Workshop on Enhancing Prevention and Risk Reduction for Climate Change Adaptation in Vulnerable Communities in the Asia-Pacific Region

APEC Emergency Preparedness Working Group

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1. INTRODUCTION

1.1 Overview

The Asia-Pacific region is frequently subjected to extreme weather events and natural disasters, which are becoming increasingly severe due to the impacts of climate change. These events pose significant threats to the socio-economic stability and development of APEC economies, particularly affecting vulnerable communities that lack the resources and infrastructure to effectively cope with such challenges.

In response to this pressing issue, the "Workshop on Enhancing Prevention and Risk Reduction for Climate Change Adaptation in Vulnerable Communities in the Asia-Pacific Region" was executed.

Held in Arequipa, Peru, this two-day workshop brought together participants from across the APEC economies, including representatives from government institutions, private sector companies and academia.

This summary report provides an overview of the workshop's proceedings, key discussions, and outcomes. It highlights the shared experiences and best practices in early warning systems, impact assessment, and the mapping of vulnerable and hazardous areas. The report also underscores the importance of collaborative efforts and knowledge exchange in building the capacity of APEC economies to anticipate, cope with, and prepare for climate-induced disasters.

By documenting the insights and recommendations generated during the workshop, this report aims to serve as a valuable resource for policymakers, practitioners, and stakeholders involved in disaster risk reduction and climate change adaptation. The ultimate goal is to support the integration of advanced scientific and technological solutions into domestic strategies, thereby enhancing the resilience and preparedness of vulnerable communities across the Asia-Pacific region.

1.2 Objectives of the Project

The main objective of this project is to support APEC economies in building the capacity to anticipate, cope with, and prepare for disasters exacerbated by climate change. This will be achieved through the sharing of experiences and best practices in prevention and risk reduction, such as early warnings, impact assessment, and mapping vulnerable and hazardous areas in vulnerable communities.

By facilitating knowledge exchange, APEC economies can incorporate the knowledge gained and enhance their domestic strategies for disaster prevention and mitigation in key sectors. Additionally, this exchange provides them with the necessary tools to address climate change challenges effectively.

1.3 Relevance of the project

The project aims to address the urgent need to enhance the resilience of vulnerable communities in the Asia-Pacific region to reduce the impact from natural disasters, specially related to the occurrence of flood disasters due to increase rainfall caused by the effects of climate change. The effects are associated with the risk of human losses, environmental damage and impacts on productive activities, generating a high risk of

escalation of acute socioeconomic challenges.

The project yields multiple benefits, extending beyond the enhancement of capacity and knowledge within APEC economies to anticipate, cope with, and prepare for climate change-exacerbated disasters. It also fosters partnerships and cooperation among APEC economies, promoting research and the development of prevention and mitigation tools for climate change-related disasters. This collaborative effort contributes to long-term synergistic work between APEC economies, establishing a foundation for sustained cooperation and progress.

It is crucial to note that there is currently a low assessment of disaster risks in vulnerable communities despite their significance and long-term presence. This situation is further compounded by the existence of infrastructure that was not designed with climate change scenarios in mind.

1.4 Target Audience

Target audiences of this project included representatives of Government institutions, non-government officials and International Organizations from APEC economies, that either work day to day on prevention and risk reduction for climate change adaptation, such as early warnings, impact assessment, and mapping vulnerable and hazardous areas in vulnerable communities, etc. that can shape policies and programs to strengthen their components, as well as representatives from academic institutions.

2. PRE-WORKSHOP RESEARCH

This research aimed to identify key challenges, assess climate risk perceptions among vulnerable communities, and understand the barriers and measures adopted by APEC economies. The findings were helpful in shaping the workshop agenda to address participants' needs effectively. It also served to identify stakeholders' engagement, disseminate information and design an adequate strategy for the enforcement of the Workshop. The study involved 12 institutions from 8 economies, such as the following:

Economy	Institutions
Canada	Sustainable Institute
Chile	Environmental Assessment Service (SEA)
Japan	Asian Disaster Reduction Center
Mexico	Domestic Institute of Ecology and Climate Change
	Mexican Agency for International Development Cooperation
Papua New Guinea	Domestic Research Institute / PNG APEC Study Centre
Peru	Agency for Environmental Assessment and Enforcement (OEFA)
	Domestic Center for Disaster Risk Estimation, Prevention, and Reduction (CENEPRED)
	Ministry of Housing, Construction, and Sanitation
Chinese Taipei	Domestic Science and Technology Center for Disaster Reduction
Viet Nam	Ministry of Agriculture and Rural Development
	Viet Nam Disaster and Dyke Management Authority

2.1 Pre workshop research results

- Emergency Planning:
  Majority of the economies involved in the pre workshop research lack an emergency plan for climate-related disasters, indicating an urgent need for improved planning, investments, and capacity-building efforts to enhance resilience.

- Cooperation in Disaster Management:
  Coordination between local, regional, and domestic authorities varies significantly. Strengthening these efforts through collaboration is essential for better disaster preparedness and response.

- Progress in Risk Management:
  Some economies have made considerable progress, while others face challenges due to weak institutional frameworks, financial constraints, and limited public engagement.

- Response Capacity:
  Many economies have demonstrated effective disaster responses in the past, but resource limitations and governance issues still hinder progress in some cases.

- Adaptation Efforts:
  Most economies show a proactive approach, with 92.3% focusing on climate-resilient infrastructure and 84.6% investing in capacity-building. Early warning systems and coastal protection measures are also widely implemented, though some areas require improvement.

- Effectiveness of Measures:
  The survey revealed that many adaptation strategies are only partially effective. This is due to gaps in implementation, coverage, and ongoing challenges such as insufficient resources and community engagement.

- Challenges in Scenario Prediction:
  More than half of the respondents reported difficulties in predicting climate scenarios, complicating planning efforts and the allocation of resources to vulnerable areas.

- Preparedness Exercises:
  38.5% of economies conduct more than five preparedness drills, demonstrating a high commitment to disaster readiness. However, 15.4% have not conducted any exercises in the past three years, posing significant risks.

- Impact of Preparedness Activities:
  While exercises have improved preparedness to some extent, further enhancement is required. A minority of economies report fully improved disaster readiness through drills.

- Use of Tools and Training Programs:
  Early warning systems, impact assessments, and mapping tools are widely adopted, but further integration through GIS platforms could enhance decision-making. Additionally, training programs are needed to build capacity among stakeholders.

Conclusions

Following are the general conclusions obtained by the 12 answers from the 8 economies involved in the pre workshop research:

- The survey results reflect a widespread commitment of APEC economies to disaster risk management and climate change adaptation.

- Although significant progress has been made, persistent challenges require attention, especially in areas such as funding, scenario prediction, and training.

- Regional cooperation and knowledge exchange can play a crucial role in improving risk management capabilities across the region.

- Continued investment in preventive measures, training, and infrastructure strengthening is essential to ensure resilience to future climate-related disasters.

- The survey results highlight the critical importance of adequate funding for disaster risk management and climate change adaptation initiatives. Economies must explore innovative financing mechanisms and leverage international support to address funding gaps effectively.

3. WORKSHOP

3.1 Methodology and beneficiaries

This project was implemented through a two-day workshop held on 10-11 May 2024, in Arequipa, Peru, bringing together representatives from APEC economies. The workshop focused on sharing concrete experiences and best practices in prevention and risk reduction. Participants engaged in discussions and activities centered around early warning systems, impact assessment methodologies, and the mapping of vulnerable and hazardous areas.

The workshop was designed to be inclusive and collaborative, welcoming participants from a diverse range of sectors and backgrounds, as the target audience included representatives from government institutions, private companies and academia, across APEC economies. By involving stakeholders from various fields, the workshop allowed to facilitate a comprehensive and multi-disciplinary approach to disaster risk reduction and climate change adaptation.

This inclusive approach was designed to ensure that the knowledge and best practices shared during the workshop were relevant, practical, and actionable for all participants involved in building climate resilience. Government officials gained insights into effective policy-making, private companies explored innovative technological solutions and academics identified different areas where to apply its research-based knowledge.

We were honored to have the participation of 17 speakers who presented insights from economies such as Canada; Chile; Japan; Republic of Korea; Mexico; Peru; and Viet Nam. International institutions such as the German Corporation for International Cooperation, the Swiss Agency for Development and Cooperation from the Federal Department of Foreign Affairs, the World Wildlife Fund from Viet Nam, and the APEC

Climate Center from the Republic of Korea were also represented.

Additionally, we welcomed more than 70 participants from 12 economies, including Canada; Chile; Indonesia; Japan; Republic of Korea; Mexico; New Zealand; Papua New Guinea; Peru; Chinese Taipei; the United States; and Viet Nam.

The workshop, included presentations, panel discussions, and networking sessions. The first day named “Risk prevention and reduction for climate change in vulnerable communities”, included 3 sessions: “Tools for climate change adaptation”, “Infrastructure for climate resiliency” and “Sustainable management of natural resources in response to climate change effects”. The second day named “Monitoring and evaluation of climate change scenarios”, included 3 sessions: “Monitoring climate adaptation”, Data analysis for climate risk prediction and management” and “Collaboration platforms and open data”.

Each session was followed by panel discussions moderated by representatives from Peru's Ministry of Environment and the U.S. Federal Emergency Management Agency (FEMA); and a special participation of the APEC Secretariat, Ms. Aurora Tsai, Program Director of the Emergency Preparedness Working Group, as Presented of the Workshop.

3.2 Opening Remarks

The workshop began with opening remarks from Mr. Juan Castro, Minister of Environment of Peru, and Mr. Juan Narciso, Chairman of the Environmental Assessment and Enforcement Agency (OEFA). They emphasized their responsibilities in ensuring compliance with environmental regulations and underscored enforcement as a crucial tool for environmental protection. Following their remarks, Victoria Salinas, Senior Official Performing the Duties of Deputy Administrator for Resilience of the Federal Emergency Management Agency of the United States (FEMA), emphasized the importance of discussions on risk reduction and disaster prevention for enhancing community preparedness, and building resilience for economic stability as disasters have cascading impacts across regions.

Also was mentioned that this workshop provides a valuable opportunity to foster collaboration among stakeholders involved in both environmental enforcement and climate adaptation. Through the exchange of knowledge, experiences, and best practices, participants can enhance their capacity to address climate-related environmental risks and develop innovative solutions to safeguard vulnerable communities.

3.3 Presentations Highlights

3.3.1 Peru’s Climate Change Adaptation Plan

Speakers: Juan Carlos Castro and Berioska Quispe
Institution: Ministry of Environment – Peru

- The presentation highlighted Peru’s Adaptation Plan, led by the Ministry of Environment, aims to mitigate the risks posed by climate change while fostering resilience and sustainable development. The plan, aligned with Peru’s Climate Change Law and the Paris Agreement, emphasizes both adaptation and mitigation strategies, targeting 13 strategic actions to reduce vulnerability by 2030 and 2050.

- The plan outlines risks associated with climate change, including glacial retreat, droughts, floods, and mass movements, and prioritizes seven key sectors: water, agriculture, fishing and aquaculture, health, forests, tourism, and transport. A total of 84 adaptation measures are being implemented across these sectors, with a focus on minimizing impacts on vulnerable populations, such as indigenous communities.

- Scientific data on future climate scenarios informs the strategy, helping prioritize actions in high-risk areas. Progress includes water resource management projects, fisheries adaptation, and public health initiatives, all intended to safeguard livelihoods and ecosystems. Notable achievements include the construction of water infrastructure, forest conservation programs, and the integration of climate policies into local governance.

- The plan's continuous improvement process ensures regular monitoring, evaluation, and coordination among ministries, regional governments, and civil society. Collaboration with indigenous communities provides valuable knowledge to enhance adaptation strategies.

- Ultimately, the Peru Adaptation Plan seeks to align climate resilience with economic recovery, demonstrating that proactive climate action can complement sustainable development goals. The strategy serves as a blueprint for integrating environmental protection into domestic priorities, emphasizing that building resilience to climate risks is essential for long-term well-being.

3.3.2 Climate Change Criteria in Environmental Impact Assessments

Speaker: Gino Olivares
Institution: Environmental Assessment Service - Chile

- The presentation highlighted the incorporation of climate change considerations in Chile's Environmental Impact Assessment System (SEIA), following the introduction of Law N°21455 in June 2023. The law mandates integrating climate variables into environmental assessments, aligning with evolving regulations, such as the updated SEIA regulation in January 2024. Key climate challenges addressed include extreme weather events, water shortages, biodiversity loss, and impacts on ecosystem services

- Projects subjected to SEIA must submit either an Environmental Impact Study (EIA) or an Environmental Impact Declaration (DIA), depending on the magnitude of their environmental impacts. The assessments evaluate how environmental components, known as Valued Ecosystem Components (VECs), may respond to climate change under the most adverse scenarios.

- Emphasized the use of the Climate Risk Atlas (ARCLIM) developed by the Ministry of the Environment to predict and assess future risks. The ARCLIM provides data on exposure and vulnerability to support climate resilience in project planning.

- Adaptation measures are a core component of the updated methodology, ensuring that environmental variables remain within acceptable thresholds. Monitoring plans are introduced to track environmental changes and issue early warnings if deviations from projections occur. These adaptive approaches aim to reduce vulnerabilities, maintain ecosystem integrity, and safeguard resources critical to local communities, including indigenous populations.

- The SEA (Environmental Assessment Service) recognizes climate change as a priority and seeks to strengthen environmental resilience through strategic adaptation and monitoring protocols, ensuring sustainable development in the face of climatic uncertainty.

3.3.3 Environmental risk alert system applied to mining tailings – SANDRA

Speaker: Jose Rosales
Institution: Peruvian Agency for Environmental Assessment and Enforcement (OEFA) – Peru

- The Peruvian Agency for Environmental Assessment and Enforcement (OEFA) has developed the Environmental Risk Alert System (SANDRA) to monitor and address environmental risks related to tailings deposits, with a focus on mitigating the impacts of climate change. The system aims to enhance environmental oversight by providing early warnings and prioritizing actions in areas most vulnerable to extreme hydrometeorological events such as floods, heavy rainfall, and droughts.

- Tailings deposits pose significant environmental risks, including acidification of water sources, heavy metal contamination, and ecosystem degradation. OEFA's analysis identifies 48 deposits in areas prone to mass movements, with 131 nearby population centers at high risk. To address these risks, the SANDRA system uses satellite data from sources like Landsat and Sentinel to monitor precipitation anomalies, stream activation, and water saturation levels.

- The system operates in three phases: data capture and processing, environmental risk analysis, and communication of alerts. Automated satellite monitoring helps generate timely reports, which guide OEFA's supervision and field verification efforts to prevent environmental disasters. Recent field inspections have identified infrastructure failures and contamination events, underscoring the need for proactive interventions.

- Looking ahead, OEFA plans to optimize hazard models, implement vulnerability analyses for critical components, and expand the scope of auditable environmental elements. These efforts will further strengthen Peru's environmental oversight framework, ensuring a more effective response to climate-related risks. Through SANDRA, OEFA aims to safeguard ecosystems, public health, and local communities, promoting sustainable development in vulnerable regions.

3.3.4 Impact-based forecasting to cope with landslides forced by extreme precipitation in Peru

Speaker: Waldo Lavado
Institution: Domestic Meteorology and Hydrology Service (SENAMHI) – Peru

- The presentation focused on SENAMHI's initiative to mitigate the impact of extreme weather events, particularly landslides or "huaycos," caused by heavy rainfall in Peru. SENAMHI employs Impact-Based Forecasting (IBF) to predict risks more effectively and guide early actions that can reduce damage to infrastructure and save lives.

- Traditional forecasts focus on what will happen. In contrast, IBF shifts the perspective toward what actions should be taken, combining hazard, exposure, and vulnerability data. Central to the IBF system is the SILVIA monitoring tool, which oversees more than 5,400 sub-basins. It uses precipitation thresholds, geological conditions, and rainfall accumulation over seven days to assess potential mass movements and issue 24-hour alerts.

- Tools like the PISCO dataset and Digital Elevation Models (DEM) provide real-time hydrological and meteorological insights. A network of local monitoring stations near Lima supports precise rainfall predictions, which are critical for urban flood management and gully activation alerts.

- By adopting this proactive forecasting method, SENAMHI enhances decision-making processes. The IBF approach also helps identify vulnerable elements such as roads, health centers, and educational institutions exposed to risks. Studies at local scales are essential to refining these tools and ensuring timely, efficient interventions.

- The IBF system aligns with domestic protocols for issuing warnings, ensuring consistency and effectiveness in response to natural hazards. This model represents a shift from research to real-world application, empowering communities and policymakers to reduce disaster-related risks more effectively.

3.3.5 Land Management and Urban Planning in Light of Climate Change Adaptation: Case studies in Canada

Speaker: Sebastian Weissenberger
Institution: University of Teluq – Canada

- The presentation discusses the challenges and strategies Canada faces in adapting to climate change impacts, especially in urban planning and land management. Outlines how Canadian cities are exposed to extreme weather events such as floods, hurricanes, and wildfires, worsened by climate change.

- Case studies include the 2021 floods in British Columbia, Hurricane Fiona in 2022, and floods in the St. John River area. These events have disrupted infrastructure, agriculture, and transportation, with significant financial and social costs. Emphasized the importance of proactive emergency management and infrastructure adaptation, highlighting examples like Fredericton's integration of climate data into urban planning and Beaubassin East's adaptation measures to mitigate sea-level rise.

- Despite successful adaptation efforts in certain regions, challenges such as outdated flood protection infrastructure, maladaptation in land use planning, and the difficulty in protecting extensive coastlines were identified. The need for a comprehensive and collaborative approach across federal, provincial, and local governments, combined with investments in science, planning tools, and community involvement, is emphasized as key to reducing future climate risks.

3.3.6 The Role of Cement in Adaptation and Resilience to Climate Change in Peru and Latin America

Speaker: Ricardo Pareja
Institution: Inter-American Cement Federation (FICEM - Chile)
Cement Producers Association (ASOCEM - Peru)

- The presentation emphasized the risks posed by natural disasters, such as floods, hurricanes, earthquakes, and droughts, particularly in Latin America and the Caribbean (LAyC), where urbanization is increasing rapidly. The region faces significant challenges, with Brazil being among the top economies at risk for river flooding and hurricanes causing immense damage.

  To address these issues, FICEM advocates for the adoption of appropriate building codes, seismic zoning, and the use of resilient materials such as reinforced concrete. These measures are essential in reducing disaster risks and fostering sustainable urban development.

- The presentation also outlined the cement industry's path to carbon neutrality by 2050, with goals to reduce CO2 emissions through improved clinker factors, co-processing, and innovative technologies such as permeable pavements and recarbonation processes. The roadmap for achieving these objectives includes collaboration across sectors and economies to implement climate actions effectively.

3.3.7 Water Management in Climate Vulnerable Areas: Lessons Learned from the Mining Region of Cesar, Colombia and Cape Breton, Canada

Speaker: José Angulo
Institution: Sustainable Institute – Canada

- The presentation highlighted the challenges and strategies in managing water resources in areas prone to climate change impacts, compared the water management practices in two mining regions, drawing lessons from their experiences:

  In Cesar, Colombia, extensive open-pit mining has led to the diversion of over 12,000 meters of watercourses and the degradation of over 10,000 hectares of land. Efforts to mitigate these impacts include partnerships between local communities, environmental authorities, and the mining industry. Strategies like reforestation, soil erosion control, and the creation of connectivity corridors have contributed to improved water management, increased biodiversity, and reduced climate risks.

  In Cape Breton, Canada, mining has resulted in significant water contamination, affecting rivers, lakes, and even the Atlantic Ocean. A comprehensive mine closure program, involving over 700 properties, has been implemented, focusing on cleaning up contaminated sites and restoring ecosystems. The collaboration between Cape Breton University, federal agencies, and local stakeholders is key in monitoring water quality and ensuring long-term sustainability.

- Both case studies underscore the importance of multi-stakeholder collaboration, continuous monitoring, and the implementation of sustainable practices. The

lessons learned demonstrate how proactive water management in mining regions can reduce environmental risks, improve water availability, and contribute to climate change mitigation. These experiences offer valuable insights for managing water resources in other climate-vulnerable areas.

3.3.8 Ecosystem-based adaptation as a response to the effects of climate change – Peru

Speaker: Alejandra Muñoz
Institution: German Corporation for International Cooperation (GIZ)

- The presentation focused about how the Ecosystem-based Adaptation (EbA) initiative, led by German cooperation through GIZ, supports Peru's efforts to address climate change by leveraging ecosystem services to increase resilience. Peru and Germany have maintained a strong climate partnership for over 60 years, focusing on policies and capacity building aimed at achieving Peru's Nationally Determined Contributions (NDCs) targets, including carbon neutrality by 2050. Given Peru’s vulnerability to climate change—marked by glacier melting, water insecurity, and rising temperatures—EbA measures are integrated into domestic and regional strategies to enhance resilience.

- Key projects include "EbAMar," which focuses on coastal and marine protection, and "Resilient Puna" aimed at improving water security and sustainable highland agriculture. Additionally, the "Amunas" project restores traditional water management techniques to address water scarcity in the Lima highlands, while "ProGIRH" enhances climate-sensitive water resource management in the Mantaro Basin.

- The EbA approach emphasizes community empowerment, sustainable management of ecosystems, and policy integration. Significant investments and successful examples have already been implemented, showing promising results in Peru's adaptation efforts. For a resilient future, scaling up investments and integrating EbA into domestic policies are critical.

3.3.9 Disaster Response Innovation Plan for Climate Crisis

Speaker: Seung Joon Back
Institution: Ministry of the Interior and Safety – Republic of Korea

- The presentation focused on how the Republic of Korea faces increasing challenges due to climate change, with severe weather events such as heavy rains, typhoons, and heatwaves becoming more frequent and intense. In response, the Ministry of the Interior and Safety (MOIS) has launched innovative strategies for disaster response to reduce human casualties and enhance resilience. Key reforms include a comprehensive overhaul of the domestic safety system, implemented in January 2023, and the enhancement of climate crisis adaptation measures introduced in June 2023.

- The MOIS aims to strengthen the management of risk areas, particularly for vulnerable populations, by expanding landslide-prone areas and improving evacuation times through refined alert systems. The establishment of situation rooms in all cities and counties by 2027 is underway, with enhanced cooperation between local governments and emergency services.

- Digital technology plays a crucial role in the ministry's approach, integrating real-time monitoring systems for efficient disaster response. Demonstrations of digital solutions, such as flood prediction using digital twins are being conducted to validate their effectiveness.

- Additionally, MOIS is updating infrastructure and disaster prevention standards to align with climate change trends. Measures include comprehensive flood risk management and preparing for extreme temperature events, such as heatwaves and cold waves, by supporting vulnerable groups with emergency notices and energy vouchers.

- These strategies aim to build a resilient and responsive disaster management system capable of minimizing the impacts of climate-related emergencies in the Republic of Korea.

3.3.10 Mitigating the impacts of climate change in the Mekong Delta through public and private sector engagement in the sand industry: Policies, Lesson Learns and Outlook

Speaker: Doan Thi Tuyet Nga
Institution: Ministry of Agriculture & Rural Development
Speaker: Ha Anh
Institution: World Wildlife Fund (WWF) – Viet Nam

- The presentation focused on how the Mekong River Delta in Viet Nam faces severe challenges due to climate change, including river and coastal erosion, saltwater intrusion, and sediment loss. The World Wide Fund for Nature (WWF) Viet Nam, in collaboration with various public and private sector stakeholders, is working to mitigate these impacts through sustainable sand management practices. The region's vulnerability is compounded by the reduction of alluvium due to upstream dam development and unsustainable sand mining practices.

- A comprehensive sand budget has been developed to monitor and manage the use of sand resources effectively. Key strategies include establishing a delta-wide sediment budget, piloting integration of these measures into local sand management plans, and promoting alternative materials to reduce reliance on river sand. Alternatives like recycled construction and demolition waste are being explored as substitutes for traditional sand in construction, with a focus on improving their technical standards and sustainability.

- The project highlights the importance of collaboration with government bodies, private entities, and international organizations to develop policies and practices that ensure sustainable sand and gravel mining. The initiative aims to enhance climate resilience in the Mekong River Delta by integrating nature-based solutions, supporting infrastructure development, and fostering regional cooperation.

- The lessons learned and best practices from the Mekong River Delta project are valuable for other regions facing similar challenges, and collaboration opportunities exist to share these insights and develop innovative approaches across the Asia-Pacific region.

3.3.11 Strengthening climate services in the Andes

Speaker: Nicole Clot
Institution: Swiss Agency for Development and Cooperation (SDC), Federal Department of Foreign Affairs – Switzerland

- The presentation highlighted on how the Swiss Agency for Development and Cooperation (SDC) is working to enhance climate resilience in the Andes through regional initiatives. Their approach focuses on strengthening climate services, particularly in areas like water management, risk assessment, and disaster preparedness. Through projects like ENANDES+, SDC aims to build technical and institutional capacities across six Andean economies (Argentina; Bolivia; Chile; Colombia; Ecuador; and Peru). This initiative promotes collaboration between domestic meteorological services and the World Meteorological Organization (WMO), with advisory support from MeteoSwiss.

- Key goals include improving data collection, developing early warning systems, and fostering local capacity to anticipate and respond to hydro-meteorological hazards. The ENANDES+ project emphasizes "last mile" solutions, ensuring that the most vulnerable communities benefit from these services through enhanced communication, training, and user-driven approaches.

- Challenges remain, such as weak infrastructure, limited financial resources, and insufficient inter-agency coordination. However, the project has made progress by enabling peer knowledge exchange and piloting innovative solutions, such as low-cost monitoring and a virtual platform to anticipate severe weather events. By addressing these issues, SDC's efforts aim to support sustainable development and climate adaptation across the region, promoting resilience to the impacts of climate change.

3.3.12 Navigating Uncertainty: How Climate Data Shapes Disaster Risk Reduction

Speaker: Gaeun Kim
Institution: APEC Climatic Center – Republic of Korea

- The presentation emphasized on how the APEC Climate Center (APCC) plays a crucial role in enhancing disaster risk reduction (DRR) across the Asia-Pacific region by leveraging climate data. Through partnerships with global climate prediction centers, APCC collects, analyzes, and disseminates climate prediction information, which is essential for managing climate-related hazards. This information helps in all stages of disaster management, from prevention and preparedness to response and recovery.

- APCC utilizes advanced tools like Earth System Models, AI, and machine learning to predict extreme weather events, such as typhoons, heatwaves, and floods. These models integrate diverse climate data, providing reliable predictions that inform decision-makers. By monitoring and analyzing trends, APCC offers early warning systems that guide communities and authorities to take preemptive actions, enhancing resilience against future climate risks.

- In collaboration with organizations like the Korean Meteorological Administration, APCC also supports capacity-building initiatives, offering training to improve the understanding and application of climate data. One of its notable achievements is the launch of the BSISO forecasting service, which

helps predict intra-seasonal climate patterns, enabling better preparation for extreme weather.

- By focusing on data integration and socio-economic factors, APCC ensures that climate insights are accessible and actionable, ultimately promoting regional climate resilience through innovative forecasting, partnerships, and education. These efforts highlight the importance of effective climate data usage in mitigating disaster risks across vulnerable regions.

3.3.13 El Niño diversity impacts in Peru and the effects of climate change

Speaker: Ken Takahashi
Institution: Peruvian Geophysical Institute (IGP) – Peru

- The presentation focused on the diverse impacts of El Niño events in Peru and the implications of climate change on these phenomena. El Niño, characterized by the warming of sea surface temperatures, has significant effects on Peru's weather, leading to extreme rainfall and flooding, particularly in the northern coastal regions. However, not all El Niño events are the same; they vary in intensity, spatial patterns, and effects, requiring tailored monitoring and forecasting approaches.

- Peru faces challenges in predicting El Niño, especially events that affect the eastern Pacific, where forecast accuracy remains lower compared to the central Pacific. New advancements, such as artificial intelligence and regional ocean-atmosphere models, are being developed to improve prediction capabilities, allowing for better preparedness and risk management.

- Climate change is expected to exacerbate the effects of El Niño in Peru. Projections indicate an increase in the frequency of extreme El Niño events, which will likely lead to more severe weather conditions, including higher rainfall variability and increased risk of deadly heatwaves, particularly along the northern coast. The "time of emergence" for climate change's impact on El Niño is estimated around 2030, highlighting the urgency for adaptive measures.

- The presentation emphasized the need for improved prediction models and regional cooperation to mitigate the adverse effects of El Niño, as well as to adapt to the looming challenges posed by climate change on weather patterns in Peru.

3.3.14 Sentan Pro: Climate Change Impact Projection in Asia and Pacific

Speaker: Koji Suzuki
Institution: Asian Disaster Reduction Center (ADRC) - Japan

- The presentation focused on the impact of climate change on hydrologic extremes, particularly flooding, with a focus on the Asia-Pacific region. Highlighted the scientific data and projections of global warming and increasing greenhouse gas levels as reported by the IPCC’s Sixth Assessment Report.

- The presentation analyzed data from Japan’s Meteorological Research Institute, emphasizing how climate change scenarios, such as the 4-degree increase scenario, project significant increases in extreme river discharge and shorten the return periods for design levels, thus challenging current flood control measures. Real-life examples of devastating flood disasters in Japan in

2018 and 2019 were provided, demonstrating the limitations of existing flood mitigation measures.

- The presentation concluded by discussing the importance of adapting to the changing climate. It outlined two key adaptation strategies: (1) Hard measures, including infrastructure enhancements like river improvements and flood defenses, and (2) Soft measures, such as advanced observation, hydrologic prediction, and timely information dissemination for evacuation.

3.3.15 Analysis of population and housing vulnerability with the use of SIGRID – Management Information System of Disaster Risk

Speaker: Eduardo Portuguez
Institution: Domestic Center for Disaster Risk Estimation, Prevention, and Reduction (CENEPRED) – Peru

- The presentation highlighted the use of geospatial information for risk management and adaptation to climate change in Peru, focused on the economy's disaster risk management system, SINAGERD. It described a multi-pronged approach towards reducing risks related to flooding and landslides caused by the El Niño phenomenon.

- Also, highlighted the integration of technical and scientific information from different sources like INGEMMET, Senamhi, and ANA, as well as the utilization of spatial data including urban cadastre and road infrastructure.

- The presentation showcased the innovative use of SIGRID Collect, an app that allows for field data collection and analysis for improved risk assessments and adaptation planning. The app supports the creation of a comprehensive database and offers interactive visualizations for tracking vulnerability at a granular level. Results from the use of the app in the city of Piura (Perú) illustrate the effectiveness of this data-driven approach, highlighting potential risk areas and allowing for more effective preparedness and response actions.

3.3.16 Domestic Atlas of México for vulnerability to climate change; A tool for decision-makers and its application in vulnerable communities

Speaker: Luis Martinez
Institution: Domestic Institute of Ecology and Climate Change (INECC) – Mexico

- The presentation introduced the Domestic Atlas of Mexico for Vulnerability to Climate Change (ANVCC). This tool serves as a guide for decision-makers in all levels of government and for the development of climate change adaptation strategies.

- The ANVCC is a comprehensive resource providing systematic information and a series of maps highlighting current and projected vulnerability to climate change impacts across Mexico. It incorporates insights from various fields such as climatology, geography, ecology, and economics to build a holistic understanding of the economy's vulnerability. The presentation detailed the methodology used in creating the Atlas, including its participatory nature, which involved collaboration with government agencies, research institutions, and key stakeholders.

- The core of the ANVCC is its detailed assessment of vulnerabilities across different dimensions like human settlements, economic activities, natural systems, and human health. This vulnerability analysis takes into account the impact of factors like sea level rise, temperature changes, and extreme meteorological events. The presentation also explored the use of the Atlas as a tool for decision-making, demonstrating its application in specific municipalities of Oaxaca (Mexico), where a project sought to reduce inequality gaps and address climate vulnerability through tailored adaptation measures.

- The ANVCC offers specific recommendations for adaptation based on identified vulnerabilities, providing a valuable roadmap for building climate resilience. The presentation concluded by highlighting ongoing efforts to expand the Atlas scope, data integration, and accessibility to facilitate the development of impactful adaptation policies and actions across the economy.

3.4 Recommendations obtained from the networking sessions

The networking sessions generated several recommendations, including:

- Strengthening regional cooperation and information sharing.
- Investing in capacity-building and training programs.
- Promoting the use of advanced technologies for impact assessment and early warning.
- Enhancing community engagement and participatory approaches in disaster planning.

3.5 Workshop Main results

The workshop's results are aligned with key indicators focused on gender parity and knowledge improvement among participants. Below is a summary of the findings based on planned versus actual outcomes:

- Participants:
  The workshop also aimed to attract 30 participants (excluding speakers and experts), but the actual attendance was 68 participants, surpassing expectations.

- Gender Distribution of Participants:
  Although the target was an even 50/50 male-to-female ratio, the final breakdown included 32 women (47.1%) and 36 men (52.9%), indicating male participants slightly outnumbered female participants.

- Speakers and Experts Engaged:
  The goal was to involve 6 experts or speakers, but 17 were engaged, considering the necessity to ensure a greater diversity of perspectives and experiences. This enriched discussions and enable challenges to be addressed from different angles. Also, it allowed to cover a wider range of specific topics related to prevention and risk reduction for climate change adaptation, which ensured that important aspects were addressed and allowed to explore different areas of interest for participants. Of these, 12 were men (70.6%) and 5 were women (29.4%), which reflects men still held a slight edge in representation. This pattern aligns with broader trends where men tend to dominate speaker roles, particularly in fields such as climate change and disaster management.

- Economies Represented:
  While the workshop aimed for participation from 10 economies, 12 APEC economies ultimately attended: Canada; Chile; Indonesia; Japan; Republic of Korea; Mexico; New Zealand; Papua New Guinea; Peru; Chinese Taipei; the United States; and Viet Nam. However, only 6 of the 10 travel-eligible economies were represented.

- Knowledge Improvement among Participants:
  Knowledge increase was measured through a pre and post workshop evaluation, where 29 participants were evaluated. The results indicate that 58.33% of participants reported knowledge improvement, and among developing APEC economies, 60% of participants from these regions reported knowledge improvement. Regarding female participants, 61.11% reported increase in knowledge in this two-day workshop.

4. SATISFACTION SURVEY

After the Workshop, an online Satisfaction survey was sent to all participants to provide their feedback on the EPWG 202 2023A Workshop. A total of 18 responses were received out of 68 registered participants from 5 APEC economies: Canada; Chile; Mexico; Papua New Guinea; and Peru.

The Satisfaction Survey summarizes participants opinions on the impact and usefulness of the workshop. Below is an organized summary of each question:

1. Relevance of the Workshop
Participants rated the workshop's relevance on a scale of 1 to 5. Most responses were 4 or 5, indicating that the workshop was highly relevant to their needs and contexts.

2. Prior Knowledge and Skills
Participants assessed their knowledge and skills on the topic before attending the workshop. Responses ranged from 1 to 4, showing varied levels of familiarity, with some participants starting with limited knowledge.

3. Knowledge and Skills After the Workshop
Post-workshop ratings showed significant improvement, with most participants scoring 4 or 5. This reflects a clear increase in understanding and practical skills gained.

4. Workshop Satisfaction
The majority of respondents agreed that the workshop met their expectations. Comments emphasized the quality of the topics covered and the use of relevant data.

5. Overall Experience Rating
When rating their overall experience, most participants gave the highest score (5), highlighting a strong sense of satisfaction with the workshop.

6. Application of Knowledge at Work
Participants shared practical examples of how they intend to apply what they learned, including:

- Organizing events and training sessions.
- Developing strategies, policies, or procedures.
- Implementing improved communication techniques.

7. Next Steps for APEC
Suggestions for APEC included continuing to promote similar initiatives, systematically sharing outcomes with member economies, and creating more opportunities to address environmental issues.

8. Suggestions for Improvement
Some participants proposed improvements such as extending the workshop into a second phase, improving time management, and incorporating more shared experiences among attendees.

5. CONCLUSIONS

- The event was carried out successfully, with the participation of 68 people from 12 economies Canada; Chile; Indonesia; Japan; Republic of Korea; Mexico; New Zealand; Papua New Guinea; Peru; Chinese Taipei; the United States; and Viet Nam; 32 women and 36 men participated.

- During this two-day workshop in Arequipa, Peru, participants shared the following valuable experiences and best practices related to risk prevention and reduction associated with the effects of climate change:

  - **Involving Vulnerable Communities**: It is crucial to involve vulnerable communities in decision-making processes to effectively generate coordinated policies and concrete measures to address climate challenges. Their participation ensures that solutions are tailored to their specific needs and circumstances.

  - **Fostering Collaboration**: Collaboration among the public and private sectors, academia, and civil society is essential to ensure the implementation of comprehensive solutions. This multi-stakeholder approach enhances the effectiveness and sustainability of disaster risk reduction strategies.

  - **Promoting Synergy and Data Sharing**: Synergy among the public sector, international organizations, and the private sector, coupled with transparent data sharing, is vital. Economies must share data obtained through their monitoring and early warning systems to enhance collaboration and avoid duplication of efforts. Interoperability and data sharing among systems are critical to maximize preparedness and mitigate risks effectively.

  - **Effective Early Warning Systems**: The collaboration among early warning systems of APEC economies is aimed at achieving an effective response to disasters. This requires establishing communication protocols, sharing real-time data, and coordinating actions among different systems to maximize preparedness and mitigate risks more efficiently.

  - **Moving from Data to Action**: There is a need to move from data collection to concrete actions. Ensuring that data obtained through various tools translates into effective risk reduction measures is crucial for improving disaster response capabilities.

  - **Improving El Niño/La Niña Forecasting**: The internationally utilized concept of El Niño/La Niña, focused on central Pacific temperature, is not sufficiently applicable for use in Peru. It is imperative to consider temperature variations

in the eastern Pacific to forecast rainfall accurately. A reductionist approach to defining El Niño fails to recognize the diversity of each event, which is critical for understanding its impacts.

Appendix A

Preworkshop Report

Workshop on Enhancing Prevention and Risk Reduction for Climate Change Adaptation in Vulnerable Communities in the Asia-Pacific Region

I. INTRODUCTION:

The Asia-Pacific region is one of the most vulnerable to the impacts of climate change, including extreme weather events, rising sea levels, and variability in rainfall patterns. Literature review highlights that developing economies in this region face significant challenges due to their high dependence on agriculture, population density, and insufficient infrastructure to mitigate climate change effects. Vulnerable communities are particularly at risk due to a lack of resources and capacity to adapt to these changes.

In preparation for the project EPWG_202_2023A, titled "Workshop on Enhancing Prevention and Risk Reduction for Climate Change Adaptation in Vulnerable Communities in the Asia-Pacific Region," the Peruvian Agency for Environmental Assessment and Enforcement (OEFA) conducted a survey. This survey aimed to identify the current level of adoption of domestic strategies and innovative alternatives to anticipate, cope with, and prepare for disasters exacerbated by climate change within APEC member economies.

This pre-workshop research directly responds to the results of the survey designed to understand the development of the topic in each of the participating economies. By analyzing the survey results, patterns, and trends, were identified. This allowed for obtaining a panoramic view implemented by some economies to prevent and reduce risks associated with climate change-exacerbated disasters.

Furthermore, this overview offered a roadmap by providing contextualized information and perspectives in the APEC region, which served as the basis for the workshop, to guide discussions towards the development of policies and practices that can be effectively implemented to improve the resilience of vulnerable communities in the region.

II. EXECUTIVE SUMMARY:

The primary aim of the survey was to gather comprehensive data to inform the development of effective policies and practices for improving community resilience.

The survey was circulated to all APEC members of the Emergency Preparedness Working Group (EPWG), and organizations which will participate to the Workshop on 10 and 11 May 2024. The survey included 10 questions with multiple choices:

N°	Question	Alternatives
1	Does your Economy have an emergency plan in case of natural disasters related to climate change?	Yes, no If yes, please specify the name
2	Is there cooperation and coordination among local, regional, and domestic authorities on disaster management and climate change?	Very low, low, moderate, high, very high *Comment on your response (optional)*

N°	Question	Alternatives
3	What is the level of progress in your economy regarding the risks management of disasters exacerbated by climate change in your region?	Very low, low, moderate, high, very high *Comment on your response (optional)*
4	How would you rate the response capacity of your economy to past natural disasters?	Very effective, effective, ineffective *Comment on your response (optional)*
5	What measures has your economy implemented to reduce climate change-related disasters in vulnerable communities? (Select all that apply)	• Promotion of reforestation and conservation of green areas to prevent landslides. • Development and implementation of climate-resilient infrastructure projects. • Implementation of early warning systems for extreme weather events. • Integration of climate change adaptation considerations into urban planning and development. • Capacity building and training programs for communities and stakeholders on climate resilience. • Enhancement practices in different sectors of your economy to adapt to changing climate conditions. • Strengthening of coastal protection measures against sea-level rise and storm surges. • Others
6	Have the implemented measures been effective against disasters associated with the effects of climate change?	Yes, partially, no
7	What obstacles or challenges has your economy faced in implementing disaster prevention and mitigation measures related to climate change? (Select all that apply)	• Limited budget • Insufficient prediction of climate change scenarios • Insufficient identification of vulnerable areas • Insufficient planning and execution of emergency response programs • Others
8	In the last 3 years, how many preparedness and emergency response exercises related to disasters associated with the effects of climate change have you conducted?	• 0 • 1-2 • 2-5 • >5
9	Have these exercises improved the preparedness and response of the population to disasters associated with the effects of climate change?	Yes, partially, no *(please comment on your response)*
10	What tools does your economy apply for enhancing prevention and risk reduction? (Select all that apply)	• Early warnings • Impact assessment • Mapping • Others

A total of 12 organizations from 8 APEC Economies responded the survey:

N°	Economy	Organization
1	Canada	• Sustainable Institute
2	Chile	• Environmental Assessment Service
3	Japan	• Asian Disaster Reduction Center
4	Mexico	• Domestic Institute of Ecology and Climate Change • Mexican Agency for International Development Cooperation
5	Papua New Guinea	• Domestic Research Institute / PNG APEC Study Centre
6	Peru	• Peruvian Agency for Environmental Assessment and Enforcement (OEFA)

N°	Economy	Organization
		• Domestic Center for Disaster Risk Estimation, Prevention, and Reduction (CENEPRED) • Ministry of Housing, Construction, and Sanitation of Peru
7	Chinese Taipei	• Domestic Science and Technology Center for Disaster Reduction
8	Viet Nam	• Ministry of Agriculture and Rural Development • Disaster and Dyke Management Authority

Based on the information collected, a high level of awareness and concern about climate change risks has been found among APEC economies. Economies are particularly worried about extreme weather events, sea-level rise, and other related issues. Many of them have already started implementing basic adaptation strategies, including constructing resilient infrastructure, adopting sustainable practices, and enhancing local disaster preparedness. However, these measures are often limited by resource constraints, which is a significant barrier to effective adaptation.

III. RESEARCH AND ANALYSIS:

Climate change poses one of the most significant threats to human well-being and ecosystem stability in the 21st century. The Asia-Pacific region, home to a large population and diverse ecosystems, is particularly vulnerable to the impacts of climate change. According to the Intergovernmental Panel on Climate Change (IPCC)[1], rising sea levels, extreme weather events, and shifts in precipitation patterns are expected to increase in frequency and intensity, exacerbating existing vulnerabilities in food security, water resources, infrastructure, and livelihoods in the region.

Vulnerable communities, including low-income populations, indigenous groups, and coastal settlements, are disproportionately affected by climate change due to limited resources, inadequate infrastructure, and social inequalities. The United Nations Framework Convention on Climate Change (UNFCCC)[2] highlights that these groups often reside in high-risk areas and lack the means to effectively respond to climate hazards. For instance, coastal communities face heightened risks from sea-level rise and storm surges, which can lead to displacement and loss of livelihoods.

Some economies may integrate aspects of disaster prevention into their climate change plans, while others may choose to develop separate strategies and policies specifically focused on disaster risk management. However, coordination and coherence between these initiatives are critical to ensure a comprehensive and effective response to the challenges posed by climate change and natural disasters.

The level of progress in APEC economies regarding the risk management of disasters exacerbated by climate change varies significantly among member economies. While some economies have made substantial advancements in disaster risk management, others may still be facing challenges in this regard.

Despite efforts to address these challenges, adaptation initiatives often face numerous barriers. Governance gaps, such as insufficient policy frameworks and coordination among stakeholders, hinder the implementation of effective adaptation strategies. Also, financial constraints are a significant obstacle, with many communities lacking access to necessary funding and resources to invest in resilient infrastructure and technologies.

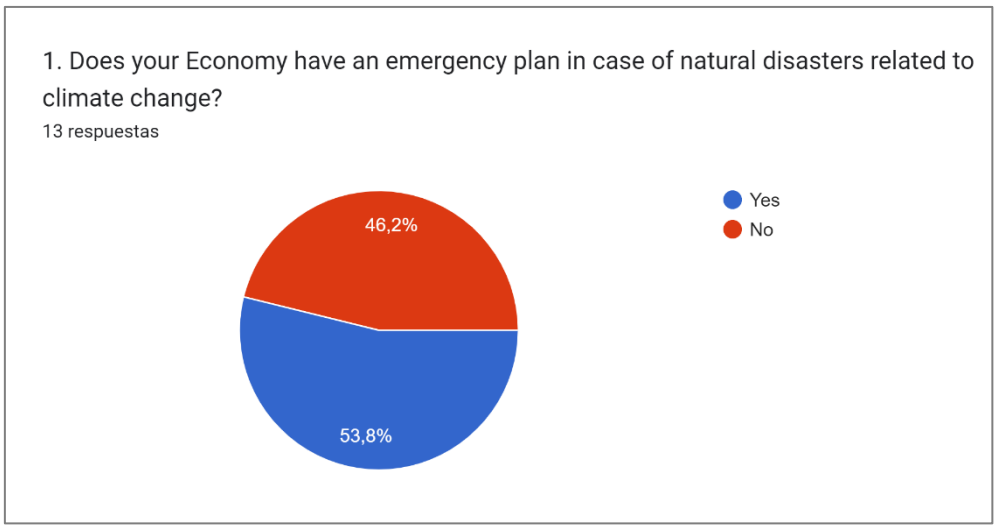
[1] IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.
[2] UNFCCC. (2019). Climate Change and Indigenous Peoples: Adaptation, Resilience and Traditional Knowledge. United Nations Framework Convention on Climate Change

Additionally, a lack of community engagement and inclusive planning processes can result in adaptation measures that do not adequately address local needs and contexts.

IV. RESULTS OF THE SURVEY DISSEMINATED TO APEC ECONOMIES:

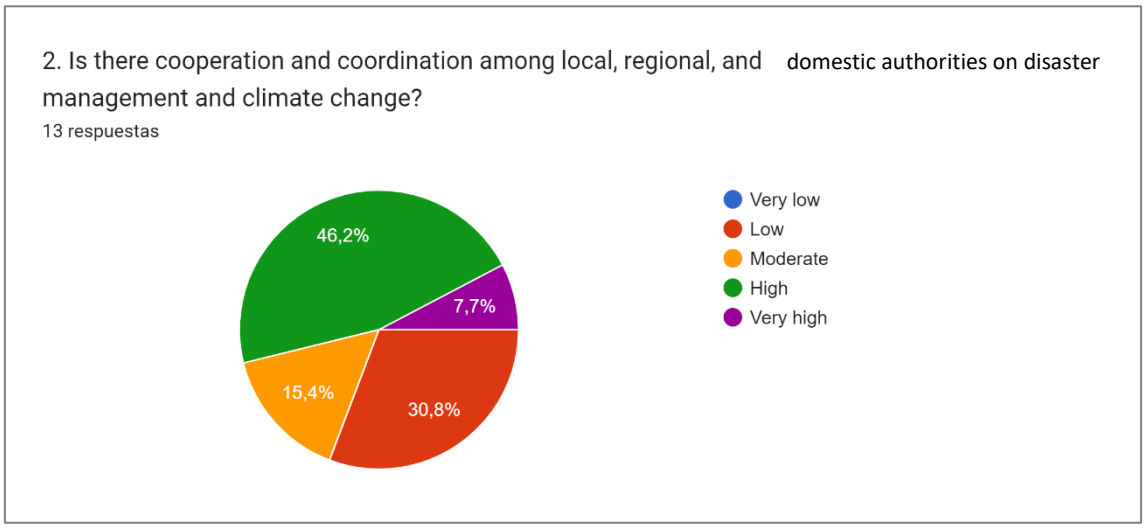
Below is presented an analysis based on the responses collected up to May 9th, involving eight economies: Canada; Chile; Japan; Mexico; Papua New Guinea; Peru; Chinese Taipei; and Viet Nam.

Question 1: Does your Economy have an emergency plan in case of natural disasters related to climate change?



Half of the surveyed economies lack an emergency plan for climate-related natural disasters highlights a significant gap in preparedness. This absence of emergency plans suggests that many regions are not adequately equipped to respond effectively to the increasing frequency and severity of climate-related events. This can lead to higher vulnerability and greater potential for loss of life, economic damage, and long-term setbacks in development.

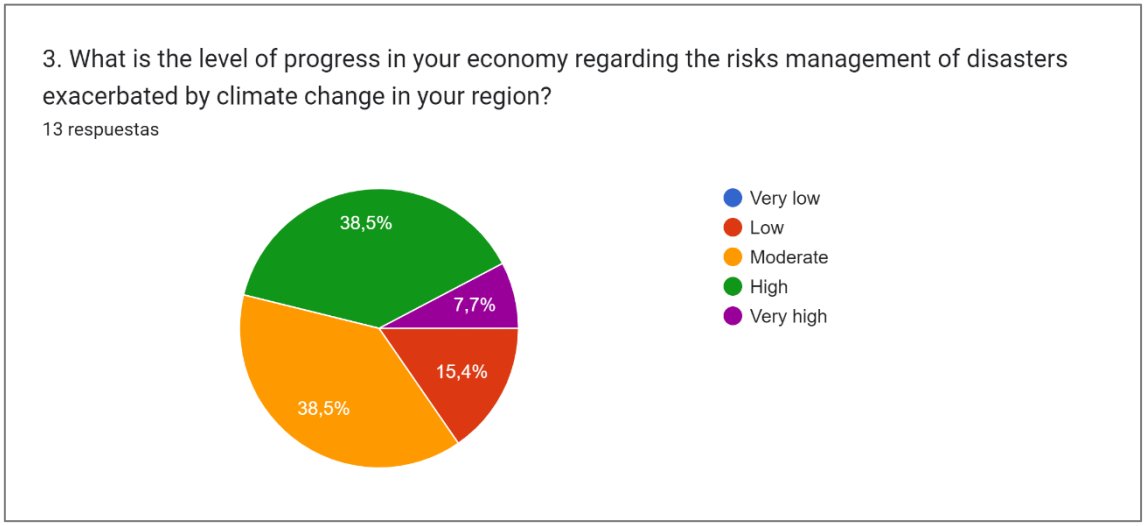
Question 2: Is there cooperation and coordination among local, regional, and domestic authorities on disaster management and climate change?



The survey results indicate a polarized perception of cooperation and coordination among authorities on disaster management and climate change. With 30.8% of respondents reporting "Low" levels of cooperation and 46.2% reporting "High" levels, it is evident that experiences and effectiveness of coordination vary significantly across different regions and economies.

The 15.4% reporting "Moderate" cooperation and the 7.7% reporting "Very High" cooperation suggest that while some regions have established effective coordination mechanisms, others are still developing or refining their processes.

Question 3: What is the level of progress in your economy regarding the risks management of disasters exacerbated by climate change in your region?

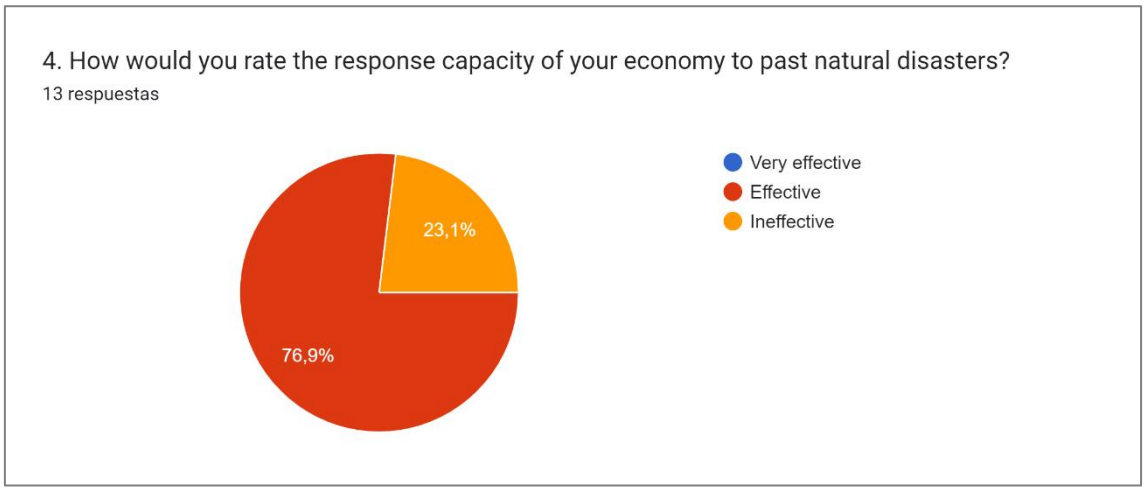


The responses indicate a diverse range of progress in disaster risk management (DRM) related to climate change across different economies:

A combined 77% of respondents rated their progress as either "Moderate" or "High." Only 15.4% rated their progress as "Low," while 7.7% reported "Very High" progress.

The survey responses highlight the varied levels of progress in disaster risk management related to climate change across the Asia-Pacific region. While some economies have made significant strides, others face substantial challenges that need to be addressed.

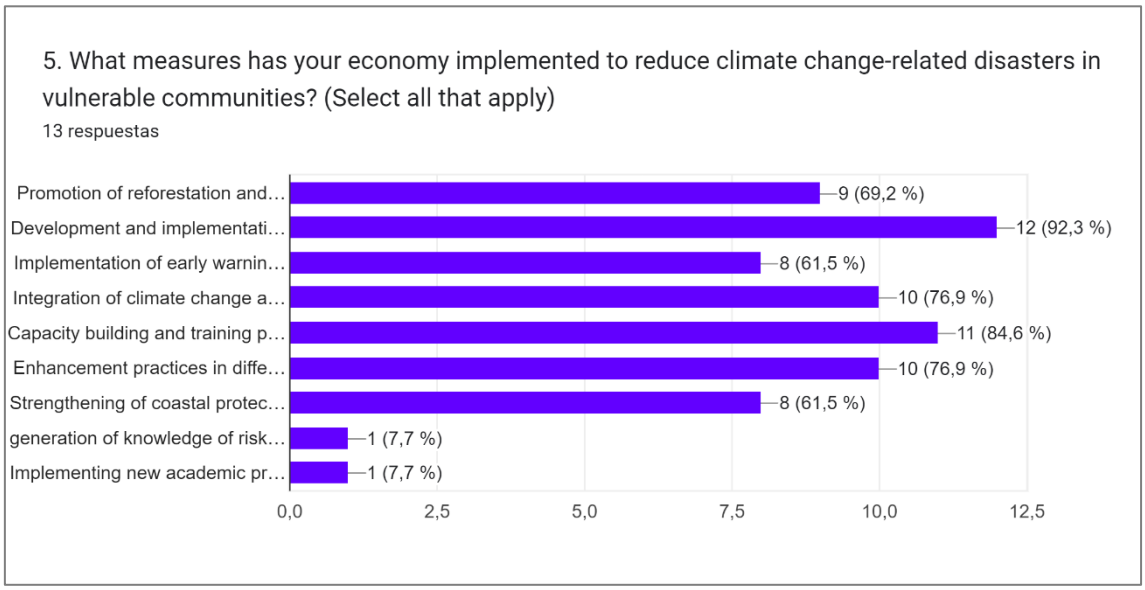
Question 4: How would you rate the capacity response of your economy to past natural disasters?



The majority of respondents (76.9%) believe that their economy's response capacity to past natural disasters has been effective. This suggests several positive attributes within these economies, such as strong emergency services, successful disaster management Practices, community resilience and resource availability

Also, the survey results indicate that while a majority of economies in the Asia-Pacific region have demonstrated effective response capacities to past natural disasters, a significant portion still faces challenges. By addressing resource constraints, improving governance, building community resilience, and ensuring adequate funding, economies can enhance their disaster response capacities and better protect their populations from the impacts of future natural disasters.

Question 5: What measures has your economy implemented to reduce climate change-related disasters in vulnerable communities?



Results:

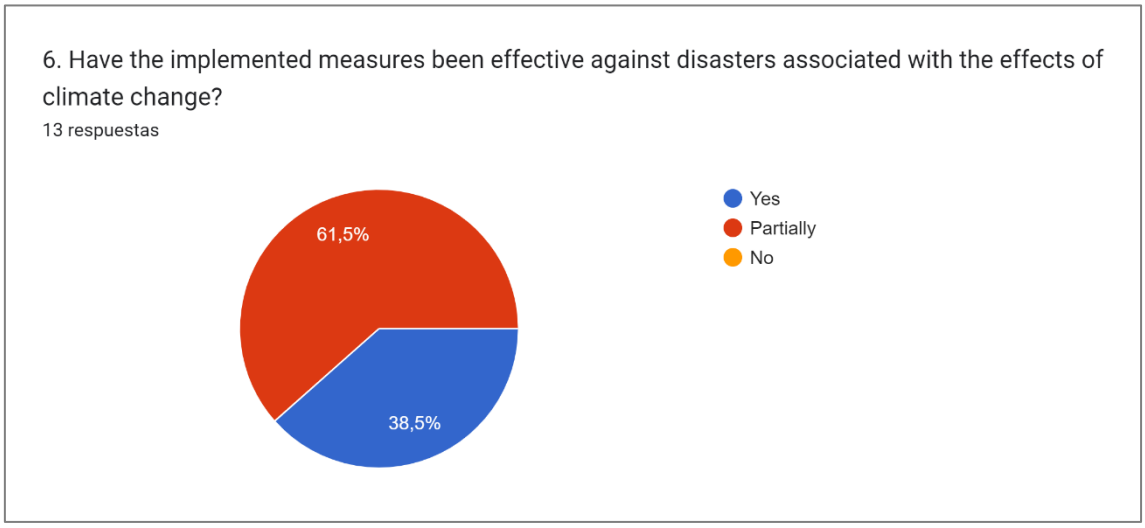
- *Promotion of reforestation and conservation of green areas to prevent landslides. 69.2%*
- *Development and implementation of climate-resilient infrastructure projects. 92.3%*
- *Implementation of early warning systems for extreme weather events. 61.5%*

- *Integration of climate change adaptation considerations into urban planning and development.76.9%*
- *Capacity building and training programs for communities and stakeholders on climate resilience. 84.6%*
- *Enhancement practices in different sectors of your economy to adapt to changing climate conditions. 76.9%*
- *Strengthening of coastal protection measures against sea-level rise and storm surges. 61.5%*
- *Generation of knowledge of risk and its effects in the framework of climate change 7.7%*
- *Implementing new academic programs about climate change and emergency management 7.7%*

The results indicate a strong commitment among APEC economies to implementing diverse measures to reduce climate change-related disasters. The high percentage of economies developing climate-resilient infrastructure (92.3%) and investing in capacity building (84.6%) suggests a proactive approach to enhancing resilience. The implementation of early warning systems (61.5%) and coastal protection measures (61.5%) also shows significant efforts in preparedness and risk reduction.

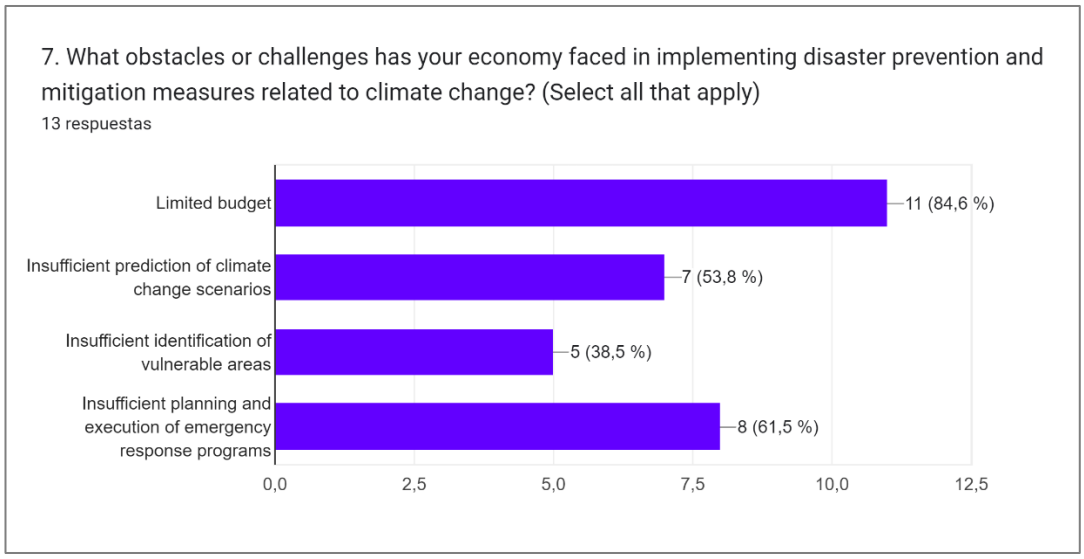
However, the relatively lower focus on generating new knowledge of risks (7.7%) and implementing academic programs (7.7%) highlights areas where further efforts are needed. Enhancing research and education in these areas could support more effective and informed decision-making processes.

Question 6: Have the implemented measures been effective against disasters associated with the effects of climate change?



The majority finding measures only partially effective indicates several potential issues. These may include: i) inadequate implementation: The strategies and policies might not be fully executed or supported by sufficient resources; ii) Gaps in coverage: Some vulnerable areas or sectors may not be adequately addressed by the current measures; iii) Ongoing challenges: Persistent obstacles such as financial constraints, lack of technical expertise, or insufficient community engagement might hinder full effectiveness.

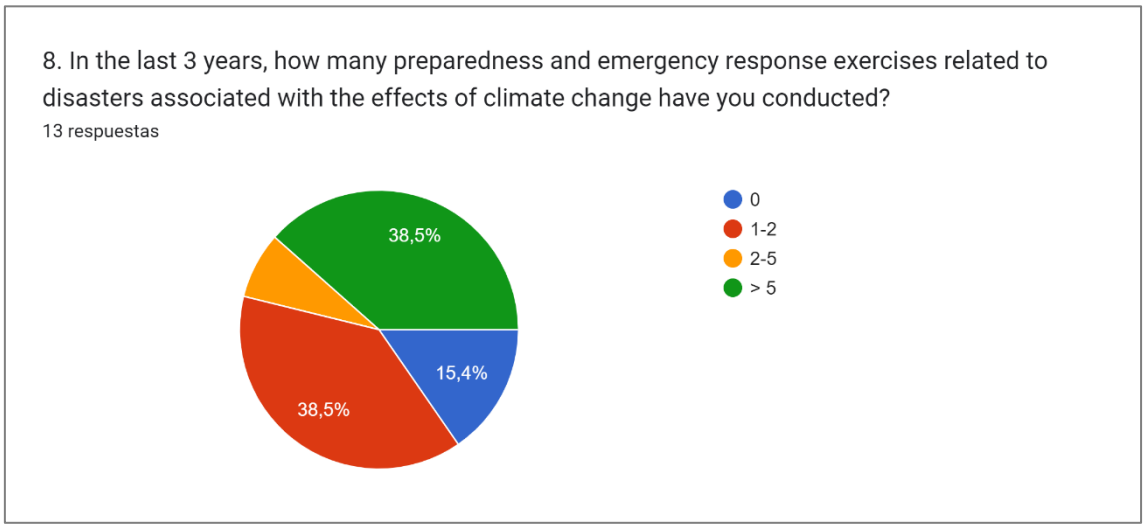
Question 7: What obstacles or challenges has your economy faced in implementing disaster prevention and mitigation measures related to climate change?



Financial constraints are the most prevalent challenge. Economies struggle to allocate sufficient funds for comprehensive disaster risk reduction and climate adaptation initiatives. This limitation affects the ability to invest in infrastructure, technology, training, and community programs.

Furthermore, more than half of the respondents reported challenges in planning and executing emergency response programs suggest gaps in coordination, strategic planning, and operational readiness. This includes the need for better training, clear protocols, and efficient mobilization of resources during disasters.

Question 8: In the last 3 years, how many preparedness and emergency response exercises related to disasters associated with the effects of climate change have you conducted?



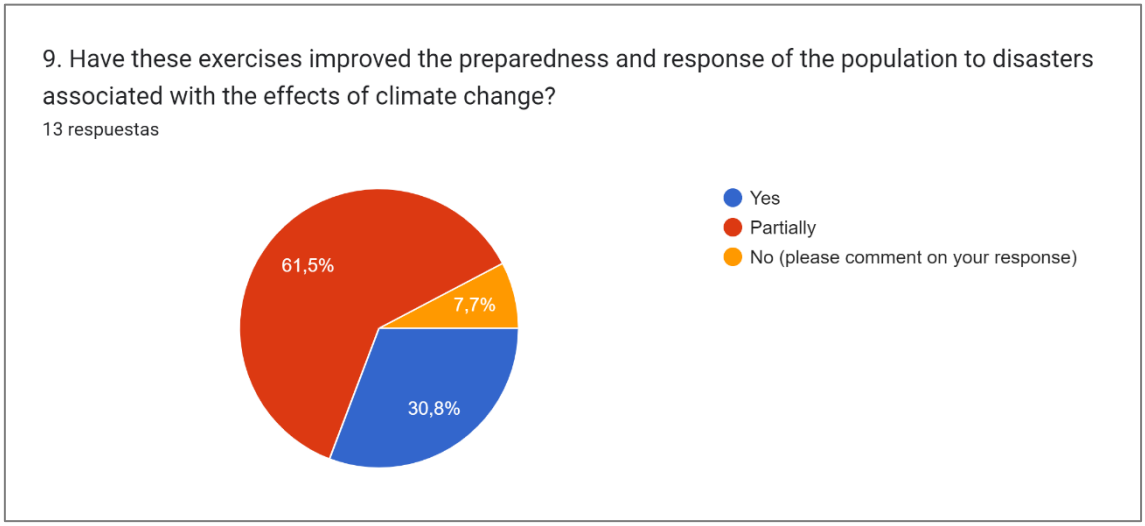
Economies conducting more than five exercises demonstrate a strong commitment to preparedness. These exercises likely contribute to improved readiness and effective

response capabilities. Frequent drills help in identifying gaps, refining response strategies, and ensuring that all stakeholders are well-prepared for potential disasters.

Economies conducting only one or two exercises may face constraints such as limited resources, insufficient coordination, or a lower prioritization of preparedness activities. While these economies are making efforts, they may need to increase the frequency and scope of their exercises to enhance overall resilience.

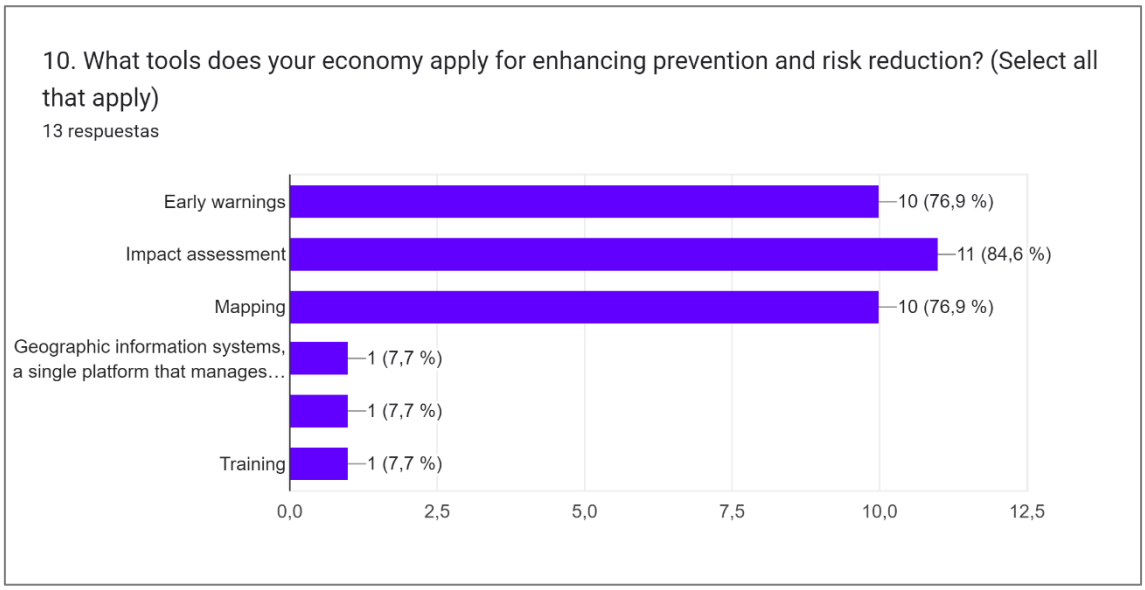
The economies that have not conducted any exercises in the last three years are at a significant disadvantage. This lack of preparedness activities can lead to uncoordinated and ineffective responses during actual disaster events, putting communities at greater risk.

Question 9: Have these exercises improved the preparedness and response of the population to disasters associated with the effects of climate change?



The majority of respondents indicated that the exercises have partially improved the preparedness and response of the population. This suggests that while exercises have had a positive impact, there are still areas that need enhancement to achieve full preparedness.

Question 10: What tools does your economy apply for enhancing prevention and risk reduction?



Early warnings, impact assessment, and mapping are widely adopted tools among respondents, indicating their recognized importance in disaster risk management.

A small percentage of economies reported using GIS as a comprehensive platform for managing technical information related to disaster risk.

Similarly, a minority of respondents mentioned providing training programs to enhance prevention and risk reduction efforts. Training initiatives aim to build capacity among stakeholders, including government officials, emergency responders, and community members, to effectively respond to disasters.

V. CONCLUSIONS:

- Responses were received from 8 APEC member economies, including Canada; Chile; Japan; Mexico; Papua New Guinea; Peru; Chinese Taipei; and Viet Nam .
- The survey results reflect a widespread commitment of APEC economies to disaster risk management and climate change adaptation.
- Although significant progress has been made, persistent challenges require attention, especially in areas such as funding, scenario prediction, and training.
- Regional cooperation and knowledge exchange can play a crucial role in improving risk management capabilities across the region.
- Continued investment in preventive measures, training, and infrastructure strengthening is essential to ensure resilience to future climate-related disasters.
- The survey highlights the critical importance of adequate funding for disaster risk management and climate change adaptation initiatives. Economies must explore innovative financing mechanisms and leverage international support to address funding gaps effectively.

- Improved prediction and scenario planning for climate change impacts are imperative to enhance preparedness and response capabilities. Investments in climate modeling, data analysis, and scenario development can help economies anticipate and mitigate future risks more effectively.

Appendix B

WORKSHOP AGENDA

Workshop on enhancing prevention and risk reduction for climate change adaptation in vulnerable communities in the Asia-Pacific Region (EPWG 202 2023A)

10 May 2024, 08:30 am – 16:00 (GMT-5) / 11 May 2024, 08:30 – 15:30 (GMT-5)

Cerro Juli Convention Center (Room Chachani), Arequipa, Peru

10 May 2024 Risk Prevention and Reduction for Climate Change in Vulnerable Communities		
Peru Time (GMT-5)	**Details**	**Keynote Speaker**
08:30 – 09:00	Welcome, registration process and ex-ante evaluation	-
09:00 – 09:10	Opening	Juan Castro **Ministry of Environment – Peru** Juan Narciso **Peruvian Agency for Environmental Assessment and Enforcement (OEFA) – Peru**
Session 1: Tools for Climate Change Adaptation		
09:10 – 09:30	Domestic Climate Change Adaptation Plan - Peru	Juan Castro / Berioska Quispe **Ministry of Environment – Peru**
09:30 – 09:50	Climate Change Criteria in Environmental Impact Assessments	Gino Olivares **Environmental Assessment Service – Chile**
09:50 – 10:10	Environmental risk alert system applied to mining tailings - SANDRA	José Rosales **Peruvian Agency for Environmental Assessment and Enforcement (OEFA)**
10:10 – 10:30	Impact-based forecasting to cope with landslides forced by extreme precipitation in Peru	Waldo Lavado **Domestic Meteorology and Hydrology Service (SENAMHI) – Peru**
10:30 – 11:00	*Panel discussion (Q&A) and exchange of experiences*	
11:00 – 11:10	*Coffee and break*	
Session 2: Infrastructure for Climate Resiliency		
11:10 – 11:30	Land Management and Urban Planning in Light of Climate Change Adaptation: Case studies in Canada	Sebastian Weissenberg **University of Teluq - Canada**
11:30 – 11:50	The Role of Cement in Adaptation and Resilience to Climate Change in Peru and Latin America	Ricardo Pareja **Inter-American Cement Federation (FICEM - Chile)** **Cement Producers Association (ASOCEM - Peru)**
11:50 – 12:20	*Panel discussion (Q&A) and exchange of experiences*	
12:20 - 14:00	***Lunch***	
Session 3: Sustainable Management of Natural Resources in Response to Climate Change Effects		
14:00 – 14:20	Water Management in Climate Vulnerable Areas: Lessons Learned from the Mining Region of Cesar, Colombia and Cape Breton, Canada	José Angulo **Sustenable Institute – Canada**
14:20 – 14:40	Ecosystem-based adaptation as a response to the effects of climate change – Peru	Alejandra Muñoz **German Corporation for International Cooperation (GIZ)**
14:40 – 15:10	*Panel discussion (Q&A) and exchange of experiences*	
15:10 – 15:20	*Coffee and break*	
15:20 – 16:00	**Networking Session** *Exchange of Contacts, establishment of alliances and cooperation among APEC economies, promoting research and development of disaster prevention and mitigation tools*.	

WORKSHOP AGENDA

Workshop on enhancing prevention and risk reduction for climate change adaptation in vulnerable communities in the Asia-Pacific Region (EPWG 202 2023A)

10 May 2024, 08:30 am – 16:00 (GMT-5) / 11 May 2024, 08:30 – 15:30 (GMT-5)

Cerro Juli Convention Center (Room Chachani), Arequipa, Peru

11 May 2024 Monitoring and evaluation of climate change scenarios		
PERU Time (GMT -5)	**Details**	**Keynote Speaker**
08:30 – 09:00	Welcome, registration process and ex-ante evaluation	-
Session 1: Monitoring Climate Change Adaptation		
09:00 – 09:20	Disaster Response Innovation Plan for Climate Crisis	Seung Joon Back **Ministry of the Interior and Safety – Republic of Korea**
09:20 – 09:40	Mitigating the impacts of climate change in the Mekong Delta through public and private sector engagement in the sand industry: Policies, Lesson Learns and Outlook	Doan Thi Tuyet Nga **Ministry of Agriculture & Rural Development** Anh Ha **World Wildlife Fund (WWF) – Viet Nam**
09:40 – 10:00	Climate Services in the Andes as key instrument for climate adaptation	Nicole Clot **Swiss Agency for Development and Cooperation (SDC), Federal Department of Foreign Affairs – Switzerland**
10:00 – 10:30	*Panel discussion (Q&A) and exchange of experiences*	
10:30 – 10:40	*Coffee and break*	
Session 2: Data Analysis for Climate Risk Prediction and Management		
10:40 – 11:00	Navigating Uncertainty: How Climate Data Shapes Disaster Risk Reduction	Gaeun Kim **APEC Climatic Center – Republic of Korea**
11:00 – 11:20	El Niño diversity impacts in Peru and the effects of climate change	Ken Takahashi **Peruvian Geophysical Institute (IGP) – Peru**
11:20 – 11:40	Sentan Pro: Climate Change Impact Projection in Asia and Pacific	Koji Suzuki **Asian Disaster Reduction Center (ADRC) - Japan**
11:40 – 12:10	*Panel discussion (Q&A) and exchange of experiences*	
12:10 - 13:30	***Lunch***	
Session 3: Collaboration Platforms and Open Data		
13:30 – 13:50	Analysis of population and housing vulnerability with the use of SIGRID – Management Information System of Disaster Risk	Eduardo Portuguez **Domestic Center for Disaster Risk Estimation, Prevention, and Reduction (CENEPRED) – Perú**
13:50 – 14:10	Domestic Atlas of México for vulnerability to climate change; A tool for decision-makers and its application in vulnerable communities	Luis Martinez **Domestic Institute of Ecology and Climate Change (INECC) – Mexico**
14:10 – 14:30	*Panel discussion (Q&A) and exchange of experiences*	
14:30 – 15:10	**Networking Session** *Exchange of Contacts, establishment of alliances and cooperation among APEC economies, promoting research and development of disaster prevention and mitigation tools*.	
15:10 – 15:20	Conclusions	Alex Uriarte (Project Overseer) **Peruvian Agency for Environmental Assessment and Enforcement (OEFA) – Peru**
15:20 – 15:30	Closure, ex-post evaluation	