



2023 Review of Climate Ambition in Asia and the Pacific

Just transition towards regional net-zero climate resilient development



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2023 Review of Climate Ambition in Asia and the Pacific

Just transition towards regional net-zero climate resilient development



Foreword



Climate change and its impacts, such as extreme weather patterns and rising sea levels, are devastating and unprecedented. In the Asia-Pacific region, typhoons, floods, heatwaves, and droughts are increasing human and economic losses that continue to undermine hard-won development gains across the region.

The stakes are very high for Asia-Pacific member States that are geared towards intensive negotiations on the loss and damage framework and financing mechanism, which are urgently needed to mitigate and adapt to climate change, and effectively address and enhance resilience to unprecedented climate-induced disasters. Expectations for stable financing for a just transition are rising since it is critical for steering the Asia-Pacific region towards the low-carbon transition pathway towards sustainable and clean energy for all, which can ensure global warming will be contained within 1.5°C.

The sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2023: Synthesis Report*, elaborates on intensifying adverse impacts from climate change and provides mitigation pathways to limit warming to 1.5°C, particularly by rapidly reducing greenhouse gas emissions. Ahead of COP28 and the launch of the Synthesis Report, the United Nations Secretary-General António Guterres referred to the IPCC report as “a how-to guide to defuse the climate time-bomb”, calling it “a survival guide for humanity”. The *2023 Review of Climate Ambition in Asia and the Pacific* applies the IPCC’s recommendations for greenhouse gas reduction to limit the temperature rise to 1.5°C. It provides analysis and recommendations for Asia-Pacific member States to set more ambitious NDC commitments, pursue new and innovative approaches to both mitigation and adaptation, and increase investments in the restoration and enhancement of terrestrial, coastal, and marine ecosystems to leverage nature-based solutions.

In Asia and the Pacific, 39 countries have made carbon-neutrality pledges, 23 of which have developed long-term low emissions development strategies, and many countries have also increased their mid-term targets towards 2030. Despite this progress, the overall ambition to reduce emissions falls short of their emission reduction ambitions to deliver on the desired 1.5°C pathway, which is not sufficient to contain warming within 2°C by 2030.

This report presents various important recommendations. Among them, I underscore the following:

First, in line with their net zero commitments, Asia-Pacific member States must take their second NDC update cycle, starting in 2024, as an opportunity to develop more robust and accurate reduction scenarios for the next 10 years. To attain the mid-century net zero target, it is critical to start immediate, substantial, and sustained steps to reduce greenhouse gas emissions during the next decade.

Second, in the process of designing more robust sectoral emission reduction trajectories, Asia-Pacific countries must utilize just transition tools and frameworks to ensure that no one is left behind and that the interests of stakeholders, including youth, trade unions, women’s groups, and the private sector, are fully accounted for. Such processes will be instrumental in achieving the net-zero commitments.

Third, building on the plans for nature-based climate solutions that are already underway, concrete, tangible, and achievable targets for the restoration and enhancement of terrestrial, coastal, and marine ecosystems should be developed to include in the updated NDCs. Capitalizing on the Asia-Pacific region's distinctive and diverse ecosystems and carbon sequestration potential will serve as critical mitigation and adaptation measures.

ESCAP, UNEP, UNFCCC/RCC Asia-Pacific, ILO, UNIDO, and the United Nations Regional Collaborative Platform for Asia-Pacific, alongside with other development partners, are fully focused on supporting Asia-Pacific member States to realize their pivotal role in overcoming the global climate crisis. I am confident that the analysis and recommendations this report provides will assist member States to implement their carbon neutrality and net-zero pledges and increase their climate ambition for a safer, sustainable, and resilient future for all.



Armida Salsiah Alisjahbana

Under-Secretary-General of the UN and Executive Secretary of ESCAP
Co-chair of the UN Regional Collaborative Platform for Asia and the Pacific

Executive Summary

Vulnerability to climate change, in the Asia-Pacific region, is increasing at an alarming speed, and the region leads with eight out of ten countries globally that are most vulnerable to disasters. Asia, the continent with the largest land mass extending to the Arctic, is warming faster than the global average. Thawing permafrost in the region is unprecedented, causing the expansion of glacial lakes which result in glacial lake outburst floods (GLOFs) that endanger the lives of downstream populations.

Preventing perilous climate change by maintaining global warming at or below 1.5°C requires undertaking substantial efforts to remove both significant amounts of carbon dioxide from the atmosphere and reduce its emissions. However, in terms of greenhouse gas emissions, the region is quite diverse with some of the top emitters in the world alongside smaller emitters, with the latter also being the most vulnerable to the impacts of climate change.

Amongst the Asia-Pacific member States, all have submitted nationally determined contributions (NDCs), and 12 member States have submitted more than two NDC updates with varying levels of emissions reduction ambition, while 39 countries have made carbon-neutrality pledges, and 23 countries have developed long-term low emissions development strategies. Furthermore, of the 12 updated NDCs, only 2 have integrated gender.

However, even with these updates, all NDC commitments fall short in their emission reduction ambition to deliver on the desired 1.5°C pathway, which is not even sufficient to contain warming within 2°C by 2030.

What is common among the Asia-Pacific member States with current insufficient NDC commitments is that almost all of them are based on a business-as-usual (BAU) model or on an intensity target for their greenhouse gas emission reduction scenarios, rather than on the actual emissions at a high-emissions baseline year. For the next NDC update cycle (2024-2025), it is highly recommended that Asia-Pacific member States critically review their previous business-as-usual scenarios for 2030, and adopt the most recent historical emissions levels for the baseline year. This will allow countries to capture the importance of their unconditional commitments and to demonstrate higher ambition aligned with their carbon neutrality pledges to attract financial support.

Furthermore, the potential of nature-based solutions to reduce greenhouse gas emissions is yet to be properly assessed and incorporated in the updated NDC commitments. Indeed, biodiversity, the variety of life on Earth, is the foundation for human, environmental and socioeconomic well-being, and contributes to both climate mitigation and adaptation.

It is to be noted that the carbon sequestration functions of land-based ecosystems, in the Asia-Pacific region, reached around 30 per cent of the carbon emissions generated through human activity in the last decade, and could provide 20 to 30 per cent of the mitigation required to ensure that global warming stays below 1.5°C towards 2050. Of these land-based ecosystems, natural forests store 40 times more carbon than plantations. However, primary forests and natural landscapes, in the Asia-Pacific region, are facing increasing pressure due to natural and anthropogenic threats including drought, heatwaves, fires, storms, population dynamics, urbanization, conflicts, economic growth and expansion of agriculture and forest plantations.

Blue carbon ecosystems, including ocean habitats like seagrasses, mangroves, and coral reefs, are estimated to mitigate about 7 to 20 per cent of the yearly emissions resulting from global deforestation and forest degradation, even though blue carbon ecosystems only occupy 1 to 2 per cent of the total forested area.

However, in a negative feedback loop, the impacts of climate change are also its drivers when it comes to intricate and interrelated climate threats, which are on the rise with increasing demand for food, feed and wood, and population and economic growth.

Key findings

- Current NDC targets by 2030, even with the most recent updates of the Asia-Pacific region's "pace-setters", continue being off-track compared to both IPCC emission reduction trajectories recommended to contain global warming within 1.5°C: the 45 per cent reductions relative to 2010 levels and the 43 per cent reductions relative to the 2019 levels.
- The Asia-Pacific countries have great opportunity to re-assess their commitments during the 2024-2025 NDC review, and align those with current policies in implementation, LT-LEDS targets and net-zero pledges to facilitate a transition to the 1.5°C goal. This includes commitments to gender responsive climate action, linked to dedicated resources and monitoring frameworks.
- A review of the current greenhouse gas emissions in the region shows that, for the Asia-Pacific member States, the current unconditional and conditional NDC commitments are not keeping pace with the global commitments. The next cycle of NDC updates in 2024-2025 will provide an excellent opportunity to recalibrate NDC commitments to the new IPCC-recommended trajectory for greenhouse gas emission reductions (43 per cent from 2019 by 2030, 60 per cent by 2035, 69 per cent by 2040, and 84 per cent by 2050 (99 per cent for CO₂ emissions).
- Sectoral emission analysis demonstrates that fossil fuels continue to be the main driver for greenhouse gas emissions, and those from coal are on the rise.
- Among the 24 countries that have updated their NDCs since 2021, 79 per cent have integrated gender aspects with 37 per cent including them for the first time. However, their commitments lack specificity, as they fail to mention detailed action plans that are essential for achieving gender equality in climate action.
- Although the region has shown immense potential to provide/harness renewable energy, it is heavily characterized by fossil-fuel locked-in economies. With the expected rise of prices of fossil fuels, robust investments in energy efficiency and renewable energy production will boost economic diversification, and support the implementation of NDC, LT-LEDS and carbon neutrality pledges.
- Just transition, green growth and green jobs hold the key to unlocking the transition of the Asia-Pacific region to a low-carbon and low-emissions development pathway.
- The current status of nature-based solutions is not sufficient to absorb all excess greenhouse gas emissions in the Asia-Pacific region. Furthermore, NbS are taking significant losses in terms of global carbon storage potential.
- Half of the world's mangroves, with enormous diversity are found in the Asia-Pacific region, and in particular in South-East Asia. However, between 1990 and 2020, the region experienced a 4.3 per cent loss of its mangrove forests, which represents 63 per cent of global losses, and is estimated to be 70 per cent of the global carbon stocks. According to scientific estimates, this could be equivalent to 460 MtCO₂e.
- The Asia-Pacific region provided 37 per cent (250 Gt) of the global forest carbon stock (662 Gt) in 2020. While the regional forest cover is increasing, the area of naturally regenerating forests is declining, which leads to a decline in invaluable natural forest ecosystems service, including to the natural water aquifers, local climate and community livelihoods, resilience to floods and droughts, and climate change.
- Since 2000, the cropland area in the ESCAP region has experienced continuous growth, and some on the expense of native forests, which has caused an increase in GHG emissions from the agricultural sector in several Asian countries. However, there is a significant decrease in per-capita cropland in the ESCAP region, as population growth has out-paced cropland expansion.

- By 2020, the net forest cover in the Asia-Pacific region had increased by 0.97 per cent, and the CO₂ emissions from deforestation were halved and stabilized. However, despite an increase in forest cover, per-capita forest has decreased from 0.38 per cent to 0.34 per cent over the last decade.
- By 2020, the Asia-Pacific region had provided 37 per cent (250 Gt) of the global carbon stock (662 Gt).
- Mangrove forests have multiple functions, including acting as barriers against natural disasters, as well as for providing invaluable sources of livelihood for local communities. Most notably, mangrove forests contribute to the estimated sequestration of 22.86 gigatons of carbon dioxide globally, which equals to about half of the yearly emissions from fossil fuels, land-use and industry.
- Almost half of the world's mangroves are found in the Asia-Pacific region. However, the Asia-Pacific region was responsible for 70 per cent of the global net loss of carbon stored in mangrove forests since the late 1990s and these losses are globally significant.
- Between 2018 and 2023, investments in mangrove restoration have increased considerably resulting in projects in over 12 Asia-Pacific member States, however with mixed success.
- An integrated and holistic approach to mangrove restoration is required that addresses both biophysical aspects, such as water quality and sediment availability, and social aspects, including land tenure and resource access. It is also important to create a constructive dialogue and engage local stakeholders to ensure successful restoration outcomes.
- Glaciers of the Hindu Kush Himalayan (HKH) region in Asia are strong indicators of climate change and are disappearing at an alarming rate; 65 per cent faster in 2011-2020 than in the previous decade. The retreating glaciers decrease snow cover, and the thawing permafrost in the region is unprecedented, causing the expansion of glacial lakes, resulting in glacial lake outburst floods (GLOFs) that endanger the lives of downstream population, as happened in northern India in September 2023.
- The impact of climate change on the glaciers, which are a major repository of frozen water outside of the Arctic and Antarctic (the "Third Pole") and an invaluable source of fresh water for 220 million people and ecosystems in the region, is causing serious concerns.

Key recommendations

- Focus on enhancing the implementation of current NDC commitments, which will stimulate transition to low GHG emissions development.
- Take full advantage of the forthcoming NDC update cycle to align greenhouse gas emission reduction trajectories with the latest recommendations of the IPCC Synthesis Report of 43 per cent, 60 per cent, 84 per cent as compared to 2019 levels by 2030, 2035 and 2050, respectively, to ensure reaching net-zero CO₂ emissions by 2050.
- During the 2024-2025 NDC update cycle, adopt real historical baseline values, preferably based on 2019 emission inventories to recalibrate previous NDC commitments that were based on business-as-usual scenarios developed prior to COVID-19. This will allow countries to craft realistic emission scenarios and support alignment with the latest IPCC guidelines to contain global warming within 1.5°C, which for several Asia-Pacific member States are within a 3-9 per cent recalibration of emissions trajectories.
- Take stock of how enabling policies support implementation of current NDCs and are impacting historical GHG emission reductions. Such an approach will create a good basis to enhance transparency framework implementation and attract financial support for conditional NDC commitments.

- Develop sectoral emission reduction trajectories with the IPCC-recommended 43 per cent reduction from 2019 levels by 2030, and the follow up trajectories for achieving carbon neutrality and implementing LT-LEDS.
- Continue to articulate how national climate action is gender responsive, develop concrete action plans, and begin to monitor and report on gender-related commitments in the NDCs of the Asia-Pacific member States which would also be in line with the commitments under the Paris Agreement and the UNFCCC Lima Work Programme.
- Several of the Global Stocktake Synthesis report recommendations can be taken as guiding principles for the Asia-Pacific region, including:
 - Scale up renewable energy and phase out all unabated fossil fuels which are indispensable elements of just energy transitions to net-zero emissions.
 - Increase measures to implement systems transformations in industry, transport, buildings and other sectors, which will rapidly reduce process and energy emissions.
 - Halt and reverse deforestation and degradation and improve agricultural practices which are critical to reducing emissions and conserving and enhancing carbon sinks.
 - Encourage just transitions, which can support more robust and equitable mitigation outcomes, and promote economic diversification, that will also support implementation of the SDGs.
 - Boost international and regional cooperation, and credible initiatives can effectively contribute to bridging emissions and implementation gaps.

Explanatory Notes

This report includes 49 of the ESCAP member States in Asia and the Pacific, which are listed in groupings of countries and territories/areas listed alphabetically as follows:

- 49 ESCAP member States: Afghanistan; Armenia; Australia; Azerbaijan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Democratic People's Republic of Korea (the); Fiji; Georgia; India; Indonesia; Iran (Islamic Republic of); Japan; Kazakhstan; Kiribati; Kyrgyzstan; the Lao People's Democratic Republic; Malaysia; Maldives; Marshall Islands; Micronesia (Federated States of); Mongolia; Myanmar; Nauru; Nepal; New Zealand; Pakistan; Palau; Papua New Guinea; the Philippines; Republic of Korea (the); Russian Federation (the); Samoa; Singapore; Solomon Islands; Sri Lanka; Tajikistan; Thailand; Timor-Leste; Tonga; Türkiye; Turkmenistan; Tuvalu; Uzbekistan; Vanuatu; and Viet Nam.
- Least developed countries: Afghanistan, Bangladesh, Bhutan, Cambodia, Kiribati, the Lao People's Democratic Republic, Myanmar, Nepal, Solomon Islands, Timor-Leste, Tuvalu, and Vanuatu prior to its graduation in 2020. Samoa was part of the least developed countries prior to its graduation in 2014.
- Landlocked developing countries: Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, the Lao People's Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan, and Uzbekistan.
- Small island developing States: Cook Islands, Fiji, Kiribati, Maldives, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu, and Vanuatu.
- East and North-East Asia: China; The Democratic People's Republic of Korea (the); Hong Kong, China; Japan; Macao, China; Mongolia; and Republic of Korea (the).
- North and Central Asia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation (the), Tajikistan, Turkmenistan, and Uzbekistan.
- Pacific: American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.
- South and South-West Asia: Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka, and Türkiye.
- South-East Asia: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam

Bibliographical and other references have not been verified. The United Nations bears no responsibility for the availability or functioning of URLs.

Data for this assessment report was used from a consistent and credible scientific source: <https://edgar.jrc.ec.europa.eu/> and <https://github.com/owid/co2-data>, as well as data from national determined contributions (NDCs), biennial update reports (BURs) and national inventory reports (NIRs).

Abbreviations

ACE	Action for Climate Empowerment
ADB	Asian Development Bank
AFOLU	Agriculture, Forestry and Other Land Use
APDRN	Asia-Pacific Disaster Resilience Network
BAU	business as usual
BTRs	Biennial Technical Reports
BURs	Biennial Update Reports
CBD	Convention on Biological Diversity
CCRI	Children’s Climate Risk Index
CDM	Clean Development Mechanism
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CIF	Climate Investment Funds
COP	Conference of the Parties
CO₂	carbon dioxide
CPEIR	Climate Public Expenditures and Institutional Review
EAP	East Asia-Pacific
EbA	ecosystem-based adaptation
EbM	ecosystem-based mitigation
Eco-DRR	ecosystem-based disaster risk reduction
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EEZ	Exclusive Economic Zone
ETF	Enhanced Transparency Framework
ETS	Emissions Trading System
FCPF	Forest Carbon Partnership Facility
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLOF	glacial lake outburst flood
GNI	gross national income
GT	giga ton
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
IPMG	Indigenous Peoples’ Major Group for Sustainable Development
LDCs	least developed countries
LT-LEDS	Long-Term Low Emissions Development Strategies
LTR	Lands, Territories and Resources
LULUCF	Land Use, Land-Use Change and Forestry
MDBs	Multilateral Development Banks
MEA	Millennium Ecosystem Assessment
MRV	Monitoring, reporting and verification

NAPs	National Adaptation Plans
NbS	Nature-based Solutions
NCS	Natural climate solution
NDCs	Nationally Determined Contributions
NGO	non-governmental organization
PES	Payment for ecosystem services
R&D	Research and Development
PIPA	Phoenix Island Protected Area
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
REEEP	Renewable Energy and Energy Efficiency Partnership
SADDD	sex, age and disability disaggregated data
SDG	Sustainable Development Goals
SIDS	small island developing States
SMEs	small and medium-sized enterprises
V-ETS	Voluntary Emissions Trading System
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children’s Emergency Fund
UNDP	United Nations Development Programme
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNFCCC	United Nations Framework Convention on Climate Change
UNSAID	United States Agency for International Development
UN Women	The United Nations Entity for Gender Equality and the Empowerment of Women
YouCCAN	Youth Network for Climate Change and Clean Air
YOUNGO	Children & Youth Constituency of the UNFCCC
VCM	Voluntary Carbon Market

Acknowledgements

The report, which is the fourth in a series of annual assessments of climate ambition presented by countries in the Asia-Pacific region in their Nationally Determined Contributions (NDCs), has been developed by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) jointly with the United Nations Environment Programme (UNEP), the Regional Collaboration Centre of the United Nations Framework Convention on Climate Change Secretariat (UNFCCC/RCC Asia-Pacific), the International Labour Organization (ILO), and the United Nations Industrial Development Organization (UNIDO).

The 2023 Review Report has been developed by a joint team led by Aneta Nikolova, including Precious Akampumuza, Sawaid Abbas (ESCAP), Mozaharul Alam (UNEP), Eric Roeder (ILO), Banashri Sinha (UNFCCC/RCC Asia-Pacific), and Sooksiri Chamsuk (UNIDO), that was guided with substantive inputs by Sangmin Nam, Environment and Development Division, ESCAP, Ms. Julie Amoroso-Garbin, Regional Lead, and, Kusum Lata and Agung Adhiasto of the Response Measures Unit Team, UNFCCC Secretariat, Bonn. The report was peer reviewed by the IBC/RCM members, including Avipsha Rayamajhi, Amy Reggers, UN Women.

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Introduction

This report, which is the fourth in a series of annual assessments of climate ambition presented by countries in the Asia-Pacific region in their Nationally Determined Contributions (NDCs), has been developed by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) jointly with the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), the Regional Collaboration Centre Asia-Pacific of the United Nations Framework Convention on Climate Change Secretariat (UNFCCC/RCC), and the UN Industrial Development Organization (UNIDO), with inputs from the members of the Issues-Based Coalition of the UN Regional Collaborative Platform (RCP), and other partners. This report aims to provide a perspective on the status and progress of climate action in the Asia-Pacific region, and the level of ambition to limit the 1.5°C temperature rise in the run-up to the 28th Session of the Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change (UNFCCC).

The report provides an updated assessment of the commitments of countries, and the level of emission reduction targets, including sectoral targets, of the Asia-Pacific region, as well as the ambition gaps that need to be addressed to support a 1.5°C temperature limiting pathway. The report takes a closer look at the opportunities for more ambitious greenhouse gas emission reductions in key sectors and provides further recommendations. It also includes a review of the status of regional natural carbon sinks, as provided in the report, using Earth observation applications in support of a regional stocktake. Furthermore, the report provides an overview of the opportunities for a just transition in the Asia-Pacific region towards a 1.5°C temperature limiting pathway.

This report has also applied the updated IPCC's recommended level of greenhouse gas (GHG) reduction to limit temperature rise to 1.5°C, which would require a reduction of emissions by 43 per cent, 60 per cent, and 84 per cent, as compared to 2019 levels, by 2030, 2035 and 2050, respectively, to ensure reaching net-zero CO₂ emissions by 2050. This recommended level is slightly different from the earlier IPCC recommendation of reducing emissions by 45 per cent, relative to 2010 levels, by 2030 to achieve a 1.5°C climate pathway. The emission gap analysis and recommendations to reduce emissions by 45 per cent, relative to 2010 levels, in Asia and the Pacific were developed earlier and presented at the 79th Commission Session of Economic and Social Commission for Asia and the Pacific (ESCAP), that was held in May 2023 (ESCAP, 2023), and which revealed that the Asia-Pacific region fell short of its greenhouse gas emissions reduction that was needed to support the 1.5°C pathway. Even with the full implementation of NDC commitments, emissions will increase to 25.2 GtCO₂e by 2030, which is a 16.13 per cent increase as compared to 2010 levels. To achieve a 1.5°C climate pathway, the region needs to limit its emissions to as low as 11.91 GtCO₂e by 2030.

The report, *Race to Net-Zero: Accelerating Climate Actions in Asia and the Pacific*, published in 2023 recognizes that the current NDC commitments are insufficient to deliver on the temperature goal of the Paris Agreement given the huge unexploited potential of nature-based solutions for climate change mitigation and adaptation in the region (ESCAP, 2023). Overall, countries in the region need to set more ambitious NDC commitments, pursue new and innovative approaches to both mitigation and adaptation, as well as increase investments in the maintenance and restoration of terrestrial, coastal and marine ecosystems to leverage nature-based solutions.

The background is a grayscale aerial photograph of a city, showing a complex network of roads, highways, and buildings. A large, vibrant circular inset is centered on the page, showing a lush green forest with a river winding through it. The text 'Chapter 1' is overlaid on this inset in a large, white, sans-serif font.

Chapter 1

Setting the scene

Chapter 1: Setting the scene

The sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC) points to a worrisome trend of global warming, as surface temperatures during the 2010-2020 period hit a 0.99°C mark relative to 1850-1900 (IPCC, 2021). A key daunting feature of the recent global warming is that it is largely induced by human activities. The past decade has been even warmer, with global temperatures being 1.09°C higher than their corresponding levels in 1850-1900. The highest increase was observed on land (1.59°C), while oceans have recorded a relatively modest increase of 0.88°C. Surface temperatures are projected to rise even further in most parts of Asia, along with polar regions, northern Europe, northern parts of North America, and two regions of South America. Also, Asia, the continent with the largest land mass extending to the Arctic, is warming faster than the global average. The warming trend in Asia, in 1991–2022, was almost double the warming trend in the 1961–1990 period, according to the report of the World Meteorological Organization, *State of the Climate in Asia 2022* (WMO, 2023), and 2023 is on track to be the warmest so far.

For the Asia-Pacific region, the assessment report highlights ambiguous patterns of changes in monsoon precipitation in the period between 1950 to 1980. While increases in monsoon precipitation are reported as a result of emission-related warming, these are counteracted by decreases caused by cooling associated with human-induced aerosol emissions. Reported human-induced changes in weather and climate extremes in Asia include increases in hot extremes and heavy precipitation with associated flooding. There is no compelling agreement with regards to changes in drought.

In the Asia-Pacific region, manifestations of climate change including extreme, unpredictable weather events and natural hazards have become more frequent and intense in the past 60 years. Tropical cyclones, heatwaves, floods and droughts have brought tragic loss of life, displaced communities, damaged people's health and pushed millions into poverty. Of the 10 countries most affected by these disasters, 6 are in the Asia-Pacific region, where food systems are being disrupted, economies damaged, and societies undermined (ESCAP, 2023). The rise in sea level, among other challenges, owing substantially to human activities has led to the degradation of land, coastal and marine ecosystems as well. Left unchecked, climate change will exacerbate the strains of ongoing and overlapping crises and imperil sustainable development.

1.1. The Road to COP28

The 26th and the 27th Conference of the Parties to United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, Scotland in November 2021, and in Sharm-El-Sheikh, Egypt in December 2022, have paved the way for transformative action, that is to be held from 30 November to 12 December 2023, at COP28 in the United Arab Emirates. The COP28 Presidency outlined a Pathway to COP28, which calls upon the world to 'unite, act, and deliver'. COP26 gave impetus to the global race to net zero with over a 100 countries pledging to phase-down and phase-out unabated use of coal power. Over 40 countries pledged to phase out inefficient fossil fuel subsidies, as well as launched the adaptation research alliance, established a work programme on just transition for discussion of pathways to achieve the goals of the Paris Agreement, and raised the importance of nature-based solutions for reduction of greenhouse gas emissions that were all reflected in the Glasgow Climate Pact outcome document (Decision 1/CP.26). COP27 propelled the negotiations towards accountability, and in the Sharm-El-Sheikh Implementation Plan Decision 1/CP.27 heightened the importance of just transition and provided financial support to developing countries to tackle their adaptation challenges, ranging from US\$

160–340 billion annually by 2030, by setting up financial mechanisms for both, and for the implementation of their nationally determined contributions commitments (UNEP, 2022a). Carbon removals announcements were tracked throughout the Conference, as part of the efforts to address loss, damage, and climate reparation (Climate Champions, 2022). A comparison of the achievements of COP26 and COP27, and the anticipated outcomes of COP28 is provided in Annex I.

Ahead of the 28th Conference of the Parties to United Nations Framework Convention on Climate Change (UNFCCC/COP28), and at the launch of the 6th Synthesis Report of the Intergovernmental Panel on Climate Change, the United Nations Secretary-General António Guterres recommended “to follow the IPCC report as a how-to guide to defuse the climate time-bomb” and “a survival guide for humanity”. He proposed to the G20 leaders a Climate Solidarity Pact and the Acceleration Agenda urging developed countries to “commit to ambitious new economy-wide nationally determined contributions encompassing all greenhouse gases and indicating their absolute emissions cuts targets for 2035 and 2040” by the end of COP28. He also urged all parties “to ensure that COP28 delivers on loss-and-damage funding” since “loss and damage is about saving lives” (António Guterres, 2023). The G20 New Delhi Leaders’ Declaration 2023 commits to urgently accelerate actions to address environmental crises and challenges, including climate change, and urges all countries that have not yet aligned their NDCs with the Paris Agreement temperature goal to revisit and strengthen their 2030 targets by the end of 2023. It further underscores that climate action must have gender equality at its core, and advocates for increased participation and leadership of women in mitigation and adaptation activities, disaster risk reduction and environmental issues.

In response to that call, the COP28 Presidency has laid out four paradigm shifts of focus to deliver on the pillars of the Paris Agreement in its latest communication (United Nations Climate Change, 2023a), including:

- Fast-tracking the energy transition by building the energy system of the future, while rapidly decarbonizing the energy system of today to keep the 1.5°C temperature increase within reach. Calling for a just and equitable way for energy decarbonization that accounts for energy security and ensures that finance and technology is available for developing countries to implement the transition.
- Transforming climate finance, by delivering on old promises and setting the framework for a new deal on finance. To unleash its power, climate finance must be affordable, available, and accessible to developing countries, including through reforming the international financial architecture and institutions, and innovative mechanisms for mobilizing private finance.
- Putting nature, people, lives and livelihoods at the heart of climate action by highlighting the urgency of investing in people and in nature to respond to the impacts of climate change. Calling on achieving strong COP28 outcomes on adaptation and loss and damage that will advance real action towards building resilience and contributing to sustainable development, including by driving enhanced adaptation finance. A climate-health ministerial dialogue and a leader-level declaration on the transformation of our food systems and agriculture aim to further heighten the people-centred focus; and
- Mobilizing for the most inclusive COP will ensure prioritizing progress across Action for Climate Empowerment (ACE), Gender and Means of Implementation tracks, including on Science, Technology, Innovation and Capacity-Building, to ensure solutions across mitigation, adaptation, and the GST response. Furthermore, bringing over 100 youth climate leaders will enhance engagement of youth in climate action and ensure that the voices of youth are at the front and centre at COP28. Widening the scope of engagement with stakeholders with focus on a gender-just transition and the importance of direct access to climate financing for women and girls, and bringing of parliamentarians, mayors, and local leaders to the events at COP28.

Finally, the COP28 Presidency reiterated its commitment to promoting green growth and circular economy, for which the United Arab Emirates seeks to become a model country as announced by the Minister of Economy.



Chapter 2

**The road to achieving carbon neutrality
in Asia and the Pacific**

Chapter 2: The road to achieving carbon neutrality in Asia and the Pacific

2.1 Where do emission levels stand in Asia and the Pacific?

This section provides a review of the current greenhouse gas emissions in the Asia-Pacific region, assesses how the submitted updated NDCs are supporting the needed GHG emission reduction trajectories in achieving 1.5°C pathway, and evaluates whether there is any considerable increase in ambition, carbon neutrality targets and net-zero plans and strategies. Sectoral ambition and targets have also been analysed to understand how well commitments by different sectors contribute to achieving a 1.5°C pathway. Furthermore, an overview of the regional loss of natural carbon sinks is provided, and opportunities and need to restore and expand these are also identified.

Despite considerable efforts in the Asia-Pacific region, such as to increase the share of renewable energy in the total energy mix, or increase efficiency in the building and transport sector, overall greenhouse gas emissions, in some countries, have increased by 22.33 per cent during 2010 to 2019, while emissions in others seem to be reaching their peak. It is clear that current efforts are quite inadequate to keep the temperature increase within the 1.5°C pathway by 2030.

Slowing emissions due to COVID-19

However, there is some hope which includes signs of plateauing emissions and emission reductions that occurred during the COVID-19 pandemic, though the pandemic did have significant impacts on health, economy and livelihoods. Greenhouse gas emissions, between 2019 and 2021, have slowed down but vary widely across the Asia-Pacific region. Out of the 49 ESCAP member States, 18 showed slowdown and reduced emissions, while the remaining 31 member States showed increased emissions between 2019 and 2021. Figure 1 shows the change in emission levels in four country categories: a) Least Developed Countries (LDCs) and Landlocked Developing Countries (LLDCs); b) the Pacific small island developing States (SIDS); c) Emerging and other developing countries; and d) Members of G20+ include the Asia-Pacific G20 members (Indonesia, Türkiye, the Russian Federation, China, India, Japan, the Republic of Korea, Australia, as well those that are invited to participate as observers (Brunei Darussalam, New Zealand, Singapore), in the two year period between 2019 and 2021, which partially reflects their varying levels of development. Clear patterns and diversities both within and across groups can be observed.

For the Pacific small island developing States (SIDS), 3 out of 14 countries experienced a reduction in emission levels during this period, with the highest reduction occurring in Timor-Leste (12.4 per cent), followed by Nauru (6.6 per cent), and Tuvalu (4.0 per cent). For the remaining 11 member States in this group, emission levels increased by magnitudes ranging from 22.7 per cent in Papua New Guinea to 2.4 per cent in Vanuatu.

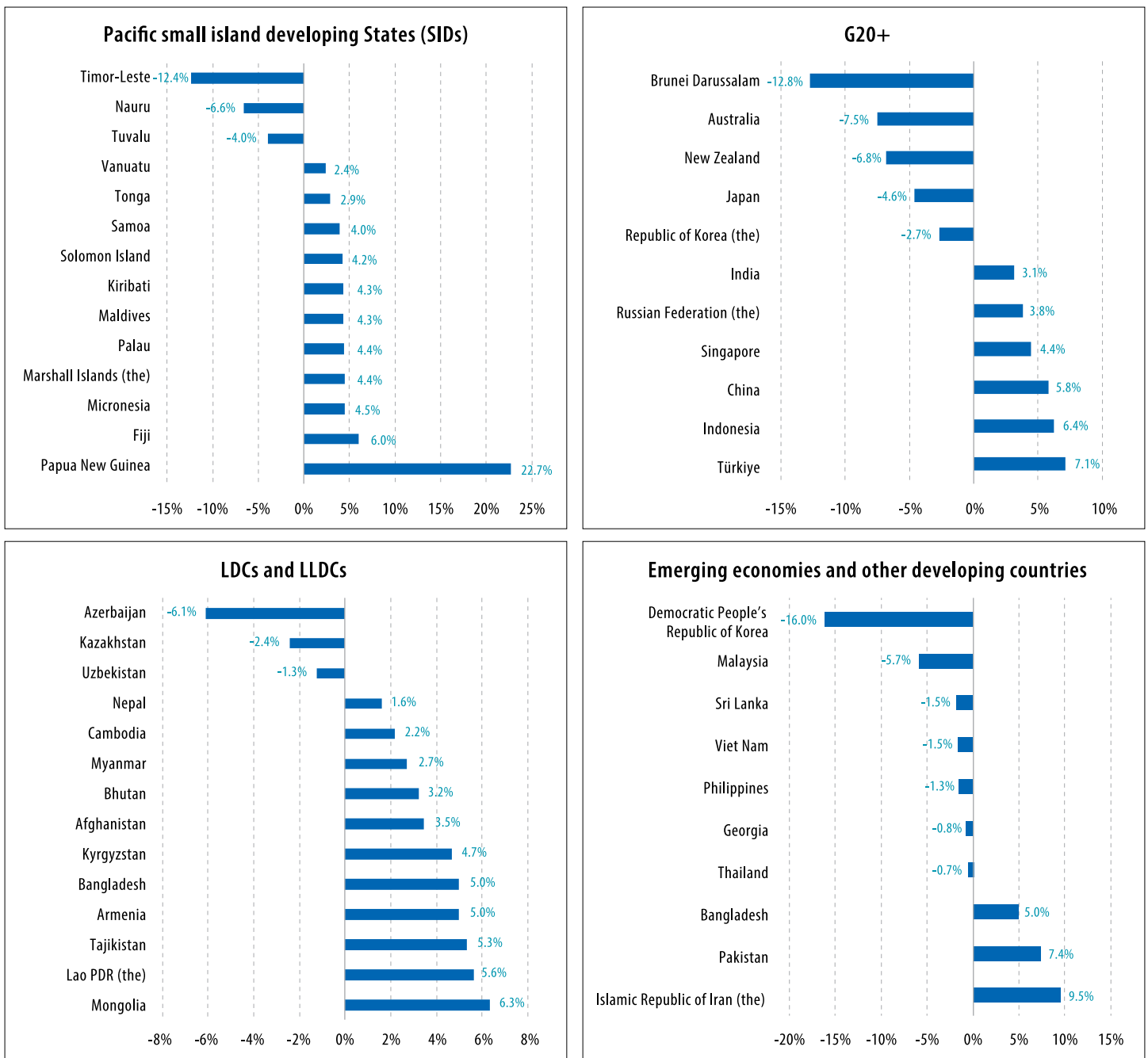
Of the 11 countries in the G20+ Group, five countries: Brunei Darussalam, Australia, New Zealand, Japan, and the Republic of Korea experienced a reduction in emission levels by rates ranging between 12.8 per cent in Brunei Darussalam to 2.7 per cent in the Republic of Korea. For other member States, there was an increase in emission levels during the period, by magnitudes ranging from 7.1 per cent in Türkiye and 3.1 per cent in India.

For LDCs and LLDCs, the emission levels reduced in 4 out of 15 countries, with the highest (16 per cent) and lowest (1.3 per cent) reduction rates in the Democratic People's Republic of Korea and Uzbekistan, respectively, while other countries experienced increases ranging from 6.3 per cent in Mongolia to 1.6 per cent in Nepal.

Finally, the emerging and other developing countries group had the highest number of countries whose emission levels reduced between 2019 and 2021, with Malaysia experiencing the highest reduction rate of 5.7 per cent. On the other hand, three member States in this group experienced an increase, with the highest rate occurring in the Islamic Republic of Iran (9.5 per cent).

These trends indicate that some regional member States may have undertaken certain steps to reduce their carbon emissions and improve the environmental sustainability of their economies, in addition to the COVID-19 pandemic which also contributed to slowing down emissions. Nonetheless, trends show reduction in emissions for 18 out of 49 member States, which, if sustained, would be a commendable milestone in greening the Asia-Pacific region. Among these member States are also some which have already reflected their commitments in the recent updates of their NDCs, which will be discussed in the next section of this chapter. It is imperative that all countries – irrespective of whether their emission levels increased or reduced – initiate and implement policies and interventions to consistently reduce emissions if the region is to comply with the IPCC recommendation consistent with a 1.5°C pathway and try to achieve overall carbon-neutrality.

Figure 1: Percentage change in GHG emissions for Asia-Pacific member states, 2019-2021



Source: European Commission, "EDGAR – Emissions Database for Global Atmospheric Research", 2021. Available at <https://edgar.jrc.ec.europa.eu>

2.2 Where do NDC commitments stand in Asia and the Pacific?

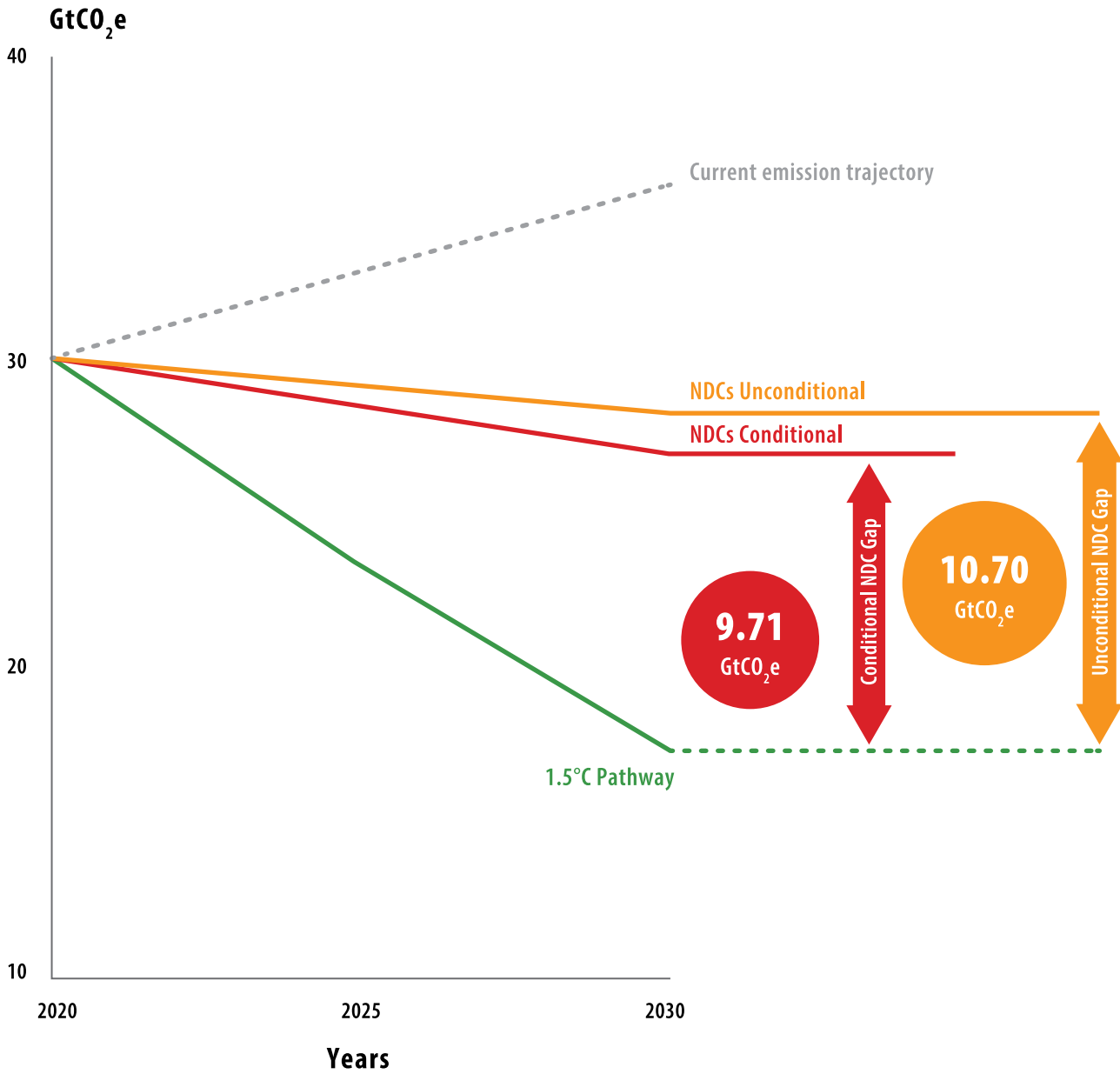
The latest synthesis report of the IPCC Sixth Assessment, published in 2023, lays out the science for an updated trajectory and highlights clear milestones for limiting warming to 1.5°C with no or limited overshoot. The report stipulates that GHG emissions reductions need to peak before 2025, and then followed by rapid and deep GHG emissions reductions of 43 per cent, 60 per cent, 84 per cent compared to 2019 levels by 2030, 2035 and 2050, respectively, to ensure reaching net-zero CO₂ emissions by 2050 (IPCC, 2022). This updated greenhouse gas emissions reductions pathway defines a less steep trajectory than the earlier recommended 2022 reductions targets relative to 2010 levels, and when supported with adequate enabling policies and sectoral policies, would seem feasible and achievable.

Adhering to the guidance of IPCC Sixth Assessment Report and a call for Asia-Pacific member States to peak their emissions reductions by 2025, and then jointly reduce emissions to as low as 43 per cent by 2030, 60 per cent by 2035 and 84 per cent by 2050, compared to the 2019 level, represents limiting of greenhouse gas emissions equivalent to 17.02 GtCO₂e by 2030, 11.94 GtCO₂e by 2035, and 4.78 GtCO₂e by 2050. However, with the current NDC commitments – both conditional and unconditional, and if those would be fully implemented – the corresponding GHG emissions are estimated to remain as high as 26.73 GtCO₂e by 2030. Figure 2 shows gaps between emission reductions under the current NDC commitments and the emission reductions required to achieve the 1.5°C pathway.

NDC commitments fall short in supporting the 1.5°C pathway

The pace of emission reduction resulting from NDC commitments is quite slow – too slow to even contain global warming within 2.0°C warming. The gap between the current and expected ambition levels in the region is not only huge but actually widening, implying a daunting likelihood of not achieving the intended targets unless ambitious efforts are established and implemented to reverse the trend. Furthermore, most of the countries in the region will take quite a long time to achieve the net-zero commitments strategies, with some countries anticipated to achieve this well beyond 2060. The forthcoming NDC update cycle provides countries with an opportunity to further enhance and deepen their greenhouse gas emission reduction commitments.

Figure 2: NDC commitments scenario and gaps with 1.5°C pathway for the Asia-Pacific region, 2023



Source: Developed by ESCAP based on data and methodology in the United Nations Environment Programme (UNEP), "Adaptation Gap Report 2022: Too Little, Too Slow – Climate adaptation failure puts world at risk", Nairobi (United Nations publication, 2022); and the IPCC 6th Report Guidance for 1.5°C pathway (IPCC, 2023a).

Further analysis of the NDC commitments of the 39 Asia-Pacific member States with carbon neutrality pledges, strategies and laws compared with the recommended levels of GHG emissions as required by the updated 1.5°C pathway by 2030 is provided in Figure 3. The analysis was developed based on latest updated NDCs, Biennial Update Reports (BURs) and National Inventory Reports (NIRs) of the 39 Asia-Pacific member States. The analysis is presented in four country categories: a) Least Developed Countries (LDCs) and Landlocked Developing Countries (LLDCs); b) the Pacific small island developing States (SIDS); c) Emerging and other developing countries; and d) Members of G20+ include the Asia-Pacific G20 members (Indonesia, Türkiye, the Russian Federation, China, India, Japan, the Republic of Korea, Australia) as well as those that are invited to participate as observers (Brunei Darussalam, New Zealand, Singapore).

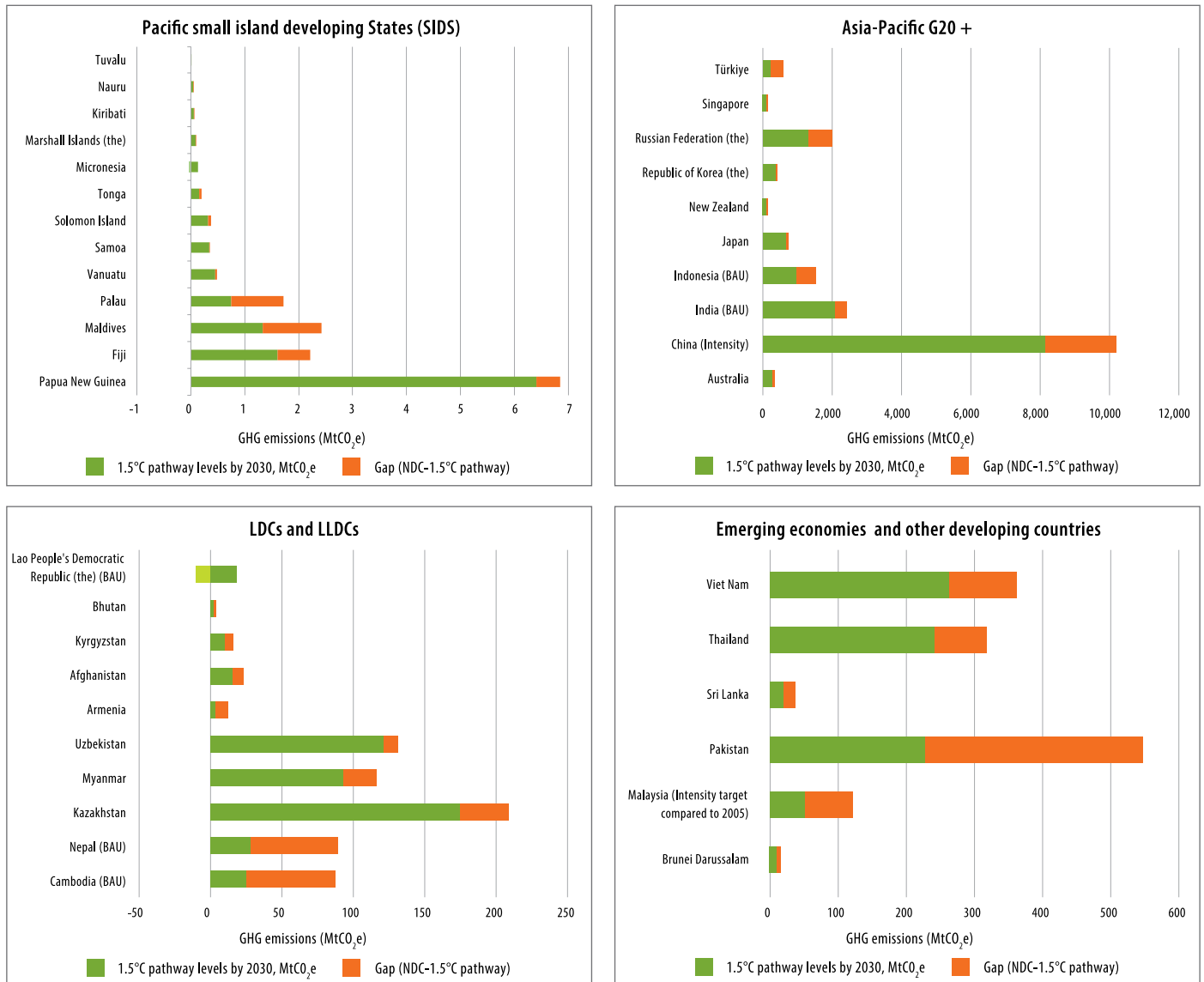
For the least developed (LDCs) and the land-locked developing countries (LLDCs), the current NDC commitments fall very short of delivering the required greenhouse gas emission levels to keep global warming below and within 1.5°C. However, among these countries, the Lao People's Democratic Republic stands out with NDC commitments that will reduce its greenhouse gas emissions much below the recommended 1.5°C pathway by 2030.

Among the Pacific small island developing States (SIDS), Tuvalu and Micronesia stand out as their current NDC commitments will bring their GHG emissions below the recommended levels of the updated 1.5°C pathway by 2030. These are followed by Papua New Guinea, Kiribati, Samoa and Vanuatu with a gap of less than 10 per cent between their NDC commitments and the recommended 2030 GHG emissions level. On the other hand, Palau and Maldives would need to take the next NDC update review process as an opportunity to reduce the substantial gap between their NDC commitments and the required GHG emissions by 2030 to be within the recommended by a 1.5°C pathway, that will also support the achievement of their carbon neutrality targets.

Similarly, the current NDCs commitments of all the six emerging economies and other developing countries are also falling short in complying with the required greenhouse gas emissions reduction to follow the recommended 1.5°C pathway.

Finally, among the Asia-Pacific G20+ countries, the highest ambition is exhibited by New Zealand with a 1.5°C pathway gap of 0.31 MtCO₂e (0.6 per cent), followed closely by Australia, the Republic of Korea and Japan whose NDC commitments are slightly above the 1.5°C pathway gap at 6 per cent, 8 per cent and 9 per cent, respectively. For countries such as Indonesia, Singapore, the Russian Federation and Türkiye, the gap between the NDC commitments and the recommended 1.5°C GHG emission levels by 2030 is ranging between 32 to 52 per cent. In other words, the current NDCs commitments of these countries fall short of contributing to greenhouse gas emission reductions and therefore for keeping global warming below 1.5°C.

Figure 3: Review of the gap between NDC unconditional and conditional commitments compared to the 1.5°C pathway GHG emissions levels for Asia-Pacific member States with carbon neutrality strategies



Source: ESCAP, based on the Asia-Pacific NDC commitments and Intergovernmental Panel on Climate Change, *Climate Change 2023: Synthesis Report*. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, H. Lee and J. Romero, eds. (Geneva, Switzerland, 2023a).

Note: BAU = Business as usual

What is common among the Asia-Pacific member States with current insufficient NDC commitments is that almost all of them are based on a business-as-usual (BAU) model or on an intensity target for their greenhouse gas emission reduction scenarios, rather than on the actual emissions at a high-emissions baseline year. The BAU and intensity targets were not reviewed for consistency with the current economic development trajectory during the year when the NDC commitments were updated.

For all Asia-Pacific member States, it is recommended that they critically review their previous business-as-usual scenarios for 2030 vis-à-vis their historical emissions growth trajectory during the next NDC update cycle (2024-2025). Member States must also consider adopting the most recent historical emissions levels for the baseline year, which will allow them to adequately capture the value of their unconditional emission reduction

commitments. Furthermore, this will demonstrate higher ambition and commitment to achieving their carbon neutrality pledges, and would make their conditional commitments more attractive for financial support.

What is also needed is that each country examines its local contexts and explores possibilities of proactive implementation of initiatives, at the national and sectoral levels, to reduce emissions to 43 per cent by 2030, as compared to 2019 levels, as well as achieve the envisioned carbon-neutrality.

In addition, when recalibrating their NDC commitments in 2024-2025 to the updated 1.5°C pathway, and in particular those with carbon neutrality pledges, member States need to align those commitments with the targets in their long-term low-emissions development strategies (LT-LEDS). By August 2023, the total number of Asia-Pacific member States with LT-LEDS increased to 23,¹ with the latest submissions from Georgia, Sri Lanka and Vanuatu, though these still represent less than the half of the regional member States. Nonetheless, another 20 Asia-Pacific member States with carbon neutrality pledges are yet to develop their LT-LEDS,² and Georgia is yet to submit a carbon neutrality pledge.

2.3 NDC updates of Asia-Pacific member States

While 47 Asia-Pacific member States have updated their NDCs, 12 member States have emerged as “pace-setters” based on their endeavours to come up with updated NDC commitments from 2020 to 2023 with second, third and fourth updates. These include Australia and Japan, with three and four NDC updates respectively; and Bangladesh, Indonesia, the Marshall Islands, Pakistan, the Republic of Korea, Sri Lanka, Singapore, Thailand, Vanuatu and Viet Nam with a second NDC update. Eleven of these 12 member States, except Bangladesh, have submitted carbon neutrality pledges and many have issued carbon neutrality strategies and bills. In terms of updated NDCs and the integration of gender, analysis in 2023 finds 19 out of the 24 countries that have updated their NDCs since 2021 have included gender elements. Nine of these 19 countries have integrated gender for the first time in their NDCs. Among the 12 “pace-setter” countries, only two countries, Japan and Pakistan, have updated their NDCs to integrate gender (UN Women, forthcoming). While the submission of an updated NDC is an important sign to show respect to the decisions of the Paris Agreement, raising ambition to achieve the 1.5°C pathway is more crucial. For example, Indonesia has submitted its updated NDC without increasing reduction targets, but submission of its LT-LEDS along with its updated NDC can be considered as an improvement. Annex II to this report presents the latest update of the carbon neutrality pledges in the Asia-Pacific region. However, the quality assessment of those updates, based on five criteria, as presented in Table 1 namely: a) level of ambition in overall emission reduction targets; b) availability of explicit sectoral reduction targets; c) level of sectoral reduction targets; d) targets for forest and land use; and e) reference to clear adaptation targets, demonstrate uneven and, for some criteria, rather modest progress and commitments towards more ambitious greenhouse gas emissions reduction that would be insufficient to support the 1.5°C pathway and carbon neutrality ambitions.

Figure 4 shows the gap between the commitments, unconditional and conditional, of the most updated NDCs of the 12 Asia-Pacific “pace-setters” as compared with the levels of greenhouse gas emissions by 2030 relative to 2019 levels that align with the IPCC-recommended 1.5°C pathway (43 per cent emissions reduction relative to 2019 levels). The analysis takes into consideration the unconditional and the conditional commitments of the member States, as well as emission records in Biennial Update Reports (BURs) and National Inventory Reports (NIRs). The values are calculated through a four-step procedure.

1. The 23 member States that have submitted their LT-LEDS are Australia, Cambodia, China, Fiji, France, Georgia, Indonesia, India, Japan, the Marshall Islands, Nepal, the Netherlands, New Zealand, the Republic of Korea, the Russian Federation, Singapore, Sri Lanka, Solomon Islands, Thailand, Tonga, Vanuatu, the United Kingdom of Great Britain and Northern Ireland and the United States of America.
2. The 20 Asia-Pacific member States with carbon neutrality pledges without LT-LEDS include Afghanistan, Armenia, Brunei Darussalam, Kyrgyzstan, Kazakhstan, Kiribati, Lao People’s Democratic Republic, the Maldives, Malaysia, Micronesia, Myanmar, Nauru, Palau, Papua New Guinea, Pakistan, Samoa, Tonga, Türkiye, Tuvalu, Viet Nam.

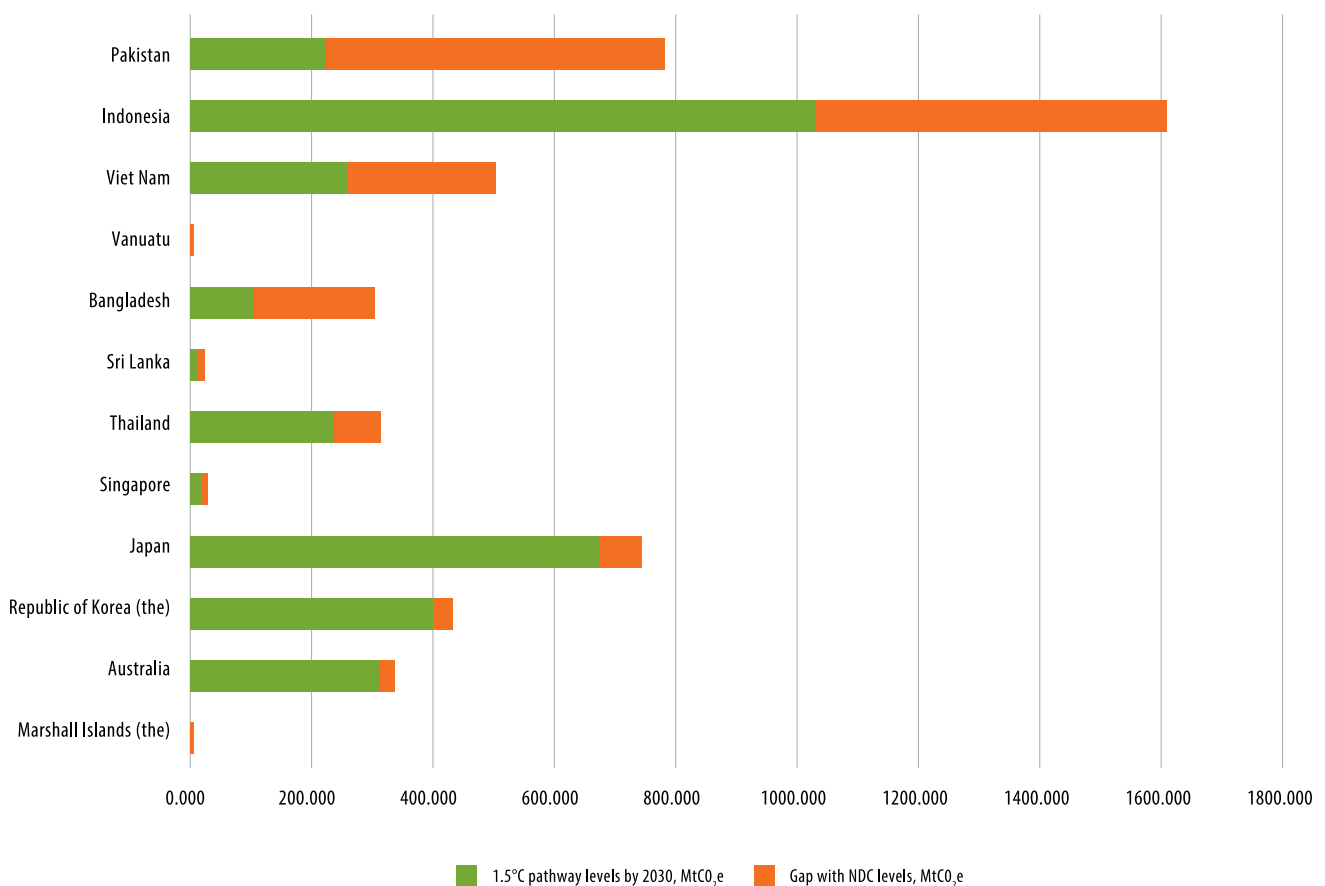
Step 1: All unconditional and conditional commitments are calculated in absolute terms, including translating those made relative to BAU into absolute MtCO₂e. For example, Indonesia has unconditional and conditional targets of combined emission reductions by 43.2 per cent against 2010 levels (2,869 MtCO₂e) which translates into a commitment of reaching to 1,629.59 MtCO₂e emissions by 2030.

Step 2: The IPCC-recommended 43 per cent reduction by 2030 relative to 2019 levels is calculated for each country. For example, Indonesia would have to reduce emissions to 1,051.7 MtCO₂e by 2030 from its 2019 level (1,845.11 MtCO₂e).

Step 3: The emissions gap is calculated as the difference between the IPCC-recommended level consistent with the 1.5°C pathway and the level of emissions which the NDC commitments would deliver by 2030. For example, for Indonesia this would be equal to (1,629.59-1,051.7) = 577.88 MtCO₂e.

Step 4: The suggested improvement of current NDC ambition in percentages is the ratio of the gap relative to the level of emissions under NDC commitment. For Indonesia, for example, this would be (577.88/1,629.55) X 100 = 35.46 per cent. This implies that Indonesia would have to increase its emission reduction target to 63.34 per cent from its current 43.2 per cent ambition. In other words, the country would have to raise ambition by 20.14 per cent to align well with the 1.5°C pathway.

Figure 4: Gaps between the NDC commitments of the Asia-Pacific region’s “pace-setters” and the 1.5°C pathway



Source: European Commission, “EDGAR – Emissions Database for Global Atmospheric Research”, 2021. Available at <https://edgar.jrc.ec.europa.eu>; NDC commitments and Biennial Update Reports of the 12 “pace-setters”.

The qualitative assessment of NDCs (Table 1) and the country trajectories of NDC commitments compared with the updated 1.5°C pathway (Figure 5) reveal that countries, such as the Marshall Islands, Australia, the Republic of Korea, Japan and Vanuatu stand out in terms of their greenhouse gas emissions reduction targets and alignment with their carbon neutrality pledges, with little re-calibration of their current commitments required. However, Singapore and Thailand need to further re-calibrate their NDC commitments and taking into account of projected impacts of low-carbon policies, such as carbon taxes and E-mobility stimulus measures. The rest of the countries would require deepening their adjustments and recalibrations during the next NDC update, and certainly adopting the most recent historical greenhouse gas emission year as a baseline, which would create a firm basis for alignment of NDC commitment with carbon neutrality pledges. At this stage, it is most important to continue implementation of current NDC commitments with robust enabling low-emissions development policies and measures.

For the other member States, there is a need to further review and enhance their NDC commitments to substantively reduce the gap with the IPCC recommended 1.5°C pathway (43 per cent emissions reduction relative to 2019 levels). To increase the ambition of their NDCs, it is recommended that these member States reassess previous projected trajectories of greenhouse gas emission growth with the current low-carbon decarbonization policies that have been implemented, and review the most recent historical emissions growth.

It is to be noted that those member States with considerable gaps in achieving the required 1.5°C pathway have simply adopted earlier BAU scenarios during their update process, without considering the progress achieved in previous NDC commitments implementation and the historical levels of GHG emissions, which has devalued the whole review process. Adopting a base-line value would strongly support the endeavours of member States to demonstrate higher ambition and commitment to achieving their carbon neutrality pledges, and would make their conditional commitments more attractive for financial support.

Table 1: Qualitative assessment of NDC commitments of the Asia-Pacific “pace-setters”

Country/Indicator	Rating																			
	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
	Ambitious reduction targets				Sectoral reduction targets				Level of sectoral reduction targets				Targets for forest or land use				Clear adaptation measures			
Australia				✓		✓				✓			✓							✓
Bangladesh		✓					✓				✓				✓					✓
Japan				✓	✓				✓					✓				✓		
Indonesia		✓						✓				✓				✓				✓
Marshall Islands (the)		✓						✓				✓	✓						✓	
Pakistan		✓					✓				✓					✓				✓
Republic of Korea (the)				✓	✓				✓					✓				✓		
Sri Lanka		✓					✓				✓				✓					✓
Singapore		✓				✓			✓						✓			✓		
Thailand			✓		✓				✓							✓		✓		
Vanuatu			✓			✓				✓					✓					✓
Viet Nam			✓				✓				✓					✓				✓
Overall score		6	3	3	4	2	4	2	4	2	4	2	2	2	4	4	5	2	5	

Legend:

0 = does not exist

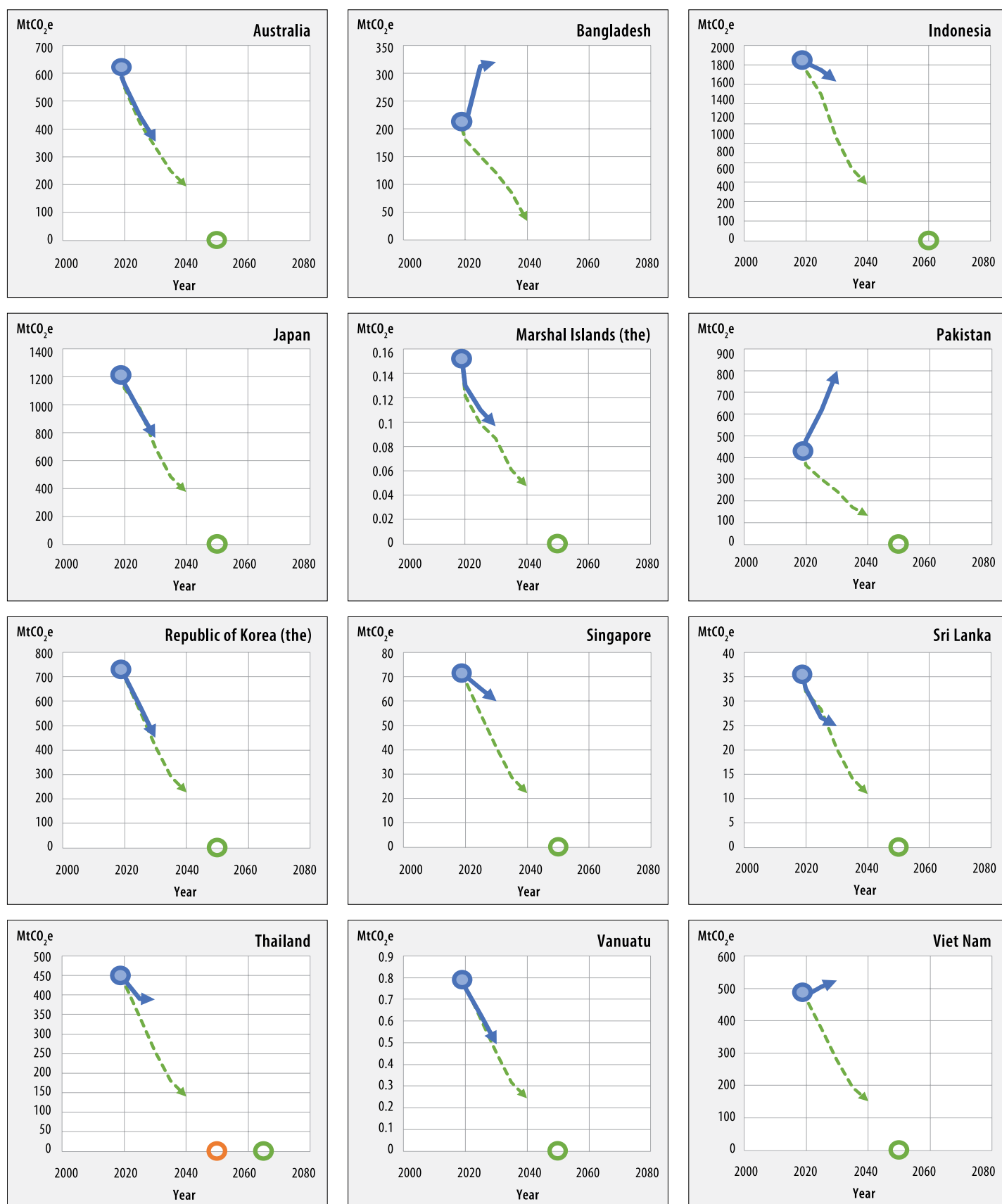
1 = weak

2 = moderate

3 = good

Note: This assessment covers the Asia-Pacific region’s “pace-setters” that have submitted two or more updates of their NDCs by 2023.

Figure 5: Trajectories of NDC commitments of the Asia-Pacific region’s “pace-setters” and their Carbon Neutrality pledges



Note: The figures represent the selected Asia-Pacific member States with 2, 3 and 4 updates of their NDCs: Australia, Bangladesh, Japan, Indonesia, the Marshall Islands, Pakistan, the Republic of Korea, Singapore, Sri Lanka, Thailand, Vanuatu, Viet Nam.

The boxes below describe commitments and policy measures that some of the Asia-Pacific region's "pace-setters" have implemented to enhance their emission reduction ambitions as per their most recent NDC updates.

Box 1: The Marshall Islands - Well defined sectoral reduction targets

The greenhouse gas emissions (GHG) target of the Marshall Islands is unchanged from its previous submissions, at 45 per cent reduction, but this third updated NDC includes strengthened policies and adaptation strategies. The target is more ambitious than other countries in the region, but there is a lack of transparency regarding conditionality with an unspecified mix of domestic and international resources that are required to achieve the targets. Another key issue is that the goals are highly dependent on international finance.

Furthermore, this third update includes quantitative sectoral GHG emissions reduction targets, and these include: 1) reductions from the electricity generation sector by 55 per cent in 2025, and 66 per cent in 2030; 2) reductions from transportation (including domestic shipping) by 16 per cent in 2025 and 27 per cent in 2030; 3) reductions from waste by 20 per cent by 2030, and; 4) reductions from other sectors (cooking and lighting) by 15 per cent by 2030. However, there is no mention on forests and land use and there is no clear adaptation planning in the NDC, since the Government of the Marshall Islands considers the focus of the update to be on mitigation. However, additional accompanying information is referenced in the NDC, particularly the 2050 strategy, an Adaptation Communication submitted in December 2020, and the development and implementation of a National Adaptation Plan. The NDC outlines four objectives of the National Adaptation Plan. Given that the Marshall Islands is particularly vulnerable to climate change, adaptation planning ought to be an integral component of the country's NDC.

Box 2: Indonesia – Improved by developing LTS-LCCR 2050

Indonesia submitted a third updated NDC aligned with the long-term low emissions development strategy - LTS-LCCR 2050 with forestry and other land use (FOLU) as a net sink starting in 2030. Under its LTS-LCCR, mangroves are not included in the forest and land sector. In the future, mangroves will be included in blue carbon (carbon stored in coastal ecosystems). Mangroves have been included in the national GHG emissions under the wetland category, as well as for Forest Reference Emission Level (FREL) determination under REDD+.

Indonesia's emissions reduction target is 29 per cent without support from the international community, and 41 per cent with additional international funding. As such, for FOLU, the contribution will constitute 17 per cent from the 29 per cent unconditional commitment, and 24 per cent of the 41 per cent commitment with international funding support, respectively. Between 2016-2021, Indonesia had taken 18 concrete corrective steps through policy, implementation, workstream, monitoring and evaluation in relation to the role of forests as carbon sinks.

Under the most ambitious scenario of the LTS-LCCP, it is estimated to produce an annual national investment growth of 4.13 per cent with a total investment of Rp 73.3 billion (Indonesian rupiah) (US\$ 4.8 million) in 2050 followed by an increase in the workforce in the field of green jobs, which also assumes that the FOLU Net Sink 2030 is achieved.

Box 3: Australia - Success regarding climate ambition

Australia is increasing the ambition of its 2030 target, committing to reduce greenhouse gas emissions to 43 per cent below the 2005 levels by 2030. The updated NDC represents a vast improvement of 15 per cent from Australia's previous target. The country also reaffirms its target to achieve net-zero emissions by 2050 and its NDC appears to be on track for the 2050 net-zero target.

Australia is one of the few countries in the region which has already begun to see a fall in GHG emissions. The highly ambitious GHG target is a positive step, but Australia will still need more ambitious climate policies to reach this goal and be compatible with a 1.5°C pathway. In this regard policies that suggest/support high levels of carbon offsets will be required to neutralize CO₂ emissions. Australia has provided three updates since its first NDC submission, and has submitted a LT-LEDS.

Box 4: Viet Nam - NbS and adaptation targets

Viet Nam's NDC outlines the goal of increasing forest cover to 42 per cent by 2030, and maintaining a stable level to 2050. The NDC also lists various policies/actions to be taken to protect, conserve, and restore forests as well as strengthen policy instruments thereon.

The NDC also outlines the impacts of climate change on each of the sectors, specifically recognizing current and future loss and damage. A thorough overview of Viet Nam's efforts in adaptation, as well as the gaps and contributions is also provided in the latest NDC update.

Box 5: Japan - Significant increase of its ambition

Japan aims to reduce its greenhouse gas emissions by 46 per cent in 2030 from its 2013 levels (with 50 per cent as an aspirational target), setting a target which is 20 per cent higher than the first NDC. This target is aligned with the long-term goal of achieving net zero by 2050, a pledge that is enshrined in law.

Japan's NDC represents one of the most ambitious targets in the region, and is among the few regional member States which have already begun to realize substantial reductions in GHG emissions. Official records reveal that emissions reduced by 18.4 per cent during the 2013-2020 period, equivalent to a 5.1 per cent decrease in 2020 from the 2019 levels (Government of Japan, 2022). Japan's NDC goals are set to achieve the 2050 net-zero target and the country has provided two updates since its first NDC submission in addition to one interim submission. Japan has also submitted a long-term low emissions development strategy (LT-LEDS).

Japan's NDC update notes proactive efforts to include gender perspective into concrete actions, including increased participation of women in environmental decision-making processes. This is significant progress from the previous NDC.

It is important that these ambitions are also inclusive and gender responsive. Parties to the UNFCCC also recognize that the integration of gender is crucial to enhanced ambition and effectiveness of climate action (UNFCCC, 2022). Some countries in the Asia-Pacific region, such as Pakistan and Sri Lanka, have progressed from their previous commitments and mainstreamed gender across their climate action plans (Box 6 and 7 below provide examples of how these countries have updated their NDCs to reflect gender), while other countries such as Australia, and the Republic of Korea still lag behind. These two countries have updated their NDCs to reflect enhanced emission targets but have failed to make it gender responsive.

Box 6: Pakistan

Pakistan has made significant strides in integrating gender into climate both at policy and institutional levels through its updated NDC in 2021. It recognizes gender-sensitive programming as a guiding principle and gender-equality as one of its cross-cutting themes.

The National Climate Change Gender Action Plan (CCGAP) has been formulated and finalized through an inclusive process to mainstream gender strategies across sectors such as agriculture, forestry, land-use change, water, energy, disaster management, waste, health, research and knowledge management. The primary focus lies on capacity-building, increasing investments, enhancing participation in decision-making, implementing legal reforms favoring women's land ownership, improving access to loans and technology, and raising awareness including sensitizing men to prevent violence against women. Pakistan has also embedded gender-responsive practices in its ongoing programs and projects and is committed to collecting gender-disaggregated data to strengthen its monitoring and evaluation efforts.

Box 7: Sri Lanka

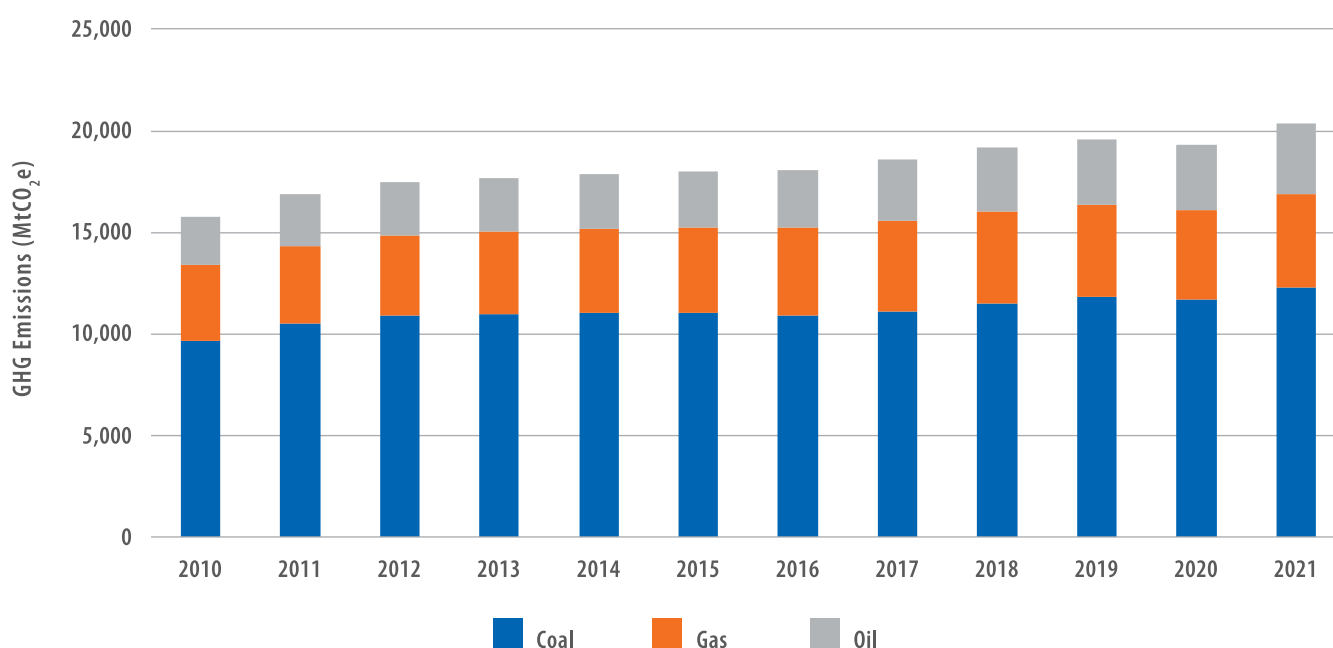
Sri Lanka's updated NDC in 2021 underscores the importance of gender equality and women's empowerment as prerequisites for successful implementation of the Paris Agreement. The NDC recognizes that gender-responsive strategies that consider the differentiated needs of men and women will be instrumental to "improve access to knowledge, technology and financing to create enabling conditions for adaptation". It acknowledges the need to harness and tap into the vast array of knowledge, expertise and potential of women in climate action. The focus also lies on developing gender-responsive actions, ensuring their implementation through allocation of budget and other resources and increasing women's participation in planning and monitoring.

2.4 Sectoral GHG emissions of selected Asia-Pacific member States

This section further analyzes the sectoral greenhouse gas emissions of the Asia-Pacific “pace-setters” and provides some opportunities for enhancing sectoral ambition in the next round of NDC updates.

Emissions trends for Asia-Pacific countries are largely driven by a heavy reliance on coal, oil and gas sectors, which in turn contribute quite substantially to the overall GHG emission levels in the region (Figure 6). For coal in particular, the contribution towards overall emissions is not only high but increased during the period 2010-2021.

Figure 6: Trend of GHG emissions from coal, oil and gas for Asia-Pacific, 2010-2021



Source: European Commission, “EDGAR – Emissions Database for Global Atmospheric Research”, 2021. Available at <https://edgar.jrc.ec.europa.eu>

Detailed sectoral analysis based on data from the Emissions Database for Global Atmospheric Research (EDGAR) reveals some patterns that could guide sector-specific efforts to raise ambition towards carbon neutrality. According to EDGAR, eight broad sectors are presented as follows:

Power industry includes power and heat generation plants (public and auto-producers).

Industrial combustion and processes include combustion for industrial manufacturing and industrial process emissions (for example, non-metallic minerals, non-ferrous metals, solvents and other product use, chemicals, etc.). In the recently updated data, these two are presented as separate sectors.

Transport includes road transport, rail transport, domestic aviation, domestic shipping and inland waterway transport for each country. International shipping and aviation also belongs to this sector and is presented separately in the country factsheets due to its international nature. Figure 7 includes also international shipping and aviation under the transport sector.

Buildings includes small-scale non-industrial stationary combustion.

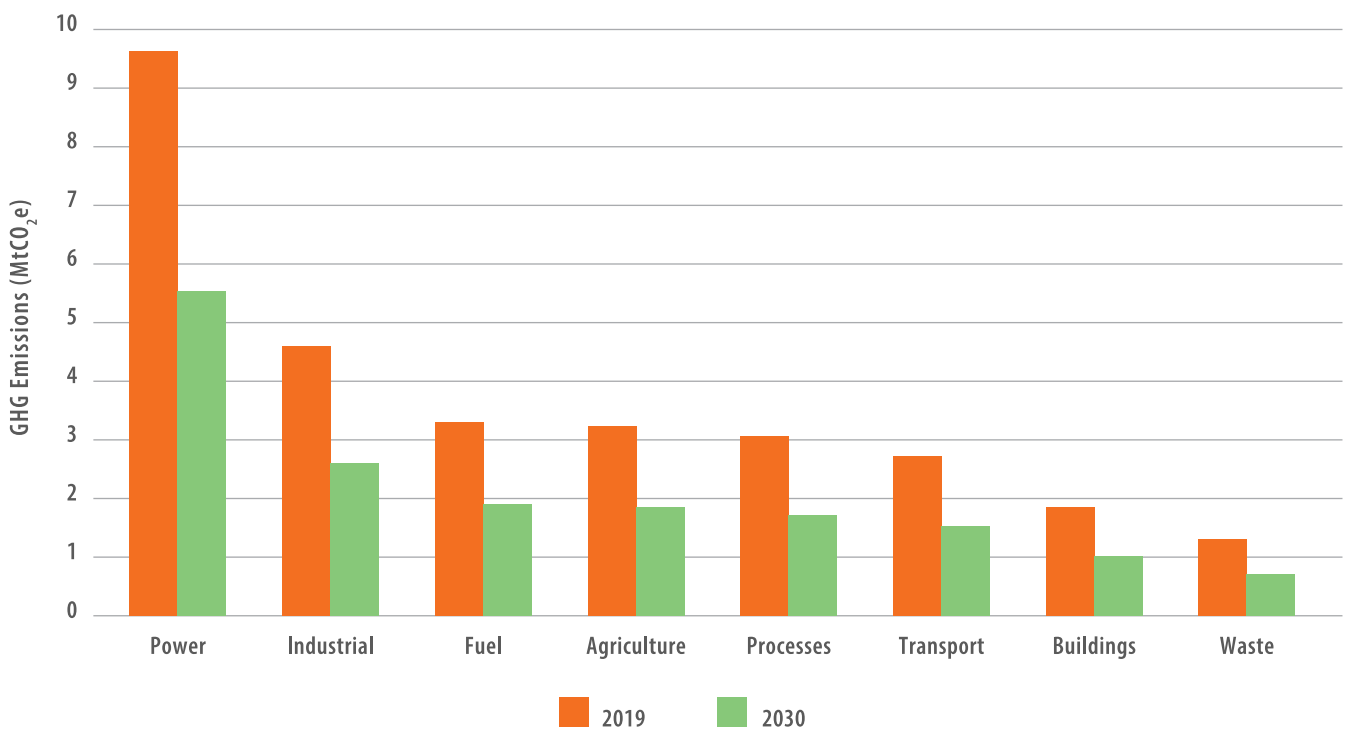
Agriculture includes agriculture livestock (enteric fermentation, manure management), agriculture soils (fertilizers, lime application, rice cultivation, direct soil emissions, indirect N₂O emissions from agriculture), field burning of agricultural residues.

Waste includes solid waste disposed on land, solid waste composted, and hazardous solid waste processing/storage, wastewater handling, waste incineration.

Fuel exploitation includes extraction, transformation and refineries activities as well as venting and flaring.

Figure 7 compares the sectoral Asia-Pacific regional emission levels in 2019 to the recommended levels for each of the sectors by 2030 in alignment with the IPCC-recommended reduction in emissions by 43 per cent in 2030, assuming equal GHG reduction potential prevails in each sector. The power sector is the largest contributor to the overall sectoral emissions in the Asia-Pacific region with emissions as high 9.60 GtCO₂e in 2019, which will have to be reduced to 5.47 GtCO₂e in 2030 for the region to achieve the IPCC-recommended reduction rate of 43 per cent. For the industrial combustion sector, the second-largest emitting sector, emission levels will have to be reduced from 4.61 GtCO₂e in 2019 to 2.63 GtCO₂e by 2030, while emissions from the fuel sector need to be reduced from 3.36 GtCO₂e to 1.91 GtCO₂e. These sectors are followed by agriculture, processes, transport and buildings, while the waste sector is the smallest contributor to overall sectoral emissions. Nonetheless, the region will have to maintain emissions from this sector to levels below 0.77 GtCO₂e to align with the 1.5°C pathway.

Figure 7: Breakdown of recommended regional sectoral emission reductions for the Asia-Pacific region by 2030 as compared to 2019, MtCO₂e

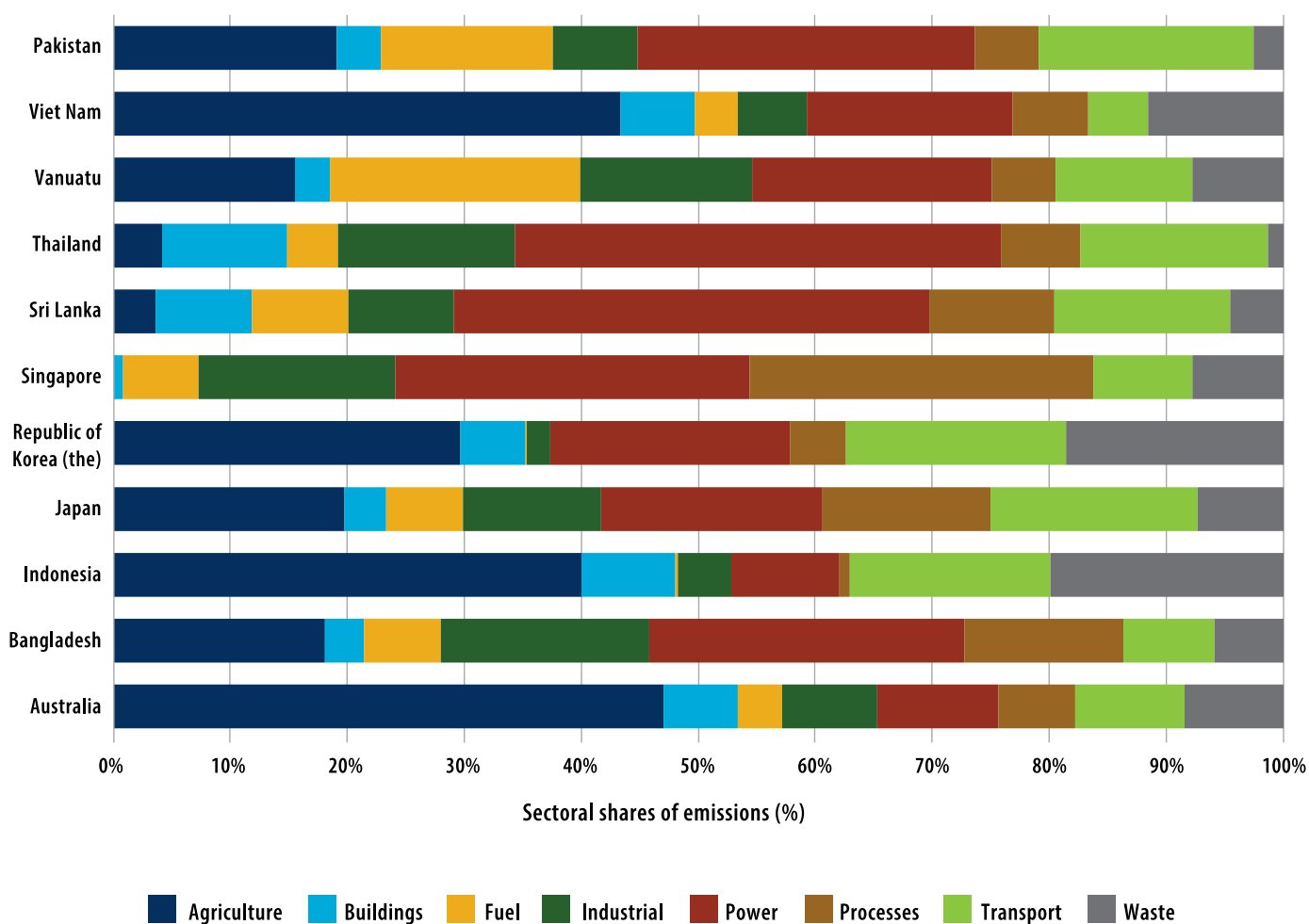


Source: European Commission, “EDGAR – Emissions Database for Global Atmospheric Research”, 2021. Available at <https://edgar.jrc.ec.europa.eu>

Taking a closer look at the situation in 11 of the 12 “pace-setters” in the Asia-Pacific region,³ Figure 8 presents further analysis of the required sectoral emission reduction for the Asia-Pacific “pace-setters” (member States with two and more NDCs updates).

Figure 8 reveals that for more advanced economies, the power sector is the largest source of emissions, with relative shares ranging from 42 per cent in Japan to 41 per cent in the Republic of Korea, followed by Singapore (30 per cent), Australia (29 per cent) and Viet Nam (27 per cent). While this observation is not surprising, given the association between level of development and power consumption, it also indicates a critical need by these countries to green their power industry by exploring relatively cleaner options as one of the strategies to align with the IPCC-recommended emission reduction consistent with a 1.5°C pathway.

Figure 8: Breakdown of sectoral shares from total emissions for the 11 “pace setters” in the Asia-Pacific region, 2022



Source: European Commission, “EDGAR – Emissions Database for Global Atmospheric Research”, 2021. Available at <https://edgar.jrc.ec.europa.eu>

3. The comparison does not show the Marshall Islands because of lack of data in the EDGAR dataset, and will focus on 11 of the “pace-setters”.

Another key source of emissions for the “pace-setters” is the agriculture sector, especially for less industrialized countries. The highest share of emissions from the agriculture sector is recorded in Pakistan (47 per cent), followed by Bangladesh (43 per cent), Vanuatu (40 per cent) and Sri Lanka (30 per cent). For these countries therefore, exploring green agriculture strategies will have to be an integral component of emission reduction efforts to align with the 1.5°C pathway. For Singapore, Japan and the Republic of Korea, the agriculture sector is a relatively small emitter, with almost non-existent emissions in the former.

For the waste sector, countries like Sri Lanka, Viet Nam, Vanuatu have relatively high GHG emissions, necessitating efforts for green waste management measures in order for these countries to meet the IPCC recommendation of reducing emissions by 43 per cent in 2030 relative to 2019 levels.

For the transport sector, emission levels are relatively high in Sri Lanka (19 per cent), Australia (18 per cent), Thailand (18 per cent), Vanuatu (17 per cent), and Japan (16 per cent), calling for further efforts to develop green transport systems – including leveraging the possibility of e-mobility – in these countries. As far as the industrial sector is concerned, emissions are relatively high in Viet Nam, Singapore, Japan and Indonesia. The building sector is relatively a small emitter with shares higher in Japan (11 per cent), the Republic of Korea (8 per cent), and Vanuatu (8 per cent) calling for greater investment in green urban infrastructure. For the processes sector, Indonesia, Thailand and Viet Nam have relatively high emissions and will hence need to explore means to achieve cleaner industrial processes to align with the 1.5°C pathway.

The current sectoral trend analysis of the 11 Asia-Pacific member States is provided in more detail in Annex III of this report.

Figure 9 illustrates the required sectoral reductions that the 11 Asia-Pacific “pace-setters” need to make in order to achieve the recommended 1.5°C pathway based on the latest IPCC guidance for achieving 43 per cent reductions from 2019 levels by 2030. The graphs are forward-looking in such a way that they indicate the year-by-year levels of emissions per sector from 2019 to 2030. For more advanced economies, like Australia, Japan and the Republic of Korea, emission reductions will have to be more substantial in the power industry which has a relatively larger contribution towards overall sectoral emissions. For Japan, for example, 500.7 MtCO₂e of GHG came from the power industry in 2019. This will have to reduce by 43 per cent to reach 285.4MtCO₂e by 2030, implying an overall gap of 215.3 MtCO₂e, and an annual reduction of 19.57 MtCO₂e. Viet Nam and Singapore follow with relatively large shares of emissions from the power industry.

For countries like Vanuatu, Bangladesh, Pakistan and Sri Lanka, the agriculture sector is the largest contributor to total emissions and consequently, the sector will have to achieve greater reductions in emissions for these countries to align with the 1.5°C pathway. For example, the agriculture sector in Bangladesh emitted 121 MtCO₂e of GHG in 2019, and this will have to reduce to 69 MtCO₂e by 2030. This translates into overall reduction of 52 MtCO₂e between 2019 to 2030, and an annual reduction rate of 4.7 MtCO₂e.

With regards to the transport sector, considerable reductions will have to happen in some countries like Sri Lanka and Vanuatu and, to some extent, Australia and Japan. These countries will realize considerable progress in aligning with the IPCC-recommended 43 per cent reduction by further greening the transport sector. Emissions reduction is relatively critical from industrial combustion for countries like Indonesia, Viet Nam, Singapore and Japan to meet the IPCC recommendation, while reduction in waste-based emissions will have to be substantial in Sri Lanka and Vanuatu.

Figure 9: Proposed sectoral reduction trajectories aligned with the 1.5°C pathway for the 11 “pace-setters” in the Asia-Pacific region

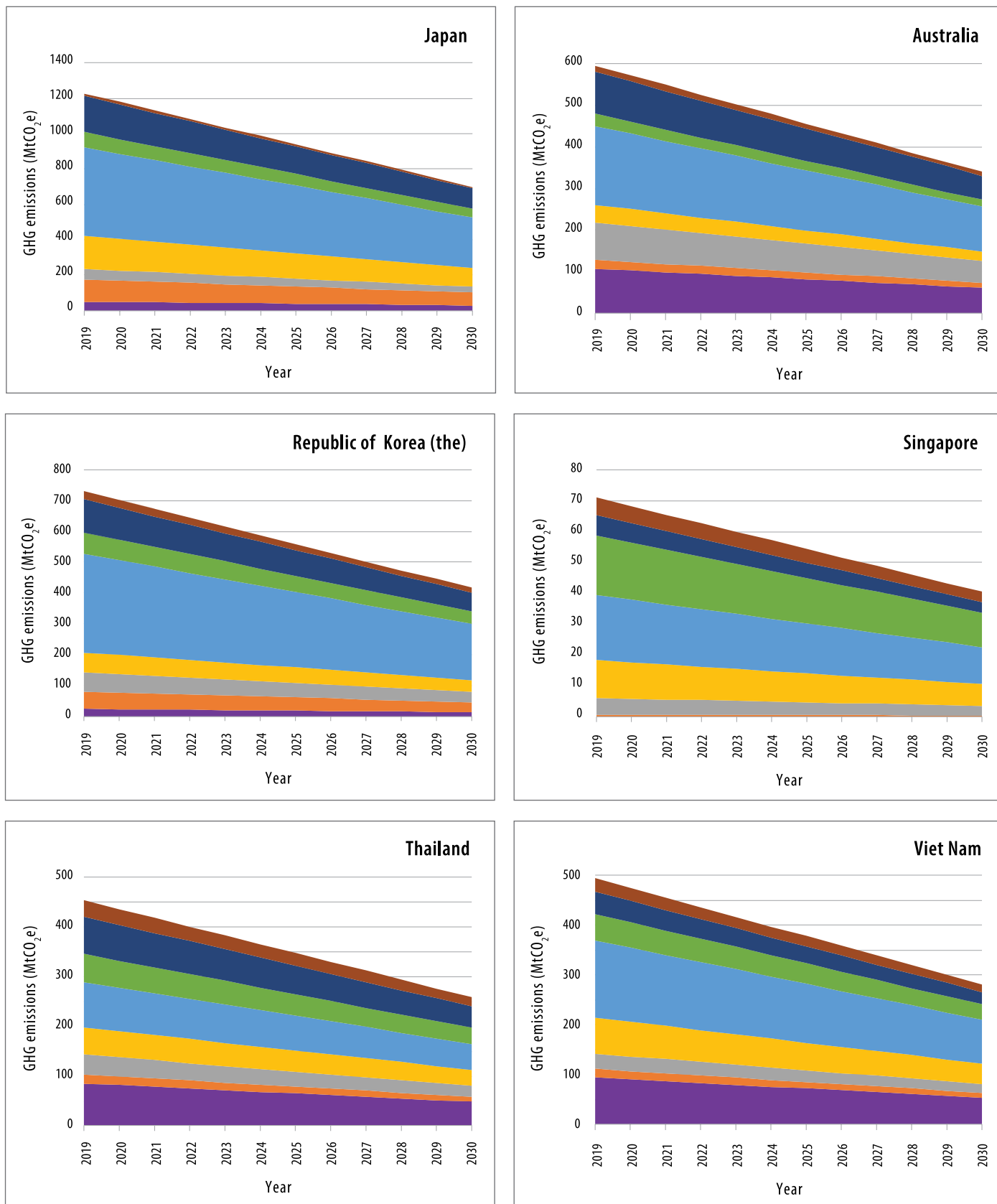
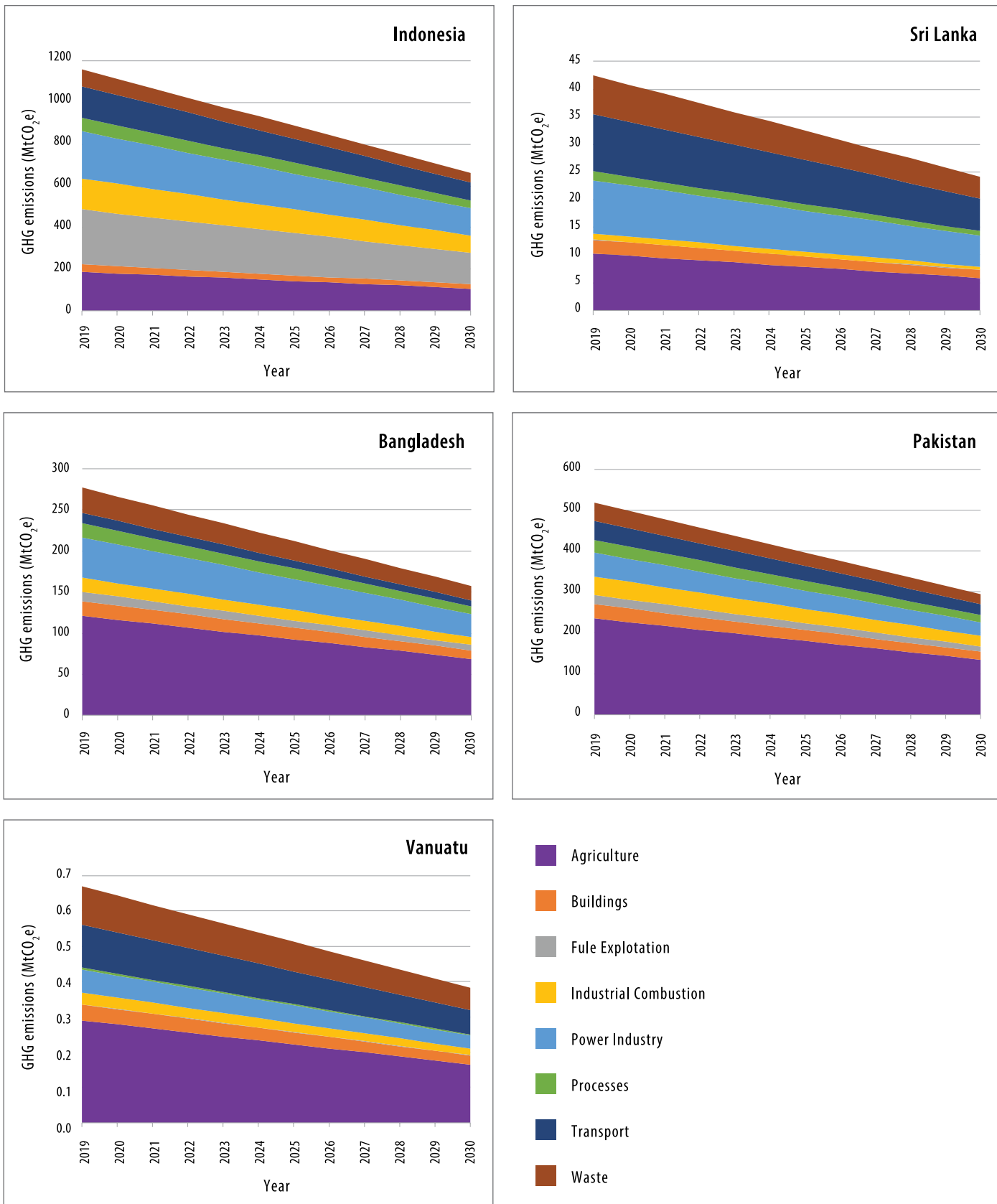


Figure 10: Continued...



Source: European Commission, "EDGAR – Emissions Database for Global Atmospheric Research", 2021. Available at <https://edgar.jrc.ec.europa.eu>

From the emission trends trajectories presented in detail in Annex III of the report, it is evident that for most countries, the power sector is the main contributor in sectoral emissions. For Australia, there seems to be a recent reduction in relative shares of power sector emissions, along with overall emissions per capita. For Japan, substantial reductions have been recorded in the power sector emissions since 2013 along with overall GHG emissions per capita. There is a rise in emissions per capita in the Republic of Korea which is driven mainly by the power sector especially since 2010. For some countries, the level of sectoral emissions increased considerably in recent years, driven mainly by agriculture in Bangladesh and Pakistan, and by the power sector in Viet Nam, especially since 2017. For Vanuatu, recent reductions were recorded mainly driven by the agriculture sector, while in Sri Lanka, the reductions since 2016 were mainly driven by waste.

A transition to low-carbon development and aligned with 1.5°C pathway trajectories would require a significant enabling environment, and development and implementation of just transition principles and policies, which are discussed in more detail in Chapter 3 of this report. Equally important are investments in enhancing and strengthening nature-based solutions, which will be discussed in Chapter 4.

A woman wearing a vibrant green and red floral sari stands behind a row of solar panels. The scene is framed within a large blue circle. The background of the entire image is a dark, textured surface of black stones.

Chapter 3

**Making just transition a mission possible
for Asia and the Pacific**

Chapter 3: Making just transition a mission possible for Asia and the Pacific

3.1 Background

The concept of a just transition originated with the United States labour movement of the 1970s and broadened as labour organizations forged alliances with environmental justice groups starting in the 1990s (Henry, Bazilian and Markuson, 2020). A deliberate effort to plan for and invest in a transition to environmentally and socially sustainable jobs, sectors and economies was made, as understanding of the climate crisis grew. As a matter of fact, 'just transition' was first mentioned in the COP decision in 2011 as one area of work of the forum to assess the impacts of the implementation of response measures when the term was first introduced and deliberated upon.

3.2 Just transition under the Paris Agreement and the Conference of Parties (COP)

The Paris Agreement Preamble takes into account "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities", and it was clear that further details needed to be negotiated on how the agreement would be implanted transparently and fairly for all. Countries set a deadline for themselves to complete these negotiations on the implementation guidelines, in 2018, at COP24. At the United Nations Climate Change Conference in Katowice, Poland (COP 24), held in December 2018, the Katowice Committee of Experts on the Impacts of the Implementation of Response Measures (KCI) was established. KCI is a constituted body to support the work programme of the forum on the impact of the implementation of response measures (FCCC/PA/CMA/2018/3/Add.1, see Decision 7/CMA.1).

The work programme of the forum and the KCI comprises the following areas:

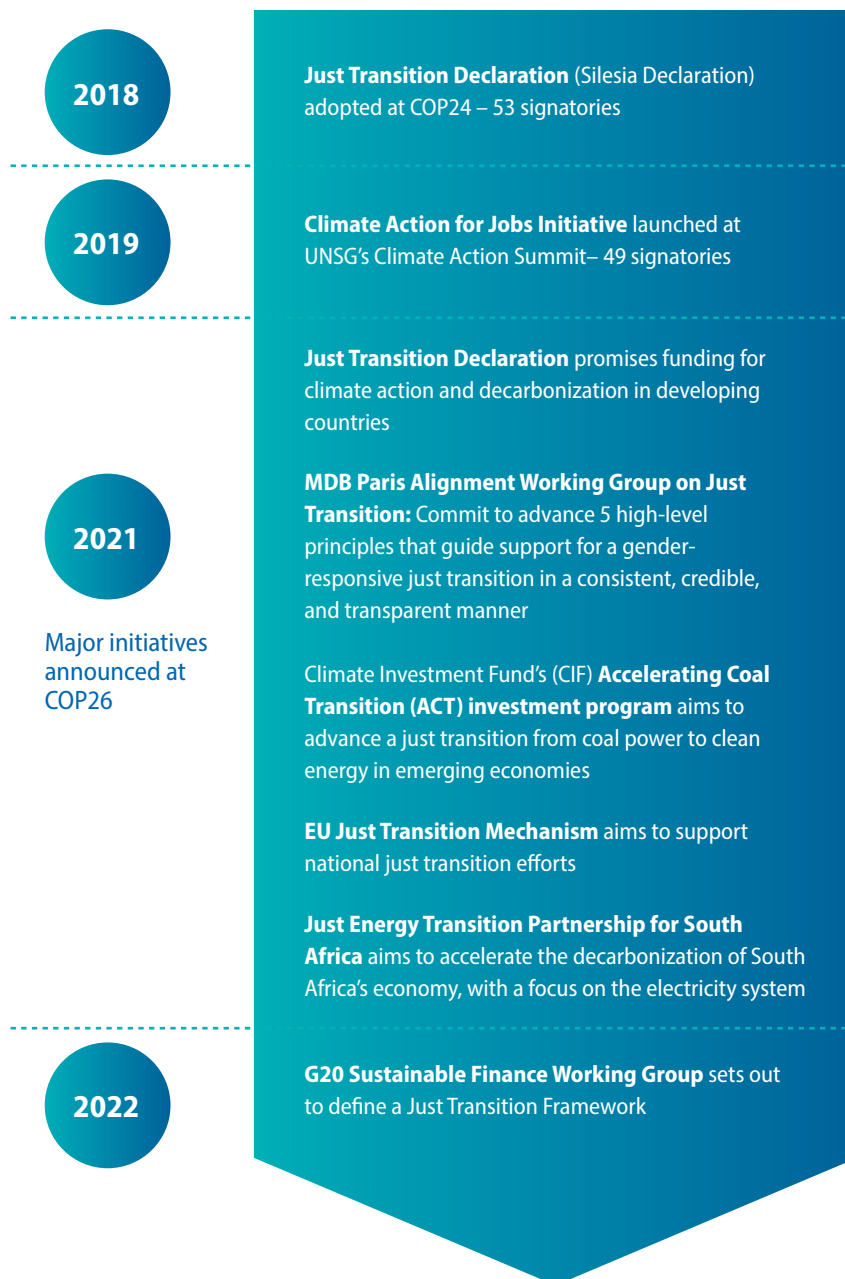
1. Economic diversification and transformation;
2. Just transition of the workforce and the creation of decent work and quality jobs;
3. Assessing and analysing the impacts of the implementation of response measures;
4. Facilitating the development of tools and methodologies to assess the impacts of the implementation of response measures.

The Katowice Committee of Experts on the Impacts of the Implementation of Response Measures finds that **economic diversification and transformation and the just transition of the workforce and the creation of decent work and quality jobs** are two of the main strategies to mitigate the potential socioeconomic impacts of response measures, while **enhancing access to the opportunities that emerge from the low carbon transition**. These strategies become even more pertinent as Parties work to meet the temperature goals of the Paris Agreement of holding the increase in the global average temperature to well below 2°C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels (KCI, 2023).

At COP26, Parties were called upon "to accelerate the development, deployment and dissemination of technologies, and the adoption of policies, to transition towards low-emission energy systems, including by rapidly scaling up the deployment of clean power generation and energy efficiency measures recognizing the need for support towards a just transition" (FCCC/PA/CMA/2018/3/Add.1, see Decision 1/CMA.3, para 36). It also recognized "the need to ensure just transitions that promote sustainable development and eradication of poverty, and the creation of decent work and quality jobs" (FCCC/PA/CMA/2018/3/Add.1, see Decision 1/CMA.3, para 85).

The Glasgow Climate Pact also urged countries to develop long-term strategies “towards just transitions to net-zero emissions” no later than COP27, and invited countries to update those strategies regularly (Decision -/CP.26). Yet, 2022 saw only 10 countries globally submitting new strategies, and Singapore submitted an addendum. Hence, the COP27 decision urged the remaining parties to communicate their long-term strategies by COP28. By September 2023, only 68 Parties have submitted their strategies. Furthermore, the Sharm-El-Sheikh Implementation Plan adopted at UNFCCC COP27 highlights the importance of just transition to clean and renewable energy and for mitigation pathways (FCCC/CP/2022/L.19).

Figure 10: Growth in just transition initiatives



Source: Sangji Lee, and Lisa Baumgartner, “How just transition can help deliver the Paris Agreement”, United Nations Development Programme (UNDP), 2022. Available at https://climatepromise.undp.org/sites/default/files/research_report_document/Just%20Transition%20Report%20Jan%202020.pdf

3.3 The Asia-Pacific regional context

There is no one-fit solution to just and inclusive transition to low-emissions development. Each member State needs to conduct a more disaggregated review of the emissions of various sectors, assess it according to the needs of its citizens, design a good range of demand-side policies that curb consumption-related emissions, and stimulate low-emissions consumption patterns. These policies should target the society as a whole, be gender responsive, and provide ranges and variations based on diverse income groups and needs. Research proves that various brown economy policies, including fossil fuel subsidies benefit the upper 40 per cent of the society (UNEP, 2020). Furthermore, the latest IPCC Synthesis Report states that “the 10% of households with the highest per capita emissions contribute 34–45% of global consumption-based household GHG emissions, while the bottom 50% contribute 13–15%”, and presents synthesis of the historical greenhouse gas emissions per capita, as seen in the Box 8 below (IPCC, 2023b). Shifting to a low-carbon economy can unlock new jobs, and funding resources and opportunities to ensure a socially and economically fair transition for everyone.

Box 8: IPCC’s 11 elements of a just transition

- i. Investments in establishing low-emission and labour-intensive technologies and sectors;
- ii. Research and early assessment of the social and employment impacts of climate policies;
- iii. Social dialogue and democratic consultation of social partners and stakeholders;
- iv. Creation of decent jobs, active labour markets policies, and rights at work;
- v. Fairness in energy access and use;
- vi. Economic diversification based on low-carbon investments;
- vii. Realistic training/retraining programs that lead to decent work;
- viii. Gender-specific politics that promote equitable outcomes;
- ix. Fostering of international cooperation and coordinated multilateral actions;
- x. Redressing of past harms and perceived injustices;
- xi. Consideration of inter-generational justice concerns, such as the impacts of policy decisions on future generations.

Source: IPCC, “Climate Change 2022: Mitigation of Climate Change”, Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, P.R. Shukla, and others, eds (Cambridge, United Kingdom and New York, NY, U.S.A: Cambridge University Press, 2022b).

3.3.1 Integrating just transition to NDCs and LT-LEDS

A just and equitable transition to a net-zero future is key to unlocking the Paris Agreement’s global climate goals. However, if not managed well, the required socioeconomic transformation runs the risk of further increasing social and gender inequality, exclusion, civil unrest, and less competitive businesses, sectors, and markets. Increasingly, countries are acknowledging these risks, and in turn are taking action to integrate a just and equitable transition of their economies into their short- and long-term climate plans, known as Nationally Determined Contributions (NDCs) and Long-Term Low-Emissions Development Strategies (LT-LEDS). An analysis of the “pace-setters” NDCs⁴ have been modest when it comes to mentioning “just transition”. At times, the countries integrate some of the areas or principles that fall under this concept, including the creation of new quality jobs and skillset development (implicit reference) in their updated NDCs.

4. The 12 “front-runners” with 2, 3 and 4 NDC updates are: Australia, Japan, the Republic of Korea, Bangladesh, Indonesia, the Marshall Islands, Pakistan, Singapore, Sri Lanka, Thailand, Vanuatu, Viet Nam.

Box 9: NDCs (Explicit reference of “just transition”)

1. The Republic of Korea: The Carbon Neutrality Act enacted in 2021 requires the Government to take support measures for the populations vulnerable to climate change, as well as in the areas where the number of jobs decreases, and economic inequality widens. Also, it stipulates support for micro-enterprises, unemployment prevention, re-employment support, and opportunities for new industries in the areas at high risk of negative impacts in the process of the transition by designating special areas for the just transition. These institutional arrangements and funding, such as the Korea Climate Action Fund, will prevent vulnerable populations from being disproportionately affected in the process of the transition.

2. Indonesia: Indonesia considers the importance of just transition of the workforce, and the creation of decent work and quality jobs for an effective and inclusive transition to low greenhouse gas emission, and climate resilient development. Creation of employment opportunities for this transition will be carried out in synergy with ongoing transition towards a prosperous Indonesia. The transition also takes into account gender and inter-generational equalities.

3. Viet Nam: Viet Nam seeks international support on policy development and improvement across institutions and legal regulations to curb the impacts of climate change through integration of energy transition.

4. Pakistan: Solely uses the term ‘just transition’ as a potential positive outcome to the introduction of electric vehicles into local communities without any further details. Furthermore, Pakistan’s proposed action and targets section notes the specific provision of training for women to create access in renewable alternative energy solutions and green jobs in the energy sectors.

NDCs (Implicit reference of “just transition”)

5. Australia: Mentions that the Australian Government will support and partner with communities and the industry on decarbonization priorities, and for the development of new clean energy industries, together with skills and training programs to support workforce development. This will ensure that Australia is well-positioned to capitalize on clean economy opportunities to drive growth and support job creation.

6. Japan: Aims to advance policy measures to contribute to integrated improvement in environment, economy and society, by utilizing local resources, technological innovation and ingenuity, which could also provide solutions for challenges, including economic vitalization, job creation and region-specific problems in the country.

3.3.2 Reducing emissions and just transition need to go hand-in-hand

As discussed in Chapter 2, global and regional greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals. With more and more severe extreme weather events, rising temperatures and sea levels, climate change is increasing the risks that people face throughout their lives. People, disproportionately women and people from marginalized groups, are affected beyond their ability to cope despite efforts to mitigate and adapt to climate change.

At the same time, climate policies may negatively impact individuals, for example, if they lose their income sources that depend on carbon-intensive sectors or on natural resources they can no longer access. Without comprehensive and adequate social protection for all, climate change adaptation and mitigation efforts may leave some people behind. This, in turn, risks undermining the sustained public support required to transition to an environmentally sustainable economy and society. A just transition means transforming the economy and the economic system in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.

While the concept of just transition is widely used to advocate for social justice and equity in climate action, there is no universally accepted definition, and the perception varies between countries and regions. The 'just transition' framework refers to a set of principles, processes and practices aimed at ensuring that no people, workers, places, sectors, countries or regions are left behind in the move from a high-carbon to a low-carbon economy (IPCC, 2022b). It includes respect and dignity for vulnerable groups; creation of decent jobs; social protection; employment rights; fairness in energy access and use and social dialogue; and democratic consultation with relevant stakeholders. Just transition is a process that promotes the equitable and sustainable transformation of economies and societies towards low-carbon, climate-resilient, and environmentally sustainable development. It seeks to ensure that the benefits and costs of this transition are distributed fairly among all stakeholders, including workers, employers, communities, women, children and vulnerable groups, with a particular focus on supporting those who may be most adversely affected. It would result in the creation of new employment opportunities, the development of sustainable industries, and the reduction of environmental impacts. It is a practice that needs to be carried out in a socially inclusive manner, providing adequate support, training, and social protection to individuals affected by the changes. These decarbonization transitions must occur across key sectors:

Energy Sector: The shift towards renewable energy sources, including solar, wind, hydro, and geothermal power, is poised to generate a substantial number of green jobs. Investments in these technologies will create opportunities in installation, operation, and maintenance, along with jobs in critical mineral mining. Additionally, the phasing out of coal-fired power plants will necessitate retraining and reskilling workers for a just transition. This transition holds significant potential for promoting women's increased participation in the energy sector, as well as redressing past historical disadvantage in the access to and benefit from clean, affordable and sustainable energy.

Manufacturing Sector: Decarbonization in manufacturing will emphasize sustainable practices, leading to the production of clean technologies like solar panels, wind turbines, electric vehicles, and energy-efficient appliances. This shift will create jobs in manufacturing and assembly, fostering innovation, economic growth, and reduced carbon emissions.

Textile Industry: Textile manufacturing is very water- and chemical-intensive. The carbon footprint from the sector is also significant, accounting for 6–8 per cent of total global emissions (Niinimäki and others, 2020, pp. 189-200). The move towards a low-carbon society is about transitioning to more sustainable practices, including eco-friendly methods, such as natural dyes, waterless dyeing technologies, and efficient wastewater treatment. This shift will create jobs in research and development of sustainable dyeing techniques, process optimization, and operating sustainable textile production facilities. The just transition needs to address industrial strategy, collective bargaining agreements for garment workers, who are predominately women in this region, including pension provisions, and government or employer-paid retraining and reskilling for garment workers.

Construction Sector: Decarbonization in construction will boost sustainable job opportunities due to the demand for resource-efficient and sustainable buildings. Workers will engage in constructing green infrastructure, such as resource-efficient homes, eco-friendly office buildings, and sustainable urban developments. Skills in green building design and renewable energy system installation will be crucial.

Transportation Sector: A shift towards cleaner and sustainable transportation modes includes advocating for electric vehicles, developing efficient public transport networks, and supporting the manufacturing and maintenance of clean vehicles, which will create jobs. Workers will participate in manufacturing electric vehicles, installing charging infrastructure, and maintaining public transportation systems. By reducing reliance on fossil fuels and promoting low-emission alternatives, this transition contributes to improved air quality and reduced carbon emissions.

Agriculture and Forestry Sector: The shift from industrial agriculture to agroecology and agroforestry is a strategy to become more resilient to climate impacts and reduce GHG emissions from food production. This shift holds tremendous potential to address gender inequalities in agricultural management, land ownership and decision-making in this sector. The transition will promote sustainable farming practices, agroecology, sustainable forest management, and biodiversity conservation. New jobs will emerge in organic farming, agroforestry, sustainable fisheries, and eco-tourism, contributing to food security and resource protection, and improving rural livelihoods. The strategy should include gender-responsive extension services to train farmers in agroecology, and support a just transition in the agriculture sector, and recognize the critical role that women play in food security and in managing natural resources. This transition prioritizes environmental stewardship, enhances food security and protects the health of both farmers and consumers.

Waste Management Sector: The move towards a circular economy will drive job growth in waste management. Initiatives include recycling systems, waste-to-energy projects, and reducing waste generation through sustainable production and consumption. This sectoral shift also holds potential to move informal waste workers, often women and people from marginalized groups in this region, into the formal economy. This transition will create formal employment in waste collection, recycling operations, waste treatment facilities, and circular economy strategies. Lastly, green jobs align with the principles of the circular economy. Workers in this sector engage in recycling, waste management, product design for recyclability, and the development of sustainable supply chains.

Financial Sector: Providing capital investment, risk-sharing mechanisms, and insurance can address challenges associated with inequitable distribution of climate and transition financing. Besides, deploying just transition measurement frameworks to assess companies' performance can guide investment flows.

Box 10: Elements of a just energy transition

- **Worker support and retraining:** It is essential to provide support and retraining programs for workers in fossil fuel industries, helping them acquire new skills and find alternative employment opportunities in the emerging clean energy sector. This can include financial assistance, education and training programs, and job placement services.
- **Community development:** Investing in the development of clean energy infrastructure and industries in regions heavily reliant on fossil fuels can help create new job opportunities and stimulate economic growth. This includes initiatives such as renewable energy projects, energy efficiency programs, and sustainable transportation systems.
- **Social safety nets:** Establishing robust social safety nets is crucial to protect workers and communities from the economic hardships that may arise during the transition. This can involve measures like unemployment benefits, healthcare coverage, pension protection, and support for affected businesses.
- **Stakeholder engagement:** Engaging and involving workers (including women), unions, communities, and other stakeholders in the decision-making process is essential to ensure their voices are heard and their needs are considered. Collaboration and dialogue can help shape policies and strategies that best address the specific challenges of each region.
- **Environmental justice:** Fossil fuel extraction and combustion often disproportionately impact marginalized communities, leading to health issues and environmental degradation. A just transition aims to rectify these disparities and ensure that marginalized communities benefit from the transition to cleaner energy sources.
- **Government policies and financial support:** Governments play a crucial role in facilitating a just transition by implementing supportive policies, regulations, and incentives. This can include subsidies for renewable energy, carbon pricing mechanisms, and targeted funding for affected communities.

Source: International Renewable Energy Agency (IRENA) and International Labour Organization (ILO), "Renewable Energy and Jobs: Annual Review 2021", Abu Dhabi and Geneva, 2021. Available at <https://www.irena.org/Publications/2021/Oct/Renewable-Energy-and-Jobs-Annual-Review-2021>

3.4 Progress and action taken in Asia and the Pacific

As the Asia-Pacific region needs to speed up the transition to low-emissions development, just transition, economic diversification and transformation are becoming increasingly fundamental to the transition to a low-carbon economy.

3.4.1 Enabling policies

Enabling policies play a crucial role in supporting the innovation and development of low-carbon technologies engaging research and industry institutes, promoting sustainable practices aiming at diversifying economies, and facilitating a just transition in the Asia-Pacific region. These range from incentivizing research and development; deploying low-carbon technologies; offering financial support, tax incentives, and grants for businesses and organizations engaged in sustainable innovation; ensuring that labour regulations protect workers' rights; ensuring decent work conditions; facilitating skills and competency development; investing in human resources development, including vocational training and lifelong learning; and offering job placement services for green jobs. Furthermore, governance structures and policies should prioritize the enhancement of symbiotic relationships between people and nature for a resilient and sustainable future through gender responsive and participatory decision-making processes and strengthening environmental governance.

Some examples of enabling policies on just transition by countries are provided below:

- The Republic of Korea's Green New Deal aims to invest in green technologies, expand renewable energy infrastructure, and promote sustainable industries, thereby addressing just transition. The "National Plan for Carbon Neutrality and Green Growth", introduced in April 2023, include five key measures for just transition. These measures primarily focus on building the social foundations for just transitions, including employment impact surveys; supporting just transitions for industries and companies; ensuring job security during the transition to carbon neutrality and green growth; promoting region-based just transitions through special district designations; and providing proactive support to the agriculture and fisheries sectors for just transitions.
- The Philippine Green Jobs Act (RA 10771) adopts the just transition approach as guide in the creation of green jobs by (a) anticipating impacts on employment and providing adequate and sustainable social protection for job losses and displacement; and (b) ensuring skills development, social dialogue, and the effective exercise of the workers' rights to organize and bargain collectively. This Act applies to initiatives or activities that contribute to preserving or restoring the quality of the environment, protecting ecosystems and biodiversity, reducing energy/materials/water consumption, contributing to carbon reduction, and helping minimize or avoid all forms of waste generation and pollution.
- Australia's Clean Energy Future Package includes labour market programs to support workers in carbon-intensive industries affected by the transition to a low-carbon economy. Australia is one of the countries that has developed public-private partnerships and stakeholder engagement with labour unions and social partners (OECD, 2019). With the closure of its car manufacturing industry in 2017, the country established a Growth Fund to support the regions and businesses affected, and developed transition centres at previous production plants. The latter supported the career guidance and retraining of former employees, which led to 82 per cent of employees being able to find a job, and 63-75 per cent of employees undertaking new training.
- Sustainable Partnership for Rooftop Solar Acceleration in Bharat (SUPRABHA) in India is a technical assistance and massive capacity-building programme. Under this, the Skill Council for Green Jobs has partnered with 14 training institutions to train bankers, entrepreneurs, distribution company officers, rooftop solar developers and maintenance staff across 17 of its states.

- Indonesia's power sector is on its way to decarbonization. The NDC target is distributed across five sectors, including the energy sector. In May 2021, the State-owned enterprise publicly announced its Net Zero Aspiration by 2060, requiring a shift from coal-based power generation to renewables-based power generation. To address these challenges, the company has updated its expertise development strategy by adding new key competencies, including in smart grid technology, energy storage, climate and the environment. Moreover, an expert career path has been established, which is divided into four categories, namely, generation and renewable energy, transmission, distribution, and engineering and technology, as stipulated in the new Directive of the State-owned enterprise's Board of Directors on Expertise Career Path.
- The Island Eco Initiative in the Marshall Islands trains young women technicians to assemble, install, operate and maintain solar-powered lights, refrigerators and freezers on different islands, thus securing decent work conditions. The project ensures a contextual approach by replacing polluting diesel generators on remote atolls where access to fossil fuels is expensive and scarce with sustainable solar equipment. The lessons learned from this project help to increase the ambitions of national climate and energy plans.
- New Zealand's Just Transition Unit (JTU) was conceptualized to focus on how to manage trade and broker relations in the affected regions, following the announcement that no other offshore oil and gas exploration permits will be issued as a result of New Zealand commitments to move towards a green economy, thereby encouraging transformation towards a "just, equitable and inclusive" economy. This unit is working to build relationships in communities that are undergoing major changes.
- Several Asia-Pacific member States, including Indonesia, Kyrgyzstan, the Republic of Korea, Thailand, Australia, and New Zealand, have set up just transition committees and task forces to tackle the issues related to climate action.

3.4.2 Innovative approaches by UN Agencies and international organizations

The Issue-Based Coalition on Raising Ambitions on Climate Action of the UN Regional Coordination Platform for the Asia-Pacific region launched, in June 2022, a Working Group to accelerate the phase down of coal, and to help regional countries and societies stimulate a just transition to clean energy. The Working Group has conducted regional and national studies, including data and policy analysis using the ESCAP Asia-Pacific Energy Portal (ESCAP, n.d.), and provided support to regional countries, that are heavily dependent on coal for energy generation, through social dialogue and technical advice on planning and drawing phase-down and phase-out strategies and transition to clean energy sources.

A just transition recognizes that the shift away from fossil fuels is necessary to mitigate climate change and reduce greenhouse gas emissions, and that a successful transition requires careful planning, collaboration, and a comprehensive approach that addresses both the economic and social aspects of the transformation. Some of the innovative approaches by multilateral organizations are:

1. Capacity-building and local entrepreneurship development: The phase out of coal and the transition to clean energy sources is a critical step in combating climate change and reducing carbon emissions. However, it is crucial to address the challenges and ensure a just transition for affected workers and communities by the closure of coal mines and power plants. The work of the ILO and its partners involves providing support for retraining, reskilling, and job placement in clean energy sectors. By facilitating the transferable skills of coal workers to renewable energy industries, the ILO promotes inclusive economic development and a socially fair transition. The ILO's Skills for Green Jobs project, in the Pacific, aims to enhance the employability and skills of workers in a gender responsive manner, in sectors such as renewable energy, sustainable tourism, and waste management. Through capacity-building programs and local entrepreneurship development, the ILO and the members of the Issue-Based Coalition (IBC) on Raising Climate Ambition of the Regional Coordination Platform in the Asia-Pacific region have facilitated the establishment of small businesses focused on the installation, maintenance,

and distribution of solar energy systems, as equal opportunities initiatives. This approach not only enhances sustainable energy access but also creates job opportunities and supports local economic development ensuring gender equality and opportunities. Governments, in collaboration with industry stakeholders, can incentivize the use of such materials through policy frameworks, green building certifications, and public procurement guidelines.

2. Evidence-based policymaking and tools and methodologies on impact assessments inform the planning process of climate policies. In this regard, a regional workshop was organized to identify the kind of support that countries will need to enable evidence-based policymaking, and to design and implement NDCs or LT-LEDS in a just, equitable and inclusive way (United Nations Climate Change, 2023b). Just transition and its principles go beyond the transition from dependency on fossil fuels for energy generation and brown-to-green industry transition to the full process of transformation of the economy to low-emissions and sustainable development pathway. Policies and strategies are to be aligned to support the work of effective climate planning informed by the Impact Assessment using qualitative and quantitative tools.

3. Multilateral funding agreements: The Just Energy Transition Partnerships (JETPs), that were launched at COP26, are supported by the International Partners Group (IPG), composed of the European Union, the United Kingdom, the United States of America, Japan, Germany, France, Italy, Canada, Denmark, and Norway, and have set up a new model for international cooperation on country-specific efforts to combat climate change aiming to help emerging economies secure a just transition towards low-carbon energy sources, with equity considerations at their core. The JETP model combines public and private investments to assist with climate financing for developing countries, particularly for transitioning energy generation away from fossil fuels. Indonesia and Viet Nam have signed the Just Energy Transition Partnership (JETP) with their international partners. Under this partnership, Indonesia will receive an initial US\$ 20 billion over the next three to five years to help phase out coal energy and invest in renewable energy infrastructure, including increasing renewable energy to 34 per cent in Indonesia's power generation by 2030. JETP has committed \$15.5 billion for Viet Nam, made up of public sector finance and private sector finance. India, through the presidency of the G20, is committed to an accelerated, responsible, and just energy transition through international cooperation and collaboration.

4. Promoting political dialogue in the Global South: The Jet Energy Transition in Coal Region Inter-Regional Platform (IKI-JET or JET-CR Platform) is a collaborative initiative that brings together governments and philanthropic organizations. Its main goal is to support stakeholders in coal regions by helping them plan and implement regional pathways for a just energy transition towards a low-carbon energy system. The JET-CR Interregional Platform plays a crucial role in promoting political dialogue in the Global South, facilitating knowledge exchange, collaboration, and capacity-building among countries facing similar challenges in transitioning away from coal. IKI-JET, funded by the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the European Union, emphasizes research, innovation, technology, and policy frameworks, leveraging international resources to introduce new technologies and research to increase ambition and achieve climate goals. Working primarily with governments, IKI-JET delivers and exchanges coal phase-out policy frameworks to drive the transition away from coal. The consortium, led by GIZ, consists of six partners implementing IKI-JET. This international, regional, national, and multilateral cooperation enhances the capacity of Asia-Pacific countries, in areas such as impact assessments, just transition, and economic diversification, facilitating the implementation of NDCs and LT-LEDS.

5. The electric mobility program supports governments to implement policies aimed at transitioning the base of their country's automobile sector from conventional fossil fuel to electricity, and recognize the benefits provided by electric vehicles. As the transition to electric mobility involves multiple stakeholders, the policies act as a guide for them to direct their actions to enable the uptake of electric mobility. A rapid transition to electronic vehicles (EVs) would increase the risk of disruption, especially against the current backdrop of rising trade barriers and resource nationalism. EV adoption is likely to influence geopolitics through several interrelated mechanisms, including international trade, energy security, competition over strategic resources and just transition. To overcome these changes, UNIDO in partnership with Global Environment Facility (GEF) have implemented projects to drive electric mobility in several Asian countries.

6. Just Transition Support Platform: The Asian Development Bank (ADB) provides support for skills development and training programs related to green jobs, particularly in sectors such as renewable energy and energy efficiency. At COP26, ADB launched a Just Transition Support Platform as part of the ADB’s commitment to ensuring that the benefits of the shift to low-carbon, resilient economies are shared equally and no individual, community, or region is left behind. The technical assistance platform aims to build the capacity of ADB’s developing member countries (DMCs) to strategically plan, implement, and finance just transition, to manage any negative impacts, and increase benefits from the transition to net zero.

3.5 Case studies from countries highlighting challenges in just transition

This section will present several case studies showcasing the opportunities and challenges faced by countries in the Asia-Pacific region in implementing ambitious and just transition sectoral carbon emissions reduction trajectories to align with the 1.5°C pathway. By incorporating just transition policies that address social inclusiveness, worker rights, and community well-being, these countries can navigate the challenges and achieve a more sustainable and equitable future.

Country	Description	Challenges	Possible solutions
Thailand	Thailand has been making efforts to transition to a low-carbon economy and achieve its climate goals. The country has implemented policies and measures to promote renewable energy, energy efficiency, and sustainable transportation. The UN Development Programme (UNDP) has supported Thailand’s efforts through various projects, including the Thailand Energy Efficiency Revolving Fund, which provides financing for energy efficiency projects in buildings and industries.	However, the just transition to a 1.5°C pathway in Thailand faces challenges related to social inclusiveness and worker rights.	Policies that prioritize a fair and equitable transition, such as skill development and job placement programs for workers in transitioning sectors, are essential for successful implementation.
Mongolia	Mongolia, heavily dependent on coal for energy and heating, faces challenges in transitioning to a low-carbon economy. The country has vast renewable energy potential, particularly in wind and solar power. The UN Environment Programme (UNEP) has supported Mongolia in developing renewable energy projects and strengthening policy frameworks for sustainable energy transition.	A key challenge in Mongolia is ensuring the social and economic well-being of communities affected by the coal phaseout.	Implementing just transition policies, such as providing alternative livelihood options, retraining opportunities, and social protection measures for affected workers and communities, can facilitate a smoother transition to a 1.5°C pathway.

Country	Description	Challenges	Possible solutions
Kazakhstan	Kazakhstan, as a resource-rich country, has been actively pursuing a low-carbon development pathway. The country has set ambitious targets for renewable energy generation and energy efficiency improvements. The UN Development Programme (UNDP) has supported Kazakhstan in implementing projects related to renewable energy, energy-efficient housing, and sustainable transport.	One of the challenges in Kazakhstan's transition is ensuring a fair distribution of benefits and opportunities from renewable energy projects.	Just transition policies that address income disparities, promote social dialogue, and provide training and job opportunities for affected workers and communities can enhance the success of Kazakhstan's efforts.
Singapore	Singapore has been proactive in its efforts to reduce carbon emissions and promote sustainability. The country has implemented measures such as carbon pricing, energy efficiency standards, and renewable energy targets. The UN Framework Convention on Climate Change (UNFCCC) has recognized Singapore's efforts as a positive example of climate action.	One challenge for Singapore is reducing carbon emissions from the industrial sector, which is a significant contributor to the country's emissions.	Just transition policies that promote innovation, clean technologies, and support for affected workers in transitioning industries can enhance the success of Singapore's decarbonization efforts.
Georgia	Georgia has been working towards a sustainable energy transition by promoting renewable energy sources and energy efficiency. The country has a favourable natural environment for hydroelectric power generation and has been exploring other renewable energy sources. The UN Economic Commission for Europe (UNECE) has supported Georgia in developing its renewable energy potential and implementing sustainable energy projects.	A challenge for Georgia lies in ensuring the inclusiveness of the transition, particularly for vulnerable communities and workers in traditional energy sectors.	Just transition policies that prioritize social protection, retraining, and job creation can help address these challenges and foster a more equitable transition process.

Some challenges identified in this chapter, and in the case studies (KCI, 2023):

- A. Just transition in the Asia-Pacific region has two distinct dimensions. On one hand, industrialized countries need to ensure just transition in the energy and energy-intensive sectors, which often provide jobs to well-organized work force, who need to be brought into the process as major stakeholders. On the other hand, less industrialized countries experience a different dimension of just transition related to nature-based solutions, and the right of indigenous people to manage and sustain natural assets that have been included in the national greenhouse gas emission reduction commitments/contributions.
- B. The number of experts with technical knowledge of new technologies and competencies is usually limited during the transition to low carbon industrial processes. Hence, it is critical to set up research, and to create a solid institutional and policy basis to support the transition process for all stakeholders (e.g. capacity-building, creating the business process, certification, guidance and procedures).

- C. The selection of the projects to support transition must be made based on their viability over time, the capacity to generate stable employment, the possibility of using endogenous resources in the area, the potential for ecological and energy transition, and change of production model.
- D. Financing a just transition in agriculture may take significant resources to cover all the different elements of participation, planning, investment, creation of new sectors, training, reskilling and social protection.
- E. Improved land tenure and access, particularly for women, is a key strategy for enabling transition to sustainable land management approaches and is an existing challenge.
- F. Women informal workers make up a significant portion of the workforce in agriculture, manufacturing of garments, and in the waste sector in this region. Just transition strategies in these sectors must be led and designed by women to include the rights and priorities of women workers, and centre on addressing gender inequalities to ensure equitable benefits for all.
- G. It is challenging for the governments to initiate inclusive and participatory dialogues with stakeholder communities, including farmers, women, workers and those along all levels of the supply chain, to understand the struggles they currently experience within the food system, and provide the support that they require to effectively make the transition to better farming practices.
- H. Less industrialized countries, with rich NbS that have a high potential to serve as carbon sinks, need to support the just transition of local communities that are custodians of natural wealth, and are active creators of mitigation and adaptation processes on the ground, and especially when significant changes in the natural ecosystems occur. Some of these issues are discussed in Chapter 4.



Chapter 4

**Regional trends of changing ecosystems
in Asia and the Pacific**

Chapter 4: Regional trends of changing ecosystems in Asia and the Pacific

Biodiversity is the foundation for human, environmental and socioeconomic well-being. From a socioeconomic perspective, biodiversity and natural ecosystems provide numerous services to humans ranging from the provision of clean air, food, water and medicine, and for supporting entire livelihoods of indigenous people. Biodiversity provides important resources for traditional medicines which are estimated to serve 60 per cent of the world's population (WHO, 2015). There are studies that highlight the important aesthetic, recreational, cultural and spiritual values associated with biodiversity and ecosystems (Cooper, 2016), as well as numerous physical and mental health benefits. Cognizant of these benefits, amidst risks of extinction due to the current rate of loss in biodiversity, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted at the UN Biodiversity Conference of 2022 (COP15) to halt biodiversity loss, restore ecosystems and protect indigenous rights (UNEP, 2022b).

The carbon sequestration functions of land-based ecosystems reached around 30 per cent of the carbon emissions generated through human activity in the last decade and could provide 20 to 30 per cent of the mitigation required to ensure global warming stays below 1.5°C towards 2050 (IPCC, 2022a). Furthermore, preserving and restoring peatlands or wetlands enhances their capacity to prevent carbon from oxidizing into the atmosphere. Ocean habitats like seagrasses and mangroves, if well preserved, could sequester carbon at a rate four times higher than terrestrial forests (UNEP, n.d.).

This chapter is developed based on preliminary findings of the ESCAP-led assessment of the status of regional ecosystems, such as carbon dioxide sinks, and provides an overview of the changes in several ecosystems in Asia and the Pacific, including mangroves, forests, croplands and mountain glaciers.

Some key findings include:

- By 2020, the net forest cover in the Asia-Pacific region increased by 0.97 per cent, and the CO₂ emissions from deforestation were halved and stabilized.
- By 2020, the Asia-Pacific region had provided 37 per cent (250 Gt) of the global carbon stock (662 Gt).
- Despite an overall increase in forested areas in the region, since 1990, primary forests continue to decline in Asia and the Pacific, and has fallen below the global average of 31 per cent in selected countries.
- The cropland area in the ESCAP region has experienced continuous growth over the past two decades, and some at the expense of native forests, which has caused an increase in GHG emissions from the agricultural sector in several Asian countries.
- There is a significant decrease in per-capita cropland in the ESCAP region, as population growth has outpaced cropland expansion. However, there is a high increase in abandoned crop and pasture lands because of urban migration.
- Mangrove forests provide multiple functions, including acting as barriers against natural disasters, and providing an invaluable source of livelihood for local communities. Most notably mangrove forests contribute to the estimated sequestration of 22.86 gigatons of carbon dioxide globally, which equals to about half of the yearly emissions from fossil fuels, land-use and industry.
- Almost half of the world's mangroves are found in the Asia-Pacific region.
- The Asia-Pacific region was responsible for 70 per cent of the global net loss of carbon stored in mangrove forests in the last 25 years and these losses are globally significant.

- Between 2018 and 2023, investments in mangrove restoration increased considerably resulting in projects in over 12 Asia-Pacific member States, though with mixed success.
- An integrated and holistic approach to mangrove restoration is required that addresses both biophysical aspects, such as water quality and sediment availability, and social aspects, including land tenure and resource access. It is also important to create a constructive dialogue and engage local stakeholders to ensure successful restoration outcomes.
- The “Third Pole”, the Hindu Kush Himalayan (HKH) region in Asia, is a major repository of frozen water outside of the Arctic and Antarctic, and an invaluable source of fresh water for 220 million people in the region.
- Melting glaciers in the HKH region are strong indicators of climate change. They are disappearing at an alarming rate, which is 65 per cent faster in 2011-2020 than in the previous decade.
- The impacts of climate change on glaciers are posing serious concerns for the region’s water resources and ecosystems that depend on glacial meltwater.
- Retreating glaciers decrease the snow cover, and the permafrost in the region is thawing at unprecedented rates, causing increased expansion of glacial lakes. Glacial lake outburst floods (GLOFs) endanger downstream population as was the case in northern India in September 2023.

4.1 Nature-based solutions as carbon dioxide sinks

As recommended by the Glasgow Pact, for countries to realize net-zero strategies, it is important to raise ambition and increase investment in nature-based solutions (NbS). In fact, the 2022 Review Report estimates that greater investment in both terrestrial and marine NbS has the potential to narrow the gap in net-CO₂-zero and increase carbon sequestration in the Asia-Pacific region, to the magnitude of 5.6 GtCO₂e by 2050 (ESCAP, 2022). The potential contribution of forests towards net-zero emissions by 2050 through carbon sequestration is quite enormous. Hence, there is compelling need for regional member States to strengthen investments in restoring forest, coastal, marine and other land-use ecosystems in order to maximize their potential as carbon sinks. This is quite important as the region is in critical need of being more ambitious within their NDCs to reduce emissions to levels consistent with the 1.5°C climate pathway by 2030.

Over time, climate change is expected to exert increasingly significant effects on nature and food security and nutrition. In the past four decades, temperatures in Asia and the Pacific have been on a rising trend, both in average values and extremes. Southern Asia has experienced an increase in mean annual temperatures, with Bangladesh witnessing the highest rise of 0.75°C. The subregions are highly susceptible to natural hazards, and there is a widespread prediction that climate change will result in more frequent occurrences of floods, droughts, cyclones, and other extreme weather events. Rural areas, where agricultural production takes place, are particularly vulnerable to adverse effects caused by climate extreme events, shifting seasonal patterns and water scarcity (FAO and others, 2023), and heightening the risk for women who are predominately responsible for agricultural production linked to food security.

The rise in temperatures and increased instances of flooding can cause damage to road and rail infrastructure, disrupting supply chains and urban mobility. The long term impacts of flooding and climate stressors can also alter land use due to abandonment of arable land and transformation of arable/agricultural land to other land use types including residential block, industrial area, urban areas or impervious surfaces. For instance, the recent 2022 floods in Pakistan affected 33 million people and inundated 1.1 million hectares of cropland area in the

Sindh province (Qamer and others, 2022, 2023). Furthermore, coastal infrastructure, including ports and key nodes in international and national supply chains, is at particular risk from sea-level rises, storm surges, and river floods. These changes in climate patterns are likely to pose considerable challenges to the region's food security and nutritional well-being (FAO and others, 2023). Additionally, the rural population of Asia has decreased from 80 to 52 per cent between 1990 and 2020, which has had a negative impact on agricultural production (UN DESA, 2019). Despite the incontestable importance of NbS, they are deteriorating quite rapidly in the Asia-Pacific region, and at rates that jeopardize the desired net-zero and carbon-neutral agenda in the region. The increasing trend in loss of regional forests is gradually weakening their contribution as carbon sinks that work towards net-zero emissions. An impact study shows that rapid deforestation, expanding agriculture and urbanization are adversely affecting land ecosystems in Asia and the Pacific, which is one of the fastest growing regions globally (The Nature Conservancy, 2022). While in 1990, the carbon sequestered by the region's forests made up approximately 40 per cent of regional carbon emissions, by the year 2050, that capacity is estimated to be reduced to 16 per cent due to land degradation and loss of natural forests (ESCAP, 2022). For coastal and marine ecosystems, prevailing threats include the increasingly rapid clearance of mangroves along coastlines to support development projects and aquaculture; the gradual disappearance of protective reefs; and overfishing and pollution, particularly from littering of plastic bottles and microplastics. Erosion induced by dams, shipping and other coastal development projects is affecting the capacity of the Sundarbans, the world's largest mangrove forest in Bangladesh, to restrain tides and sequester carbon (Tan and Ricciardi, 2023). The Global Mangrove Alliance (GMA) estimates that, between 1996 and 2020, South-East Asia lost 4.8 per cent of its mangrove forest cover, a rate much higher than the global average of 3.4 per cent (Leal and Spalding, 2022). The corresponding disappearance rate for Australia and New Zealand was 4.3 per cent, while the Pacific Island countries recorded a 0.7 per cent loss over the same period. The disappearance of carbon-rich ecosystems implies uncontrolled release of carbon dioxide, and the reduced ability of these natural carbon sinks to mitigate against emission-induced warming in the region.

There is a strong demand for nature-based solutions in the Asia-Pacific region. Over 30 per cent (85 million tons of nature-based credits) of all nature-based credits issued globally have come from the region. Overall, the investment in nature-based solutions in the region is limited and focused on terrestrial ecosystems like forests (Carbon Market Institute, 2021). Nature-based carbon sequestration projects are still in their early stages of development in the Asia-Pacific region, but there is significant potential for growth (Carbon Market Institute, 2021; United Nations Environment Programme, 2022c). Most projects have been concentrated in a few countries, and most of these projects have involved forestry and revegetation. However, there is also significant untapped potential for nature-based carbon sequestration projects in many other countries in the region, particularly in island countries. There are opportunities to invest in nature-based solutions in the coastal and marine ecosystems of the region. The expansion of initiatives, such as mitigation banking, and the development of methodologies, such as blue carbon, could attract the interest of private sector actors (Carbon Market Institute, 2021).

However, the trend of degradation from human activities is undermining the capacity of marine ecosystems to contribute towards climate change mitigation and adaptation. The geography of the region with many countries having relatively large marine surface areas implies naturally conferred carbon-neutrality. However, with the entry into the UN Decade of Ecosystems Restoration, recent research shows that the interest in coastal and marine ecosystems restoration, and of mangroves is notably growing, though success rates vary because of poor planning, and lack of consultations with local stakeholders (Friess and others, 2022).

4.1.1 Mangrove forests in Asia and the Pacific

Mangroves are the dominant vegetation in the intertidal zone of sheltered (muddy) coastlines found in tropical, subtropical, and warm temperate oceans. The term ‘mangrove’ is used to describe both a specific type of vegetation and the distinctive habitat which is also referred to as tidal forest, swamp, wetland, or mangal (Duke and others, 2007; Spalding, 2010). The mangrove habitat is characterized by a continuum of features, including mudflats (zone below mean sea level), mangrove forests (zone between mean sea level and the level of higher neap tides), and salt flats (zone above the level of higher neap tides). The distribution of these features may vary across space and time due to variations in climate, topography, and hydrology (Woodroffe, 1992). Mangrove forests not only act as barriers against natural disasters, but they are also estimated to sequester 22.86 gigatons of CO₂ globally, about half the yearly emissions of fossil fuels, land-use and industry (Mundol and Goveas, 2023).

Mangroves spanned over about 147,359 km² worldwide in 2020, with 51 per cent of these forests (74,808 km²) located in the Asia-Pacific region (Figure 11), 29 per cent in the Americas, and 20 per cent in Africa. Globally, mangrove forests have decreased by 5,245 km² (3.4 per cent) between 1996 and 2020, out of which 63 per cent of the loss in mangroves was recorded in the Asia-Pacific region, with the largest net loss of 4.3 per cent (3,338 km²) in mangrove forest cover. However, over the last decade, between 2010 and 2020, the net loss in mangrove cover has declined to 420 km² (0.05 per cent) from 2918 km² (3.73 per cent) during 1996 – 2010 (Figures 11-14, Annex IV) (Bunting and others, 2022; Leal and Spalding, 2022; UNEP, 2023a).

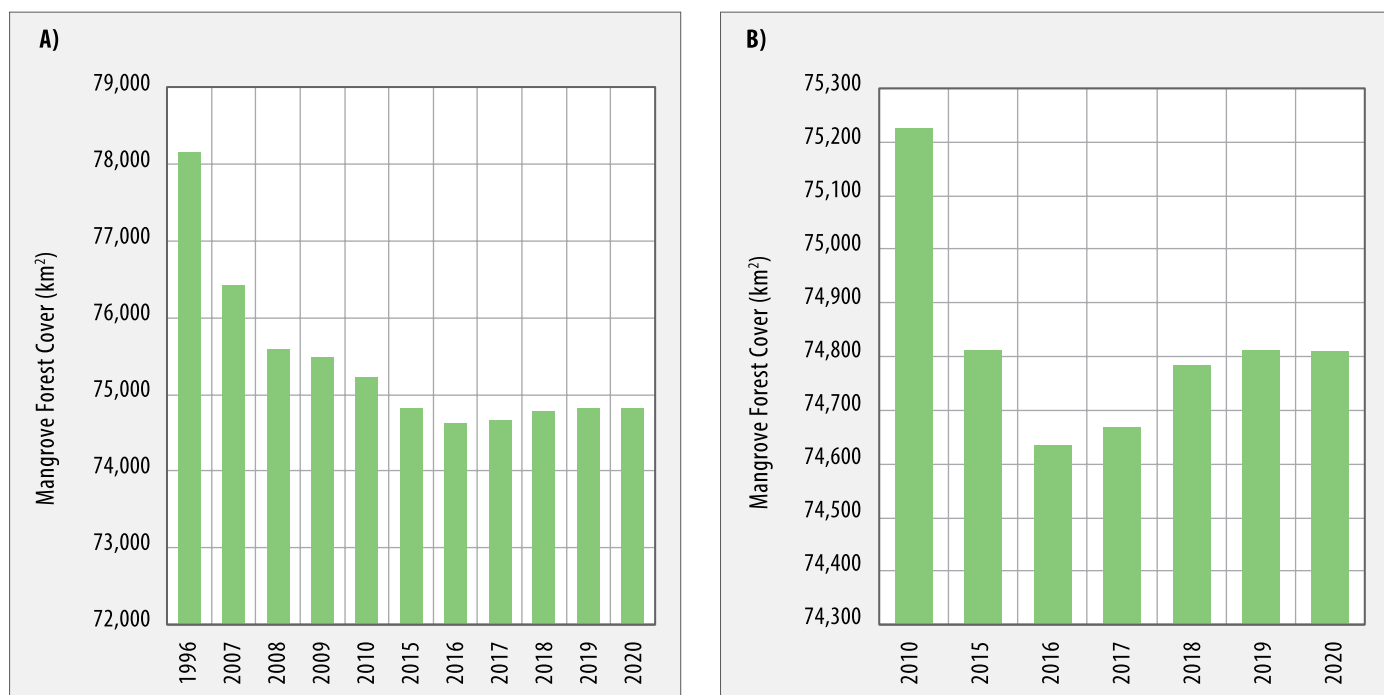
Figure 11: Spatial distribution of mangrove forest cover in Asia and the Pacific, in 2020



Source: P. Bunting, and others, “Global Mangrove Extent Change 1996 – 2020: Global Mangrove Watch Version 3.0”, *Remote Sensing*, vol. 14, No. 15 (July 2022).

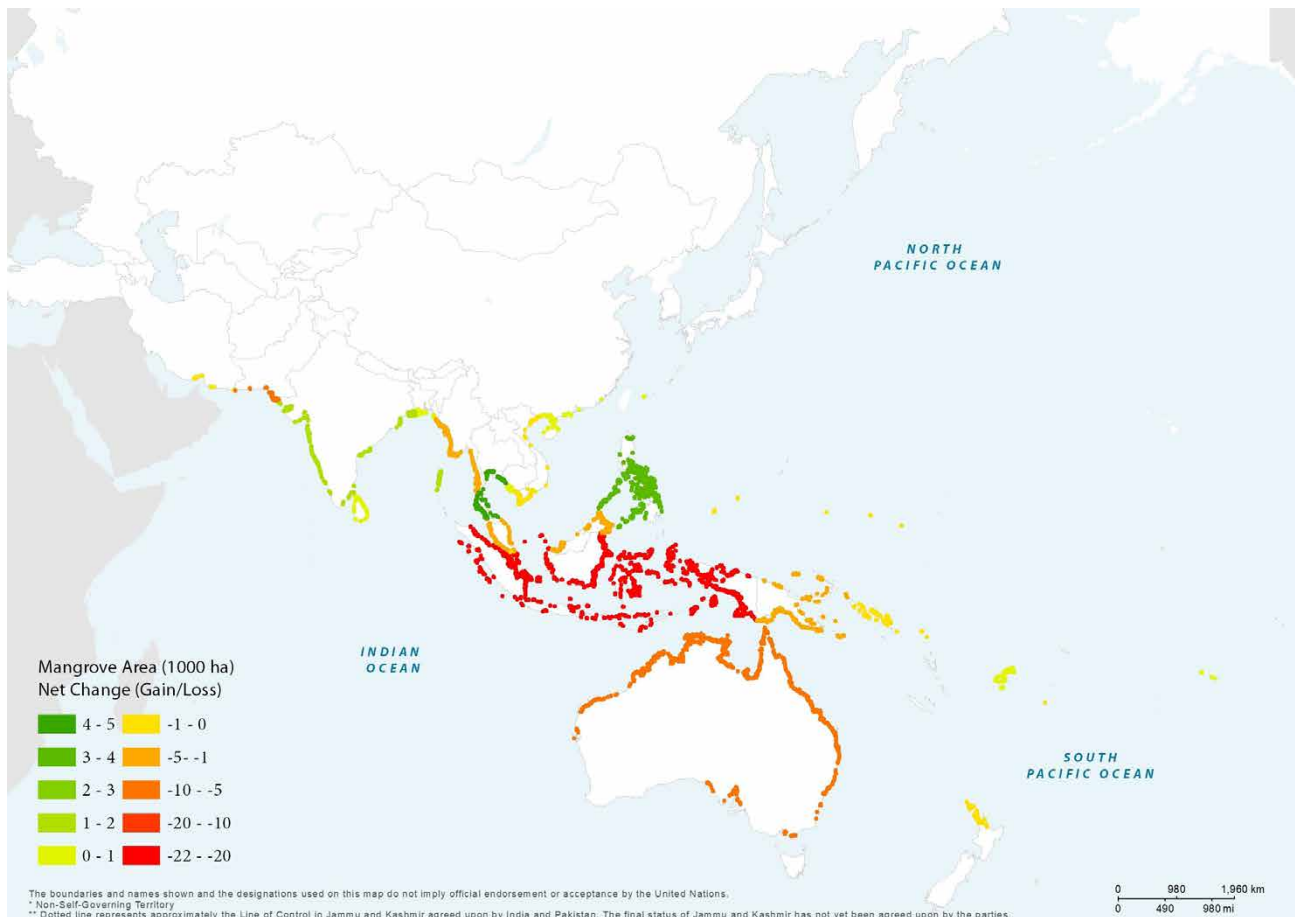
Half of the world’s mangroves are found in Asia, and this region accounted for most of the mangrove-area loss in both the 2000-2010 and 2010-2020 periods (Figure 12, Annex III). In the first decade, Asia accounted for 68 per cent of global mangrove-area loss, and in the second decade, this figure decreased to 54 per cent. The most significant cause of mangrove loss is aquaculture development, followed by natural retraction. Other causes include conversion to oil palm and rice cultivation, direct settlement, wood extraction, natural disasters and indirect settlements (FAO, 2023).

Figure 12: Changes in mangrove forest cover from 1996 – 2020 in the Asia-Pacific region



Source: Maricé Leal, and Mark D. Spalding, eds., “The State of the World’s Mangroves 2022”, Global Mangrove Alliance, 2022. Available at https://www.mangrovealliance.org/wp-content/uploads/2022/09/The-State-of-the-Worlds-Mangroves-Report_2022.pdf ; and United Nations Environment Programme (UNEP), “Decades of mangrove forest change: What does it mean for nature, people and the climate?” United Nations Environment Programme, Nairobi, 2023a.

Figure 13: Net change in mangrove cover area in the ESCAP countries



Source: P. Bunting, and others, "Global Mangrove Extent Change 1996 – 2020: Global Mangrove Watch Version 3.0", *Remote Sensing*, vol. 14, No. 15 (July 2022); Maricé Leal, and Mark D. Spalding, eds., "The State of the World's Mangroves 2022", Global Mangrove Alliance, 2022. Available at https://www.mangrovealliance.org/wp-content/uploads/2022/09/The-State-of-the-Worlds-Mangroves-Report_2022.pdf; and United Nations Environment Programme (UNEP), "Decades of mangrove forest change: What does it mean for nature, people and the climate?" United Nations Environment Programme, Nairobi, 2023a.

Note: The mangrove area is aggregated at country level. The net change is estimated from the mapped mangrove area in 2010 and 2020.

Figure 13 indicates that the currently available statistics and estimates of mangrove cover may not be consistent and accurate at the national level. For example, there have been many reports and research articles indicating that the mangroves in Pakistan are increasing due to natural regeneration, massive plantations and restoration activities.

Between 1996 and 2020, the amount of carbon stored in mangrove forests decreased by net 139 Mt (gain of 168 Mt, loss of 308 Mt) globally, with an estimated 0.6 per cent of the total emissions from change in land use, and less than 0.1 per cent of the total global CO₂ emissions (Worthington and Spalding, 2018). The Asia-Pacific region had the highest net loss of 98 Mt of carbon (gain of 86 Mt and loss of 184 Mt) stored in mangrove forests during 1996-2020. This was 70 per cent of the global net loss of carbon stored in mangrove forests (UNEP, 2023a). Mangroves possess the natural ability to recolonize suitable environments, making restoration efforts particularly effective when they concentrate on creating conditions conducive to their reestablishment and growth (FAO, 2023). Mangrove cover loss maps, between 1996 – 2020, can be used to estimate potential restoration areas by removing the permanent land-use change or eroded areas. The Asia-Pacific region has the highest restoration potential due to massive deforestation.

Restoring mangroves is a crucial and high-priority endeavour due to the wide array of indispensable advantages they offer to people, ecosystems, and biodiversity, and regional efforts have played a significant role in expanding

mangrove areas in Asia over the past 20 years. In East Asia, restoration accounted for the entire gain in mangrove areas, while in South and South-East Asia, restoration contributed about one-quarter of the observed gain (FAO, 2023).

Mangrove restoration projects, engaging a variety of government and non-government organizations are underway in many countries in the Asia-Pacific region, including the Philippines, Thailand, Viet Nam, India, Pakistan, Bangladesh, Sri Lanka, Myanmar, Australia, and some Pacific Islands. These projects focus on replanting mangrove trees, raising awareness about the importance of mangrove conservation, and protecting mangrove forests from threats, such as aquaculture and development.

Indonesia, for example, had the largest potential restoration area, with over 2,000km² available for restoration, which is one-fourth of the area with the potential for restoration across the globe (UNEP, 2023a; Leal and Spalding, 2022).

Furthermore, China is developing a green wall of mangroves along its coasts by planning to create and restore over 18,000 hectares of mangrove forest by 2025, with the ambition to become one of the countries with a net gain in mangroves (WEF, 2023). To empower mangrove conservation actions, the “China Mangrove Conservation and Restoration Strategy Research Project” was initiated in 2018. Over the past two decades 8,000 hectares of mangrove forests have been restored (Paulson Institute and others, n.d.), and 67 per cent of mangrove forests in the country were enclosed within protected areas (CIP, 2023). In 2020, the national Government of Indonesia announced its aim to rehabilitate 600,000 hectares of mangroves between 2020 and 2024 (Sasmito and others, 2023).

Mangrove restoration is often unsuccessful because it focuses too much on replanting mangrove seedlings, particularly in unsuitable habitats, and with poor site–species matching; a lack of maintenance; inadequate assessment and control of barriers to mangrove recovery; and a lack of support from and participation by local communities in the restoration efforts. In the Philippines, the long-term survival rates of mangrove plantings have been as low as 10-20 per cent. In Sri Lanka, 40 per cent of restored mangrove sites failed, and only 20 per cent were successful (FAO, 2023).

The Seas of East Asia support 30 per cent of the world’s coral reefs and one-third of the world’s mangroves. Recognizing that need, nine riparian countries⁵ have created a Coordinating Body on the Seas of East Asia (COBSEA) as a regional intergovernmental mechanism for mangrove restoration and protection of marine and coastal ecosystems of the East Asian Seas (UNEP, 2023b).

Mangroves have been valuable resources for people living along coastal areas for centuries. They provide a variety of important services, such as protection from natural disasters, enhancement of fisheries, and pollution control (FAO, 2023). Changes in the extent of mangrove forests can have a significant impact on the socioeconomic well-being of millions of people. By taking into account estimates of the proportion of mangrove-dependent small-scale fishers and the net change in mangrove coverage, it becomes feasible to identify countries and territories where mangrove fishers may have experienced significant effects. (UNEP, 2023a).

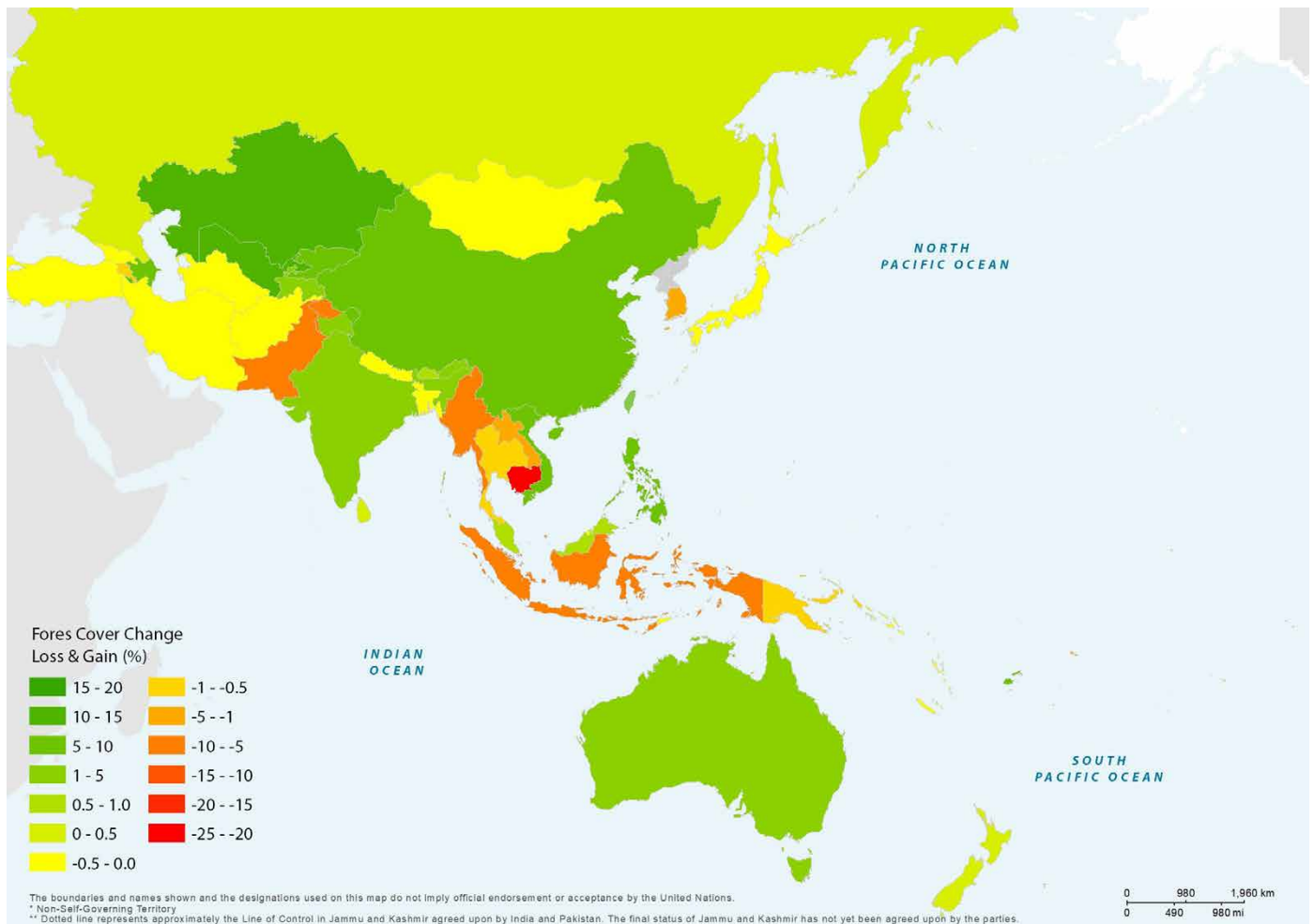
Mangrove loss is a serious problem in the Asia Pacific region, especially in South-East Asia. It is important to continue efforts to address the drivers of land use that result in the loss of mangroves. This includes developing policies to direct agricultural development in a way that avoids deforestation of remaining mangrove forests and devastation of the coastal habitat. The role of climate change as a contributing factor to the natural decline of mangroves and/or its ecosystem services should be recognized, as this exacerbates the vulnerability of coastal communities to natural disasters, the inundation of mangroves, and the erosion of coastlines (FAO, 2023). Therefore, an integrated approach to mangrove restoration is required in addressing both biophysical aspects, such as water quality and sediment availability, and social aspects, including land tenure and resource access (FAO, 2023), as well as toward creating constructive dialogue and engaging local stakeholders to ensure successful restoration outcomes.

5. Cambodia, People’s Republic of China, Indonesia, the Republic of Korea, Malaysia, the Philippines, Thailand, Singapore and Viet Nam.

4.1.2 State of forest cover in Asia and the Pacific

The total global forest area was 4.06 billion hectares (about 31 per cent of the global land area) in 2020, according to the Forest Resource Assessment. In the Asia-Pacific region, the forest cover has increased by 0.97 per cent (15.203 million hectares) from 1.577 billion hectares in 2010 to 1.592 billion hectares in 2020 (Figures 14 and 15, Annex V). The region has lost 14.35 million hectares (about 0.9 per cent) of forests during the last decade, between 2010 -2020. However, there has been a significant increase in the forest cover, 29.6 million hectares (1.87 per cent), making a net gain in forest cover in the region (FAO, 2020).

Figure 14: Net change indicating loss or gain in forest cover in the ESCAP countries, 2010-2020



Source: Extracted from Food and Agricultural Organization of the United Nations (FAO), “Global Forest Resources Assessment 2020 - Main Report”, Italy, 2020. Available at <https://doi.org/10.4060/ca9825en>

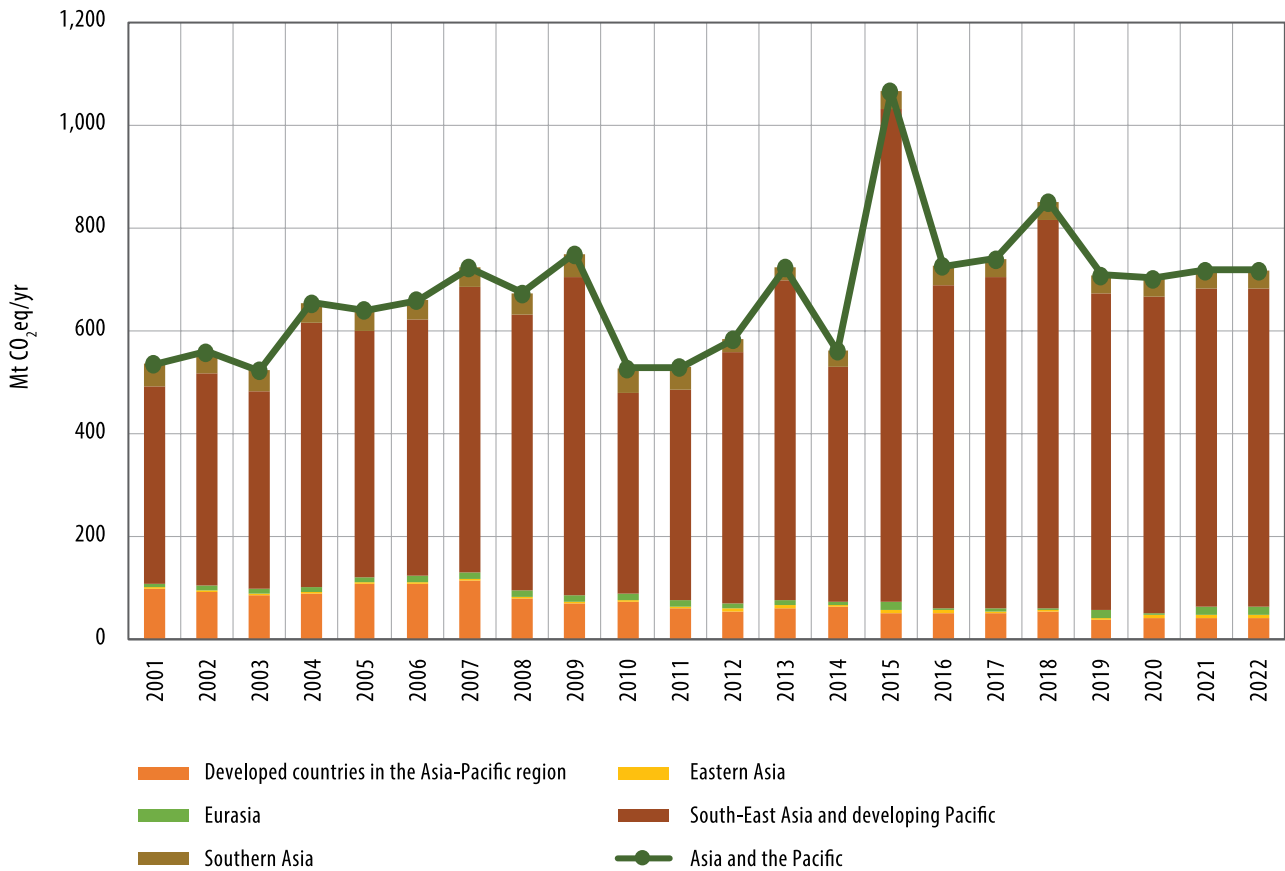
The Forest Resources Assessment (FRA) is based on two primary sources of data: Country Reports prepared by National Correspondents, and remote sensing that is conducted by the FAO together with national focal points and regional partners (FAO, 2020). The “FRA is a country-driven process, which is based on official statistical data reported to FAO by Members. The work of FRA is guided by the FAO’s governing and statutory bodies” (APCF, 2022).⁶

The most recent assessment of the forest resources, FRA 2020, indicates a gain of 31.3 million hectares of forest cover in the member countries of the Asia-Pacific Forestry Commission (APFC), between 1990 and 2020, out of which 13.8 million hectares (44 per cent) of forest cover increased in the decade between 2010-2020. The total forest area in APFC member countries, in 2020, was 751 million hectares, which is 18.5 per cent of the global forest area. The increase in forest cover in the region is contrary to the global loss of 47.4 million hectares of forest cover, between 2010 and 2020. However, the gain in the APFC is not uniform across the region; forests increased in 9 member countries (Australia, Bhutan, China, Fiji, India, Nepal, New Zealand, Thailand, and Viet Nam), while 17 countries reported a decline in forest cover. China, Australia, Indonesia, and India are among the 10 countries with the largest forest area, globally (APCF, 2022; FAO, 2020). While the area of deforestation in APFC member countries has been more than offset by areas of forest expansion, the loss of primary forests remain a concern, and it is likely that overall forest biodiversity in the region has reduced because of deforestation and increased share of planted forests as compared to naturally regenerated forests (APCF, 2022; FAO, 2020). The area of naturally regenerating forests declined from 649 million hectares in 1990 to 619 million hectares in 2020. Only seven countries (Bhutan, China, Fiji, India, Japan, Nepal, and Viet Nam) reported increases in areas of naturally regenerated forests in the period 1990-2020 (APCF, 2022; FAO, 2020).

The review of CO₂ emissions from deforestation in the Asia-Pacific region, from 1990 to 2022, as estimated in Figure 15 below, shows a reduction of almost 50 per cent compared to the levels in 1990. However, the data shows large fluctuations between 2010 and 2022, and was stabilized only from 2018 onwards because of reforestation efforts made by Asia-Pacific member States.

6. Data source for the FRA is available at <https://data.apps.fao.org/catalog/dataset/forest-area-1990-2020-1000-ha>

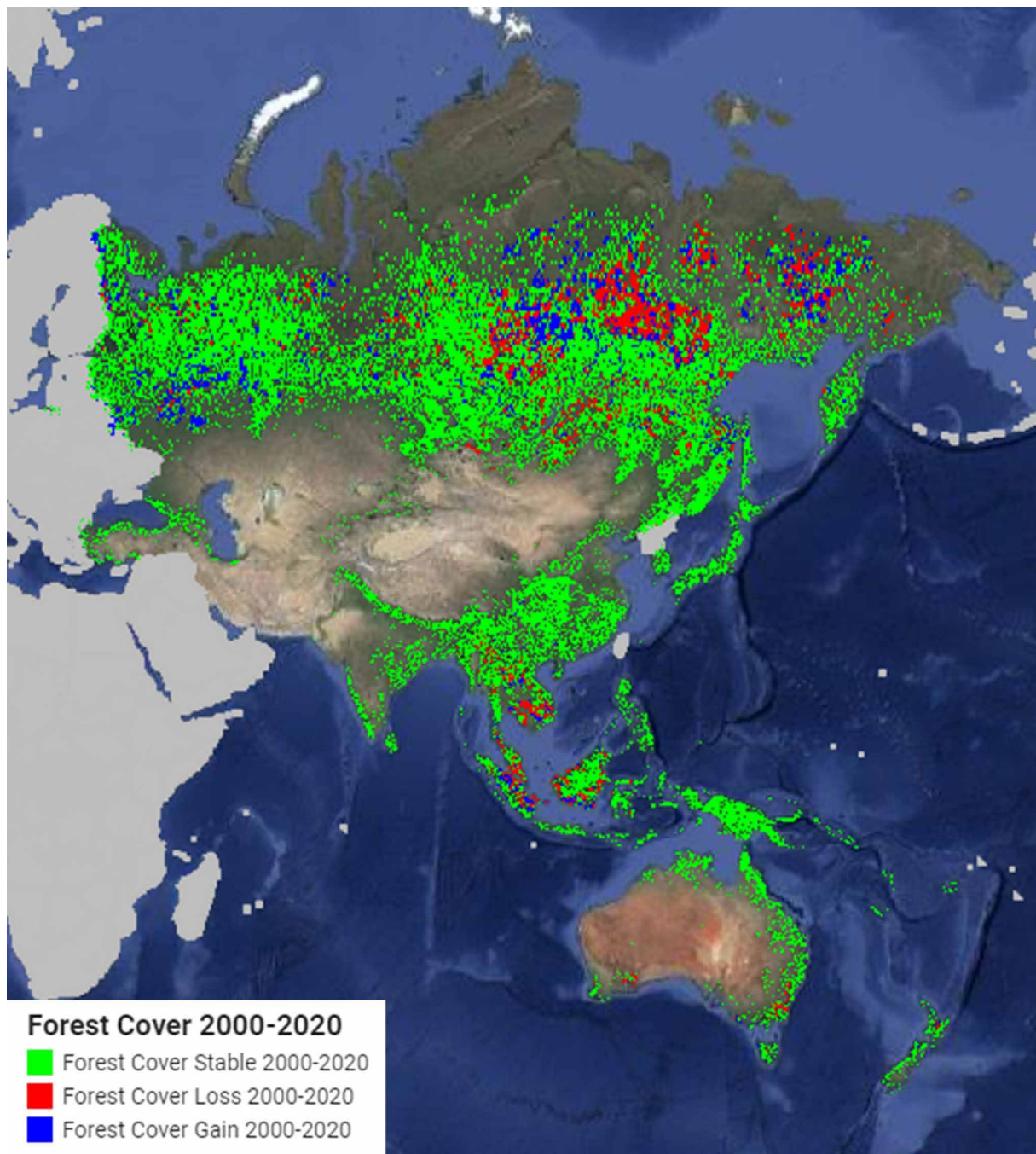
Figure 15: Reduction of CO₂ emissions from deforestation in the Asia and Pacific region, MtCO₂e, 2022



Source: European Commission, "EDGAR – Emissions Database for Global Atmospheric Research", 2023. Available at <https://edgar.jrc.ec.europa.eu>

Despite an overall increase in forested areas in the region, since 1990, primary forests continue to decline in Asia and the Pacific. Among the 19 APFC member countries that reported on primary forest areas to the FRA 2020, primary forest areas total 86.1 million hectares, or 17.1 per cent of the forest area in those countries. This is much lower than the global average of 32 per cent. Primary forest areas, among the 18 APFC member countries that have reported primary forest statistics for the complete time series (1990-2020) to the FRA, have declined by 15 per cent. Degradation and fragmentation further weaken the functionality and resilience of primary forest ecosystems, together with their capacity to provide ecosystem services, and to cope with external shocks. Hence, reversing these trends and halting primary forest loss and degradation should be a priority for all countries in the region (APCF, 2022; FAO, 2020).

Figure 16: Spatial patterns of forest cover gain and losses between 2000 and 2020 in the Asia-Pacific region



Source: Derived from M.C Hansen, M.C., and others, “High-Resolution Global Maps of 21st-Century Forest Cover Change”, *Science*, vol. 342, No. 6160 (November 2013). Available at <https://www.science.org/doi/10.1126/science.1244693>; and Global Land Analysis and Discovery (GLAD), “Global Forest Change”, n.d. Available at <https://glad.earthengine.app/view/global-forest-change>

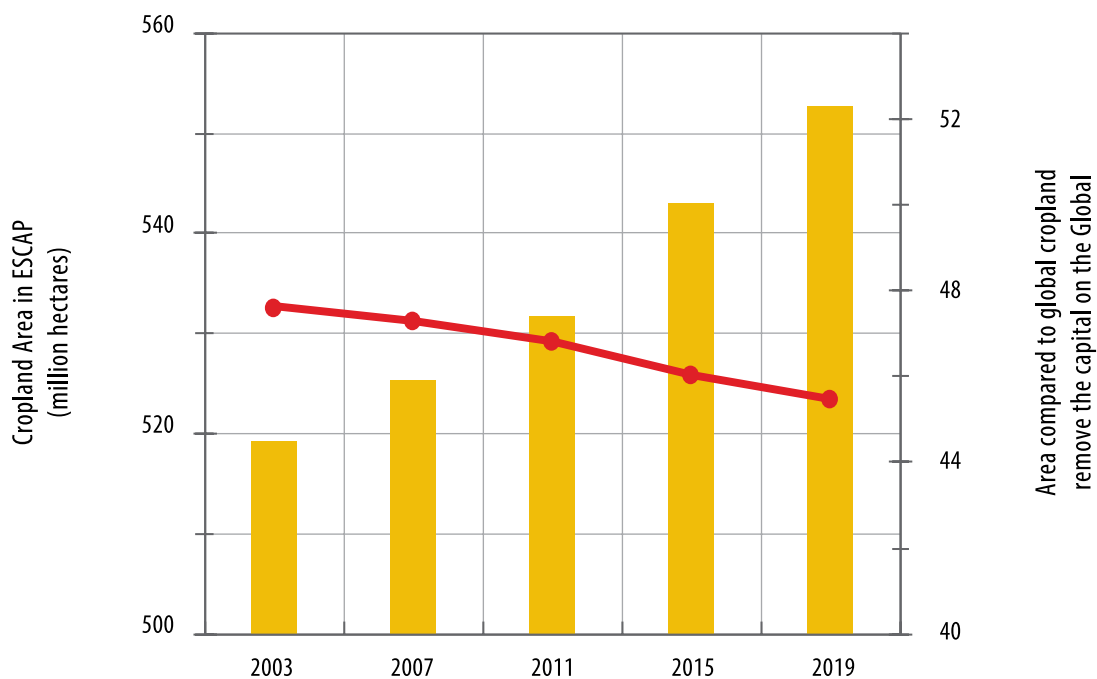
Note: In this dataset, the forest extent maps for the year 2000 and 2020 were produced by attributing with ≥ 5 m forest height as the “forest” land cover class, to ensure consistency with definitions in the FRA (FAO, 2020). The forest extent change (net forest extent loss and gain) was derived directly from the year 2000 and 2020 map comparison. However, the forest definition differs from the one used by the FAO by the inclusion of trees outside forests (agroforestry, orchards, parks) and the exclusion of temporally unstocked forest areas (See University of Maryland, Department of Geographical Sciences, “Global Forest Change 2000-2020: Data Download”. Available at <https://storage.googleapis.com/earthenginepartners-hansen/GFC-2020-v1.8/download.html>).

4.1.3 State of cropland areas in Asia and the Pacific

Though the Asia-Pacific region has the largest share of agricultural production globally (Aryal, 2022), it was home to 60 per cent (4.7 billion people) of the world’s population by 2022 with a steady growth curve (UN DESA, 2023), and this demographic shift poses further challenges for ensuring food security in the region. The total agricultural land area worldwide is roughly 5 billion hectares, accounting for 38 per cent of the global land surface. Among this, approximately one-third is utilized for cropland, while the remaining two-thirds are designated as meadows and pastures for grazing livestock (FAO, 2021).

The global cropland area was estimated to be 1.26 billion hectares in 2019, and the ESCAP region accounts for the 46 per cent, 552.8 million hectares of global cropland (Figures 17-18). Of the croplands in the ESCAP countries, 24.77 per cent lie in India, 22.3 per cent in China, 15.42 per cent in the Russian Federation, 8.2 per cent in Australia, and 13 per cent is shared among Kazakhstan, Pakistan, Türkiye, and Thailand (Potapov and others, 2022). In 2019, India had the largest total cropland area, with nearly 170 million hectares. It was closely followed by China (about 140 million hectares), and the Russian Federation (125 million hectares) (FAO, 2021). Farmlands and croplands have a significant carbon sink potential, though often are also a source of greenhouse gas emissions with great heterogeneity and complexity. Some of these factors, related to human activities are discussed in this section. Farmlands and croplands have a significant carbon sink potential, though often are also a source of greenhouse gas emissions with great heterogeneity and complexity. Some of these factors, related to human activities are discussed in this section.

Figure 17 : Dynamics of regional cropland area for ESCAP countries, and as a proportion of global cropland



Source: ESCAP, based on P. Potapov and others, “Global maps of cropland extent and change show accelerated cropland expansion in the twenty-first century”, *Nature Food*, vol. 3. Available at <https://doi.org/10.1038/s43016-021-00429-z>Note: Cropland area was mapped for each 4-year interval. The bars indicate cropland area in the ESCAP, and the line shows the proportion of cropland area in the ESCAP to global cropland area.

The current situation regarding cropland and food security in the ESCAP region is a mix of progress and challenges. Some countries, like China and India, have shown significant advancements in increasing agricultural production and reducing hunger. However, other nations such as Afghanistan and Pakistan continue to grapple with food insecurity, where the causes are complex and interrelated. Economic conditions and political instability are the primary drivers of food insecurity, and it is exacerbated by lack of water availability and climate extreme events, including floods, heatwaves, droughts, and storms.

Overall, the cropland area in the ESCAP region has experienced continuous growth over the past two decades, expanding by 6.4 per cent from 519 million hectares in 2003 to 552.8 million hectares in 2019 (Figure 17). However, the proportion of the region's cropland area to the global cropland has slightly decreased from 47.64 per cent to 45.48 per cent between 2003 and 2019 (Figure 18). The increase in cropland was not enough to keep up with the growth of the population, which led to a significant decrease in the amount of per-capita cropland in the ESCAP region. Despite a notable increase in the global cropland, global per-capita cropland area decreased by 14 per cent from 0.14 hectares per person, in 2003, to 0.12 hectares per person in 2019. The largest relative decrease of per-capita cropland area was observed in South-West Asia (by 19 per cent). South-East Asia had the smallest per-capita cropland area in 2019 (0.08 hectares per person), whereas Australia and New Zealand had the largest (1.34 hectares per person) (Potapov and others, 2022). Continuing population and consumption growth will mean that the global demand for food will increase for at least another 40 years (Godfray and others, 2010), demand for agricultural commodities is projected to increase inexorably (70-100 per cent by 2050), and cropland intensification threatens biodiversity especially in India and China (Zabel and others, 2019). Since the focus on agricultural production is motivated also by income generation and economic growth, high pressure on farming systems will continue in the next decades.

Among the ESCAP countries, India and China had the most substantial increases in net cropland area, 15.5 million hectares (13 per cent), and 5.4 million hectares (4 per cent), respectively (Figure 18). The primary driver of cropland expansion is the increasing demand for food for the rapidly increasing population in the region. Other countries that have experienced significant losses during 2003-2019 are the Republic of Korea (11 per cent, 0.16 million hectares), Viet Nam (2.5 per cent, 0.13 million hectares), and Georgia (15 per cent, 60,000 hectares).

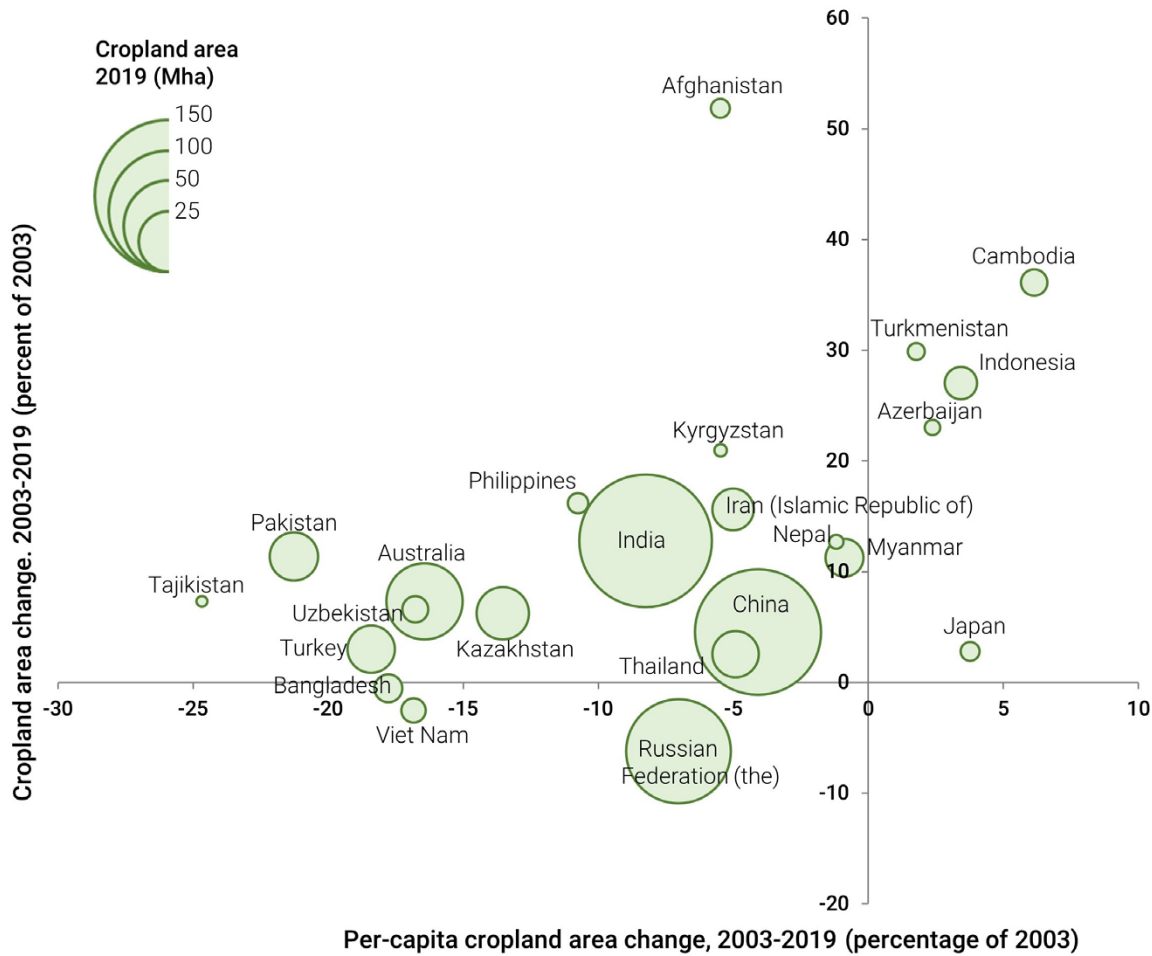
Overall, more than 60 per cent of the expansion of cropland areas was due to pasture conversion and recultivation of abandoned arable land. And one-fourth of the area was increased due to conversion of natural vegetation or tree plantations into croplands (Potapov and others, 2022). The largest proportions of natural vegetation conversion to croplands (excluding dryland irrigation) were found in South-East Asia (61 per cent).

On the other hand, the Russian Federation experienced the largest reduction in cropland area, with a net loss of 5.7 million hectares, or a 6 per cent decrease between 2003 and 2019 (Potapov and others, 2022). According to FAO statistics, the cropland area in the Russian Federation decreased by 8 per cent over the period 1990-2019 (FAO, 2021). This was caused by the collapse of the former socialist form of agriculture based on "cooperatives" (Yin and others, 2020), and the termination of 90 per cent of state subsidies for agriculture, from 1990 to 2000, for cultivation in economically and environmentally marginal agricultural areas (Prishchepov and others, 2013).

The estimates of cropland area can vary between countries due to several reasons. For instance, in the Russian Federation, where crop abandonment is common but not well-documented, the FAO may be overestimating the amount of arable land (Potapov and others, 2022). Furthermore, such abandonment of cropland has also been observed during the last two decades in countries, such as China, due to rural out-migration, urbanization, and large-scale reforestation programs such as Grain for Green, (Yin and others, 2020). In Nepal, cropland abandonment is caused by rural out-migration and climate change, especially in mountainous communities and remote or marginalized areas (Yin and others, 2020).

To overcome the problem, in 2000, the Government of China launched a series of programs aiming to restore vegetation cover by converting croplands located in mountains and drylands to forests or grass-lands. However, restoration efforts were reduced after 2004 due to concerns about China's food security (Yin and others, 2018), and the maps show a subsequent decline in abandonment rates (Yin and others, 2020). Cropland retirement (212,979 ± 54,939 hectares during 2001–2014) mostly occurred at the early stage of ecological programs, and was mainly concentrated in drier environments and steep terrains (Yin and others, 2018).

Figure 18: Total and per capita cropland change in the ESCAP countries, 2013- 2019



Source: ESCAP, based on P. Potapov and others, “Global maps of cropland extent and change show accelerated cropland expansion in the twenty-first century”, *Nature Food*, vol. 3. Available at <https://doi.org/10.1038/s43016-021-00429-z>

Note: The cropland area is aggregated at country level. The net change is estimated from the mapped cropland area in 2000-2003 and 2016-2019. The mapped cropland area estimates are comparable to FAO’s estimates, however, there could be some differences at national due to multiple factors and reporting mechanism.

4.2 Glaciers in the Hindu Kush Himalaya (HKH) and High Mountain Asia (HMA)

Glaciers are strong indicators of climate change; the changes in their mass are a clear sign of how they respond to changes in temperature, snowfall, and other meteorological variables (IPCC, 2022a). Given the importance of glaciers, this report also provides a short overview of the status of a major glaciers range in the Hindu Kush Himalayan (HKH) region, also known as the “Third Pole” in Asia, which is a major repository of frozen water outside the Arctic and Antarctic. The retreating glaciers, the decrease in snow cover, and thawing permafrost in the region are unprecedented and largely irreversible, driven by global warming (Bolch and others, 2019; Guo and others, 2023; ICIMOD, 2023; IPCC, 2022a; Sakai, 2019). The impacts of climate change on the glaciers are posing serious concerns for the region’s water resources and ecosystems that depend on glacial meltwater. Since 1990s, retreating glaciers are inducing an increase and expansion of glacial lakes, the total area and the number of glacial lakes has notably grown. This expansion of glacial lakes also brings potential risks, particularly concerning glacial lake outburst floods (GLOFs). Further, glaciers in Asia are the sources of water resources for about 220 million people living downstream. The glacial melt water in the southern Tibetan Plateau increased during 1998–2007 and will further increase till 2050. Melting glaciers are resulting in the instability of supply of water resources.

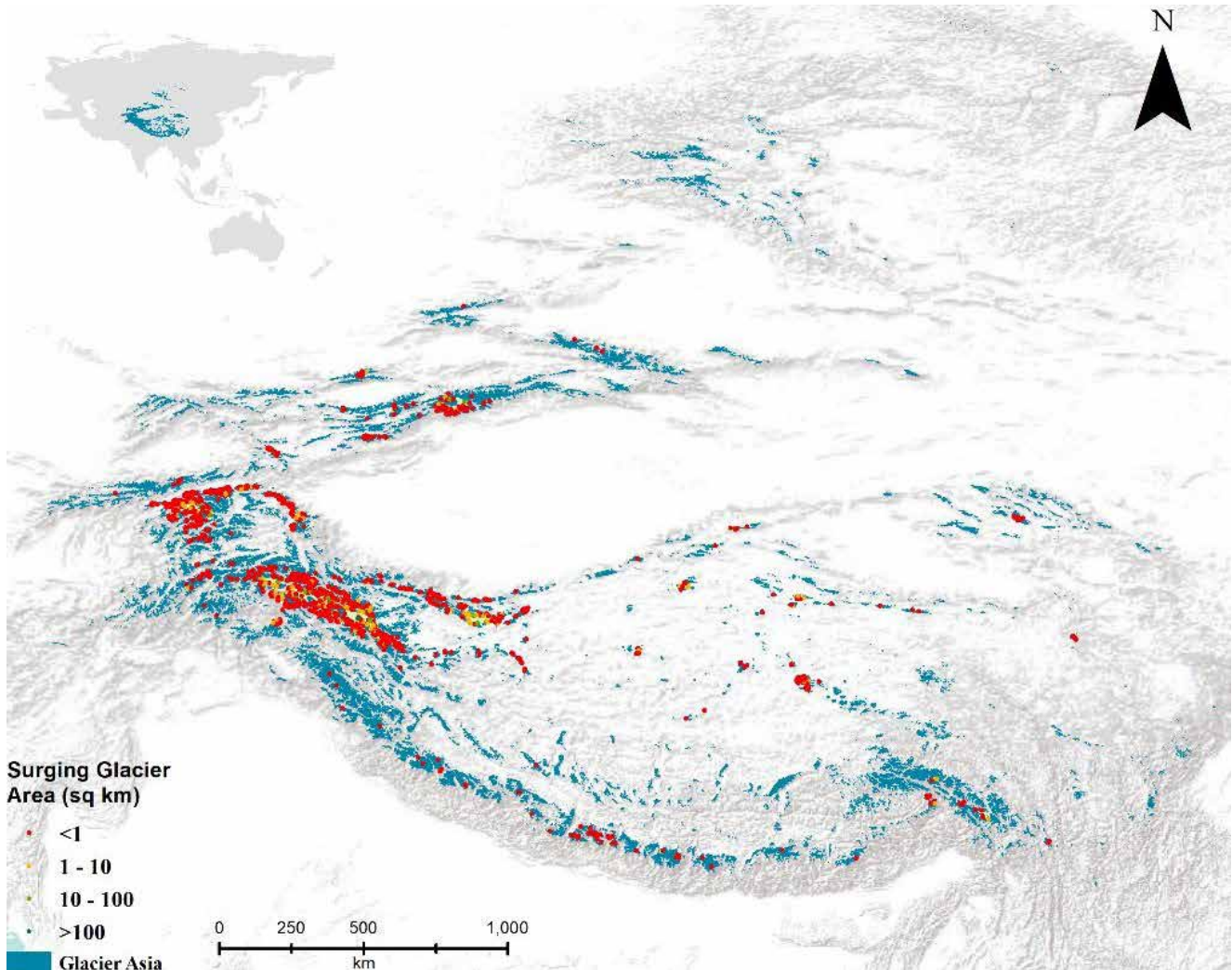
Glacial lake outburst floods (GLOFs) are not a recent phenomenon in the HKH, they remain a persistent threat to downstream communities and infrastructure, and must therefore be part of any planning in the lower reaches. The frequency of GLOFs and risks from potential GLOFs are expected to increase as the climate continues to change. As temperatures rise, new lakes form, existing ones expand and sometimes merge, increasing the potential flood volumes in the high mountains. Cooperation among countries sharing the river basins is crucial to manage the potential risks posed by GLOFs, and ensure the safety and well-being of the communities living in these vulnerable areas. These events pose hazards and risks, and the likelihood of such occurrences is considered high. Thus, GLOFs highlight the significant and ongoing impacts of climate change on the glaciers of High Mountain Asia, posing serious concerns for the region's water resources and ecosystems that depend on glacial meltwater (ICIMOD, 2023).

In the scenario of global warming between 1.5°C to 2°C, it is highly likely that the glaciers in the HKH region will experience significant reductions in volume, ranging from 30 to 50 per cent by the year 2100. The remaining glacier-covered areas are expected to vary between 50 and 70 per cent. These mass losses will be continuous throughout the 21st century. Although the specific mass balance rate will continue to be negative, it is anticipated to become less negative by the end of the century, mainly due to the glaciers' retreat to higher elevations. In the event of global warming levels beyond 2°C, the remaining glacier volume is projected to decrease further, ranging from 20 to 45 per cent. Additionally, the specific mass balance rates will become increasingly negative as the 21st century progresses (ICIMOD, 2023).

Addressing the growing challenges posed by the changing glacial landscape in the Pamir-Hindukush-Himalaya Glaciers region requires integrated efforts involving climate change mitigation, adaptation strategies, and comprehensive disaster risk reduction plans. The recent GLOF South Lhonak Lake outburst caused the rise of water levels in the Teesta river that flooded at least four districts in north Sikkim, India, with serious losses of life and property. Since there was similar GLOF burst in 2013, this prompts for urgent action and commitment to develop adaptation and rapid response measures to ensure quick response and minimize damage from such climate-induced disasters.

The revised GAMDAM (Glacial Area Mapping for Discharge from the Asian Mountains) glacier inventory, GAMDAM V2, estimates that the High Mountain Asia (HMA) region hosts 131,819 glaciers, covering an area of 99,817 km² (Guo and others, 2023), out of which, the glaciers in the HKH region occupy an area of approximately 73,173 (±7000) km² (Annex III) (Sakai, 2019; ICIMOD, 2023).

Figure 19: Overview of the distribution of glaciers, and spatial variation in the density and frequency of identified surging glaciers across the High Mountain Asia (HMA).



Source: A. Sakai, "Brief communication: Updated GAMDAM glacier inventory over high-mountain Asia", *The Cryosphere*, vol. 13, No. 7 (2019). Available at <https://doi.org/10.5194/tc-13-2043-2019>; and L. Guo, L., and others, "A new inventory of High Mountain Asia surge-type glaciers derived from multiple elevation datasets since the 1970s", *Earth Systems Science Data*, vol. 15, No. 7 (July 2023). Available at <https://doi.org/10.5194/essd-15-2841-2023>

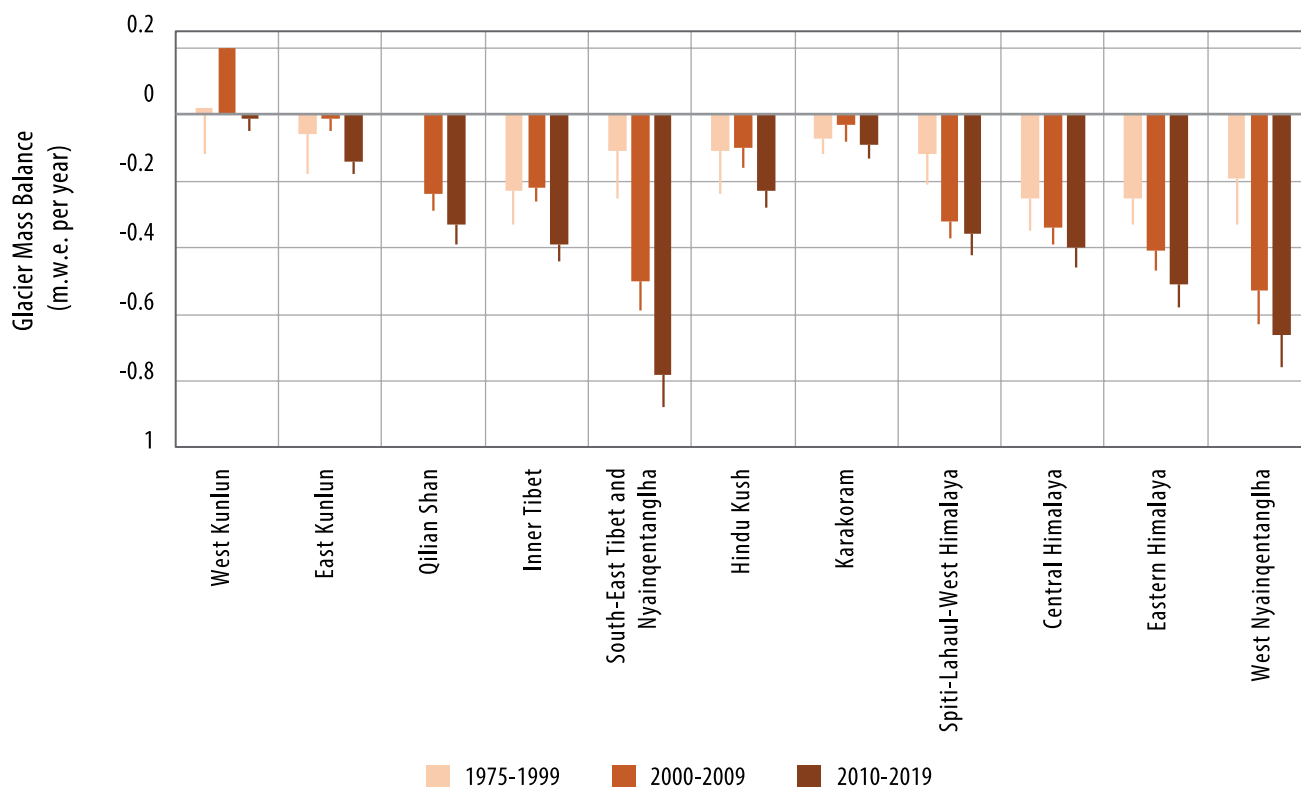
Note: The surging glaciers are categorized in four classes by area covered by the glaciers.

A total of 890 surging glaciers and possibly 336 more surging glaciers have been identified in High Mountain Asia (HMA) (Figure 20), which accounts for the 2.49 per cent of the total glacier count and 16.59 per cent of the glacier area in the region. It is important to note that the exclusion of glaciers smaller than 0.4 km² was made for this calculation. Glacial surge was observed in 21 out of the 22 subregions of HMA. The density of surging glaciers was unevenly distributed across these subregions. Glacier surges occur more frequently in the north-western subregions, such as Pamir and Karakoram, but are less common in the peripheral subregions (Guo and others, 2023).

Furthermore, the glaciers in the HKH region are experiencing rapid thawing. It is estimated that up to two-thirds of the stored fresh water in the region could be released by 2050 due to the melting glaciers (Maharjan and others, 2018). This could have severe consequences for water availability and ecosystems in the region.

The glaciers in the HKH are disappearing at an alarming rate, which is 65 per cent faster in 2011-2020 than they did in the previous decade. Recent assessment by the ICIMOD indicated that the glacier mass balance in the HKH region has experienced a growing negative trend, with rates increasing from -0.17 metres water equivalent per year (m.w.e. per year) during the period from 2000 to 2009 to -0.28 m.w.e. per year from 2010 to 2019, indicating a faster loss of mass (ICIMOD, 2023). The most significant mass losses are observed in the eastern part of the HKH, specifically within South-East Tibet and Nyainqêntanglha regions, with a recorded value of -0.78 ± 0.10 m.w.e. per year for the years 2010 to 2019. Conversely, the west Kunlun region demonstrates a nearly balanced mass budget of -0.01 ± 0.04 m.w.e. per year. Even the Karakoram region, historically known for its balanced mass balances, experienced a slight wastage of 0.09 ± 0.04 m.w.e. per year during the same period from 2010 to 2019 (Figure 20; Annex III).

Figure 20: Region-wide glacier mass balances, expressed in metres water equivalent per year (m.w.e. per year) from different regions in the HKH over the periods 1975–1999, 2000–2009, and 2010–2019



Source: International Centre for Integrated Mountain Development (ICIMOD), “Water, ice, society, and ecosystems in the Hindu Kush Himalaya: An outlook”, Nepal, 2023. Available at <https://doi.org/10.53055/ICIMOD.1028>

A circular inset image shows a fisherman in a traditional boat on a body of water. The fisherman is wearing a wide-brimmed hat and a light-colored shirt, and is holding a large, circular fishing net. The boat is a small, dark wooden boat with a small outboard motor. The water is calm, and the sky is overcast. The background of the entire image is a black and white photograph of a beach covered in plastic waste, including many plastic bottles and containers. The text "Chapter 5" is overlaid in white on the circular inset.

Chapter 5

Conclusions and recommendations

Chapter 5: Conclusions and recommendations

Vulnerability to climate change in the Asia-Pacific region is increasing, and the region leads with six out of ten countries globally that are most vulnerable to disasters. Furthermore, in terms of greenhouse gas emissions, the region is quite diverse with some of the top emitters in the world, alongside smaller emitters.

Although all member States have submitted nationally determined contributions, overall emission reduction ambition remains too weak to deliver the desired 1.5°C pathway, and in fact, is not even sufficient to contain warming within 2°C by 2030.

However, with current NDC commitments – unconditional and conditional combined – emission levels are anticipated to remain as high as 26.73 GtCO₂e in 2030, implying a gap of 9.71 GtCO₂e with the recommended trajectory of 43 per cent reductions by 2030 from 2019 GHG emission levels. The gap further widens for those Asia-Pacific member States that have BAU-based NDC commitments when comparing the estimated scenarios with the recommended IPCC reduction trajectories of 60 per cent and 84 per cent by 2035 and 2050, respectively. Out of the 49 countries in the Asia-Pacific region, 12 have submitted two and more NDC updates with varying levels of emissions reduction ambition, while 39 countries have made carbon-neutrality pledges and 23 countries have developed long-term low emissions development strategies.

Out of the 12 member States (pace setters) with more than one NDC update, only pledges from the Marshall Islands, Australia, the Republic of Korea, Japan and Vanuatu stand out in terms of their greenhouse gas emissions reduction targets and alignment with their carbon neutrality pledges, with little re-calibration of their current commitments required. Among the 12 “pace-setter” countries, only two countries, Japan and Pakistan, have updated their NDCs to integrate gender.

What is common among the Asia-Pacific member States with current insufficient NDC commitments is that almost all of them are based on a business-as-usual (BAU) model or on an intensity target for their greenhouse gas emission reduction scenarios, rather than on the actual emissions at a high-emissions baseline year. For the next NDC update cycle (2024-2025), it is highly recommended that Asia-Pacific member States critically review their previous business-as-usual scenarios for 2030 and adopt the most recent historical emissions levels for the baseline year. This will allow countries to capture the value of their unconditional commitments and to demonstrate higher ambition aligned with their carbon neutrality pledges to attract financial support.

By sector, energy is a key emitter, particularly coal, oil and gas, with the former constituting over one half of the emission levels from these three sources. Across all sectors, the power industry and other industrial combustion (combustion for industrial manufacturing and fuel production) are the most critical sources of emissions especially for Japan, the Republic of Korea, Viet Nam, Singapore and Australia. For countries like Bangladesh, Indonesia, Pakistan and Vanuatu, emissions are mainly derived from other sectors, constituted by industrial process emissions, agriculture and waste.

Key findings

- Current NDC targets by 2030, even with the most recent updates of the Asia-Pacific region's "pace-setters", continue being off-track compared to both IPCC emission reduction trajectories recommended to contain global warming within 1.5°C: the 45 per cent reductions relative to 2010 levels and the 43 per cent reductions relative to the 2019 levels.
- The Asia-Pacific countries have great opportunity to re-assess their commitments during the 2024-2025 NDC review and align those with current policies in implementation, LT-LEDS targets and net-zero pledges to facilitate a transition to the 1.5°C goal. This includes commitments to gender responsive climate action, linked to dedicated resources and monitoring frameworks.
- A review of the current greenhouse gas emissions in the region shows that, for the Asia-Pacific member States, the current unconditional and conditional NDC commitments are not keeping pace with the global commitments. The next cycle of NDC updates in 2024-2025 will provide an excellent opportunity to recalibrate NDC commitments to the new IPCC-recommended trajectory for greenhouse gas emission reductions (43 per cent from 2019 by 2030, 60 per cent by 2035, 69 per cent by 2040, and 84 per cent by 2050 (99 per cent for CO₂ emissions)).
- Sectoral emission analysis demonstrates that fossil fuels continue to be the main driver for greenhouse gas emissions, and those from coal are on the rise.
- Among the 24 countries that have updated their NDCs since 2021, 79 per cent have integrated gender aspects with 37 per cent including them for the first time. However, their commitments lack specificity, as they fail to mention detailed action plans that are essential for achieving gender equality in climate action.
- Although the region has shown immense potential to provide/harness renewable energy, it is heavily characterized by fossil-fuel locked-in economies. With the expected rise of prices of fossil fuels, robust investments in energy efficiency and renewable energy production will boost support economic diversification and the implementation of NDC, LT-LEDS and carbon neutrality pledges.
- Just transition and green growth and green jobs hold the key to unlocking the transition of the Asia-Pacific region to a low-carbon and low-emissions development pathway.
- The current status of nature-based solutions is not sufficient to absorb all excess greenhouse gas emissions in the Asia-Pacific region. Furthermore, NbS are taking significant losses in terms of global carbon storage potential.
- Half of the world's mangroves, with enormous diversity, are found in the Asia-Pacific region, and in particular in South-East Asia. However, between 1990 and 2020, the region has experienced a 4.3 per cent loss of its mangrove forests, which represents 63 per cent of global losses, and is estimated to be 70 per cent of the global carbon stocks. According to scientific estimates, this could be equivalent to 460 MtCO₂e.
- The Asia-Pacific region provided 37 per cent (250 Gt) of the global forest carbon stock (662 Gt) in 2020. While the regional forest cover is increasing, the area of naturally regenerating forests is declining, which leads to a decline in invaluable natural forest ecosystems service, including to the natural water aquifers, local climate and community livelihoods, resilience to floods and draughts, and climate change.

7. The Asia-Pacific "pace-setters" are 12 member States that have submitted from two to four NDC updates. These include: Australia, Bangladesh, Indonesia, Japan, the Marshall Islands, Pakistan, the Republic of Korea, Singapore, Sri Lanka, Thailand, Vanuatu, and Viet Nam.

- The cropland area in the ESCAP region has experienced continuous growth, over the past two decades, and some on the expense of native forests, which has caused an increase in GHG emissions from agricultural sector in several Asian countries. However, there is a significant decrease in per-capita cropland in the ESCAP region, as the population growth has out-paced cropland expansion.
- By 2020, the net forest cover in the Asia-Pacific region has increased by 0.97 per cent, and the CO₂ emissions from deforestation were halved and stabilized by 2020. However, despite an increase in forest cover, the per-capita forest has decreased from 0.38 per cent to 0.34 per cent over the last decade.
- By 2020, the Asia-Pacific region had provided 37 per cent (250 Gt) of the global carbon stock (662 Gt).
- Mangrove forests have multiple functions, including acting as barriers against natural disasters, as well as for providing invaluable sources of livelihood for local communities. Most notably, mangrove forests contribute to the estimated sequestration of 22.86 gigatons of carbon dioxide globally, which equals to about half of the yearly emissions from fossil fuels, land-use and industry.
- Almost half of the world's mangroves are found in the Asia-Pacific region. However, the Asia-Pacific region was responsible for 70 per cent of the global net loss of carbon stored in mangrove forests in the last 25 years and these losses are globally significant.
- Between 2018 and 2023 investments in mangrove restoration have increased considerably resulting in projects in over 12 Asia-Pacific member States, however with mixed success.
- An integrated and holistic approach to mangrove restoration is required that addresses both biophysical aspects, such as water quality and sediment availability, and social aspects, including land tenure and resource access. It is also important to create a constructive dialogue and engage local stakeholders to ensure successful restoration outcomes.
- Glaciers of the Hindu Kush Himalayan (HKH) region in Asia are strong indicators of climate change and are disappearing at an alarming rate; 65 per cent faster in 2011-2020 than in the previous decade. The retreating glaciers decrease snow cover, and the thawing permafrost in the region is unprecedented, causing the expansion of glacial lakes, resulting in glacial lake outburst floods (GLOFs) that endanger the lives of downstream population, as happened in northern India in September 2023.
- The impact of climate change on the glaciers, a major repository of frozen water outside of the Arctic and Antarctic - the "Third Pole"- and an invaluable source of fresh water for 220 million people and ecosystems in the region is causing serious concerns.

Key recommendations

- Focus on enhancing the implementation of current NDC commitments, which will stimulate transition to low GHG emissions development.
- Take full advantage of the forthcoming NDC update cycle to align greenhouse gas emission reduction trajectories with the latest recommendations of the IPCC Synthesis Report of 43 per cent, 60 per cent, 84 per cent as compared to 2019 levels by 2030, 2035 and 2050, respectively, to ensure reaching net-zero CO₂ emissions by 2050.
- During the 2024-2025 NDC update cycle, adopt real historical baseline values, preferably based on 2019 emission inventories to recalibrate previous NDC commitments that were based on business-as-usual scenarios developed prior to COVID-19. This will allow countries to craft realistic emission scenarios and support alignment with the latest IPCC guidelines to contain global warming within 1.5°C, which for several Asia-Pacific member States are within a 3-9 per cent recalibration of emissions trajectories.
- Take stock of how enabling policies support implementation of current NDCs and are impacting historical GHG emission reductions. Such an approach will create a good basis to enhance transparency framework implementation and attract financial support for conditional NDC commitments.
- Develop sectoral emission reduction trajectories with the IPCC-recommended 43 per cent reduction from 2019 levels by 2030, and the follow up trajectories for achieving carbon neutrality and implementing LT-LEDS.
- Continue to articulate how national climate action is gender responsive, develop concrete action plans, and begin to monitor and report on gender-related commitments in the Asia-Pacific member States NDCs in line with the commitments under the Paris Agreement and the UNFCCC Lima Work Programme.
- Several of the Global Stocktake Synthesis report recommendations can be taken as guiding principles for the Asia-Pacific region, including:
 - Scale up renewable energy and phase out all unabated fossil fuels which are indispensable elements of just energy transitions to net-zero emissions.
 - Increase measures to implement systems transformations in industry, transport, buildings and other sectors, which will rapidly reduce process and energy emissions.
 - Halt and reverse deforestation and degradation and improve agricultural practices which are critical to reducing emissions and conserving and enhancing carbon sinks.
 - Encourage just transitions, which can support more robust and equitable mitigation outcomes, and promote economic diversification, that will also support implementation of the SDGs.
 - Boost international and regional cooperation, and credible initiatives can effectively contribute to bridging emissions and implementation gaps.



Annexes

Annex I. Comparison between COP26 and COP27

	COP26	COP27 ^{8,9}
Key focusses	<ul style="list-style-type: none"> Mitigation agreements secured increased ambition targets. Collaboration between countries, civil society & private sector recognised as necessary. 	<ul style="list-style-type: none"> Strengthening climate change adaptation measures; loss and damage was firmly put on the agenda. Implementation plans to shift ambition into action.
Key outcomes¹⁰	<ul style="list-style-type: none"> The Glasgow Climate Pact was agreed upon, marking the first climate agreement which explicitly plans to phase down unabated coal usage and phase out fossil fuel subsidies. 65 country commitments to coal phase out and all Parties agreed to coal phase-down. Adaptation Fund raised over \$350m in new pledges. Additionally, a 5% share of proceeds from the Article 6.4 UNFCCC mechanism of the Paris Agreement will be delivered to the Adaptation Fund. Least Developed Countries Fund received over \$600m in new pledges. Commitment to double Adaptation Finance on 2019 levels by 2025. Launched Glasgow - Sharm el-Sheikh work programme on Global Goal on Adaptation. Agreed on functions and process to develop the funding arrangements for the Santiago Network on Loss and Damage. Finalised the Paris Rulebook; including on transparency, Article 6 on carbon markets and non-market approaches, and common time frames for future NDCs. 	<ul style="list-style-type: none"> Dedicated Loss and Damage fund established. Adoption of the Sharm el-Sheikh Implementation Plan. Progress on governance structure for Santiago Network on Loss and Damage. \$3.1bn plan unveiled to ensure all countries protected by weather disaster early-warning systems in next 5 years. V20 and G7 launched the Global Shield against Climate Risks with new commitments of over \$200m. Adaptation Fund received \$242m in new pledges and contributions. Sharm El-Sheikh Adaptation Agenda launched. Launch of new five-year work program to promote climate technology solutions in developing countries. Mitigation Work Programme progress. Second technical dialogue of the first Global Stocktake. 25 new collaborative actions under the Breakthrough Agenda to decarbonise five key areas: power, road transport, steel, hydrogen and agriculture. A 100% increase in the total amount of finance mobilized for the LEAF coalition.

8. Natalia Alayza, and others, "COP27: Key takeaways and what's next", 8 December 2022. Available at <https://www.wri.org/insights/cop27-key-outcomes-un-climate-talks-sharm-el-sheikh>
9. United Nations Climate Change, "COP27 reaches breakthrough agreement on new "Loss and Damage" fund for vulnerable countries, 20 November 2022. Available at <https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries>
10. United Nations Climate Change, "COP26 outcomes: Finance for climate adaptation", n.d. Available at <https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact/cop26-outcomes-finance-for-climate-adaptation#What-are-the-next-steps-in-ensuring-that-more-supply>

	COP26	COP27
<p>Other outcomes¹¹</p>	<ul style="list-style-type: none"> • New UN Climate Change work programme on mitigation established; Glasgow Work Programme on Action for Climate Empowerment. • Established an annual high-level Ministerial event on pre-2030 ambition. • Glasgow Leaders’ Declaration on Forests and Land Use. • 12 members joined the UN No New Coal Power Compact. • Powering Past Coal Alliance grew to 168 members. • 34 countries and five public finance institutions committed to end international fossil fuel finance by end of 2022. • Global Methane Pledge signed by 110 countries. • COP26 Declaration on Accelerating the Transition to 100% Zero Emissions Cars and Vans signed by over 120 members. • Race to Zero Campaign increased to 11,000 members. • 86 countries have National Adaptation Plans. • Launched Adaptation Research Alliance. • Over \$450m mobilised for initiatives and programmes enhancing locally-led approaches. • Race to Resilience campaign mobilised non-state actors and launched new metrics framework. • The Coalition for Climate Resilient Investment has over 120 members, with \$20tn in assets under management. • Delivery Plan shows \$100bn per year goal to be met in 2023. Formal review report agreed upon. • Launched the process for the new post-2025 finance goal. • Launched work on a report on best practice in financial flows. • International Sustainability Standards Board established. • Over \$133tn committed to Glasgow Financial Alliance for Net Zero. • Established the Climate and Development Ministerial process. 	<ul style="list-style-type: none"> • Launched the Food and Agriculture for Sustainable Transformation initiative. • High-Level Expert Group on Net-Zero Commitments published report. • Indonesia Just Energy Transition Partnership will mobilize \$20bn over next three to five years to accelerate a just energy transition. • Launch of the Forest and Climate Leaders’ Partnership, which brought together more than 28 countries. Public and private donors pledged to mobilize a further \$4.5bn on the \$12bn that governments pledged at COP26, over a 5-year period. • 11 new strategies towards just transitions to net-zero emissions developed for Glasgow Climate Pact. • EU announced that it would further boost its emissions target from a 55% to a 57% reduction by 2030. • 20 new countries signed the Global Methane Pledge, bringing total to 150. • Call to accelerate renewable energy deployment in COP cover decision. • Just Energy Transition Partnerships announced between South Africa with France and Germany, and between Indonesia with the US, Japan and multiple EU countries. • Initiative to restore >120 million hectares of degraded land in Africa by 2030 supported by a \$2bn blended finance mechanism from three financing partners. • African Cities Water Adaptation Fund and supporting coalition was launched. • Nature-based solutions included in cover decision for first time.

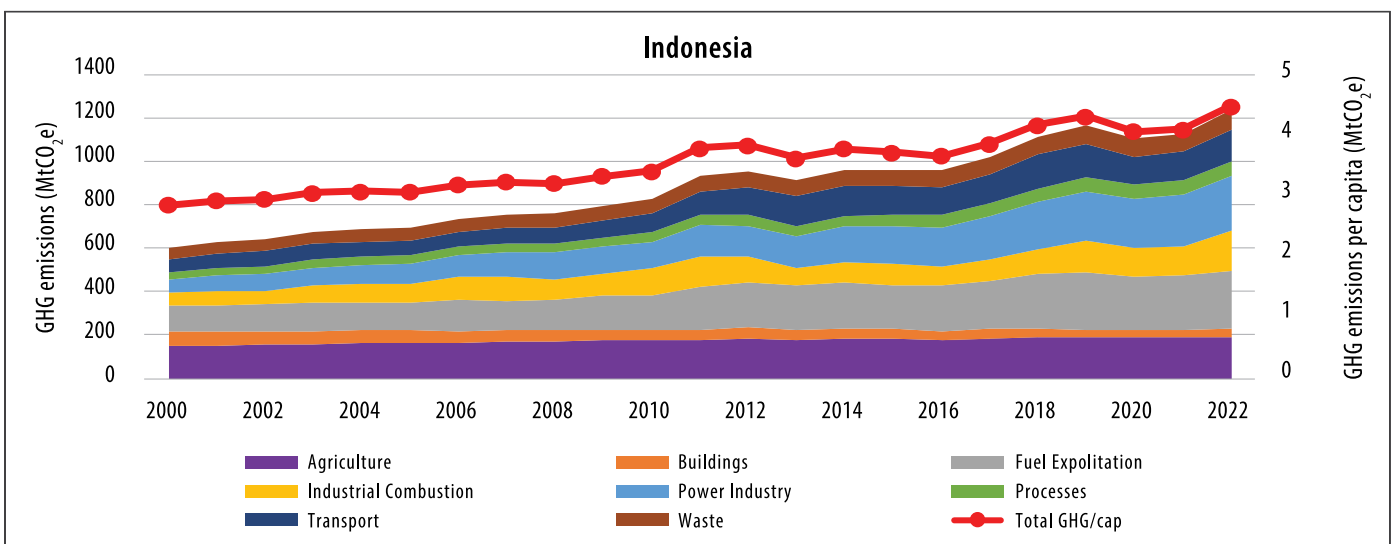
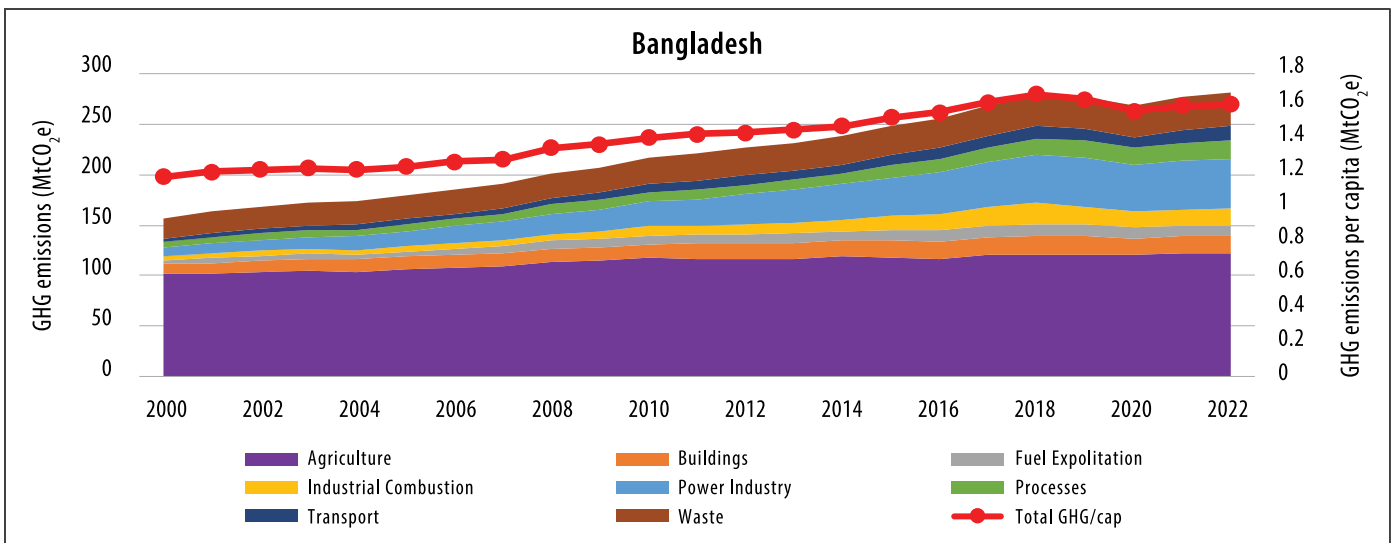
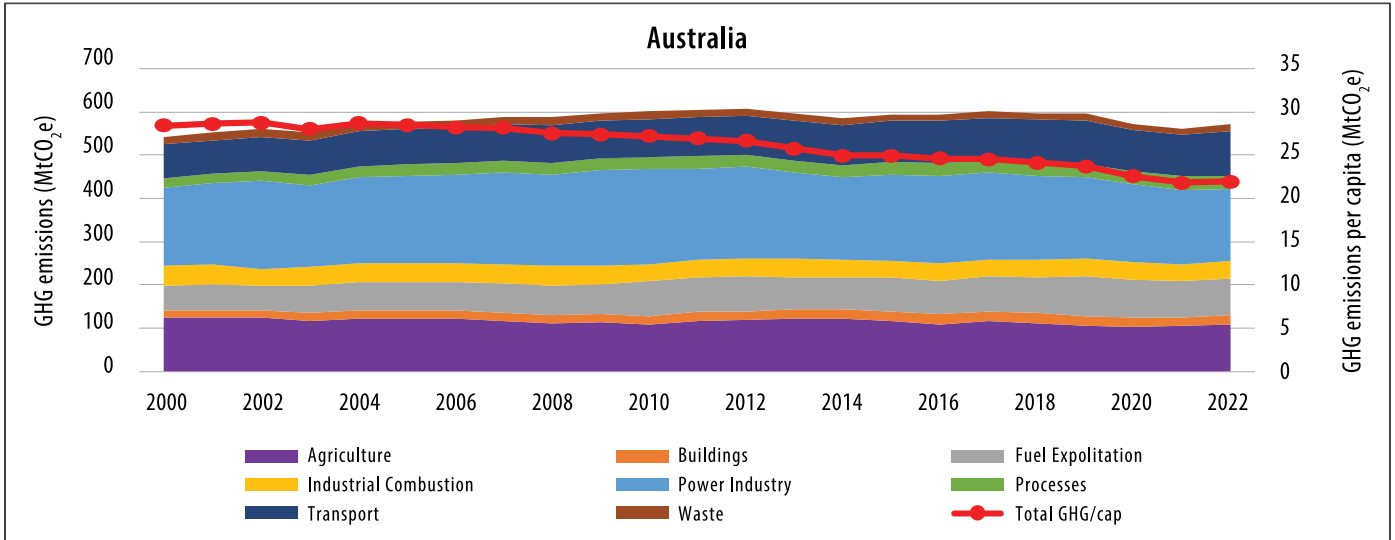
11. GOV.UK, “COP26 Presidency Outcomes”, Policy Paper, 30 November 2022. Available at <https://www.gov.uk/government/publications/cop26-presidency-outcomes/cop26-presidency-outcomes>

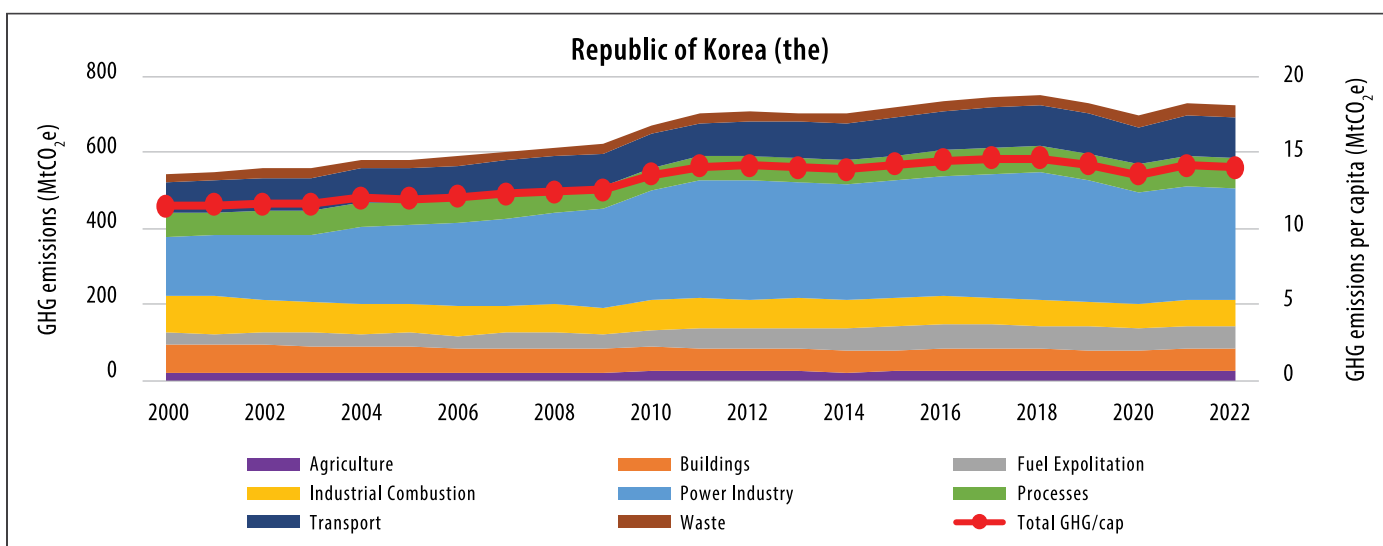
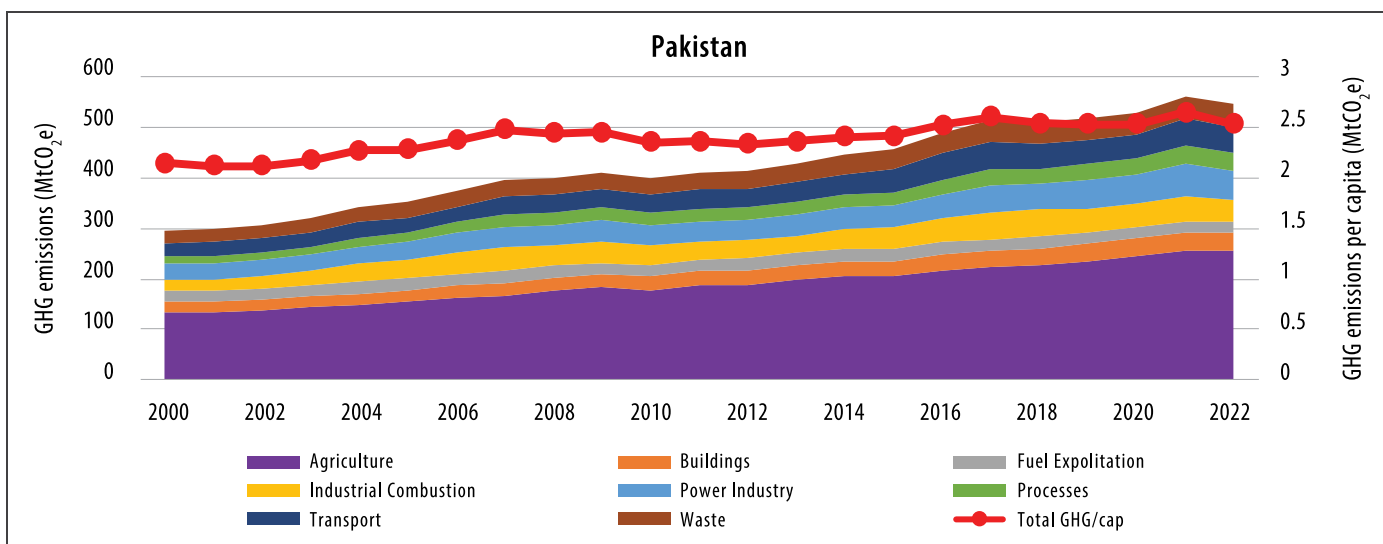
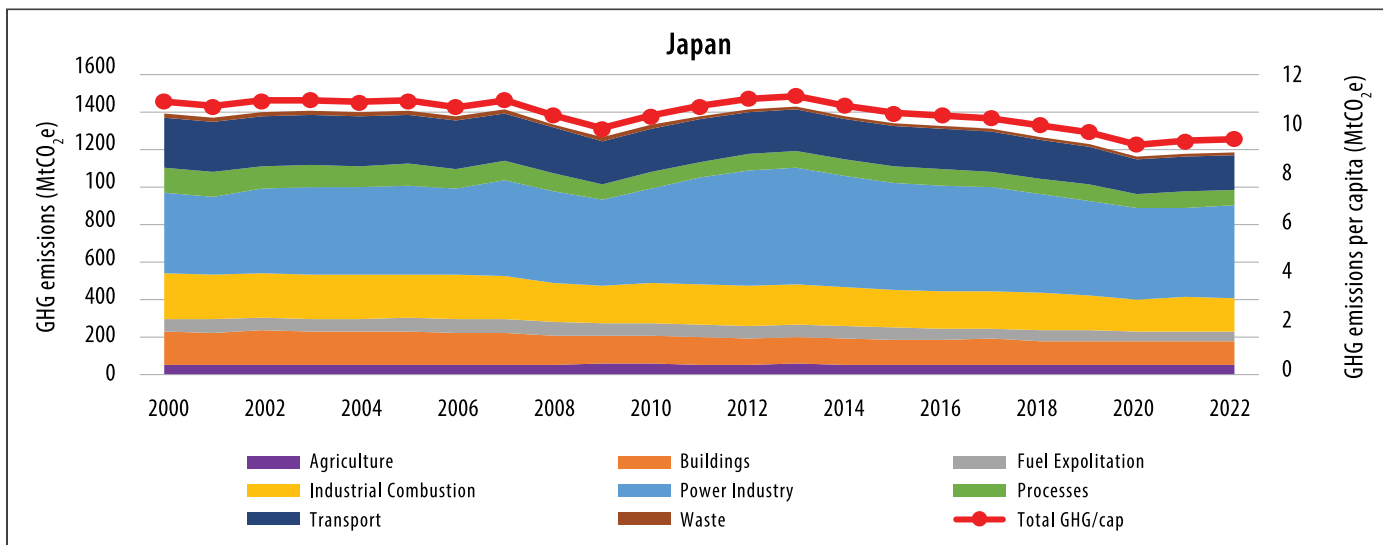
	COP26	COP27
Other outcomes	<ul style="list-style-type: none"> Established Taskforce on Access to Climate Finance. Various financial pledges. Agreed on three-year Work Programme on Local Communities and Indigenous People. Established annual ocean-climate dialogue. Established the Forest, Agriculture and Commodity Trade (FACT) Dialogue with 28 countries. 45 countries endorsed the Breakthrough agenda on Agriculture, Power, Hydrogen, Steel and Road Transport. Established the Energy Transition Council. Launched the Green Grids Initiative. Progress on ZEVs; Transition Council and International Assistance Taskforce. 22 country signatories to the Clydebank Declaration on green shipping corridors International Aviation Climate Ambition Coalition of 21 countries 150 organisations and governments supporting the Global Action Agenda on Innovation in Agriculture 16 countries launched the Policy Action Agenda for Sustainable Agriculture Announced 165 million pounds to boost women’s climate leadership. Launched the Global Science Partnership for Net Zero. 	
New/updated NDCs	<ul style="list-style-type: none"> By August 2021, according to ESCAP/UNEP/ UNWOMEN 2021 NDC Review Report, a total of 30 Asia-Pacific regional member States communicated new or updated NDCs, 6 of which were a second NDC submission. 	<ul style="list-style-type: none"> By August 2022, according to the ESCAP/ UNEP/UNICEF 2022 Review of Climate Ambition Report, a total of 38 Asia-Pacific regional member States communicated new or updated NDCs, and 7 submitted a second updated NDC.

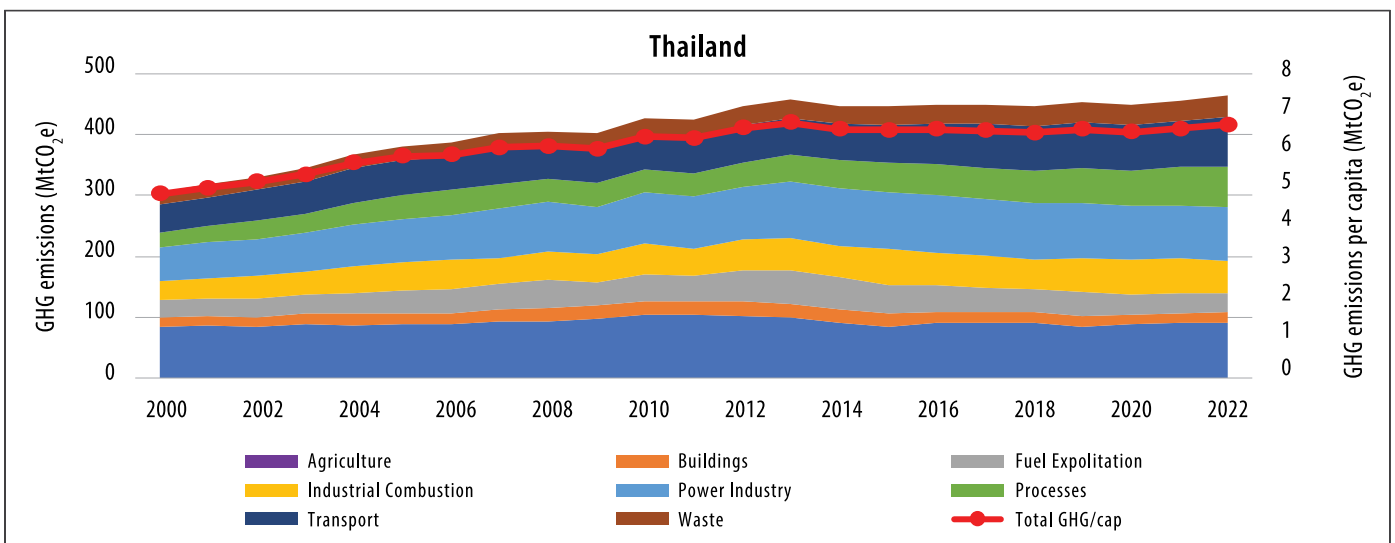
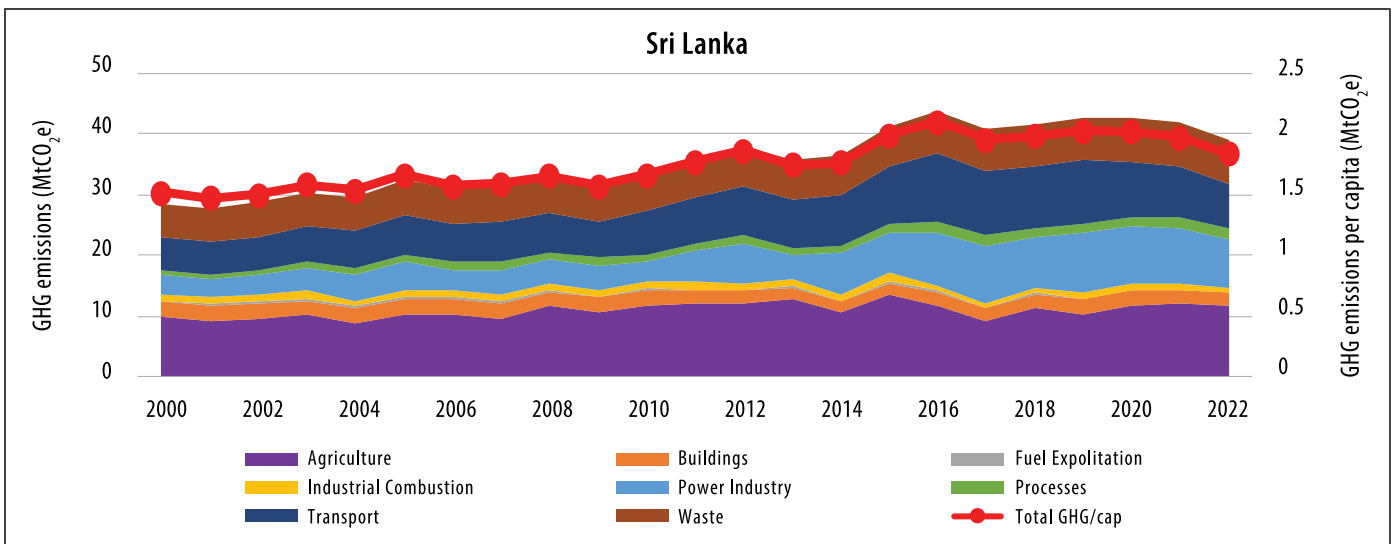
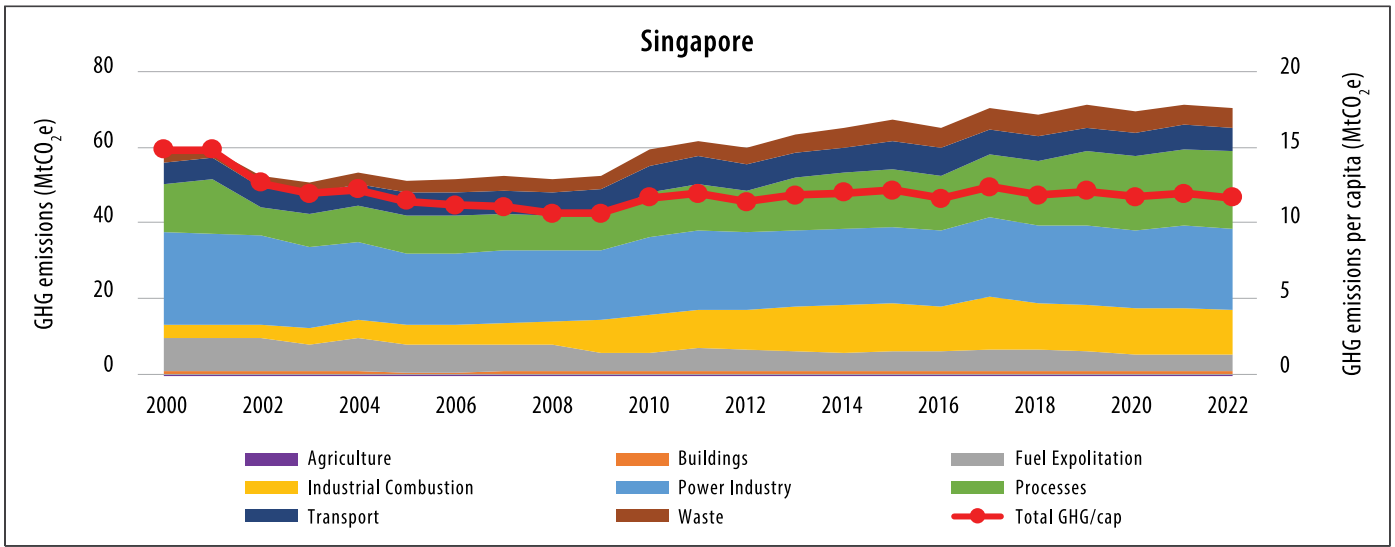
Annex II. 2023 Status of Carbon Neutrality pledges

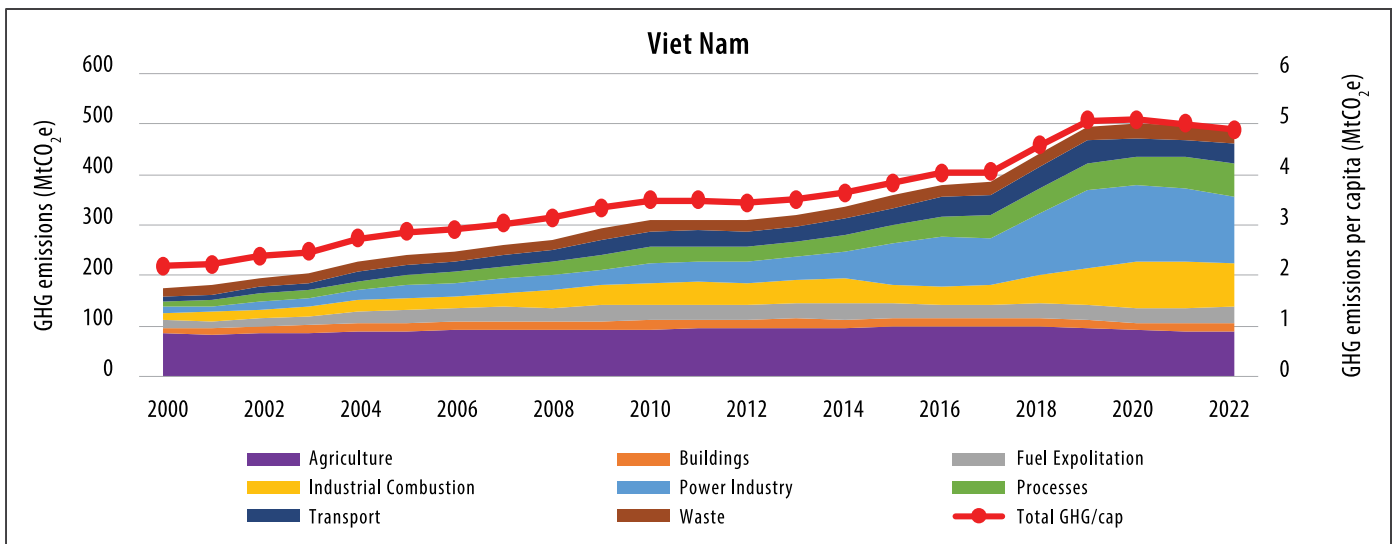
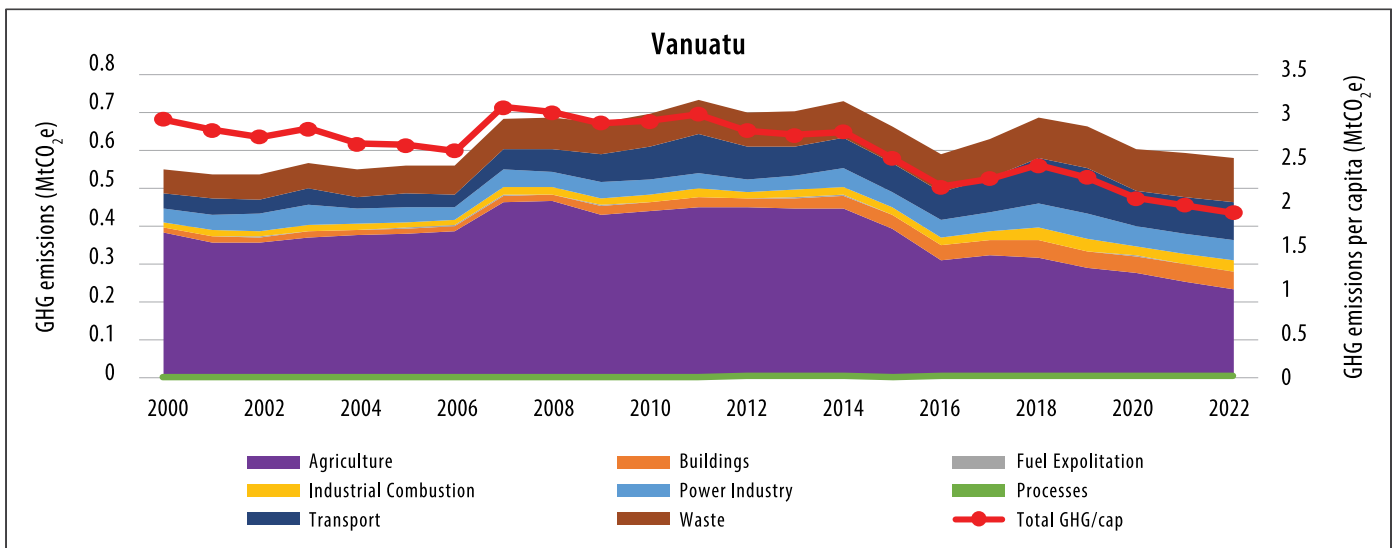
Achieved	Adopted a Law	Policy Document		Declaration/Pledge		Not Yet Considered
Bhutan	Australia	China	Cambodia	Afghanistan	Pakistan	Azerbaijan
	Fiji	Kazakhstan	Indonesia	Armenia	Palau	Bangladesh
	Japan	Malaysia	Lao People's Democratic Republic	Brunei Darussalam	Papua New Guinea	Georgia
	Maldives	Nauru	Marshall Islands (the)	Kyrgyzstan	Russian Federation (the)	Iran (Islamic Republic of)
	New Zealand	Singapore	Nepal	Kiribati	Samoa	Tajikistan
	Republic of Korea (the)	Sri Lanka	Solomon Islands	India	Tonga	Democratic People's Republic of Korea (the)
		Uzbekistan	Thailand	Micronesia (Federated States of)	Türkiye	Philippines
			Viet Nam	Myanmar	Tuvalu	Mongolia
					Vanuatu	Timor-Leste
						Turkmenistan

Annex III. Trends in sectoral GHG emissions of the 12 "pace-setters" in the Asia-Pacific region









Annex IV. Data on the glaciers region-wide coverage

The figure below shows region-wide area covered by the glaciers, and glacier mass balances expressed in meters water equivalent per year (m.w.e. per year) from different regions in the HKH over the periods 1975–1999, 2000–2009, and 2010–2019.

Region	Glacier Area (km ²)	1975-1999	2000-2009	2010-2019
West Kunlun	8,141	0.02 ± 0.14	0.2 ± 0.05	-0.01 ± 0.04
East Kunlun	3,254	0.06 ± 0.12	-0.01 ± 0.04	-0.14 ± 0.04
Qilian Shan	1,640	±	-0.24 ± 0.05	-0.33 ± 0.06
Inner Tibet	7,923	-0.23 ± 0.1	-0.22 ± 0.04	-0.39 ± 0.05
South-east Tibet & Nyainqentanglha	3,876	-0.11 ± 0.14	-0.5 ± 0.09	-0.78 ± 0.1
Hindu Kush	2,941	-0.11 ± 0.13	-0.1 ± 0.06	-0.23 ± 0.05
Karakoram	22,881	-0.07 ± 0.05	-0.03 ± 0.05	-0.09 ± 0.04
Spiti-Lahaul-West Himalaya	7,776	-0.12 ± 0.09	-0.32 ± 0.05	-0.36 ± 0.06
Central Himalaya	5,450	-0.25 ± 0.1	-0.34 ± 0.05	-0.4 ± 0.06
Eastern Himalaya	4,904	-0.25 ± 0.08	-0.41 ± 0.06	-0.51 ± 0.07
West Nyainqentanglha	4,386	-0.19 ± 0.14	-0.53 ± 0.1	-0.66 ± 0.1
Overall status in the HKH	73,173	-0.12 ± 0.18	-0.17 ± 0.05	-0.28 ± 0.05

Source: International Centre for Integrated Mountain Development (ICIMOD), “Water, ice, society, and ecosystems in the Hindu Kush Himalaya: An outlook”, Nepal, 2023. Available at <https://doi.org/10.53055/ICIMOD.1028>

Annex V. Data on the mangrove forest cover change in the Asia-Pacific region

The table below shows the change in mangrove forest cover extent over the last four decades, from 1980 – 1990. The figures for 1980 and 1990 are from the FAO assessments which come from different sources, and may not be consistent with the figures from 1996 to 2020 from the consistent estimates of global mangrove forest extents.

Region	Year	Extent (km ²)	Annual change (km ²)	Change from 1996 (km ²)	Change from 1996 (%)
Asia-Pacific	1980	98,950.00			
	1990	87,820.00			
	1996	78,146.35			
	2007	76,413.79	-157.51	-1,732.56	-2.22
	2008	75,596.75	-817.05	-2,549.61	-3.26
	2009	75,471.84	-124.90	-2,674.51	-3.42
	2010	75,228.34	-243.51	-2,918.02	-3.73
	2015	74,811.38	-83.39	-3,334.97	-4.27
	2016	74,637.03	-174.36	-3,509.33	-4.49
	2017	74,669.22	32.20	-3,477.13	-4.45
	2018	74,784.23	115.00	-3,362.13	-4.30
	2019	74,813.69	29.47	-3,332.66	-4.26
	2020	74,808.56	-5.13	-3,337.79	-4.27

Source: P. Bunting, P., and others, "Global Mangrove Extent Change 1996 – 2020: Global Mangrove Watch Version 3.0", *Remote Sensing*, vol. 14, No. 15 (July 2022).

Annex VI. Data on forest cover change in the Asia-Pacific region

Forest cover area, in the ESCAP countries, has been extracted from the Forest Resources Assessment (FRA), 2020, conducted by the FAO. The Assessment is based on two primary sources of data: Country Reports prepared by National Correspondents and remote sensing that is conducted by FAO together with national focal points and regional partners (FAO, 2020). The “FRA is a country-driven process, which is based on official statistical data reported to FAO by Members. The work of FRA is guided by the FAO’s governing and statutory bodies” (APCF, 2022).

Country	2010	2020	Loss/Gain	Loss/Gain %
Afghanistan	1208.44	1208.44	0	0
American Samoa	17.43	17.13	-0.3	-1.72117
Armenia	330.56	328.47	-2.09	-0.63226
Australia	129,546.10	134,005.10	4459	3.442018
Azerbaijan	1032.49	1131.77	99.28	9.615589
Bangladesh	1888.34	1883.4	-4.94	-0.26161
Bhutan	2705.29	2725.08	19.79	0.73153
Brunei Darussalam	380	380	0	0
Cambodia	10,589.23	8068.37	-2520.86	-23.8059
China	200,610.38	219,978.18	19367.8	9.654436
Cook Islands	15.59	15.59	0	0
Fiji	1073.24	1140.02	66.78	6.22228
French Polynesia (Desk study)	149.46	149.46	0	0
Georgia	2822.4	2822.4	0	0
Guam	24	28	4	16.66667
India	69,496	72,160	2664	3.833314
Indonesia	99,659.20	92,133.20	-7526	-7.55174
Iran (Islamic Republic of)	10,691.98	10,751.87	59.89	0.560139
Japan	24,966	24,935	-31	-0.12417
Kazakhstan	3082.18	3454.68	372.5	12.0856
Kiribati (Desk study)	1.18	1.18	0	0
Kyrgyzstan	1229.68	1315.38	85.7	6.969293
Lao People’s Democratic Republic	16,940.50	16,595.50	-345	-2.03654
Malaysia	18,947.65	19,114.04	166.39	0.878156
Maldives	0.82	0.82	0	0
Marshall Islands (the)	9.4	9.4	0	0
Micronesia (Federated States of)	64.13	64.42	0.29	0.452206
Mongolia	14,183.90	14,172.78	-11.12	-0.0784

Myanmar	31,441	28,543.89	-2897.11	-9.21443
Nauru (Desk study)	0	0	0	0
Nepal	5962.03	5962.03	0	0
New Zealand	9848.12	9892.59	44.47	0.451558
Northern Mariana Islands	30.32	24.36	-5.96	-19.657
Pakistan	4093.73	3725.9	-367.83	-8.9852
Palau	40.56	41.41	0.85	2.095661
Palestine (Desk study)	9.95	10.14	0.19	1.909548
Papua New Guinea	36,178.89	35,855.76	-323.13	-0.89315
Philippines (the)	6839.72	7188.59	348.87	5.100647
Republic of Korea (the)	6387	6287	-100	-1.56568
Samoa	166.49	161.67	-4.82	-2.89507
Singapore	17.74	15.57	-2.17	-12.2322
Solomon Islands	2530.28	2522.97	-7.31	-0.2889
Sri Lanka	2103.62	2113.02	9.4	0.446849
Tajikistan	410	423.8	13.8	3.365854
Thailand	20,073	19,873	-200	-0.99636
Tonga	8.95	8.95	0	0
Turkmenistan (Desk study)	4127	4127	0	0
Tuvalu	1	1	0	0
Uzbekistan	3349.6	3689.66	340.06	10.15226
Vanuatu	442.3	442.3	0	0
Viet Nam	13,388.06	14,643.09	1255.03	9.374248
Russian Federation (the)	815,135.60	815,311.60	176	0.021591
New Caledonia (Desk study)	839.02	838.02	-1	-0.11919
Total forest cover in ESCAP	1577099.6	1577099.6		
Total loss in forest cover in ESCAP (2010-2020)	-14350.64	-0.909938754		
Total gain in forest cover in ESCAP (2010-2020)	29554.09	1.873952091		
Net gain/loss in forest cover in ESCAP (2010-2020)	15203.45	0.964013337		

Source: Data has been taken from Food and Agricultural Organization of the United Nations, "Forest area (1990-2020/1000ha)", n.d. Available at <https://data.apps.fao.org/catalog/dataset/forest-area-1990-2020-1000-ha>

Annex VII. Key elements and guidelines for just transition

The ILO conceptualizes that “a just transition involves maximising the social and economic opportunities of climate action while minimising and carefully managing any challenge – including through effective social dialogue and respect for fundamental principles and rights at work” (ILO, 2015). Just transition is a process that promotes the equitable and sustainable transformation of economies and societies towards low-carbon, climate-resilient, and environmentally sustainable development. It seeks to ensure that the benefits and costs of this transition are distributed fairly among all stakeholders, including workers, employers, communities, and vulnerable groups, with a particular focus on those who may be adversely affected.

The Guidelines for Just Transition, that have been published by ILO in 2015 (ILO, 2015), outline several principles, which concern not only climate change but also other environmental issues such as biodiversity and pollution, and are described below:

1. Social Dialogue and Participation: Just transition requires the active involvement of all stakeholders, including workers’ and employers’ organizations, governments, and civil society. Social dialogue and participation are essential to ensure that the concerns and perspectives of all groups are taken into account in decision-making processes related to the transition.

2. Rights-based Approach: Just transition should be based on internationally recognized labour standards, human rights, and principles of social justice. It should prioritize the protection and promotion of workers’ rights, including the right to organize, the right to safe and healthy working conditions, and the right to social protection.

3. Skills Development and Training: The transition to a green economy necessitates the development of new skills and competencies. Just transition strategies should include comprehensive and accessible skills development and training programs to facilitate the transition of workers from declining industries to emerging green sectors. The focus should be on providing lifelong learning opportunities to ensure workers’ employability and job security.

4. Social Protection and Support: Measures should be in place to protect workers and communities affected by the transition. This includes income support, social protection, job placement services, and support for entrepreneurship and small enterprises. Special attention should be given to vulnerable groups, such as workers in informal sectors and marginalized communities.

5. Job Creation and Investment: Just transition aims to create decent and sustainable employment opportunities in green sectors. Governments, employers, and other stakeholders should collaborate to promote green investments, including renewable energy, energy efficiency, sustainable agriculture, and waste management. These investments should be accompanied by policies that foster decent work, fair wages, and good working conditions.

Annex VIII. Green jobs encompass various transitions aimed at reducing environmental impacts

Green jobs as advocated by the green and decent jobs initiative of ILO are defined as employment opportunities that contribute to environmental sustainability, support the transition to a low-carbon economy, and help address climate change challenges. These jobs are found in sectors such as renewable energy, energy efficiency, sustainable transportation, sustainable buildings, waste management, and agriculture. Green jobs not only involve working in sectors that contribute to environmental sustainability but also encompass transitioning away from dirty industries and processes towards cleaner alternatives. This shift is crucial for mitigating the negative environmental impacts associated with activities such as coal-fired power generation and chemical-intensive textile dyeing.

Guidelines for Green Jobs

- 1. Decent Work Principles:** Green jobs should adhere to the principles of decent work, including respect for workers' rights, fair wages, and safe and healthy working conditions. They should provide opportunities for skill development, career advancement, and social protection.
- 2. Sustainability and Environmental Responsibility:** Green jobs should contribute to environmental sustainability by reducing greenhouse gas emissions, conserving resources, and promoting sustainable practices. They should prioritize renewable energy sources, energy efficiency, and the circular economy.
- 3. Gender Equality and Social Inclusion:** Green jobs should promote gender equality and social inclusion. Efforts should be made to address the underrepresentation of women, indigenous communities, and other marginalized groups in green sectors. Equal opportunities and fair treatment for all workers should be ensured.
- 4. Training and Capacity-Building:** Green jobs require specific skills and knowledge related to environmental protection and sustainable practices. Training and capacity-building programs should be provided to equip workers with the necessary competencies and support their career development in green sectors.
- 5. Monitoring and Evaluation:** Regular monitoring and evaluation mechanisms should be established to assess the quality, quantity, and impact of green jobs. This information can inform policy decisions and ensure that green job creation remains aligned with sustainability goals and just transition principles.

Source: International Labour Organization, "The Green Jobs Programme of the ILO", Geneva, 2009. Available at <https://www.ilo.org/public/libdoc/ilo/2009/447728.pdf>.

Annex IX. The Philippines Green Jobs Act 2016

The Philippines' current policy environment created an impact on the Philippine labor market, by creating more green jobs. The estimated number of green jobs created, across different sectors in 2014:

- Renewable energy and biofuels – 14,604 green jobs
- Sustainable Transport – 163,439 or 7 per cent of total estimated jobs in transport
- Green building and construction – 211,090 green jobs
- Sustainable agriculture and forestry
 - Organic agriculture – 14,160-118,000 green jobs
 - Sustainable forest management – 35,125 green jobs
 - Sustainable aquaculture – 113,096 green jobs

To ensure just transition, the government is also pursuing labour market skills development, and strengthened social protection and occupational safety and health:

- Greening the Technical-Vocational Education and Training (YVET) System, which led to the adoption of TESDA training regulations on green technology (e.g.. pest management, photovoltaic systems, hydroponics, vertical gardening, and seaweed farming).
- Establishment of the TESDA Green Technology Center, which serves as a green skills hub offering technical/vocational education courses to train workers in skills needed for emerging green areas
- Social protection floor (spf) for active age, which covers emergency employment, livelihood programs, apprenticeship, and social insurance.
- Occupational safety and health, which entails evaluating the hazards and risks to workers in all green jobs, processes and products through the implementation of risk assessment and management measures.

Annex X. UNIDO: Electric mobility success stories in just transition

The governments of many countries have recognized the benefits provided by electric vehicles (EVs) and have implemented policies aimed at transitioning the base of their country's automobile sector from conventional fossil fuel to electricity. As the transition to electric mobility involves multiple stakeholders, the policies act as a guide for them to direct their actions to enable the uptake of electric mobility. A rapid transition to EVs would increase the risk of disruption, especially against the current backdrop of rising trade barriers and resource nationalism. EV adoption is likely to influence geopolitics through several interrelated mechanisms, including international trade, energy security, competition over strategic resources and just transition. To overcome these changes, UNIDO in partnership with Global Environment Facility (GEF) has implemented projects to drive electric mobility in several Asian countries.

China

The growth of China's electric vehicle market has been accompanied by a corresponding growth in demand for the electricity required to charge these vehicles. The Integrated Adoption of New Energy Vehicles in China (IANEV, July 2017 – late 2022) project was developed to test strategies for decoupling the growth of EVs from a reliance on China's carbon-intensive national grid. The project tested technologies and processes through city-level pilot initiatives that deployed infrastructure such as charging stations, renewable energy (RE) micro-grids, smart-meters and data monitoring centres. The IANEV also undertook extensive policy work, developing policy recommendations, roadmaps, technical standards and institutional plans for both stimulating EV uptake and for supporting 'EV-RE integration'; increasing use of RE in EV charging; and increasing use of EVs as a means for supporting RE integration within the national grid. The IANEV was supported by \$8.93 million from the GEF with a further \$172 million in cash and in-kind co-financing from Chinese institutions and delivery partners. UNIDO served as the GEF implementing agency, supporting project oversight and providing technical inputs where required. China's Ministry of Industry and Information Technologies (MIIT) served as the executing agency and appointed the China Society for Automotive Engineers (CSAE) to manage and monitor day-to-day delivery of the IANEV.

Malaysia

The project, Energy Efficient Low Carbon Mobility in Malaysia (EELCT, Oct 2015 – Mar 2020) received grants of \$2.0 million from the GEF, combined with \$6,050,000 in cash, and \$22,670,000 in-kind co-financing from Malaysian partners, and was executed by the Malaysian Green Technology and Climate Change Centre (MGTC). The project was a pioneering project by the transport sector to embark on the acceleration of widespread use of EVs as part of the energy efficient low carbon transport and low carbon initiatives in Malaysia. The project's achievements include increased policy development and stakeholder development on low carbon transport: the project developed and launched a Low Carbon Mobility Blueprint and Action Plan for Land Transportation 2021-2030 (LCMB) in 2020. The blueprint presents a holistic plan for Malaysia to adopt clean energy-based transport. Key ministries and agencies, transport associations, fuel suppliers and car manufacturers in Malaysia all actively participated in the formulation of the plan via workshops and focus group discussions. In addition, the LCMB served as a foundation for the project team to later on successfully develop a Low Carbon Langkawi Island Plan.

The project activated interest in investment in EV Charging. Pilot demonstration projects for photovoltaic based (PV) energy storage EV chargers in partnership with the private sector have succeeded in convincing direct beneficiaries on the potential for higher capacity replication of the system. The two demonstration projects differentiate from other EV chargers installed in the country because they are PV-based and integrated into the energy storage system. Ten slow chargers were installed on the Langkawi Island. The demonstrations were successful in providing the authorities and implementation agencies with the experience and confidence to scale up the technologies. Skills development and capacity-building for government officials were achieved. A National Occupational Standard was developed for installation and maintenance of EV charging stations. This will lead to the creation of certified installers for EV charging stations. The further development of related EV competency training will be conducted by Skill Malaysia in cooperation with the MGTC as part of project continuation.

Lessons learned toward reaching full electric mobility and just transition in Asian countries

1. Creating a sustainable marketing demand is essential to ensure long-term low carbon mobility uptake after the project ends. Therefore multiple 'viable and locally created' showcases are needed and long-term support for new technologies and services has to be ensured.
2. Electric mobility transition and domestic capacity in transport vehicle production are intertwined since multiple product and spare part suppliers and maintenance options are needed to create a competitive and conducive environment. For example, an imported brand without local production and service base is unlikely to become a viable option.
3. Electromobility has to fit into local needs, and the local climate and technology has to be adapted accordingly as countries in Asia and the Pacific are located in different climatic zones. It would be challenging for technologies that have been tested and used in cold and dry weather conditions to be used in hot and humid climate conditions. For instance, the hot climate seems to have a negative impact on durability and capacity of the batteries.
4. Electromobility is seen as an attractive and convenient technology to reduce transport emissions ("Cool EV cars" are driving the change), but most of the existing EVs do not focus on high efficiency. For some companies, the decision to utilize EVs is seen as part of their sustainability strategies and not as business cases.
5. Building the capacity of local experts, mostly technicians, is a key to upscale the use of electric vehicles nationwide, given the fact that the highly skilled technicians are in those countries that rely on fossil-fuel run internal combustion engines.
6. Driving the transition to electric mobility requires different stakeholders than those in the conventional fossil-fuel base. A dedicated inter-ministries platform to drive the electric mobility sits at the cornerstone of success.
7. Systemic gender mainstreaming policy and action plans are required to ensure women professionals are included and considered in a country's transition to electric mobility. For instance, safety rules and standards on electric vehicles need to take women's physical needs and attributes into the guidelines during the development.

Annex XI. Thailand: Implementing just transition in the energy sector through evidence-based policies

The electrification of the transport sector, and the increasing uptake of the share of electric vehicles that are replacing internal combustion engine (ICE) vehicles fuelled by oil, could play a major role in achieving low-carbon economies. Thailand has set a zero-emission vehicle (ZEV) goal to achieve 50 per cent of electric vehicles (EVs) sold and locally produced by 2030, and indicated “30/30 policy” which works towards a target of producing 725,000 EV cars and pick-ups, together with 675,000 EV motorcycles by 2030, which would constitute 30 per cent of all auto production. The promotion of EVs would impose challenges for existing automotive industries which would need to move towards electric vehicles, and the build-up of EV ecosystems, as well as in the willingness of consumers to switch to EVs. At the same time, the growth of electric vehicles could also have significant impacts on oil and biofuel industries given that, as an agriculture-based economy, Thai energy crop farmers and actors in bioenergy value chains have enjoyed biofuel policies for decades.

In partnership with the Korean Energy Agency (KEA), and under the guidance of the Department of Alternative Energy and Energy Efficiency (DEDE) Ministry of Energy, Thailand, and UNIDO, a low carbon policy project financed by the Republic of Korea aims to create evidence-base low carbon policies in response to these policy challenges and equip policymakers with solid and empirical data to inform their policy decisions.

The following recommendations are made to achieve just transition in the energy sector:

1. Policy suggestions for EV promotion
 - a. The Government should take prompt action to increase the availability of EV public charging stations and fast charging outlets throughout the country.
 - b. The measure of low-priority EV public charging needs to be reconsidered.
 - c. The Government should incentivize EV car-sharing businesses with charging infrastructure and designated parking areas. By doing so, the Government can create both a favourable environment for the growth of EV car-sharing services and the expansion of the charging network.
 - d. The Government should consider implementing a grace period within the EV roadmap policy to support and facilitate domestic EV production.
2. Policy suggestions for oil and biofuel business
 - a. The Government should clearly communicate the long-term policy direction (including plans, targets, and incentives) in the oil and biofuel industries to ensure that entrepreneurs can recognize the future prospects of these industries and align their business strategies accordingly.
 - b. Regarding the effects of the EV transformation trend, the Government should adopt mitigation policies for entrepreneurs in the oil and biofuel sectors.
 - c. The Government should consider measures to utilize the excess supply of ethanol in various end-products by implementing the excise tax exemption and the regulation revision.
 - d. The Government should establish a comprehensive ecosystem to support the domestic production of Sustainable Aviation Fuel (SAF). This ecosystem should encompass various aspects, including supply chain management, material storage tanks, the approval process for imported materials, and the creation of domestic demand.
 - e. The Government should expedite the development of institutional regulations and policy directions for green finances or green loans, aiming to support domestic investments in environmental businesses.

Annex XII. The Republic of Korea: Integrating just transition in the carbon neutrality plan

Starting with the establishment of the National Strategy and Framework Plan for Green Growth in 2009, the Republic of Korea declared its 2050 carbon-neutral vision in 2020. It enhanced its 2030 NDC, aiming to reduce emissions by 40 per cent by 2030 from the 2018 emission levels. In 2021, the “Framework Act on Carbon Neutrality and Green Growth to Tackle the Climate Crisis” (hereinafter referred to as the “Framework Act”) was enacted. Subsequently, the Government of the Republic of Korea introduced the “National Plan for Carbon Neutrality and Green Growth” (hereinafter referred to as the “National Plan”) in April 2023.

Both the Framework Act and the National Plan have dedicated chapters on just transition. The Commission on Carbon Neutrality and Green Growth (hereinafter referred to as the “Commission”), established under the Framework Act, comprises four sub-commissions, with one solely dedicated to just transition.

The law defines just transition as a policy direction aimed at protecting workers, farmers, small and medium-sized entrepreneurs, etc., in regions or industries that might face challenges during the transition to a carbon-neutral society.

Accordingly, the law specifies five major policies: the survey of the impacts on employment status; designation of special districts for just transitions; support for business conversion; minimization of the risk of property loss; and establishment of a just transition support centre.

The Ministry of Employment and Labour (MOEL) is required to report to the Commission every 5 years on the results of the survey regarding the expected impact during the transition to carbon neutrality. This includes measures such as employment support, vocational skills development training, and livelihood support. The MOEL and the Ministry of Trade, Industry, and Energy (MOTIE) will jointly determine the criteria for the designation of special districts and review applications from local governments for such designations, with a maximum period of five years in two-year increments. The MOTIE must also report to the Commission on measures like consulting support, financing, and funding to minimize the risk of asset loss for companies. The MOEL, MOTIE, and the designated local government for a just transition district may establish a just transition support centre. Currently, the MOEL has designated the Korea Employment Information Service (KEIS), and the MOTIE has designated the Korea Institute for Advancement in Technology (KIAT).

The National Plan, as per the Framework Act’s 20-year plan period, extends to 2042. It was finalized in April 2023 after deliberations by the Commission and approval at the Cabinet Meeting. The plan encompasses mitigation measures in ten main sectors: energy, industry, building, transport, agriculture and livestock farming, waste, hydrogen, carbon sinks, carbon capture, usage and storage (CCUS), and international mitigation. It also includes measures for climate change adaptation, green growth, just transition, local-led carbon neutrality, fostering human resources, raising awareness, and international cooperation.

Within the National Plan, there are five key measures for just transition, which include the aforementioned provisions in the law. These measures primarily focus on building the social foundations for just transitions, including employment impact surveys, supporting just transitions for industries and companies, ensuring job security during the transition to carbon neutrality and green growth, promoting region-based just transitions through special district designations, and providing proactive support to the agriculture and fisheries sectors for just transitions.

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