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**CORAL TRIANGLE
INITIATIVE**
ON CORAL REEFS, FISHERIES
AND FOOD SECURITY



Regional Climate Change Adaptation Action Plan 2025-2030

USAID Sustainable Coral Triangle Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security

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USAID Sustainable Coral Triangle

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Regional Secretariat

Regional Climate Change Adaptation Action Plan 2025-2030

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Acronyms and Abbreviations

ATSEA-2:	Arafura and Timor Seas Ecosystem Action Program
CTI-CFF:	Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security
CT6:	Coral Triangle six member countries including Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands, Timor Leste
CTMPA level 3:	Coral triangle marine protected area is effectively sustained
CTMPA level 4:	Coral triangle marine protected area is effectively institutionalized
GDP:	Gross Domestic Product
GESI:	Gender Equality and Social Inclusion Policy
IMF:	International Monetary Fund
LMMA or LMMAs:	Locally marine managed area(s)
MPA or MPAs:	Marine protected areas
NGOs:	Non-government organizations
OECD:	Other Effective Conservation Measures
READY:	Hazards Mapping and Assessment for Effective Community-Based Disaster Risk Management Project. Government of the Philippines, United Nations Development Programme, Government of Australia.

Executive Summary

The Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security (CTI-CFF) has brought together leaders from six member countries to identify regional best practices in climate change adaptation, with support from USAID Sustainable Coral Triangle. The resulting Adaptation Action Plan highlights five categories of action for support by government, private sector, and civil society organizations.

Coastal communities that rely on fisheries and coral reefs directly benefit from regional support for climate risk reduction and economic resilience. The first adaptation action is to reduce exposure to climate risks through information infrastructure and local implementation. This includes early warning systems to give affected communities more time to take shelter, prevent the loss of productive assets or evacuate. Market development and capitalization of climate-resilient small businesses diversifies income sources to enhance economic resilience. The second action is to enhance adaptive capacity and resilience of fish-dependent communities, fish populations, and ecosystems. This includes expansion of social protections, financial services and insurance to fund rapid recovery from a poor fishing season or extreme weather event. Resilience also relies on robust natural resources management, including marine protected areas, locally managed marine areas and other effective area-based conservation measures.

Governments responsible for implementing climate change adaptation on the ground will need enhanced staff capacity. The third action is to invest in the capacity of resource managers and practitioners to lead learning and innovation on climate adaptation, including government officials, community leaders, women, youth and Indigenous peoples. This includes training sessions, socialization of risk reduction measures, and regional exchanges to cultivate a community of practice. At a regional level, CTI-CFF can support national and local actors with technical guidelines, templates and funding models to promote resilience in fish-dependent communities. The fourth action is to strengthen policy and governance for climate-resilient marine resource management, incorporating best practices for climate change into existing policies for coastal and marine resources. At the same time, marine experts and leaders need to ensure cross-sectoral collaboration to include fish-dependent communities in national approaches to climate change.

The fifth action is to strengthen disaster preparedness and response for coastal communities. The Coral Region is especially vulnerable to coastal flooding, severe storms and typhoons. Best practices for adaptation include community-based disaster response plans, scenario training, multi-hazard early warning systems and support for post-disaster recovery programs.

This regional climate change adaptation action plan highlights 28 best practices drawn from lessons learned in the Coral Triangle region. Implementation has begun for 82% of these best practices, and the greatest regionwide need is to expand adaptation programs to reach the most vulnerable coastal communities. The most progress has been made in disaster preparedness, incorporating climate change into policy, and in enhancing adaptive capacity and resilience. More progress is needed in reducing exposure to climate risks, and strengthening the ecosystem approach to fisheries management. The largest gap in the adoption of best practices is investing in the capacity, learning and innovation in climate change adaptation. Only half of the best practices for investing in the capacity of resource managers and practitioners have been implemented.

Introduction to the CTI-CFF Adaptation Action Plan

This Climate Change Adaptation Action Plan was developed by the CTI-CFF Climate Change Adaptation Working Group in cooperation with representatives of the CTI-CFF Women’s Leadership Forum. This joint session was convened in September 2024 in Bangkok, Thailand, following a Training on Climate Adaptation Policies and Strategies with the support of USAID Sustainable Coral Triangle and the Coral Triangle Initiative for Coral Reefs, Fisheries, and Food Security. During these discussions, CT6 member country representatives presented and discussed their experiences with implementation of climate change adaptation for fisheries associated with coral reefs and food security. Finally, the members reviewed and finalized recommendations drawn from (1) the May 2024 CTI-CFF Climate Change Adaptation Regional Exchange in Jakarta, Indonesia and (2) the source documents “Climate Risk and Resilience: Reimagining Small-Scale Fisheries in Southeast Asia,” and “Climate Risk Management Planning for Small-Scale Fishing Communities in Southeast Asia and the Coral Triangle” (Stiles et al. 2024 a and b).

Climate Change in the CTI-CFF Regional Plan of Action 2.0

The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) is a multilateral partnership of six countries (CT6), composed of Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste, working together to sustain the most extraordinary marine and coastal resources in the Coral Triangle by addressing crucial threats adversely impacting the climate, marine biodiversity, and food security. Through the Regional Plan of Action 2.0 (RPOA 2.0), the CT6 countries collectively and individually committed to specific goals, targets and regional actions to successfully achieve sustainable management of marine and coastal resources for current and future generations. Climate change adaptation is integrated within multiple target outcomes and outputs, as summarized in Table 1 below.

Table 1. Target outcomes and outputs on climate change adaptation in the Coral Triangle from the CTI-CFF Regional Plan of Action 2.0

Target Outcome A1	By 2030, coral reefs, mangroves, seagrass beds and other coastal and marine ecosystems in the CT Region are resilient and effectively managed and/or the impacts of climate change, natural and anthropogenic stressors on reefs, mangroves and seagrass beds are reduced, by comparison with 2020
Regional Activity Outcome A1.3.1	Regional ecosystem-based adaptation and mitigation initiatives are actively pursued and promoted to improve protection of key coastal and marine ecosystems in the Coral Triangle region

Target Output A1.3.1.a	By 2025, Regional agreements/frameworks/ plans, specific guidelines, building on CTI-CFF LEAP and REAP, [regional early action plan] and other existing initiatives, to apply regional ecosystem-based adaptation and mitigation solutions are developed and implemented, to support efforts to protect key coastal and marine ecosystems in the Coral Triangle region
Target Outcome A1.3.2	Facilitate and develop Nature-Based approaches, including integrating citizen science, for governments, private sectors and other stakeholders (local communities, Local Governments) in the Coral Triangle region
Target Output A1.3.2.b	By 2030, a number of regional/national actions on Nature-Based solutions including ecosystem-based adaptation and mitigation programs/initiatives to protect, restore and /or manage key coastal and marine ecosystems in the Coral Triangle region.
Target Outcome B3.1	By 2030, coastal communities in CT region are resilient and adapted to climate change related risks
Target Output B3.1.1	By 2025, Exposure and vulnerability levels including projections on climate change risks are established and reported through the mid-term report in the CT Region.
Target Output B3.1.2	By 2025, relevant existing climate change adaptation action plans are updated, guided by current climate change projections and technology, and disseminated within CT region
Target Output B3.1.3	By 2030, the CT6 By 2030, the CT6 are supported by partners to design, develop and/or implement CCA projects and programs
Target Output B3.1.4	By 2030, the levels of adaptive capacity of CT6 coastal communities and local governments are strengthened through increased awareness/education/training on climate change impacts, implementation of community-resilient and adaptation programs and provision of climate-financing support.
Regional Activity B3.1.1	By 2030, knowledge on climate change is updated, recorded, reported, managed and utilized as guidance for regional and national programs.
Output B3.1.1.a	By 2025, regional exchanges, training and learning events are conducted on generating and reporting information on Climate Change Adaptation and risks.
Output B3.1.1.b	By 2025, a knowledge management system dedicated to Climate Change Adaptation information is in place to support decision

	making in the CT region.
Regional Activity Outcome B3.2.1	By 2030, vulnerability index and adaptation assessments, and Climate Change Adaptation initiatives are determined and conducted for coastal environment and small island ecosystems by each CT6
Output B3.2.1.a	By 2025, Climate Change adaptation plan for coastal and small-islands ecosystem is developed and implemented
Outcome B3.2.2	By 2030, Partnerships with private sectors and strategic Partners to support the vulnerability assessments training, promulgation, and implementation are established

Gender Equality and Social Inclusion Policy (GESI Policy)

In line with the CTI-CFF v the ultimate goal of GESI Policy in the CTI-CFF is to bring benefits to all women, men, youth, disabled people and all social groups in the Coral Triangle area with the improved marine, coastal and small islands ecosystems. This means that work conducted within the CTI-CFF area must incorporate GESI in the plan, implementation and evaluation of projects and programs, and should bring benefits to all communities and gender.

About USAID Sustainable Coral Triangle

The USAID Sustainable Coral Triangle (SCT) is a five-year grant awarded by the United States Agency for International Development Regional Development Mission for Asia (USAID/RDMA). It is implemented by the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) Regional Secretariat (RS). This grant aims to support the sustainable management of marine biodiversity and fisheries resources in the Coral Triangle region (Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor Leste), focusing on strengthening governance, building capacity, enhancing community engagement, and securing blue financing for conservation efforts.

Under Objective 1 of the USAID Sustainable Coral Triangle, Expected Result 1.2 focuses on improving the capacity within CTI-CFF RS and CT6 countries to govern the transboundary Coral Triangle and formulate integrated fisheries management and climate adaptation policies and strategies. Activity 1.2.1 specifically targets the enhancement of climate adaptation policies and strategies through comprehensive training sessions. This activity aligns with the SOM-18 approved 2024 Climate Change Adaptation Working Group (CCA WG) workplan, to conduct workshops to update and disseminate CT6 climate change adaptation (CCA) action plans in alignment with current projections and technologies.

CTI-CFF Regional Climate Change Adaptation Action Plan 2025-2030

Consistent with RPOA 2.0 on the following:

RPOA Target Output B3.1.2

By 2025, relevant existing climate change adaptation action plans are updated, guided by current climate change projections and technology, and disseminated within CT region

and the CTI-CFF Gender Equality and Social Inclusion Policy (GESI Policy)¹

CT6 member countries plan to implement the following best practices for climate change adaptation and GESI integration within fisheries management plans, frameworks, regulations, and data collection, in order to build resilience to climate impacts in the following ways:

1. Reduce exposure to climate risks through information, infrastructure, and local implementation. For example:

- a. Early warning systems for storms by text, phone, social media, display boards in fishing communities or through village elders/leaders; ensuring gender-sensitive inclusion of marginalized groups
- b. Daily and seasonal monitoring of fish catches, wave height, sea surface temperature.
- c. Weatherproof shelters for fish vendors drying and selling fish in the rainy season.
- d. Safe and equitable access to coastal landing sites affected by sea level rise through erosion prevention, nature-based solutions, and entry points for people with limited mobility.
- e. Market development and capitalization of climate-resilient small businesses that provide supplemental and alternative livelihoods and inclusive leadership opportunities in fishing communities.

2. Enhance the adaptive capacity and resilience of fish-dependent communities, fish populations, and ecosystems. For example:

- a. Increase access to parametric insurance and savings for vulnerable households, ensuring gender-sensitive inclusion of marginalized groups including fish vendors, fish processors, crew, subsistence fishers
- b. Work with fishers and fishworkers to adjust fishing intensity and target species in response to irregular fish availability and severe weather, applying the ecosystem approach to fisheries management (EAFM).
- c. Protect coral reefs, seagrass, mangroves, and other coastal and marine ecosystems, including areas important for fishing and gleaning, through marine protected areas (MPAs), marine managed areas (MMAs), locally managed marine areas (LMMAs) and other effective area-based conservation measures (OECM).

¹ In line with the CTI-CFF Gender Equality and Social Inclusion Policy (GESI) Goal - The ultimate goal of GESI Policy in the CTI-CFF is to bring benefits to all women, men, youth, disabled people and all social groups in the Coral Triangle area with the improved marine, coastal and small islands ecosystems. This means that work conducted within the CTI-CFF area must incorporate GESI in the plan, implementation and evaluation of projects and program, and should bring benefits to all communities and gender. Source: <https://coraltriangleinitiative.org/sites/default/files/resources/Attachment%202022.%20Final%20version%20of%20GESI%20Policy.pdf>

- d. Enhance seafood preservation and value addition for income and food security during longer periods of reduced catches.

3. Invest in the capacity of resource managers and practitioners to lead learning and innovation on climate adaptation, including government officials, community leaders, women, youth, and Indigenous peoples. For example:

- a. Regional exchange of learning, case studies, mentors, and data on climate change adaptation within the ecosystem approach to fisheries management.
- b. Provide training to enhance capacity on climate risk management of temperature-sensitive fisheries and ecosystems.
- c. Socialize risk reduction and adaptation with strategic outreach to identify vulnerable fish-dependent communities.
- d. Develop technical guidelines, templates and funding models for national programs to promote resilient fishing communities.
- e. Support climate change adaptation including fisheries and food security with sustainable innovative financing, business models and investment of public and/or non-public finance

4. Strengthen policy and governance for climate-resilient marine resource management. For example:

- a. Incorporate climate change within national policies for coastal and marine resources
- b. Develop climate-resilient regulations for coastal and marine resources
- c. Enhance capacity of policymakers to address climate change impacts on coastal ecosystems
- d. Establish cross-sectoral collaboration between government agencies

5. Strengthen disaster preparedness and response for coastal communities. For example:

- a. Develop community-based disaster response plans for coastal communities
- b. Provide training on disaster risk reduction and emergency response in coastal communities
- c. Implement community-based disaster response plans for coastal communities
- d. Strengthen early warning systems for natural disasters
- e. Ensure post-disaster recovery programs meet the needs of fish-dependent communities

ACTION 1: Reduce exposure to climate risks through information, infrastructure, and local implementation.

Table 2. National implementation to reduce exposure to climate risks for fish-dependent communities.

Dark blue indicates implementation has been started or is in progress.

IDN	MYS	PNG	SLB	TL S	
					Early warning systems for coastal flooding
					Early warning systems for fishing in severe weather
					Localized monitoring of fish catches, wave height, sea surface temp.
					Covered shelter for vendors to dry and sell fish in rainy season
					Retrofit coastal infrastructure, accessible to people w/limited mobility
					Market development, capital for small climate-resilient businesses
					Other programs: transit house for fish vendors

A. Early warning systems

Early warning systems for storms through by text, phone, social media, display boards in fishing communities or through village elders/heads; ensuring gender-sensitive inclusion of marginalized groups

Early warning systems include four key components, “(1) risk awareness, (2) monitoring and warning, (3) warning dissemination & communication, and (4) response capability.” (Coughlan de Perez et al. 2022). Prior training and preparation in a culturally-specific context is essential for (1) and (3), such as during town meetings called by village elders in the Pacific, capacity-building sessions organized by NGOs in the Philippines or Indonesia, or by other means.

Flood early warning systems provide a clear example of the potential to save lives and save money through climate information services. The mortality rate from flooding dropped by ~45% from 2000 to 2017, as the number of early warning systems doubled and additional structural and other risk reduction measures were implemented globally (Perera et al. 2019). When considering avoided damages, cost-benefit ratios for the Philippines estimate ~33 dollars saved for every dollar invested in early warning systems for floods; with cost-benefit ratios in Fiji closer to ~7.3 dollars saved for every dollar invested (Perera et al. 2019).

B. Local monitoring of trends in climate indicators

Daily and seasonal monitoring of fish catches, wave height, sea surface temperature.

Local monitoring of wave height, water temperature, coral bleaching and fish catches is needed to complement traditional local knowledge as seasonal weather patterns shift in response to climate change. Producing this data at a local level provides a more accurate baseline for management interventions when combined with global and regional projections. In addition to climate-specific management, sardine, scad, tuna, and similar fisheries benefit from increased monitoring of catches and abundance surveys independent of the fishery to inform regional and national stock assessments, though this is not widely implemented in the region.

By focusing on simple, low-cost indicators tailored to community concerns, monitoring programs can also help build broader understanding of climate risks. For example, monitoring of coral bleaching can engage youth in data collection before, during, and after bleaching, as through Reef Check in Malaysia, Greenfins in the Philippines and Eco Divers in Indonesia.

C. Weatherproof shelters for seafood supply chain

Weatherproof shelters for fish vendors drying and selling fish in the rainy season.

Construction of sheltered drying facilities and markets with stalls to sell fish, cook and serve seafood meals can increase revenue during fair weather and ensure continuity during severe weather (Borja et al. 2022). In the Philippines, drying facilities with fans and other tools accelerate the process during the rainy season to extend the period of earnings for women fish vendors (Borja et al. 2022). In the Pacific islands, 75% to 90% of fish market vendors are women, and they contribute significantly to their household income ([Vitukawalu et al. 2020](#)). The United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) has expanded market buildings in the Solomon Islands and other Pacific island countries to increase safety for women, include accommodation for vendors who must travel long distances from rural areas, improve clean water and sanitation facilities, and increase the representation of women on market committees ([Vitukawalu et al. 2020](#)). Internet connectivity can also open alternate pathways for women to continue selling seafood in adverse conditions, as demonstrated by women fish sellers who began selling online to consumers during the pandemic (Stiles et al. in prep).

D. Safe and equitable access to coastal landing sites

Safe and equitable access to coastal landing sites affected by sea level rise through erosion prevention, nature-based solutions, and entry points for people with limited mobility.

Climate shocks disproportionately affect people with disabilities when warning systems, evacuation routes, emergency shelters and economic opportunities are not made accessible (Widelska et al. 2023). **Persons with disabilities are 2 to 4 times more likely to be killed in disasters** (ESCAP) and represent 15% of the global population (King et al. 2019). Barriers such as inaccessible building entrances combine with impaired mobility, senses, cognition or psychosocial difficulties to block persons with disabilities from responding to natural disasters amplified by climate change (ESCAP).

For example, elevated walkways and homes on stilts protect fishing villages from flooding and sea level rise, but **unless ramps are provided it can be very difficult** for residents with limited mobility to leave the house, including elderly, children and pregnant community members. These barriers to evacuation increase climate risks for differently abled community members as severe storms and flooding become more frequent and unpredictable (Flavelle 2018).

Persons with disability need to be included in government and community planning for severe storms and other climate shocks, to prevent situations similar to the 2014 flooding in the Solomon Islands “where an **older woman with mobility difficulty...had initially been left behind** when the community evacuated from the rising waters” though she was later rescued by canoe (King et al. 2019). Inclusion during recovery can lead to aid distribution for people unable to leave their homes and rebuilding of accessible infrastructure. (King et al. 2019).

E. Market development and capitalization of climate-resilient small businesses

Market development and capitalization of climate-resilient small businesses that provide supplemental and alternative livelihoods and inclusive leadership opportunities in fishing communities.

Access to markets and finance are key facilitators for livelihood transitions in communities engaged in both fishing and farming, in addition to skills training, knowledge sharing, family support, and changes in gender norms, as identified through systematic review of 84 economic growth projects ([Malhotra et al. 2023](#)). Investing in local leaders among project beneficiaries early in the process was also highlighted as an ingredient for success based on analysis of more than 100 livelihood projects in the Philippines (Pomeroy et al. 2017). This support can include start-up or working capital, production skills and support for scaling or increasing the productivity of existing enterprises (Pomeroy et al. 2017).

The Group for Fishermen’s Wives (KUNITA) in Malaysia provides entrepreneurship training and business opportunities to enhance the socioeconomic status of women in fishing communities (Shaffril et al. 2017). In addition to fishing-related products, many fishers in Malaysia are active users of mobile phones and motorcycles which could be converted into productive assets for non-fishing businesses (Shaffril et al. 2017). The Fishermen’s Economic Group within Malaysia’s National Fishing Association (PNK) provides small-scale fishers interested in entrepreneurship with advisors and support.

Some research suggests that fishers who exit the fishery (or become less reliant on fish) tend to have more diversified livelihoods and greater wealth, and their exit decision is affected by declines in the volume or value of their catch ([Kramer et al. 2017](#)). On the other hand, increased access to export markets for selling fish may have the opposite effect as fishers “doubl[e] down on a declining fishery, seemingly reluctant to exit due to higher prices and new market opportunities” ([Kramer et al. 2017](#)).

ACTION 2: Enhance adaptive capacity and resilience of fish-dependent communities, fish populations, and ecosystems.

Table 3. National implementation to enhance adaptive capacity and resilience

Dark blue indicates implementation has been started or is in progress.

IDN	MYS	PNG	SLB	TL S	
					Parametric or index-based insurance for fishers, fishworkers, families
					Mechanism to adjust fishing intensity, species to fish availability, weather
					Locally managed marine areas including coral reefs, seagrass, mangroves
					Marine protected areas including no-take core zones
					Fishery management plans for key species for export, domestic consm.
					Improvements to seafood preservation, value addition for key species
					Other programs: blue economy and sustainable coastal livelihoods

A. Increase access to parametric insurance and savings

Increase access to parametric insurance and savings for vulnerable households, ensuring gender-sensitive inclusion of marginalized groups including fish vendors, fish processors, crew, subsistence fishers

Increase financial services for fish-dependent households

Financial adaptive capacity includes literacy, resources and tools to help communities prepare for and respond to climate impacts. Many fishing households lack access to formal financial services, particularly in rural areas (Pomeroy et al. 2020), leaving them less able to invest in adaptive strategies, and less prepared financially for climate shocks (Shaffril et al 2017). Small-scale fishing community members in the region identified the lack of assets, such as capital for starting a business or land for farming, as a barrier to climate change adaptation in fish-dependent communities (Stiles et al. *in prep*). This gap in financial services is currently filled by informal money lenders that allow fishing households to meet emergency needs, such as following a severe storm, but do not support financial resilience or economic growth in the community (Pomeroy et al. 2020). In Malaysia, credit agreements with *tauke*, or middle men, require fishers to sell their catch at a lower price (Shaffril et al. 2017).

Civil society, private sector, or government each have a role to play in enhancing financial capacity. For example, Rare has organized 497 savings clubs in the Philippines since 2016, empowering women and following the Village Savings and Loan Association (VSLA) model (Ferrari 2023). This solution overcomes several barriers by not requiring the documentation, minimum deposit balances, minimum loan amounts, fees or travel to a city that a commercial bank would expect (Pomeroy et al. 2020).

Expand index-based or parametric insurance

Index-based insurance delivers payment of a fixed amount from the government policyholder to individual fishers when a certain threshold is reached based on indicators such as wave height or wind speed (Hansen et al. 2022). This enables more rapid relief and fewer costs compared to an insurance claims process requiring inspection of actual damage to individual homes and vessels. For example, the Philippines Bureau of Fisheries and Aquatic Resources has a pilot program to provide a parametric insurance based on a weather index for small-scale fishers that would be included in licensing, as reported by experts during the regional exchanges. Marine Change is developing a parametric climate risk insurance product for small-scale tuna fishing in Indonesia that will offer payments to fishers when they are unable to work due to extreme weather events ([ORRAA 2022](#)). Evaluation of 56 development activities found that index-based agricultural insurance is one of the most proven solutions for food security during climate extremes (Hansen et al. 2022).

Regional parametric insurance

Regional insurance pools share the risk among a large group of people or states signed up for insurance as described above. Since fishing communities in a limited geographic area may all be affected simultaneously by the same extreme weather event, the creation of a regional pool or backing by reinsurance companies can increase the viability of the program (Wabnitz et al. 2021). In 2019, the governments of Grenada and St. Lucia became policyholders in The Caribbean Ocean and Aquaculture Sustainability Facility (COAST), paying insurance premiums on behalf of fishers and aquaculturists, and distributing benefits in response to tropical cyclones (Wabnitz et al. 2021).

Ensure gender equity and social inclusion in insurance

Gender and social inclusion is a critical consideration in the design of climate risk insurance, given the disparate roles played by women and men in Indo-Pacific fishing communities. For example, government officials may rely on formal registration lists to identify beneficiaries for insurance, leading to the exclusion of women informally employed as processors and fish sellers (Wabnitz et al. 2021). This can be overcome by deploying insurance as part of a broader intervention that includes enhancing value chain participation by women and other marginalized groups, and by empowering women's associations as decision-makers. For example, the savings clubs organized by Rare Philippines deliberately focus on women and women's organizations (Ferrari 2023).

B. Work with fishers to apply the Ecosystem Approach to Fisheries Management

Work with fishers and fishworkers to adjust fishing intensity and target species in response to irregular fish availability and severe weather, applying the ecosystem approach to fisheries management (EAFM).

More consistent and more comprehensive implementation of the Ecosystem Approach to Fisheries Management (EAFM) is needed now more than ever as climate shocks become increasingly severe. The fundamentals of fisheries management contribute directly to climate resilience, including (a) rebuilding coastal fish and shellfish populations to sustainable levels, (b) reducing overcapacity in industrial fishing (i.e. fishing power as indicated by the number of vessels, size, gear type) and (c) reducing illegal, unreported and unregulated fishing, as outlined in the Coral Triangle Regional Ecosystem Approach to Fisheries Management Guidelines (Heenan et al. 2013).

Regional experience in managing fisheries affected by La Niña conditions, temperatures and ocean currents (within the El Niño Southern Oscillation or ENSO) simulates future trends for temperature-sensitive species due to climate change. The widely recognized vessel day scheme for transboundary tuna management through the Parties to the Nauru Agreement (PNA) accommodates the migration of tuna populations during La Niña conditions (Bell et al. 2021). When these conditions cause tuna to concentrate in the western part of the participating countries' combined national waters, countries in the west buy fishing days from the countries in the east, mitigating the loss of access fees (Bell et al. 2021). This adaptive management can potentially buffer future projections of tuna catch declines in ten Pacific small island developing states. For Solomon Islands the projected tuna catch decline is projected to be between -8.7 and -15.5 percent, and for Papua New Guinea the projected tuna catch decline is between -26 and -33 percent (Bell et al. 2021).

Currently California adjusts fishing pressure based on a temperature index that is correlated to the productivity of sardine populations, in order to prevent a population crash during less favorable climate conditions. Since creating this temperature-based decision rule, the frequency of overfishing has dropped by 17% (Ishimura et al. 2013). Transboundary stocks of Pacific sardine (*Sardinops sagax*) have long been shared between the USA, Mexico and Canada. However, the distribution of fish is shifting with climate change and transfer payments similar to the PNA may be needed in the future (Ishimura et al. 2013). Some of the region's most temperature-sensitive fish include transboundary populations of scad (*Decapterus spp*, *Megalaspis cordyla*, *Selaroides leptolepis*), sardines (*Sardinella lemuru* and *S. fimbriata*), mackerels (*Scomberomorus commerson*, *Scomberomorus guttatus*) and neritic tunas (*Auxis thazard*, *Auxis rochei*, *Euthynnus affinis*) (Kaczan et al., 2023, Puspasari et al. 2021). Additional research can help identify changes in distribution for these and other species.

C. Protect coral reefs, seagrass, mangroves with MPAs, LMMAs and OECMs

Protect coral reefs, seagrass, mangroves, and other coastal and marine ecosystems, including areas important for fishing and gleaning, through marine protected areas (MPAs), marine managed areas (MMAs), locally managed marine areas (LMMAs) and other effective area-based conservation measures (OECM).

Protection of these priority ecosystems is essential to the CTI-CFF Regional Plan of Action 2.0, under Target Outcome A1, "By 2030, coral reefs, mangroves, seagrass beds and other coastal and marine ecosystems in the CT Region are resilient and effectively managed and/or the impacts of climate change, natural and anthropogenic stressors on reefs, mangroves and seagrass beds are reduced," and the corresponding indicator A1, "number of established/MPAs/MMAs/LMMAs/OECMs with resilient coral reefs, mangroves and seagrass beds in each CT6 country are protected and have effective management plans (that include

the reduction of stressors e.g. climate change, natural and anthropogenic) at Coral Triangle MPA 3 and 4 levels, by 2030 using 2020 as the baseline.”

Current governance in Southeast Asia and Coral Triangle countries includes marine protected areas with multiuse and core / no-take zones, as well as locally managed marine areas. Within the six Coral Triangle countries, there are 1,267 designated marine protected areas (MPAs) and locally managed marine areas (LMMAs) covering more than 26 million ha, based on CT Atlas data from 2013-2023 (CTI-CFF unpublished).

Marine protected areas (MPAs) have proven benefits for coral reefs and associated fisheries, particularly no-take zones, older and larger areas, and those which are adequately staffed, funded and enforced (Smallhorn-West et al. 2019, Green et al. 2014). MPAs can be powerful tools to protect biodiversity, enhance fisheries productivity and resilience in coral reef ecosystems by enabling fish to grow to maturity, particularly for territorial species with high site fidelity (Green et al. 2014). MPAs, particularly no-take zones, benefit fisheries by significantly increasing the size and abundance of fish, resulting in more fish eggs and increased catches in nearby fishing grounds (Roberts and Hawkins 2000; Maypa et al. 2002; Russ et al. 2004; Harrison et al. 2012; Harrison et al. 2020).

Resilience to climate change can also start with a community-based approach that contributes to a broader network. Locally Managed Marine Areas (LMMAs) and other forms of community-based natural resource management are especially important in Melanesia and in other Pacific island communities, where they have effectively managed fishing for food security and other locally determined objectives (Govan 2009). LMMAs are primarily managed by coastal communities in collaboration with partner organizations and/or government representatives ([LMMMA Network](#)). When combined as a network, LMMAs can contribute to socio-ecological resilience to multiple threats including climate change (Govan 2009).

The mangrove or mud crab, *Scylla serratta*, is an important source of livelihoods for women gleaners in Papua New Guinea, along with other fish, shellfish and plants in the mangrove forest (Konia et al. 2019). This crab is one of the fishery species most vulnerable to climate change since it is exposed to warming and rainfall in shallow waters, and is likely overfished (Johnson et al. 2021). Mangroves are especially vulnerable in western Papua New Guinea and Timor Leste, where they are affected by sea level rise, declines in rainfall (in contrast to Southeast Asia) and may be more vulnerable due to the lack of management resources. Community-based natural resource management has been applied to mangroves in Indonesia with varying effectiveness of reforestation and less success in deterring destructive fishing for mangrove crabs ([Damastuti et al. 2019](#)).

D. Enhance seafood preservation and value addition

Enhance seafood preservation and value addition for income and food security during longer periods of reduced catches.

Enhancing existing livelihoods to be “more effective, more efficient, or lower risk” is the first step to increasing household resilience, because any new livelihood is unlikely to completely substitute for fishing, fish selling or processing (Torrell et al. 2010 in Wright et al. 2016). Where possible, market diversification, changing the price of fish in response to fuel price fluctuations,

accessing more stable markets and accessing higher value markets could provide some relief in response to climate-related catch declines (Galappaththi et al. 2022).

One of the lessons learned from the pandemic was that businesses selling shelf-stable products, and those with capacity to sell online were more prepared to adapt to disruptions (Love et al. 2021). Small-scale producers, in some cases with support from NGOs, increased the direct marketing of catch to consumers (Love et al. 2021). Public and private sector investment in catch documentation and traceability systems was also highlighted during expert consultation as an entry point for higher-value markets.

Social inclusion in sustainable coastal livelihoods is highlighted in the CTI-CFF Regional Plan of action 2.0, in Target B2.2, “By 2030, the CTI-CFF reports a positive change in productivity, skills, income, gender and social inclusions, youth involvement and sustainability of coastal livelihoods in priority seascapes and MPA networks.”

ACTION 3: Invest in the capacity of resource managers and practitioners to lead learning and innovation on climate adaptation in fisheries.

Table 4. National implementation to invest in the capacity of resource managers and practitioners

Dark blue indicates implementation has been started or is in progress.

IDN	MYS	PNG	SLB	TL S	
					Community of practice for exchange, lessons learned, data, mentoring
					Training to enhance capacity in managing <u>fisheries</u> for climate
					Training to enhance capacity in managing <u>ecosystems</u> for climate
					Socialization of risk reduction and adaptation strategies
					Vulnerability assessment, outreach to fish-dependent populations
					Tech. guidelines, templates, funding models for resilient communities
					Other programs

Climate change adaptation begins with investing in human capacity, and particularly in resource managers and practitioners, as highlighted in the CTI-CFF Regional Plan of Action

2.0, Regional Activity B3.1, “Improve capacity in generating and reporting information on Climate Change risks.” These training opportunities and leadership development can bring together government officials, community leaders, women, youth, and Indigenous peoples to lead learning and innovative solutions into the future.

A. Regional exchanges

Regional exchange of learning, case studies, mentors, and data on climate change adaptation within the ecosystem approach to fisheries management.

Given the limited climate-finance-specific capacity of national government agencies, regional experts have highlighted the importance of regional exchange specific to climate finance for adaptation in fisheries and aquaculture. For example, although there are very few national entities with accreditation to directly access climate funds, there are accredited regional entities including the Secretariat of the Pacific Regional Environment Programme (SPREP) and The Pacific Community (SPC) ([Fouad et al. 2021](#)). Sessions on climate change adaptation at four regional exchanges in 2023 and 2024 contribute to the RPOA 2.0 output indicator B.3.1.1.a, “number of regional exchanges, training and learning events are conducted for the various stakeholders/participants on generating and reporting information on Climate Change Adaptation and risks (e.g. vulnerability index and adaptation assessments), by 2025. Regional exchange participants from Indonesia, Malaysia, Philippines and Solomon Islands shared their experiences on climate vulnerability assessment, policy and program implementation.

B. Provide training to enhance capacity in managing fisheries and ecosystems for climate

Training to enhance capacity on climate risk management of temperature-sensitive fisheries and ecosystems.

Training on general resilience through fisheries management, and climate-specific resilience can empower local and national government officials to more effectively mainstream climate change adaptation within their responsibilities. For example, the Pacific-European Union Marine Partnership (PEUMP) funded a micro-qualifications, non-formal training and professional short courses across 14 Pacific island countries, with 70% of participants gaining new skills for climate resilience and coastal resource management ([Chand et al. 2023](#)). As part of this program, the University of South Pacific delivered a micro-qualification in establishing and operating a small seafood business for fisheries officers and community workers from the Solomon Islands, including 6 women and 9 men in the first class to graduate ([USP 2022](#)). Within the Coral Triangle region, the National Fisheries College in Papua New Guinea is working to expand applied fisheries management related to climate change. Next steps include identifying more training institutions in CT6 countries who can enhance the skills, expertise and competencies of fisheries managers with similar offerings.

C. Socialize climate risk reduction and adaptation

Socialization of risk reduction and adaptation with strategic outreach to identify vulnerable fish-dependent communities.

Strategic outreach to communities with best practices in climate adaptation and natural resources management is critical to ensuring that all communities are included, not only those

where pilot projects have taken place ([LMMA Network](#)). Limited access to information on climate change in local communities in Southeast Asia is blocking action on adaptation, along with other barriers ([Dedicatoria and Diomampo 2018](#)). Though many lessons have been learned through pilot projects, the high cost of site-by-site implementation has blocked scaling across the many islands and small-scale fishing communities in the region ([LMMA Network](#)).

To meet this need, the Locally Managed Marine Area Network is sharing lessons learned through culturally appropriate outreach tools and media campaigns in Pacific island countries, together with The Pacific Community, with funding for 2020-2023 from the Pacific-European Union Marine Partnership (PEUMP) ([LMMA Network](#)). This includes community-focused radio programs and *talanoa* discussions on mud crab harvest best practices and other mechanisms for socialization and meaningful community participation ([LMMA Network](#)).

D. Technical support and funding models for climate resilience in fish-dependent communities

Develop technical guidelines, templates and funding models for national programs to promote resilient fishing communities.

Within the Philippines, a primary source of training for municipal government officers has been through national government programs on disaster risk reduction, with interventions that can also apply to climate change adaptation for small-scale fishing communities. For example, the READY program (Hazards Assessment for Effective Community-Based Disaster Risk Management) provided municipal training on mainstreaming disaster risk reduction within local development planning ([Dujardin et al. 2017](#)).

The Arafura and Timor Seas Ecosystem Action Program (ATSEA-2) developed a template and guidance for fishing communities to develop their own local action plans for climate adaptation and management. The materials were tested through a participatory process in Oeseli village in Rote Ndao, East Nusa Tenggara, Indonesia, involving consultation men who fish, women who farm seaweed, fish buyers and village officials of both genders, youth (all boys), and staff from the [ATSEA-2 project](#). Following the example of community-based disaster risk management across Southeast Asia, climate strategies can build on local resources and capacities, in order to meet local requirements and priorities ([Gupta and Barman preprint](#)).

Technical support and funding for local implementation of national and regional climate change adaptation goals is especially valuable in the Solomon Islands, where 90% of inshore coastal areas are under customary tenure and community members bring local expertise on adaptive strategies and what is likely to work in practice ([Basel et al. 2020](#)). For example, Rendova Island communities in the Western Province, Solomon Islands, began participatory climate change adaptation planning through village-level workshops with provincial government and the National Ministry for Environment, Climate and Disaster Management to prioritize interventions within technical assessments prepared by experts ([Basel et al. 2020](#)).

E. Support Sustainable Finance Strategies

Support climate change adaptation including fisheries and food security with sustainable innovative financing, business models and investment of public and/or non-public finance

Sustainable finance strategies are identified in the CTI-CFF Regional Plan of Action 2.0, under Regional Activity 1.2 “Develop and execute sustainable finance strategies, and other innovative financing models, to increase financial self-reliance, for the management of the coastal and marine ecosystems in Priority Seascapes and Coral Triangle MPAs.”

From 2010-2019, climate finance in Pacific island countries came from bilateral agreements (59%) and multilateral funds (41%)(UNDP 2021). For example, bilateral funding from Australia and the European Union has been the most important source for Papua New Guinea (Fouad et al. 2021).

Climate finance for adaptation in Pacific island countries is increasingly coming from multilateral climate funds (see Box 1), which requires engaging the implementing entities and agencies responsible for proposing, overseeing and evaluating projects (Fouad et al. 2021). This limits the role of national actors in countries which do not have an accredited entity - as of 2021, no organization in Melanesia was accredited to receive funds at the level of the Micronesia Conservation Trust or Fiji Development Bank (Fouad et al. 2021). This international public funding includes funds from donors, development finance institutions and climate funds (Fouad et al. 2021).

Climate change adaptation project funds specific to ocean and coastal areas in the Asia-Pacific from 2010 to 2019 totalled \$4.3 billion USD from the Asian Development Bank, Global Climate Fund, Global Environment Facility, World Bank; of which \$2.0 billion USD went to India and Bangladesh (Shiiba 2022). Within the Coral Triangle, the primary recipients of these funds were the Philippines (\$453 million USD) and Timor Leste (\$132 million USD) (Shiiba 2022). However, climate change adaptation remained only 5% of climate finance as of 2019 (Shiiba 2022). Alternative sources of climate finance in Southeast Asia are both insufficient and underutilized (Dedicatoria and Diomampo 2018).

Sustainable finance is needed for governments to be able to cover the annual public cost of climate change adaptation, estimated between 1.6% to 4.5% of GDP for CT6 countries, as

Primary climate funds and facilities currently accessed by Pacific island countries.
Adapted from Fouad et al. 2021.

Green Climate Fund (GCF)
Pilot Program for Climate Resilience
Global Environmental Facility (GEF)
Abu Dhabi Fund for Development
NAMA Facility
Asia-Pacific Climate Finance Fund
Adaptation Fund
Least Developed Country Fund
Global Climate Change Alliance
Special Climate Change Fund
Climate Change Fund
Asian Development Fund
Adaptation for Smallholder Agriculture Program
Canadian Climate Fund for Private Sector in

illustrated in Figure 1 (Fouad et al. 2021). Though these are ongoing and growing needs, “the majority of climate finance flows to the Pacific are provided through short-term and project-based initiatives and...tend to be poorly integrated into development, thereby making it harder to achieve long-term impact for communities” (UNDP 2021). Though most climate finance in the Pacific has been disbursed as grants, in Solomon Islands concessional loans have been widely used (Fouad et al. 2021). One of the drawbacks of project-based funding is the emphasis on observable short-term results rather than interventions that yield lasting social change (UNDP 2021).

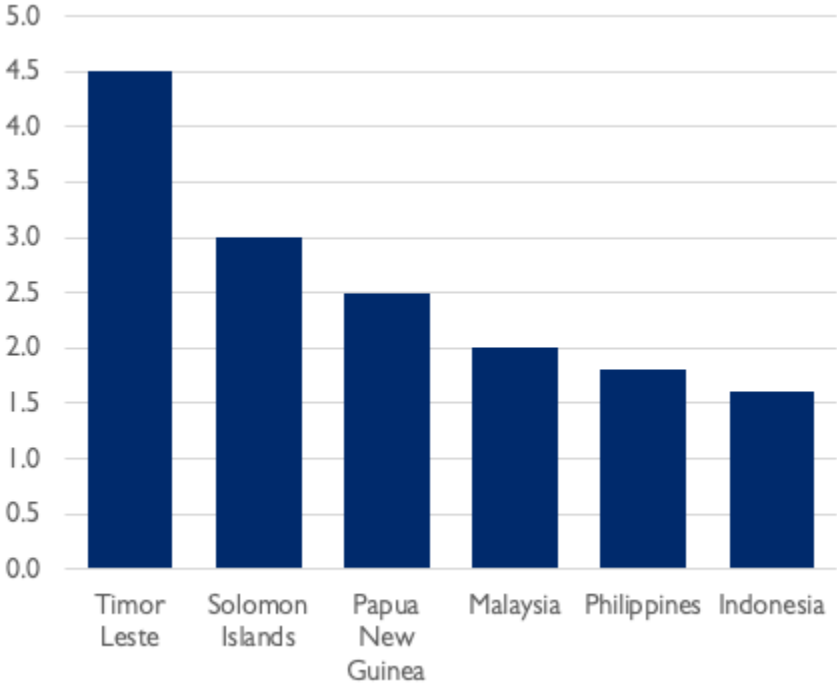


Figure 1. Estimated annual public climate change adaptation costs in percent of GDP.
Modified from Fouad et al. 2021 and based on IMF data.

ACTION 4: Strengthen Policy and Governance for Climate-Resilient Marine Resource Management

Table 5. National implementation to strengthen policy and governance for climate-resilient marine resource management

Dark blue indicates implementation has been started or is in progress.

IDN	MYS	PNG	SLB	TL S	
					Incorporate climate change within national marine resource policy
					Development of climate-resilient regulations for marine resources

				Enhance capacity for policymakers to address climate impacts
				Strengthening legal frameworks for sustainable marine resource mgmt.
				Encourage cross-sectoral collaboration between government agencies
				Other programs

A. Incorporate climate change within national policy for coastal and marine resources

While the fishing sector is mentioned in a number of the national adaptation plans of CT6 member countries, additional sector-specific policy development is needed for fisheries in some countries, and continuing regulatory implementation and budgeting is needed across the region. For example, Timor Leste is currently working to incorporate climate change within fisheries and aquaculture policies and legal frameworks with the support of WorldFish, UN Food and Agriculture Organization (FAO), Global Environment Facility (GEF) through the IKAN Adapt project ([WorldFish](#)). National and municipal officers, along with suco chiefs cooperated in designing the project based on local needs and a baseline review of existing laws and regulations, with leadership from Timor Leste’s Directorate General of Fisheries of the Ministry of Agriculture and Fisheries ([FAO 2020](#)).

B. Develop climate-resilient regulations for coastal and marine resources

More consistent and more comprehensive implementation of the Ecosystem Approach to Fisheries Management (EAFM) is needed now more than ever as climate shocks become increasingly severe. The fundamentals of fisheries management contribute directly to climate resilience, including (a) rebuilding coastal fish and shellfish populations to sustainable levels, (b) reducing overcapacity in industrial fishing (i.e. fishing power as indicated by the number of vessels, size, gear type) and (c) reducing illegal, unreported and unregulated fishing, as outlined in the Coral Triangle Regional Ecosystem Approach to Fisheries Management Guidelines (Heenan et al 2013).

Some fish respond to changing temperatures, ocean currents, and rainfall during La Niña warming conditions, dramatically affecting the catch (Puspasari et al. 2021). Regional experience in managing fisheries affected by La Niña conditions, temperatures and ocean currents (within the El Niño Southern Oscillation or ENSO) simulates future trends due to climate change. The widely recognized vessel day scheme for transboundary tuna management through the Parties to the Nauru Agreement (PNA) accommodates the migration of tuna populations during La Niña conditions (Bell et al. 2021). Currently California adjusts fishing pressure based on a temperature index that is correlated to the productivity of sardine populations, in order to prevent a population crash during less favorable climate conditions. Since creating this temperature-based decision rule, the frequency of overfishing has dropped by 17% (Ishimura et al. 2013).

C. Enhance capacity of policymakers to address climate change impacts on coastal ecosystems

Countries across the region need to increase proper implementation of climate policies and laws on climate change adaptation ([Dedicatoria and Diomampo 2018](#)). CTI-CFF recognized the need for regional, national and local capacity development for government leaders and planning offices in its [2011 Region-wide Early Action Plan for Climate Change Adaptation](#), identifying the need to prepare “decision-makers in key positions to mainstream climate concerns into policies, programs, projects and plans.” Additional target audiences for capacity building on climate change adaptation were identified, including practitioners, local government leaders, public and private managers or natural resources, and sector planners. Given the scale of the challenge and the rapidly evolving best practices in climate change adaptation, capacity-building for policymakers remains a priority in CTI-CFF’s Regional Plan of Action 2.0, under Target Output Indicator B.3.1.4, “number of courses or trainings designed for governments, coastal communities and other relevant stakeholders in response to climate change impacts to strengthen levels of adaptive capacity of CT6, by 2030.”

D. Strengthen legal frameworks for sustainable coastal and marine resource management

Within the CTI-CFF Regional Plan of Action 2.0, the Ecosystem Approach to Fisheries Management (EAFM) is essential to Target A3: Healthy and Productive Fisheries as a foundation for resilient communities. Strengthening legal frameworks is consistent with Target Outcome Indicator A3.1, “number of EAFM, including CBRM, EBA, ICM and other relevant fisheries management approaches, initiatives and programs implemented by CT6 countries, to improve fish stock and health, by 2030.”

For example, since 2019 the Philippines has established 12 Fishery Management Areas across the country in order to shift toward more participatory and science-based management ([EDF](#)). Fisheries Management Area 8 has established its management body, scientific advisory group, stock assessments for top species, and a scorecard on “good governance principles of transparency, accountability and public participation, and predictability under the rule of law” ([FMA8](#)). By amending the Fisheries Code, the Philippines has created a stronger legal framework for EAFM implementation for major fishing grounds around the country.

E. Encourage cross-sectoral collaboration between government agencies

Better collaboration across jurisdictions and between multiple government agencies is needed to effectively adapt to climate change in Southeast Asia ([Dedicatoria and Diomampo 2018](#)). For example, coordination between environment agencies, coastal development authorities and city administrators may be required in order to minimize landward barriers to the migration of mangroves, tidal flats and beaches as they shift inland with sea-level rise (Heenan et al. 2013). Coordination across jurisdictions is also needed to reduce pollution from coastal and upland land use that can make coral reefs more vulnerable to warming waters and coral bleaching. Sediment runoff from agriculture, forestry, and urbanized areas is projected to increase with more frequent and more intense rainstorms due to climate change (Heenan et al. 2013). Coordination between government agencies is also an effective strategy for local and national governments to overcome institutional capacity gaps ([Cid and Lerner 2021](#)). Collaboration between national and local agencies is also critical to ensure a rapid, coherent

response, as highlighted by delays caused in emergency aid for Typhoon Haiyan (Yolanda) in the Philippines due to lack of clarity in the roles of different responding teams (Coughlan de Perez et al. 2022).

ACTION 5: Strengthen Disaster Preparedness and Response for Coastal Communities

Table 6. National implementation to strengthen disaster preparedness and response for coastal communities

Dark blue indicates implementation has been started or is in progress.

IDN	MYS	PNG	SLB	TL S	
					Development of disaster response plans for coastal communities
					Training on disaster risk reduction and emergency response
					Implementation of community-based disaster preparedness programs
					Strengthening of early warning systems for natural disasters
					Post-disaster recovery programs tailored to coastal communities
					Other programs: island-specific action plan, MPA vulner. assessment

A. Develop community-based disaster response plans for coastal communities

Small island communities face increased costs in responding to disasters, along with increased vulnerability in some cases ([Abenir et al. 2022](#)). This specific context requires disaster response plans that are generated together with the needs and context of different groups, members and organizations in that community. Funding for community-based disaster risk reduction plans can be a barrier in many communities, which in some cases may be addressed through partnerships with external development actors or strong support from local leadership ([Abenir et al. 2022](#)). Community-level planning of disaster response is essential to ensure preparation for the specific needs of marginalized groups, including accessibility for persons with disabilities ([King et al. 2019](#)) and warning systems in appropriate dialects, languages and culturally meaningful terms ([Kuruppu and Willie 2015](#)).

B. Provide training on disaster risk reduction and emergency response in coastal communities

Civil society and government can work together to provide training on disaster risk reduction and emergency response, followed by simulations that improve response times in case of a real emergency.

For example, Sitarjo Village in East Java, Indonesia conducted a coastal flooding simulation exercise to practice working together in disaster preparedness teams, using early warning system and communication tools, and following the protocol outlined in their contingency plan with support from USAID Indonesia's Climate Change Adaptation and Resilience Project (APIK) ([Sakera et al. 2020](#)). At the same time, the simulation helped "ensure that community members understand how the system works and what actions they should take during an emergency situation," so they recognize the flood siren and can evacuate in a timely manner ([Sakera et al. 2020](#)). Residents of Lae, Morobe Province in Papua New Guinea also tested early warning systems for flooding on the Bumbu River with a simulation exercise with support from United Nations Development Programme (UNDP) in partnership with New Zealand's National Institute of Water and Atmospheric Research (NIWA) and the Government of Papua New Guinea ([UNDP 2018](#)).

Free training is available online for practitioners and community members working to reduce the risk of climate-related hazards such as coastal flooding. For example, WWF Adapt training on "Natural and nature-based flood management methods" ([WWF Adapt](#)). This online training includes animations, exercises, review questions, and detailed descriptions of best practices in flood risk reduction.

C. Implement community-based disaster response plans for coastal communities

The initial plans for community-based disaster preparedness and adaptation are often developed with short-term project funding, though the need for preparedness is continuous and increasing in the long term. Lessons learned from 23 community-based adaptation programs in the Pacific emphasize local funding, NGO involvement and integration with climate awareness and ecosystem-based approaches as common threads in successful long-term implementation ([McNamara et al. 2020](#)). As highlighted in the United Nations [Sendai Framework for Disaster Risk Reduction 2015-2030](#), it is critical for disaster preparedness to be developed in a participatory way with the affected communities, to ensure early warning systems and other preparations are specific to the local context.

For example, Indonesia's Disaster Management Authority (BNPB) initiated support for community-based disaster preparedness through the 2012 Guidelines for Disaster Resilient Village (Destana) ([Husein 2022](#)). These guidelines were then implemented in approximately 1500 communities by NGOs, university service programs, business corporate social responsibility programs, and in approximately 500 communities by government agencies ([Husein 2022](#)). In Bima, Kalimantan, implementation was led by the Islamic faith-based organization Muhammadiyah, and began with extensive community engagement through meetings, text messages and personal contacts. This process led to culturally relevant preparedness, including the use of wooden bamboo slit-drum as part of the early warning system, following its traditional use as a warning or call to public meetings ([Husein 2022](#)).

D. Strengthen early warning systems for natural disasters

In addition to specific impacts on fishing communities from flooding and severe storms amplified by climate change, Coral Triangle countries are exposed to a wide range of natural disasters. The United Nations “Early Warnings for All” initiative is working to expand multi-hazard early warning systems, particularly in small island developing states where only a third of people have access to effective early warning systems ([UNEP 2023](#)).

Timor Leste is beginning development of a multihazard early warning system designed to cover floods, heatwaves, cyclones and storm surges, with the support of UNEP to install observation equipment. These forecasts will then feed into communication alerts, with the goal of reaching 80% of residents through radio, text messages, and social media ([UNEP 2023](#)). The Australian Humanitarian Partnership began the second phase of the Disaster READY program in 2022 with a greater focus on gender equity and inclusion of differently abled people ([AHP](#)). For example, in the Solomon Islands the national disaster management office created a disaster information management system and strengthened local early warning systems with support from Disaster READY ([AHP](#)).

E. Ensure post-disaster recovery programs meet the needs of fish-dependent communities

Post-disaster recovery can last for many years, and marginalized communities may be left behind with the inevitable limitations on resources. For this reason, the Disaster READY project from the Australian Humanitarian Partnership seeks to “equip [communities] with the tools needed to return to life as quickly as possible. This focus on ‘bouncing back’ is so important to communities impacted by disaster, as it minimizes disruption to crucial social structures like functioning markets and children’s education” ([AHP](#)).

Coastal communities may be particularly slow to recover when they remain vulnerable to future severe storms, flooding or other shocks before they have rebuilt their assets and savings. For example, more than eight years after Typhoon Haiyan (Yolanda) devastated Tacloban City in Philippines, segments of the population remained in precarious physical, economic and social conditions after suffering through additional typhoons in the intervening years (Mangada and Cuaton 2022). Fish-dependent communities need to maintain access to the resources they depend on (Jamero et al. 2019, McMichael and Powell 2021), even when relocation due to storm damage or sea level rise becomes necessary. Even moving a short distance can lead to decreased consumption of fresh seafood, and a dietary shift towards less healthy packaged foods (McMicheal and Powell 2021).

Conclusion: Coral Triangle member countries have begun climate change adaptation in fisheries, and broader implementation is needed to reach affected communities

As early leaders in responding to climate change impacts on fisheries, Coral Triangle member countries are in the process of testing and improving the **full range of coastal adaptation strategies** at the institutional level. Global practitioners can learn from ongoing responses to more frequent and more intense storms and floods, decreased catches and changing coral

reef ecosystems in the Coral Triangle. National and local actors have insights refined through a growing community of practice on climate change adaptation, resilience and recovery. As climate change unfolds, this regional cooperation will remain ever more important in the race to support **120+ million people who rely on marine resources** in the Coral Triangle ([CT Atlas](#)) and will need institutional support to adapt and recover from the consequences of climate change.

Among 28 best practices highlighted below for adaptation action in fisheries, **82% are in pilot, startup or implementation** phases in at least one of the CT6 countries (Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor Leste), as illustrated below in Figure 2. This figure summarizes the country-specific reporting on adaptation implementation presented above in Tables 2, 3, 4, 5, and 6. Results reported by each country for specific best practices has been normalized to add up to a maximum score of ten for each adaptation action (such as action 2, enhance adaptive capacity and resilience), based on the number of best practices that have been implemented. An implementation score of ten indicates that implementation has begun for all of the best practices within an adaptation action (such as parametric or index-based insurance, adjusting fishing intensity, and locally managed marine areas).

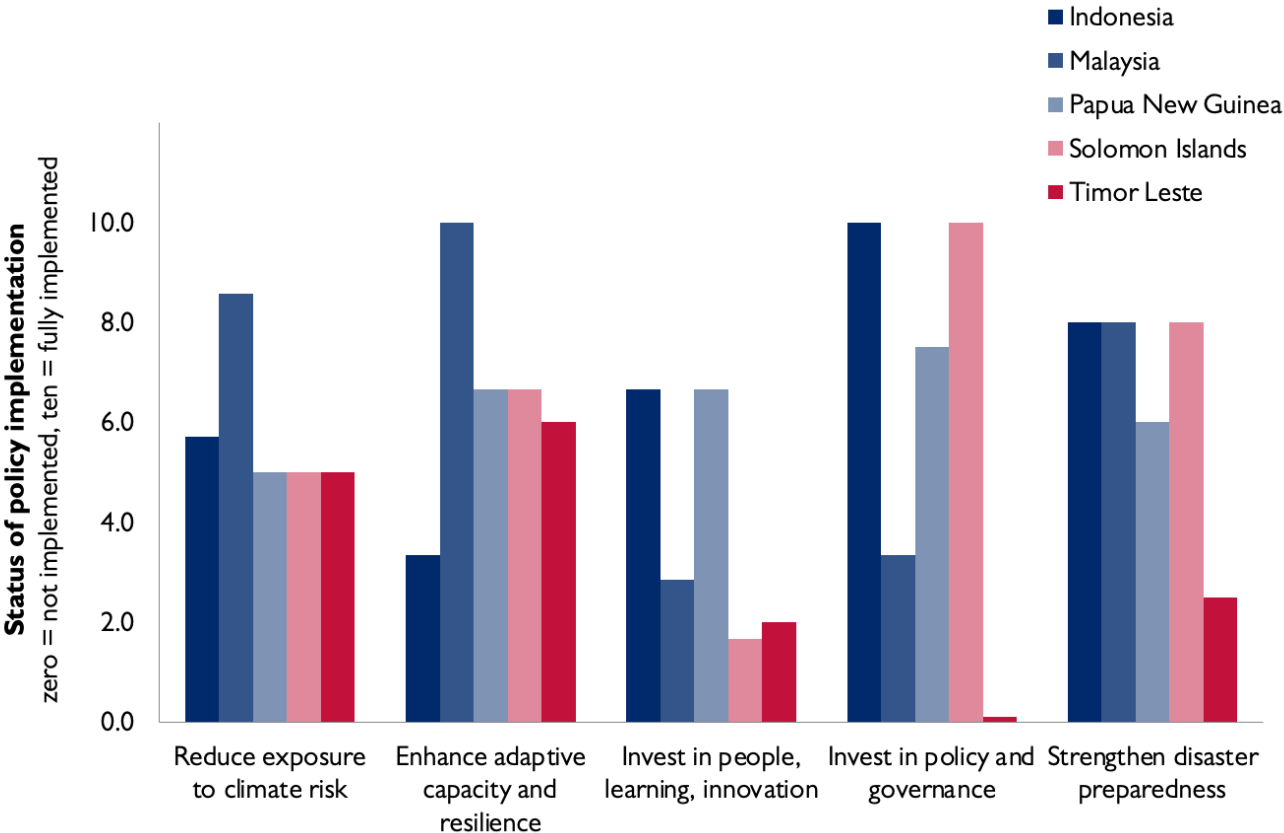


Figure 1. Status of national implementation of the CTI-CFF Regional Climate Change Adaptation Action Plan.

The plan includes 28 policy interventions within five actions named on the horizontal axis. Status was reported as of October 2024 to the CTI-CFF Regional Secretariat by National Coordinating Committee or Climate Change Adaptation Working Group Members, and

published sources, noting that data from the Philippines was not available. See Tables 2 through 6 for more detail on implementation of specific interventions.

Governments are focused on interventions to **enhance adaptive capacity and resilience** of fish-dependent communities and related ecosystems. Of the best practices described under enhancing adaptive capacity, an average of 80% have been implemented at a regional level, with the most progress in Malaysia, Papua New Guinea, Solomon Islands, and Timor Leste. Indonesia needs more implementation in this area, and Philippines data was unavailable. **Disaster preparedness implementation is also very strong**, with an average of 80% of best practices implemented, with the most progress in Indonesia, Malaysia and Solomon Islands. Though none of the individual best practices have been fully implemented at scale, **marine protected areas, locally managed marine areas, and multihazard disaster early warning systems** are the farthest along, with implementation activities underway in all CT6 countries.

Policy and governance to support climate change adaptation in fisheries have been implemented in Indonesia and the Solomon Islands, with all best practices incorporated. In Papua New Guinea, 75% of best practices for climate change **integrated into legal frameworks, policy, and regulations** at the national level. Policy and governance specific to climate and fisheries is still needed in Malaysia and Timor Leste. Despite **progress in the region on fishery management plans, fishery management areas and other mechanisms for ecosystem approaches to fisheries management (EAFM)**, there is a lack of mechanisms to dynamically adjust fishing intensity and target species in response to climate impacts. For example, Malaysia has acted to limit fishing by destructive gears such as trawling, but these measures are not accelerated or adjusted in response to catch fluctuations or extreme weather or both.

Though some action has been taken, there is a lot of **potential for additional climate risk reduction to minimize impacts on fisheries, with only 50% to 57%** of best practices implemented in Indonesia, Papua New Guinea, Solomon Islands, and Timor Leste. Specific best practices that are being pilot-tested or have been partially implemented in at least four countries include early warning systems to alert fishers about severe weather, improved shelter for fish vendors, accessible wharfs retrofitted for sea level rise, and support for climate-resilient small businesses - expansion of these programs in the next five years is a key opportunity for investment.

The greatest region-wide gap in CCA adaptation action is **investing in people, learning and innovation**, with a regional average of only 50% of best practices adopted to prepare government officers and communities with the training, skills and information they need. For example, no action was reported on investment in the capacity of fisheries managers to lead learning and innovation on climate adaptation, including government officials, community leaders, women, youth and indigenous peoples. However, Papua New Guinea and Indonesia are regional leaders in human capacity development for climate change adaptation. Across the Coral Triangle region, national representatives rated capacity enhancement as an important need, with a lack of training specific to managing fisheries for climate.

The second **region-wide gap is the mainstreaming of gender equity and social inclusion** across all 28 best practices in CCA adaptation action, to ensure no one is left behind in reducing risks and enhancing capacity. Local communities also need post-disaster recovery

programs tailored to coastal communities, with the exception of the Solomon Islands where disaster recovery is mainstreamed and effectively includes coastal community members. **Local community leaders need more technical support**, as the reporting country representatives were unaware of any technical guidelines, templates or funding models for climate resilience in fishing communities.

Appendix 1. Next steps for implementation of RPOA 2.0 related to climate change adaptation

RPOA 2.0 outcome or output	Date and Target	Implementation Next Steps
Target Outcome B3.1	By 2030, coastal communities in CT region are resilient and adapted to climate change related risks	More implementation of best practices across the region. While implementation has begun, it needs to be expanded to reach a much higher percentage of coastal communities
Target Output B3.1.1	By 2025, Exposure and vulnerability levels including projections on climate change risks are established and reported through the mid-term report in the CT Region.	Gender-disaggregated data needed in vulnerability assessments. More resources needed to scale vulnerability assessment to all areas. The results of vulnerability assessments need to be published and disseminated, including in the Solomon Islands.
Target Output B3.1.2	By 2025, relevant existing climate change adaptation action plans are updated, guided by current climate change projections and technology, and disseminated within CT region	Progress on implementation of this adaptation action plan to be shared at upcoming regional exchanges.
Target Output B3.1.3	By 2030, the CT6 By 2030, the CT6 are supported by partners to design, develop and/or implement CCA projects and programs	Accelerated implementation of CCA projects and programs, building on the support from USAID Sustainable Coral Triangle, Sustainable Fish Asia Technical Support, GIZ SOMACORE, ATSEA2 and other activities
Target Output B3.1.4	By 2030, the levels of adaptive capacity of CT6 coastal communities and local governments are strengthened through increased	Training, implementation and financing to enhance adaptive capacity needs to be scaled to reach a much larger percentage of

RPOA 2.0 outcome or output	Date and Target	Implementation Next Steps
	awareness/education/training on climate change impacts, implementation of community-resilient and adaptation programs and provision of climate-financing support.	CT6 coastal communities.
Regional Activity Outcome B3.2.1	By 2030, vulnerability index and adaptation assessments, and Climate Change Adaptation initiatives are determined and conducted for coastal environment and small island ecosystems by each CT6	More gender-disaggregated data collection in vulnerability and adaptation assessments. More resources needed to scale vulnerability and adaptation assessment to all areas.
Output B3.2.1.a	By 2025, Climate Change adaptation plan for coastal and small-islands ecosystem is developed and implemented	More localization of national adaptation plans in coastal and small-island communities across the region
Outcome B3.2.2	By 2030, Partnerships with private sectors and strategic partners to support the vulnerability assessments training, promulgation, and implementation are established	More private sector engagement in CCA projects and programs in the CT6 in parallel with USAID Sustainable Coral Triangle, Sustainable Fish Asia Technical Support, GIZ SOMACORE

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