application more broadly in the ATS region. Some of these improvements relate to the challenges participants identified, and others to increasing access to the Guide and widening its use in the ATS region.

Specific improvements to the Guide that participants identified were:

- Develop a digital format with App for facilitators to work through (e.g. Kobo or other platform)*.
- Translate to Bahasa Indonesian*.
- Provide estimates for how long each step will take.
- Include image or local names for species (or provide example activity as done in Oeseli village case study that identified local names as part of the participatory process)*
- More choices of response for table A2(e.g. How often do you target these species – always, sometimes, never/rarely)
- Simplify the prioritisation matrix in step 4*.
- Include the risks for each priority action (i.e. the possibility of success for the action) which will help the community to implement*.
- Provide monitoring and evaluation step/tools to follow-up and determine if unsustainable fishing or other impacts have been addressed*.
- Develop network to collect local data.

Some of these improvements were identified by multiple participants (denoted by an asterisk), reinforcing the need for these updates. Many of the suggested improvements will be incorporated into the Guide in the next revision, but others are not possible or are more substantial and require additional time, government endorsement and/or funds to complete. The details of these additional Guide improvements are outlined below. Notably, most of these more substantial improvements were identified by multiple participants so warrant consideration as future projects under ATSEA-2.

Develop a digital format

The Guide is currently only available as a printed resource, and while this is useful for many facilitators and communities, the development of a digital version could extend the Guide more widely throughout the ATS region. Providing a digital or App version, that facilitators can work through on a tablet or device with Kobo or another similar platform, will make the process easier and faster, avoid errors in compiling the results of each step into the community action plan, and allow for dropdown options to select throughout the planning process. Such a development would require a programmer to work with the project team to develop the digital or App version, and time to test the beta version until it is refined to a user-friendly final tool. Dissemination of such a digital Guide would increase access across the ATS region and extend the utility of the Guide.

Translation

The Guide is currently only available in English, and a Bahasa Indonesian version would increase ease of use with communities in Indonesia and Timor-Leste. This translation could also be extended to the digital version, if that is developed. Translation should be a relatively simple task, that would take 1-2 months.

Monitoring of marine resources

The Guide includes Section 5 that provides general information on implementation, including monitoring and review of the Guide. It emphasises the importance of monitoring local marine resources to determine whether local actions being implemented from the community action plan are effectively addressing the issue they are targeting. For example, if the target local issue is overfishing, and the local action is gear restrictions to minimise the catch of juvenile fish, monitoring of fish catches to ensure that mostly adult fish are being caught, is required. Monitoring by local communities is possible and recommended, however it usually requires communities to either be trained in monitoring techniques or to collaborate with NGOs or other agencies conducting monitoring.

Community monitoring is a valuable and effective approach for supporting local action plans, and there exist monitoring tools available for communities (e.g. Pacific Community Marine Monitoring Toolkit[1]) that could be tailored to the ATS region. Such a monitoring toolkit could be supplementary material for the Guide, and training delivered to interested community members during the action planning process (essentially as step 6). Tailoring a monitoring toolkit to the ATS region would require the project team to work with local communities, potentially in Oeseli village who are familiar with the action planning process and have developed a community action plan, to create and test a regionally-specific version over a period of 6-8 months.

Develop network to collect local data

The Guide does not currently include any steps for local data collection, beyond the participatory development process that includes local knowledge to create the community action plan. If a community monitoring toolkit were to be developed or some other monitoring implemented by partner agencies, a network in the ATS region that shares and stores monitoring data would be a valuable inclusion (potentially through an online database). This would need to align with national and regional initiatives, particularly as NGOs in the ATS region are active in monitoring, and there may be a network that the project could link to. This would require further exploration with national governments and regional agencies and NGOs.

[1] https://c2o.net.au/community-marine-monitoring-toolkit/

RESULTS OF PRE- AND POST-TESTS

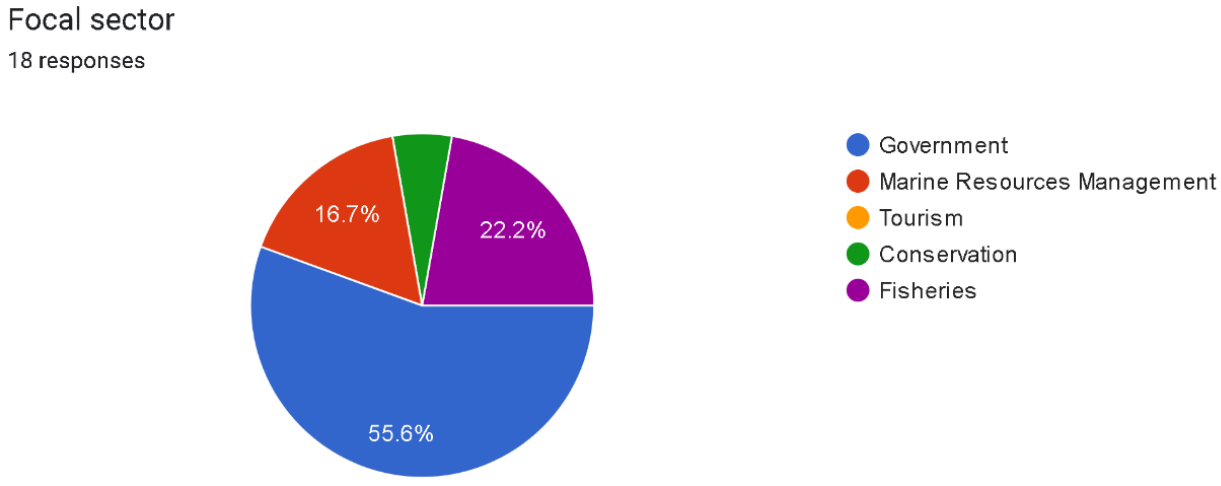
The workshop included a pre- and post-test to measure participants' level of awareness and knowledge about climate change science, climate projections for the ATS region and potential adaptation actions. The post-test measured any increases in awareness and knowledge and areas for future training. The detailed results of the pre- and post-tests are provided below, with a brief analysis of the results in terms of workshop success and future training needs.

Questions with open-ended responses are included in the discussion of individual questions, and questions asked only in the pre-test due to the baseline nature of the question only report one set of results. Questions 8, 17 and 26 were only included in the pre-test asking participants to rank their topics of interest for the workshop. The questions were intended to inform the delivery of the workshop and are therefore not reported here.

Generally, all indicators of impact for the workshop showed an increase from the pre- to the post-test. This included participants knowledge on all topics (climate change impacts, climate vulnerability, climate change adaptations, and guides and tools) as well as confidence in communicating climate change information with colleagues and stakeholders, willingness to incorporate climate change into work plans and projects, and willingness to use guides and tools to support climate change adaptation planning. These are all positive results that demonstrate the effectiveness of the awareness workshop and the interactive group work.

Background context

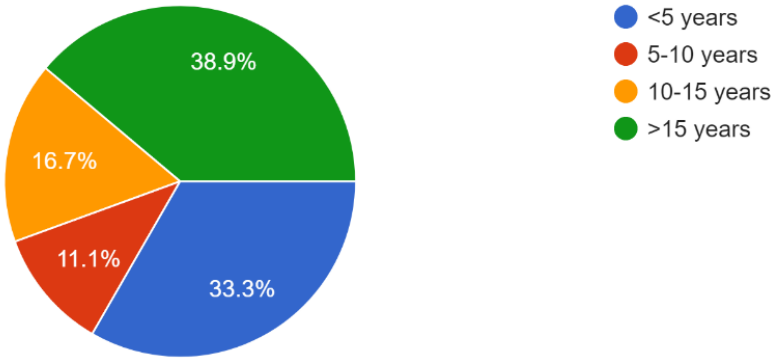
Participants were asked to provide information on their institution, country and region, years working in sector and focal sector. For privacy reasons, only the latter two are reported on below.



More than half of the participants were from the government sector (55.6%) with good representation also from fisheries and marine resource management. No tourism representatives participated in the workshop.

Years working in sector

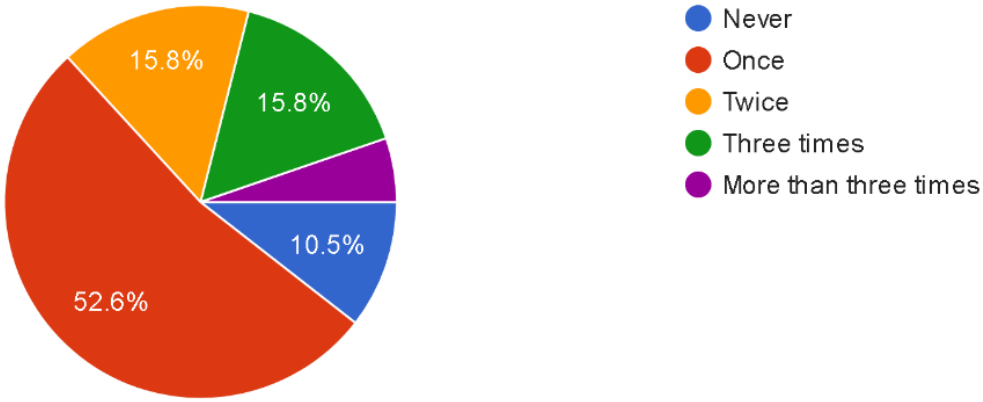
18 responses



Many of the participants have worked in the marine sector for more than 15 years (38.9%), followed by those who have worked in the sector for less than 5 years (33.3%), 10-15 years (16.7%), and 5-10 years (11.1%). This represents a good range of experience and knowledge for the workshop.

Question 1

How often have you participated in climate change awareness or training in the past 5 years?

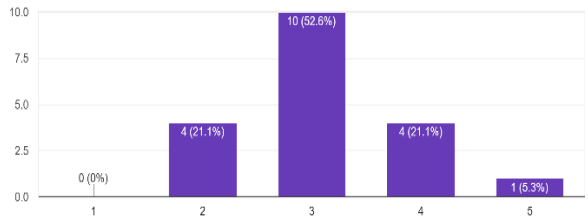


The responses were variable in terms of previous attendance at climate change awareness training, with more than half of participants only participating once in the past 5 years (52.6%), 15.8% twice, 15.8% three times and only 5.3% more than three times. And 10.5% have never participated in any climate change awareness training, making this workshop a timely and valuable session for most participants.

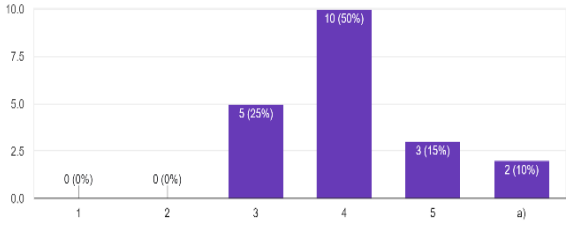
Question 2

How much do you know about climate change in your country or region? (1 = no knowledge to 5 = expert knowledge)

Pre-test



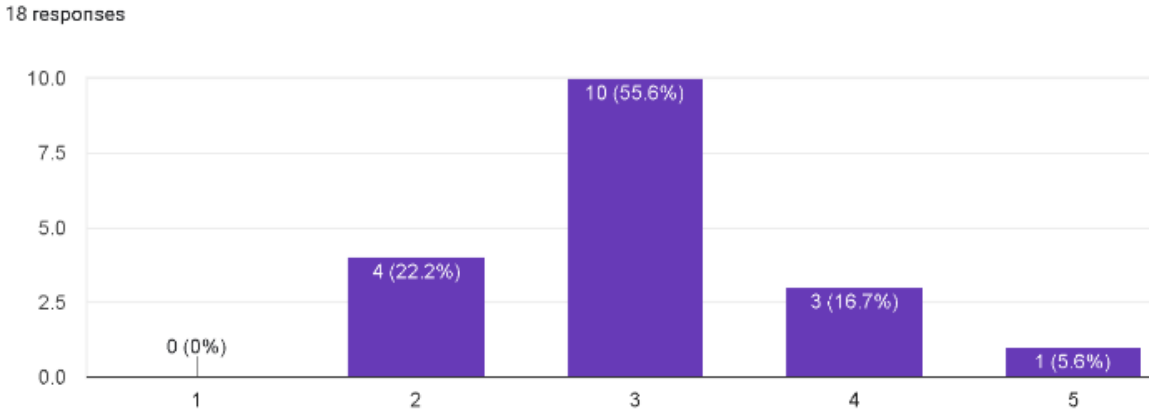
Post-test



The pre-test showed limited (21.2%) to moderate (52.6%) participant knowledge about climate change in their country, which increased in the post-test with more participants reporting high (50%) to expert (15%) knowledge and only 25% reporting moderate knowledge. No participants in the post-test reporting having no or limited knowledge, demonstrating the effectiveness of the training workshop.

Question 3

How often do you access or use climate change projections for your country or region in your work? (1 = never to 5 = regularly)

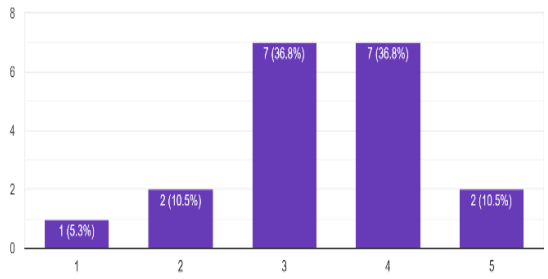


The responses from participants were varied, with most participants rarely (22.2%) or sometimes using climate change projections (55.6%) in their work. Few participants regularly used climate change projections (5.6%) and no participants had never used climate change projections.

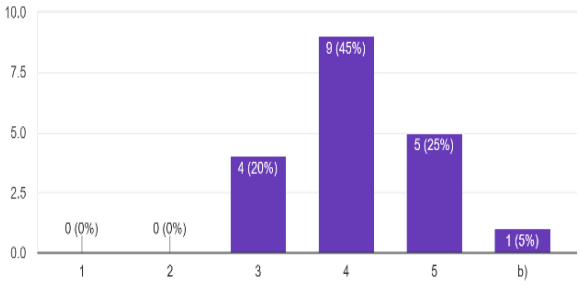
Question 4

How much do you know about how climate change will impact the sector you work in? (1 = no knowledge to 5 = expert knowledge)

Pre-test



Post-test

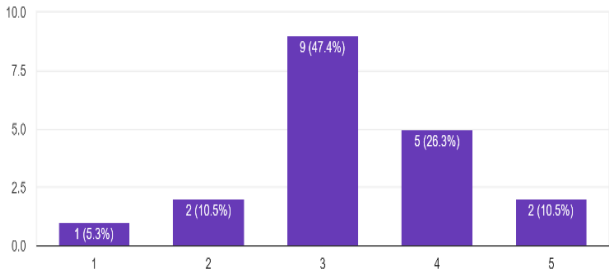


The pre-test showed that most participants reported having moderate (36.8%) to high (36.8%) knowledge of climate change impacts to their sector, which increased in the post-test with more participants reporting high (45%) to expert (25%) knowledge and only 20% reporting moderate knowledge. No participants in the post-test reporting having no or limited knowledge, demonstrating the effectiveness of the training workshop.

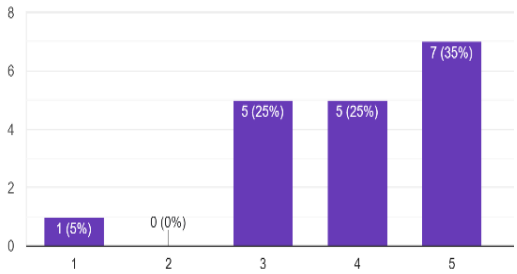
Question 5

How confident do you feel discussing climate change in your work? (1 = no confidence to 5 = expert confidence)

Pre-test



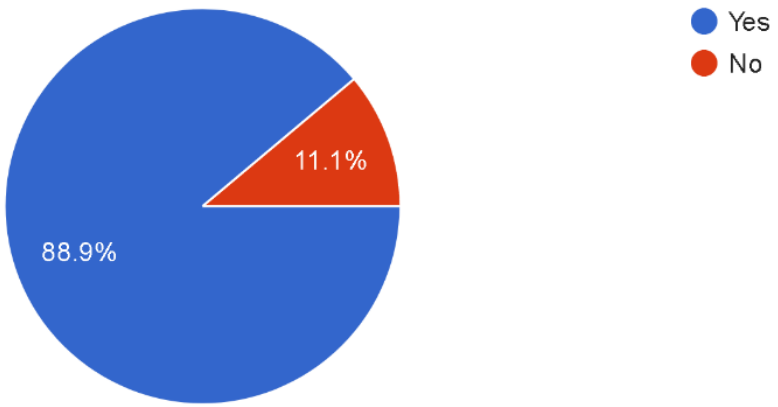
Post-test



The pre-test results showed that the majority of participants reporting a moderate (47.4%) to high (26.3%) confidence in discussing climate change at work, which increased to participants reporting high (25%) and expert (35%) confidence in talking about climate change with their colleagues and stakeholders. No participants reporting a low confidence in the post-test and a consistent 5% reporting no confidence in both the pre- and post-tests.

Question 6

Have you (or your team) included climate change in any project planning or activities?



Most of the participants said they had included climate change in their project planning or activities (88.9%). This includes studies on the population of tuna and other marine resources, the technological assessment for climate change mitigation and adaptation, social and economic studies on marine fishery sectors, and conservation projects. This demonstrates a recognition that climate change is affecting marine ecosystems and resources, and the importance of providing current climate information to support project planning and activities.

Question 7

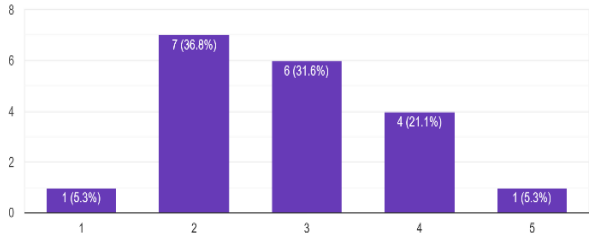
If "yes" to question 6, please describe how and when. 14 participants responded to this question, and each described varied projects that have included climate change.

- Allocate budget every year for conducting activities related to climate change adaptation.
- Tuna is a migratory species and its movement is determined by the sea temperature and productivity areas. Climate change affects sea temperature and therefore the movement of tuna so planning is needed for the tuna fishery in PNG.
- Mangrove rehabilitation after habitat degradation due to clearing and storms was conducted in 2019.
- While developing programs, especially those focused on marine resource management, climate change is one of the thematic and/or cross-cutting areas incorporated.
- Artisanal fisheries management development is considering climate change impacts in the public consultation.
- Consider impacts of climate change on fisheries resources for management.
- Indonesian Directorate of Climate Change Adaptation has a focus on mainstreaming climate change adaptation into government (national and local) development plans.
- Focus on tuna fisheries resources and understanding tuna population, biology of tuna and potential tuna resources to support data for RFMOs.
- Building community awareness to conserve and protect land and marine resources.
- ASTEA 2 PNG has recently included future training and awareness in the South Fly district.

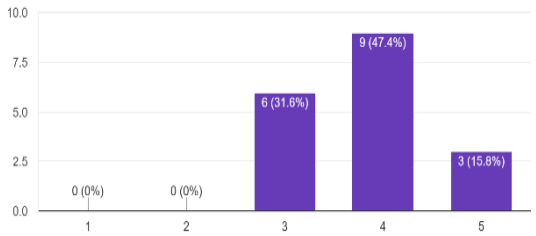
Question 9

How much do you know about climate change vulnerability and adaptation strategies in your focal sector? (1 = no knowledge to 5 = expert knowledge)

Pre-test



Post-test

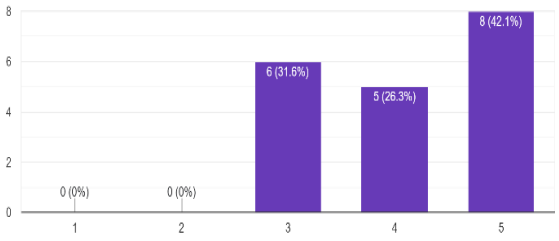


There was an increase in the number of participants with high knowledge about climate change vulnerability and adaptation strategies in their field of work between the pre- and post-tests. The number of participants that limited knowledge about vulnerability and adaptation dropped from 36.8% (pre-test) to 0% (post-test), and the number of participants reporting high knowledge increased from 21.1% (pre-test) to 47.4% (post-test). No participants reported no or limited knowledge of climate change vulnerability and adaptation strategies in the post-test. This demonstrates the effectiveness of the awareness workshop and the new knowledge participants will hopefully be able to apply to their work.

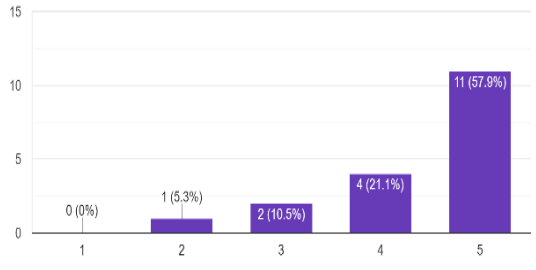
Question 10

How important do you think it is to include climate change adaptation strategies in your work? (1 = no importance to 5 = very high importance)

Pre-test



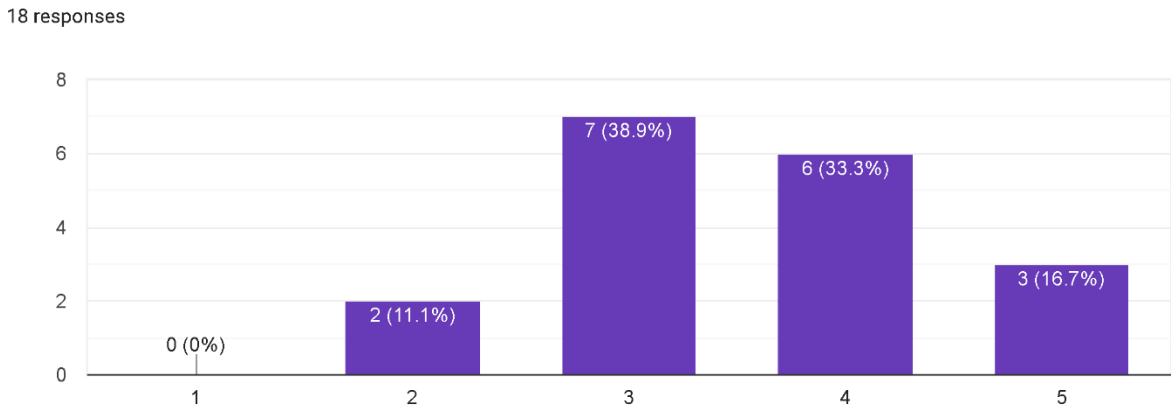
Post-test



The number of participants who reported that incorporating climate change adaptation into their work is very important increased from 42.1% (pre-test) to 57.9% (post-test). And the number of participants who think that it is only moderately important decreased from 31.6% (pre-test) to 10.5% (post-test), demonstrating how perceptions of participants have changes as a result of the awareness workshop.

Question 11

How much do you discuss how climate change will impact the sector you work in with colleagues or stakeholders? (1=never and 5=regularly)

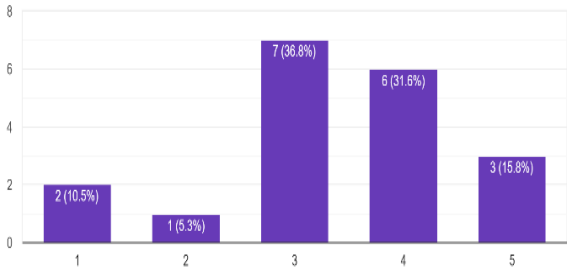


Most participants reported discussing climate change impacts on their sector sometimes (38.9%) or often (33.3%) with their colleagues or stakeholders. And 16.7% reported discussing climate change impacts on their sector regularly with colleagues or stakeholders.

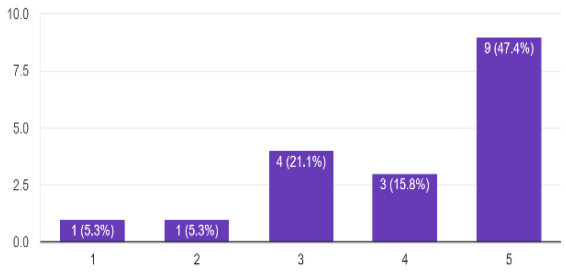
Question 12

How confident do you feel discussing climate change adaptation in your work? (1 = no confidence to 5 = expert confidence)

Pre-test



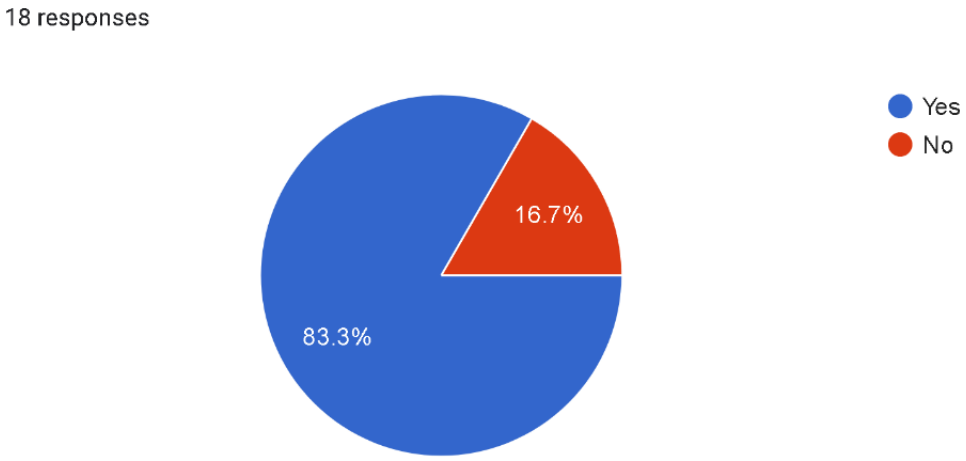
Post-test



The pre-test results showed that the majority of participants reported a moderate (36.8%) to high (36.1%) confidence in discussing climate change adaptation in their work, which increased to participants reporting expert (47.4%) confidence in talking about climate change adaptation with their colleagues and stakeholders. Fewer participants reporting no (5.3%) confidence and a consistent 5.3% reported low confidence in both the pre- and post-tests.

Question 13

Have you (or your team) included climate change adaptation strategies into any project planning or activities?



The majority of participants (83.3%) have included climate change adaptation strategies into project planning or activities. While only a few participants (16.7%) have not included climate change adaptation strategies into any project planning or activities. This demonstrates a group of professionals who are aware of climate change implications in their sector.

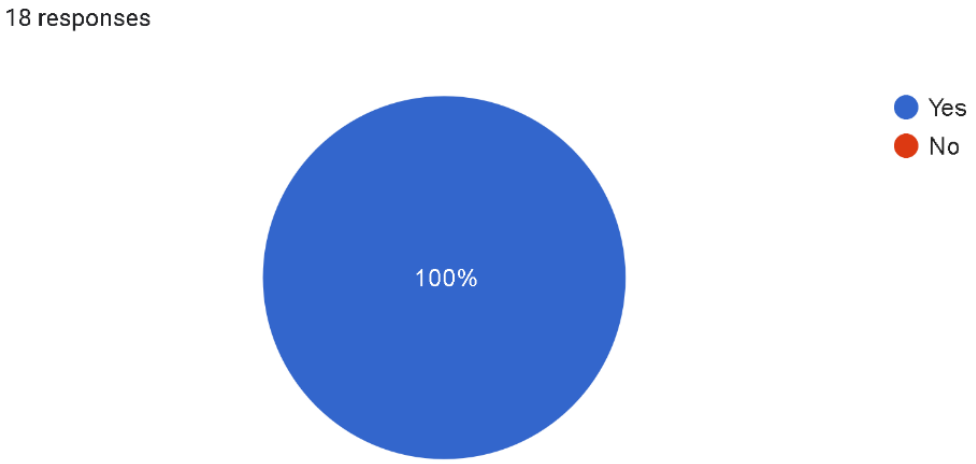
Question 14

If "yes", please describe how and when. 7 participants responded to this question with varied responses outlined below.

- Planning and implementing activities that mainstream climate change adaptation and also promote resilience of local communities against the impacts of climate change.
- Included in public consultation on artisanal fisheries development.
- Consider the impacts of climate change on fish populations during research projects.
- Building community awareness to protect and conserve habitats, including terrestrial and marine.
- Within Provincial planning & District planning.

Question 15

Would you consider including more climate change adaptation into current or future projects?



All participants (100%) reported that they would consider including climate change adaptation into current or future projects.

Question 16

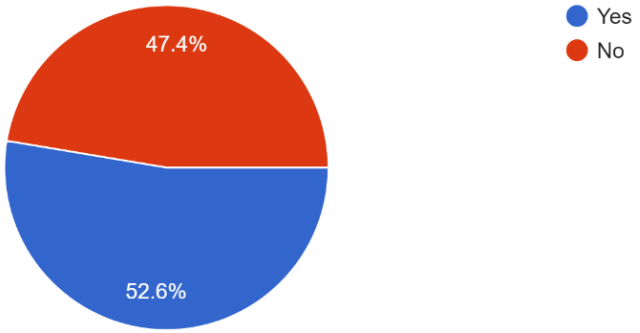
If yes, please describe how and why. 10 participants responded explaining that climate change is a critical issue and describing how they would include it into current or future projects.

- Climate change is occurring, and planning must include climate change resilience.
- Drought prevention/response projects need to consider climate change.
- Timor-Leste is prone to climate change impacts and in future activities/projects at the country level, efforts will be taken to ensure that climate change is prioritize in line with National Policy frameworks that outline actions to address climate change.
- By making stakeholders aware that climate change does impact fisheries resources directly and indirectly.
- We need to take action now to mitigate and adapt.
- By providing education to the public because the issue of climate change is very important.
- Improve the capacity of the community and make sure that they understand climate change impacts and how to adapt.
- Encourage more awareness, training and activities for communities to support capacity to understand and respond to climate changes & its effects on marine resources.
- Planning, extension and education awareness for communities, to support the development of mitigation and adaption plans to minimise impacts from climate change.

Question 18

Are you aware of any guides or tools that help include climate change adaptation in project planning or activities?

19 responses



More than half of participants (52.6%) are aware of guides or tools to include climate change adaptation in their projects. Most of them rely on UN Climate Change policies and National Adaptation Plans to identify adaptations as well as regulations enacted within their country (e.g. Indonesia has the Ministry of Environment and Forestry Decree No. P.33/2016 and P.7/2018).

Question 19

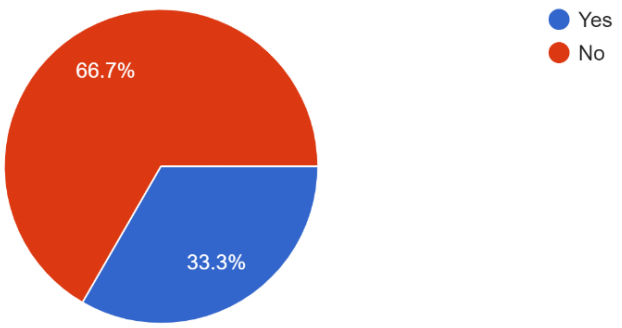
If "yes", please describe the guide or tool. Only 6 participants responded to question 19 with half reporting they did not understand the guides or tools they knew of or suggesting that more guides and tools were needed to incorporate climate change into local planning. Some responses are provided below.

- National Adaptation Plans, UN Climate Change Policies and tools.
- Ministry of Environment and Forestry decree number P.33 year 2016 and number P.7 (2018)
- ATSEA-2 Guide incorporating regional climate change results into local action planning.

Question 20

Have you (or your team) used these guides or tools to include climate change adaptation into any project planning or activities?

18 responses



While question 18 identified that more than half of participants were aware of existing guides or tools, only 33.3% have used these guides to include climate change adaptation into project planning or activities. Most of the participants that have used these guides or tools applied them in limited or high-level circumstances, mainly for decision-making processes in national planning (e.g. Timor-Leste uses tools when developing and implementing new programs at the country level).

Question 21

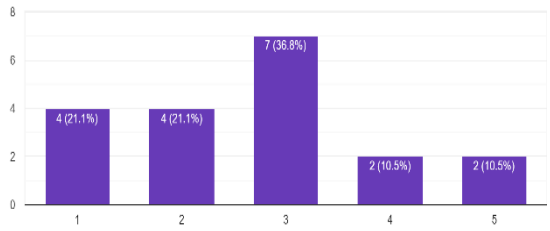
If "yes", please describe how and what tool. Only 5 participants responded to question 21 with varied use of guides or tools.

- During developing and implementing new programs at the country level (Timor-Leste).
- Facilitating local government to develop action plans for adaptation.

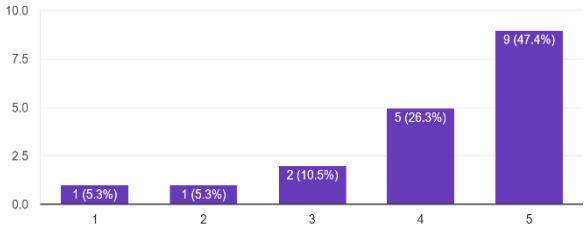
Question 22

How often do you / would you use guides or tools to include climate change adaptation in any project planning or activities? (1 = never to 5 = regularly)

Pre-test



Post-test

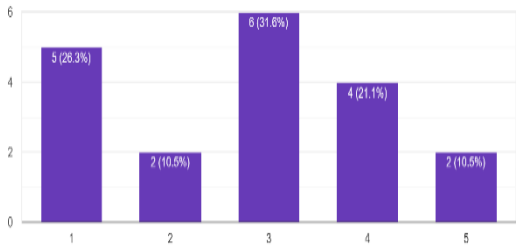


The pre-test showed that most participants never (21.1%), rarely (21.1%) or moderately (36.6%) used guides or tools to include climate change adaptation in project planning or activities. This changed in the post-test with only 5.3% of participants reporting they would never or rarely use guides or tools, and an increase to 26.3% using guides and tools often and 47.4% using guides and tool regularly. This demonstrates the important capacity building success of the workshop, that provided participants with the knowledge, skills and practice in using guides and tools, who can now see the value of such resources.

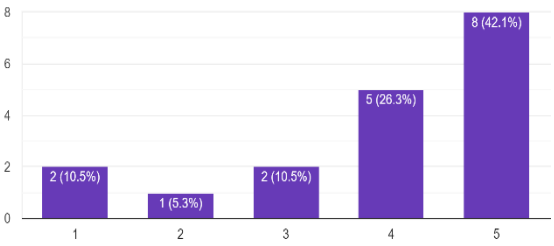
Question 23

How confident do you feel using guides or tools to include climate change adaptation in your work? (1 = no confidence to 5 = expert confidence)

Pre-test



Post-test

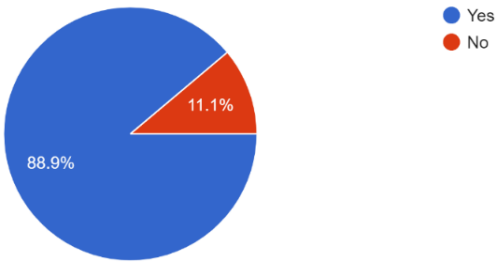


The pre-test results showed that the majority of participants reported no (26.3%), low (10.5%) and moderate (31.6%) confidence in using guides or tools to include climate change adaptation in their work. This increased to participants reporting high (26.3%) and expert (42.1%) confidence in using guides or tools. Fewer participants reporting no (10.5%), low (5.3%) and moderate (10.5%) confidence in the post-test.

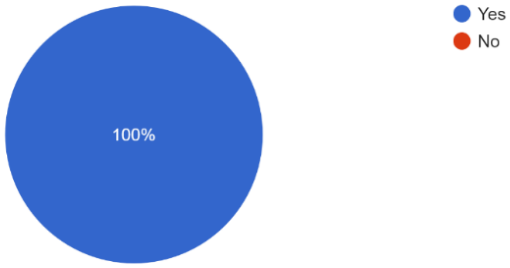
Question 24

Would you consider using guides or tool more to include climate change adaptation in your work?

Pre-test



Post-test



The majority of participants (88.9%) would consider using guides or tools more to include climate change adaptation in their work in the pre-test. This increased to 100% of participants in the post-test.

Question 25

If yes, please describe how and why. Most participants responded to this question during the pre-test and some responses are provided below.

- I would want to more often use guides or tools to help address climate change impacts on marine resources, particularly fisheries to ensure sustainability.
- Guides or tools to mitigate climate change and disasters.
- I would use a climate change guide if it was available in my country.
- I would use tools in future projects to identify climate change impacts in our study areas.
- We need a guide that is easy to apply and understand.
- To protect our environment I think it very important to use guides or tools to support management and planning.
- It is very important to understand and prevent climate change impacts.
- A guide to make sure that the community understand climate change and have the capacity to adapt.
- Need support through such programs & projects to enhance capacity and deliver adaptations.
- The guide will very much assist us in planning for our communities. Our commitment to assist and educate our communities about climate change is strong.

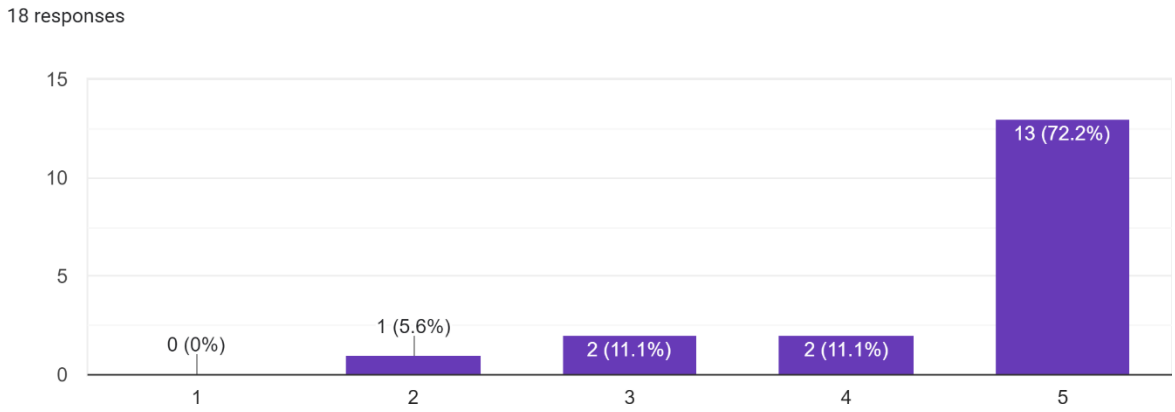
WORKSHOP SURVEY RESULT

The workshop included a survey to elicit further input from participants about their experience at the workshop regarding the content, structure, speakers, and facilities. This provided information about the effectiveness of the delivery and any future topics for awareness training.

PART 1: Content

Question 1

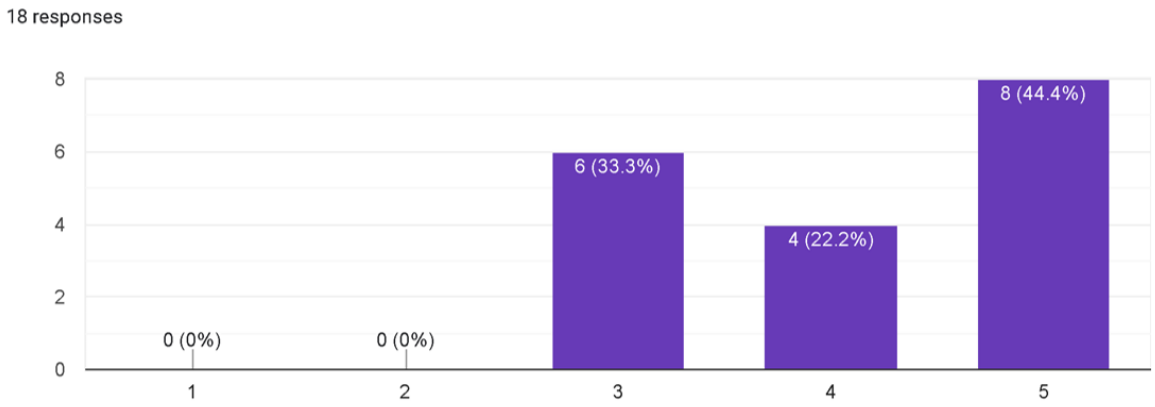
The workshop was relevant to your work.



Most of the participants strongly agreed (72.2%) that the workshop was relevant to their work.

Question 2

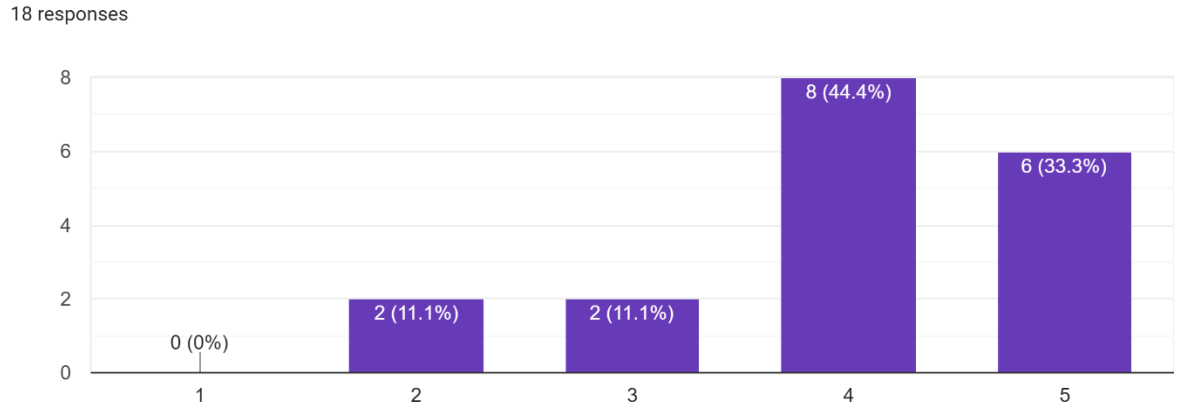
The workshop was enjoyable



Most of the participants agreed (22.2%) or strongly agreed (44.4%) that the workshop was enjoyable.

Question 3

The content of the workshop was easy to follow

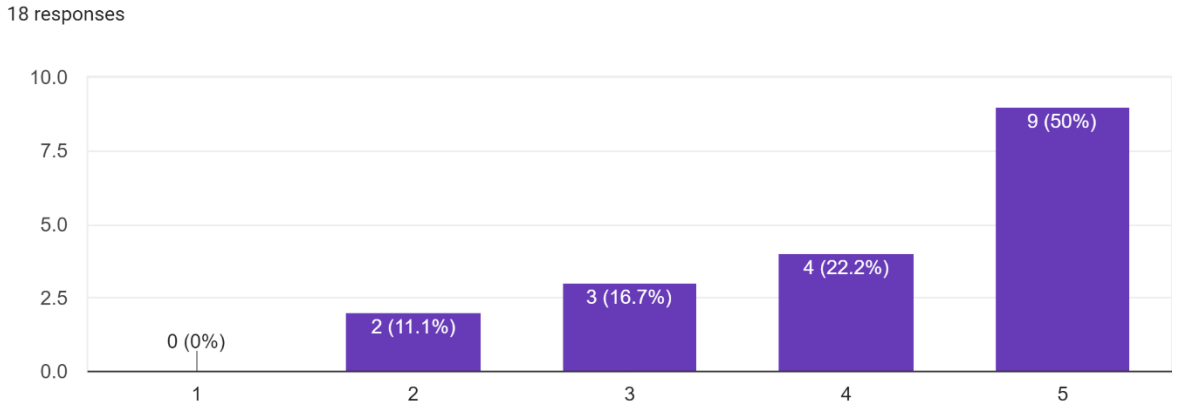


Most participants agreed (44.4%) or strongly agreed (33.3%) that the content of the workshop was easy to follow. No participants strongly disagreed that the content of the workshop was easy to follow.

Structure

Question 4

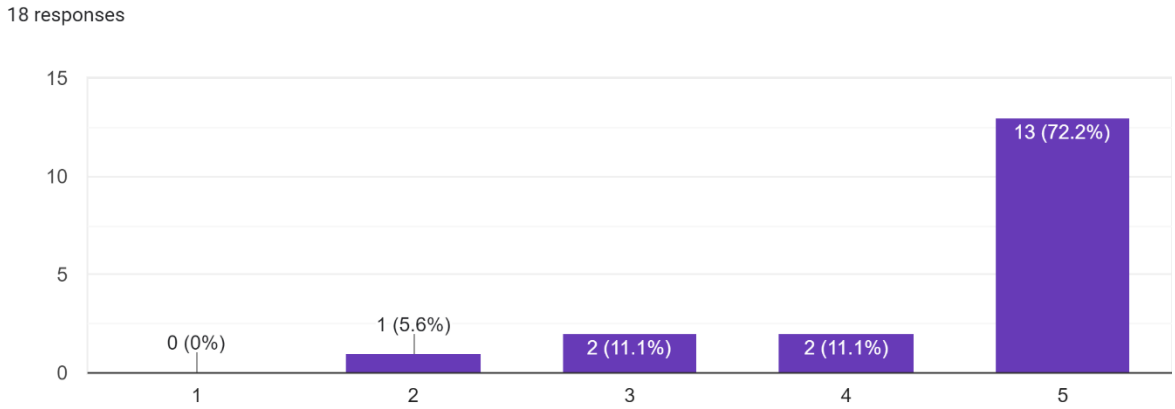
There was enough time spent in interactive learning



Most participants agreed that there was enough time spent on interactive learning, with 22.2% agreeing and 50% strongly agreeing. While no participants strongly disagreed and only 11.1% disagreed that there was enough time spent on interactive learning.

Question 5

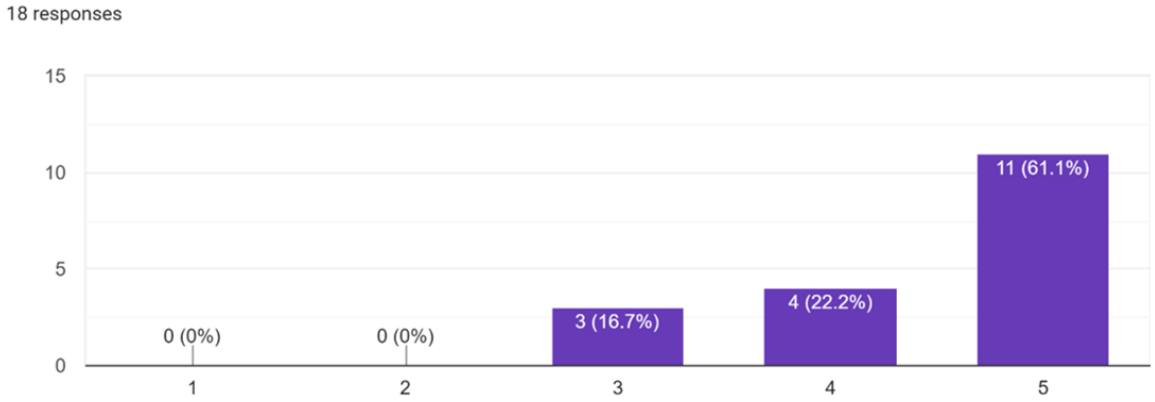
Participation and interaction were encouraged



Most of the participants strongly agreed (72.2%) that the participation and interaction were encouraged.

Question 6

Workshop well organised

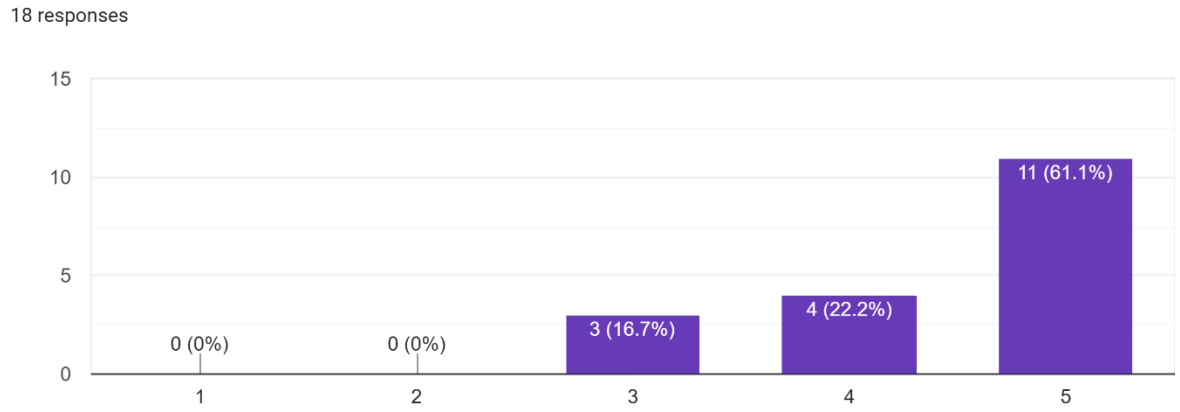


Most of the participants agreed (22.2%) or strongly agreed (61.1%) that the workshop was well organized.

Speakers

Question 7

The speakers were knowledgeable and well prepared.

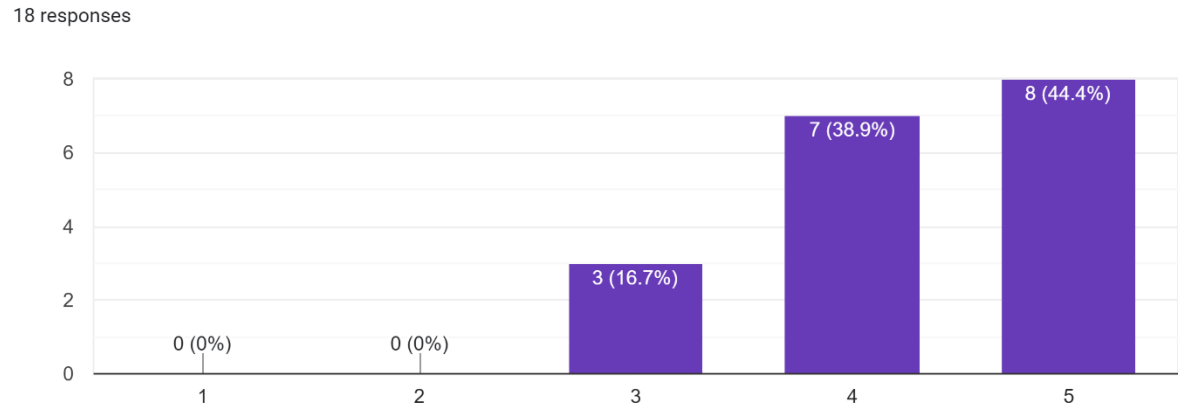


Most participants thought the speakers were knowledgeable and well-prepared, with 22.2% agreeing and 61.1% strongly agreeing. No participants strongly disagreed or disagreed that the speakers were knowledgeable and well-prepared.

Facilities

Question 8

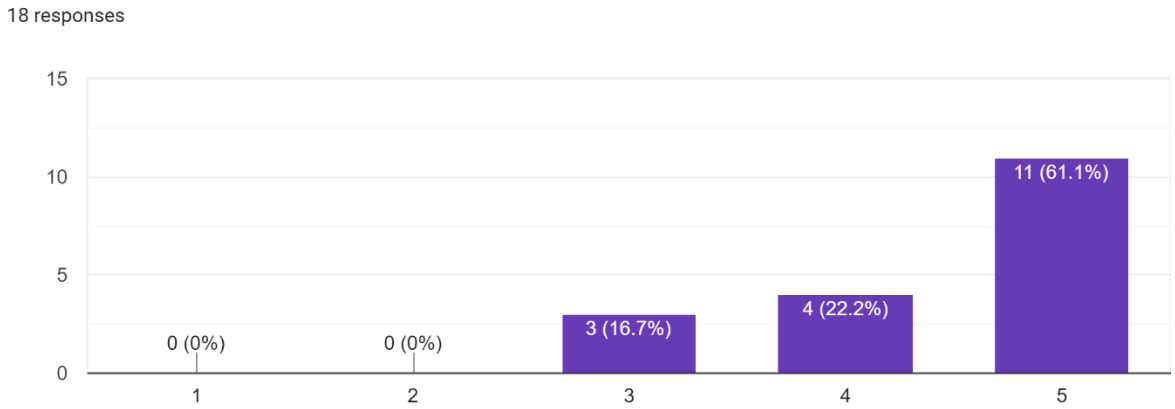
The catering was enough and good quality.



The participants thought the workshop provided enough and good quality catering, with 38.9% agreeing and 44.4% strongly agreeing. No participants strongly disagreed or disagreed that the catering was sufficient and good quality.

Question 9

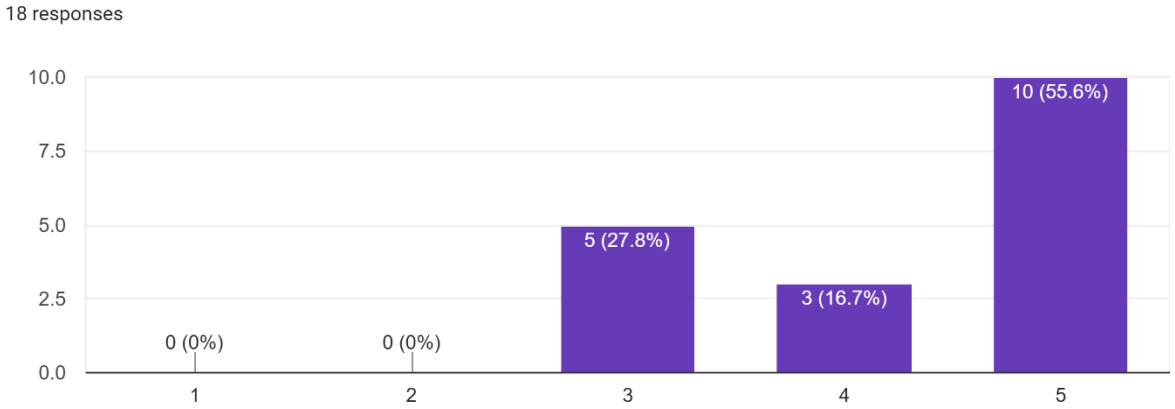
The location of the workshop was convenient



Most of the participants agreed that the location of the workshop was convenient, with 22.2% agreeing and 61.1% strongly agreeing. No participants strongly disagreed or disagreed about the convenience of the venue location.

Question 10

The material distributed were helpful

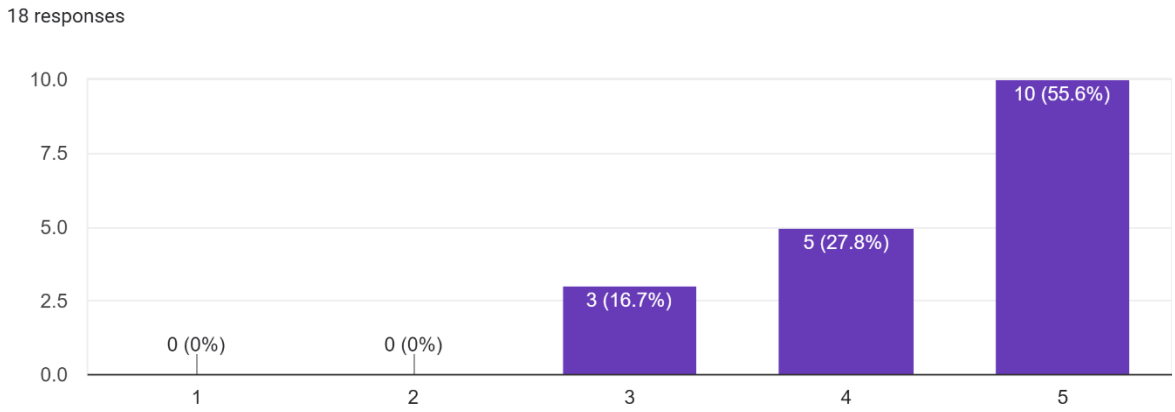


The participants agreed that the materials distributed in the workshop were helpful, with 16.7% agreeing and 55.6% strongly agreeing. None of the participants thought the delivered materials were not helpful and 27.8% were neutral.

Overall

Question 11

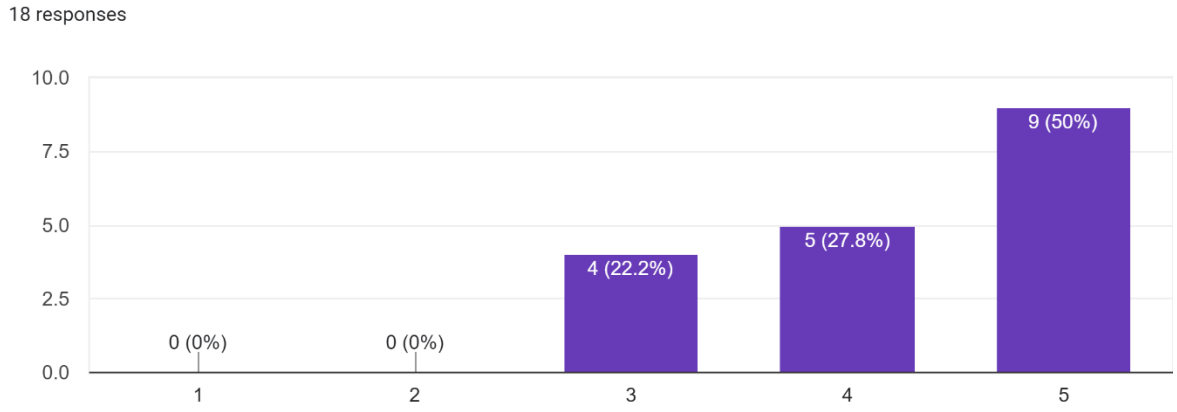
The workshop objectives were met.



Most participants agreed that the workshop objectives were met, with 16.7% being neutral, 27.8% agreeing that the objectives were met, and 55.6% strongly agreeing that the objectives were met. None of the participants thought the objectives were not met.

Question 12

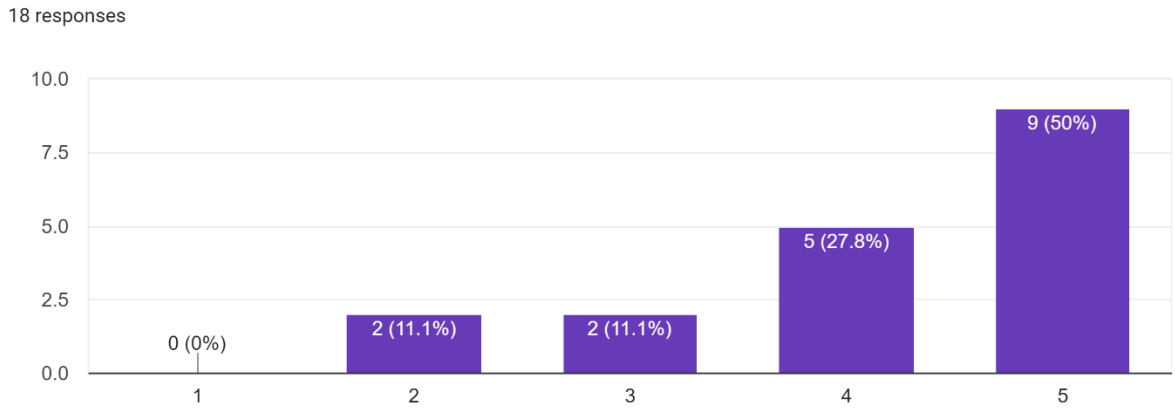
The pre-workshop notification was well-organized.



Most of the participants agreed that the pre-workshop notification was well-organized, with 50% of the participants strongly agreeing, 27.8% agreeing, and 22.2% being neutral. No participants thought that the pre-workshop notification was not well organized.

Question 13

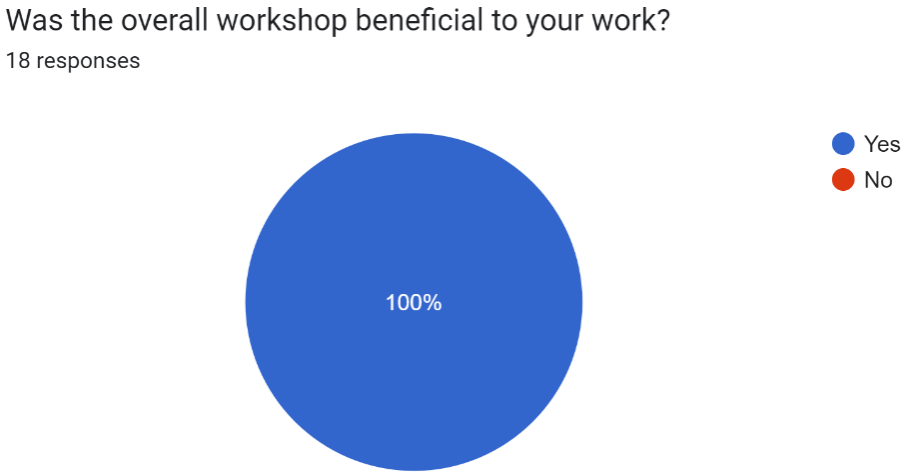
The duration of the workshop was sufficient.



The opinions regarding the workshop duration varied; 50% of the participants strongly agreed that the duration was sufficient, 27.8% agreed it was sufficient, 11% were neutral, and 11.1% thought it was not sufficient.

PART 2

Question 1



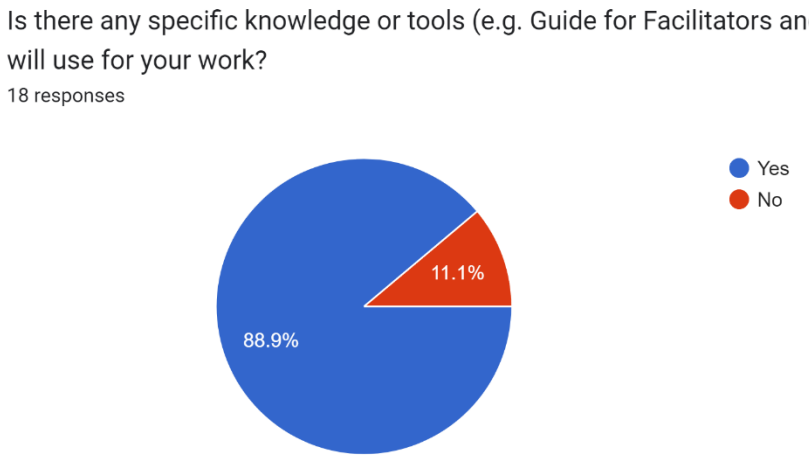
All participants agreed that the overall workshop was beneficial to their work. They found new knowledge and insights from the workshop about climate change vulnerability and adaptation. The survey results suggest that the awareness workshop has helped them to make decisions about incorporating climate change into their work and implement relevant adaptation and mitigation actions. Participants also thought the workshop was helpful in communicating climate change more broadly, including to the public.

Question 2

If "yes", please explain how it was beneficial. If "no", please explain why not.

- I found the use of recycled products as an economic decision.
- Getting new information and knowledge was valuable.
- Knowledge helps us to prioritise and develop adaptation plans.
- Workshop helped to improve my capacity to implement my project in the field.
- All of the materials can be used for the fisheries local communities.
- The workshop really connected to our work in the field.
- The workshop was very relevant to ATSEA-2 work.
- I got new ideas on how to integrate climate change issues into my current work.
- Coming from a background of managing coastal resources, the workshop was really helpfully in understanding climate change and its effect on marine environments. How to tackle climate issues while managing the resources was an important part of the training.
- I now have a better understanding of climate change issues in a more structured way.
- A good opportunity for me to improve my knowledge.
- Our main task is to mainstream climate change adaptation into planning development in the government both national and local. and increase participation in communities to conduct adaptation and mitigation actions. This workshop has given me more knowledge to communicate on climate change to the public.

Question 3

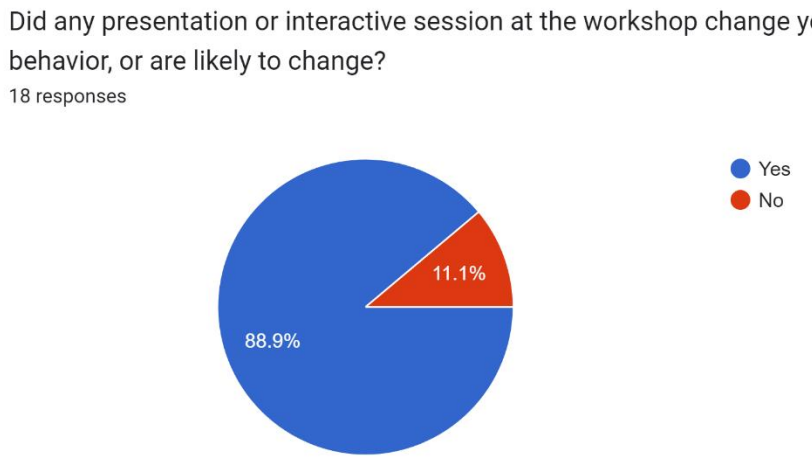


Most participants (88.9%) reported that they learnt about tools and specific knowledge that they can use in the future for their work. Some participants already using guides from the private and public sectors (e.g. SIGAP approach, ATSEA-2 Guide, and the UNCCC Guidelines) but will use guides and tools more after the workshop. Only 11.1% of participants did not consider that they will use guides or tools for their work as a result of the workshop (no reason provided).

Question 4

If "yes", please provide at least one concrete example. If "no", please try to explain why not. Of the 13 participants who responded to question 4, 10 identified the ATSEA-2 Guide for Facilitators and Decision-makers as useful for their work and something they will use. The Guide was reported as being helpful, providing support for local climate change action plans and identifying future climate change risks for communities.

Question 5



Most participants (88.9%) reported that the workshop has changed their perceptions on the impacts of climate change on coastal and marine ecosystems and they will likely change their attitude or behaviour. Only 11.1% did not report any influence of the workshop on their perceptions, attitude or behaviour, providing reasons that they already have experience related to climate change in the marine and fisheries sector, and are aware and implementing appropriate behaviour.

Question 6

If "yes", please provide at least one example.

- I see that both environmental and economic developments must be aligned and maintained together.
- New knowledge that has changed my perceptions and attitudes.
- Introduction on the 1st day provided good background that will influence me.
- Climate change is real and is impacting coastal and marine systems. Urgent actions are needed for adaptation.
- Guide for facilitators and decision-makers will be used.
- I have more experience and knowledge now.
- The need for considering climate change adaptation in the EAFM plan for South Fly district.
- The group discussions gave me an opportunity to understand that different countries in the ATS region experience the same climate change impacts but at different local scales.
- The overlying maps of climate change and impacts in the ATS region were fascinating.
- Knowledge improvement.
- Better knowledge and skills to communicate about climate change.

Question 7

What further information or follow up support would help you in your work?

- Incentives.
- Additional training.
- Conservation planning considering climate change.
- Update regarding implementation of the Guide so that we could also apply in region outside ATSEA project.
- How to gather data and information, and using local language.
- All of the material of the workshop was helpful and would like access.
- Run a similar workshop in Timor-Leste for more participants.
- Would be good to share the information regarding climate change such as the result of the vulnerability assessment, and implementation to continue collaboration among us
- The Guide can be used for adaptation planning and climate change mitigation.
- Implementation reports from the case study project presented.
- A copy of the final Guide and sharing any new work done in the field of climate change that I can contextualize for the country (Timor-Leste) to better meet the demands of our government stakeholders.
- Climate change modelling be available for planning purpose.
- Need more best practice examples.
- Continue to conduct the vulnerability assessment in the community.
- Climate change projection and global models in a simple language.

Question 8

Do you have any recommendation or other comments on the workshop?

- It has been great.
- Excellent.
- Training in Timor-Leste for more participants.
- Please go through or review the slides of the speakers before the event.
- We need to scale up the workshop to reach a broader audience and more participants.
- Sharing information and best practices between ATS countries.
- Everything was good and excellent.
- It might be good to have translator so the participants who do not speak English fluently will be active as well.
- The workshop was conducted very well, including materials, resource people, organisation and accommodation.
- Related trainings need to be implemented at the community level for the locals to effectively understand climate change issues and how they can tackle them with the available resources and give them a sense of responsibility that they have to step up and influence policy and actions on climate change.
- Overall, the workshop was an important information session as it improved my understanding of climate change. The training is well overdue and wish there was more

training conducted to all stakeholders for better understanding and incorporating climate change into activities.

- Well prepared and organised.
- Workshop could have been for 5 days.
- Recommend to ATSEA-2 to prepare a one week for training or workshop next time.
- Cool workshop.

Recommendations

The survey also allowed participants to make recommendations on the workshop format and delivery, as well as future training needs and topics. The key suggestions were:

- Consider including an English-Indonesian translator in future workshops to overcome the language barrier for some participants.
- Request for more training workshops, especially in highly vulnerable areas (e.g. Timor-Leste), so that more people in government and NGOs understand climate change impacts and vulnerability, and can make informed decisions or implement targeted adaptation actions.
- Increase the length of the workshop to 4 or 5 days to allow more time for learning and discussions.
- Continue knowledge sharing and collaboration between ATS countries, particularly on how the Guide is applied in communities.

FURTHER RESOURCES

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

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.

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

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

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

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., 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

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.

APPENDIX A: CLIMATE CHANGE AWARENESS 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 PNG	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 Ikbal Alexander and 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?	Facilitated by Ikbal Alexander and Johanna Johnson	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?	Facilitated by Ikbal Alexander and Johanna Johnson	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	Facilitated by Ikbal Alexander and 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.	Facilitated by Ikbal Alexander and 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

ATSEA-2 Regional Project Management Unit

Jl. Mertasari No.140 Sidakarya,
Denpasar 80224, Bali, Indonesia

P: +62 361 448 4147
E: infoatsea2@pemsea.org
W: https://atsea-program.com/