

**Summary of the 55th Session of the Intergovernmental Panel on Climate Change and the 12th Session of Working Group II: 14-27 February 2022**

As the impacts of climate change become increasingly apparent and widespread, the work of the Intergovernmental Panel on Climate Change (IPCC) and its Working Group II (WGII), in particular, is crucial to help the world truly understand what is at stake in order to take appropriate action to address this global problem. The task of WGII is to assess the impacts of climate change on human and natural systems at both the global and regional levels, and to consider their vulnerabilities, capacities, and limits to adapt and reduce climate-associated risks.

Delegates at the 12th session of IPCC WGII (WGII-12) were keenly aware of the need to strike a balance in how the Working Group communicates the science—ensuring that the Summary for Policymakers (SPM) conveys the seriousness and urgency of the situation without signaling that the situation is hopeless. As noted by Petteri Taalas, Secretary-General, World Meteorological Organization (WMO), climate change is impacting mental health, especially of young people who are experiencing “apocalyptic fear.” He stressed that “fear” should be targeted towards decision-makers, not young people. On the other hand, Inger Andersen, Executive Director, United Nations Environment Programme (UNEP), noted the WGII report warns about the dire consequences of inaction, addresses the climate anxiety many are feeling, and highlights that taking action can deal with the anxiety.

Delegates and authors worked together during the two weeks of the session to finalize the SPM, which presents the key findings of “Climate Change 2022: Impacts, Adaptation and Vulnerability,” which is the WGII contribution to the IPCC’s Sixth Assessment Report (AR6). Some of these findings include:

- human-induced climate change has caused widespread adverse impacts and related losses and damages to nature and people;
- approximately 3.3 - 3.6 billion people live in contexts that are highly vulnerable to climate change;
- current unsustainable development patterns are increasing exposure of ecosystems and people to climate hazards;
- many natural systems are near the hard limits of their natural adaptation capacity and additional systems will reach limits with increasing global warming;

- feasible and effective adaptation options are available and can reduce risks to people and nature;
- enabling conditions, such as political commitment and follow-through, institutional frameworks, adequate financial resources, and monitoring and evaluation, are key for adaptation;
- maladaptive responses to climate change can create lock-ins of vulnerability, exposure, and risks that are difficult and expensive to change and that exacerbate existing inequalities; and
- climate resilient development (CRD) action at the global level is more urgent than previously assessed in the Fifth Assessment Report (AR5).

The 55th session of the IPCC (IPCC-55) and WGII-12 ran significantly over time—finishing about 40 hours after the originally scheduled close. The meetings convened virtually from 14-27 February 2022.

**A Brief History of the IPCC**

The IPCC was established in 1988 by WMO and UNEP to assess, in a comprehensive, objective, open, and transparent manner, the scientific, technical, and socio-economic information relevant to understanding human-induced climate change, its potential impacts, and adaptation and mitigation options. The IPCC is an intergovernmental and scientific body with 195 member countries.

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It does not undertake new research or monitor climate-related data; rather, it conducts assessments of the state of climate change knowledge based on published and peer-reviewed scientific and technical literature. IPCC reports are intended to be policy relevant, but not policy prescriptive, and they provide a key input into international climate change negotiations

The IPCC has three Working Groups (WGs):

- WGI addresses the physical science basis of climate change.
- WGII addresses climate change impacts, adaptation, and vulnerability.
- WGIII addresses options for reducing greenhouse gas (GHG) emissions and mitigating climate change.

Each WG has two Co-Chairs and seven Vice-Chairs, with the exception of WGII, which has eight Vice-Chairs. The Co-Chairs guide the WGs in fulfilling their mandates with the assistance of Technical Support Units (TSUs). In addition, the IPCC also has a Task Force on National Greenhouse Gas Inventories (TFI), also supported by a TSU, to oversee the IPCC National GHG Inventories Programme. The Programme's aims are to develop and refine an internationally agreed methodology and software for calculating and reporting national GHG emissions and removals and to encourage its use by parties to the UN Framework Convention on Climate Change (UNFCCC).

The Panel elects its Bureau for the duration of a full assessment cycle, which includes the preparation of an IPCC assessment report that takes between five and seven years and any other special reports or technical papers that are published during that cycle. The Bureau is composed of climate change experts representing all regions, and includes the IPCC Chair and Vice-Chairs, WG Co-Chairs and Vice-Chairs, and TFI Co-Chairs. The IPCC has a permanent Secretariat, which is based in Geneva, Switzerland, and is hosted by the WMO.

### IPCC Products

Since its inception, the Panel has prepared a series of comprehensive assessment reports and special reports that provide scientific information on climate change to the international community.

The IPCC has produced five assessment reports, which were completed in 1990, 1995, 2001, 2007, and 2014. AR6 is expected to be completed later in 2022. The assessment reports are structured in three parts, one for each WG. Each WG's contribution comprises a comprehensive assessment report (the "underlying report"), a Technical Summary (TS), and a Summary for Policymakers (SPM). Each of these reports undergoes an exhaustive and intensive review process by experts and governments, involving three stages: a first review by experts, a second review by experts and governments, and a third review by governments. Each SPM is then approved line-by-line by the respective WG and adopted by the Panel.

A synthesis report (SYR) is then produced for the assessment report as a whole, integrating the most relevant aspects of the three WG reports and special reports of that specific cycle and, finally, the Panel undertakes a line-by-line approval of the SPM of the SYR.

The IPCC has produced a range of special reports on climate change-related issues. The AR6 cycle includes three special reports:

- [Global Warming of 1.5°C \(SR1.5\)](#), which was approved by IPCC-48 in October 2018;
- [Climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems \(SRCCL\)](#), which was approved by IPCC-50 in August 2019; and

- [Ocean and Cryosphere in a Changing Climate \(SROCC\)](#), which was approved by IPCC-51 in September 2019.

In addition, the IPCC produces methodology reports, which provide guidelines to help countries report on GHGs. Good Practice Guidance reports were approved in 2000 and 2003, while the IPCC Guidelines on National GHG Inventories were approved in 2006. A Refinement to the 2006 Guidelines on National GHG Inventories (2019 Refinement) was adopted at IPCC-49 in May 2019.

In 2007, the Nobel Peace Prize was jointly awarded to the IPCC and former US Vice-President Al Gore, for their work and efforts "to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations needed to counteract such change."

### Sixth Assessment Cycle

**IPCC-41 to IPCC-43:** IPCC-41 (24-27 February 2015, Nairobi, Kenya) adopted decisions relevant to the AR6 cycle. IPCC-42 (5-8 October 2015, Dubrovnik, Croatia) elected Bureau members for the AR6 cycle. IPCC-43 (11-13 April 2016, Nairobi, Kenya) agreed to undertake two special reports (SRCCL and SROCC) and the 2019 Refinement during AR6, and, in response to an invitation from the 21st session of the Conference of the Parties to the UNFCCC, to prepare a special report on the impacts of limiting global warming of 1.5°C above pre-industrial levels (SR1.5). The Panel also agreed that a special report on cities would be prepared as part of the AR7 cycle.

**IPCC-44:** During this session (17-21 October 2016, Bangkok, Thailand), the Panel adopted outlines for SR1.5 and the 2019 Refinement, as well as decisions on, *inter alia*, a meeting on climate change and cities.

**IPCC Cities and Climate Change Science Conference:** This meeting (5-7 March 2018, Edmonton, Canada) produced a research agenda to better understand climate change impacts on cities and the critical role local authorities can play in addressing climate change.

**IPCC-45 to IPCC-47:** IPCC-45 (28-31 March 2017, Guadalajara, Mexico) approved the SRCCL and SROCC outlines, and discussed, *inter alia*: the strategic planning schedule for the AR6 cycle; a proposal to consider short-lived climate forcers (SLCFs); and resourcing options for the IPCC. IPCC-46 (6-10 September 2017, Montreal, Canada) approved the chapter outlines for the three WG contributions to AR6. During IPCC-47 (13-16 March 2018, Paris, France), the Panel agreed to, *inter alia*, establish a Task Group on Gender and draft terms of reference for a task group on the organization of the future work of the IPCC in light of the Global Stocktake under the Paris Agreement.

**IPCC-48:** During this session (1-6 October 2018, Incheon, Republic of Korea), the IPCC accepted SR1.5 and its Technical Summary and approved its SPM, which concludes that limiting global average temperature rise to 1.5°C is still possible but will require "unprecedented" transitions in all aspects of society.

**IPCC-49:** During this session (8-12 May 2019, Kyoto, Japan), the IPCC adopted the Overview Chapter of the 2019 Refinement and accepted the underlying report. IPCC-49 also adopted decisions on the terms of reference for the Task Group on Gender and on a methodological report on SLCFs to be completed during the AR7 cycle.

**IPCC-50:** During this session (2-7 August 2019, Geneva, Switzerland), the IPCC accepted the SRCCL and its Technical Summary and approved its SPM. A Joint Session of the three WGs, in cooperation with the TFI, considered the SPM line by line to reach agreement.

**IPCC-51:** This session (20-24 September 2019, Monaco) accepted the SROCC and its Technical Summary, and approved its SPM, following line-by-line approval by a Joint Session of WGs I and II.

**IPCC-52:** During this session (24-28 February 2020, Paris, France), the IPCC adopted the outline for the AR6 SYR, containing a stage-setting introduction and three sections: current status and trends; long-term climate and development futures; and near-term responses in a changing climate. The Panel also adopted the IPCC Gender Policy and Implementation Plan, which, among other things, establishes a Gender Action Team.

**IPCC-53:** This session (7-11 December 2020, online), which took place virtually due to the COVID-19 pandemic, addressed the IPCC Trust Fund Programme and budget. The Panel approved the revised budget for 2020 and revised proposed budget for 2021.

**IPCC-53 bis:** During this session (22-26 March 2021, online) the IPCC adjusted the strategic planning schedule for the AR6 cycle with regard to modalities for the approval plenary of the WGI report in light of the COVID-19 pandemic, and preparations for the election of Bureau members for the AR7 cycle. The Panel also established an *ad hoc* group with open-ended membership to provide recommendations to the Panel on the size, structure, and composition of the IPCC Bureau for AR7.

**IPCC-54:** IPCC-54 included the 14th session of WGI (WGI-14), and took place virtually from 26 July to 6 August 2021. The IPCC approved the WGI contribution to AR6, entitled “Climate Change 2021: The Physical Science Basis.” The report was finalized and officially published on 6 August 2021.

### IPCC-55 and WGII-12 Report

On Monday morning, 14 February, IPCC Chair Hoesung Lee opened IPCC-55. He welcomed all participants and underlined that the need for WGII’s work, dealing with climate change impacts, adaptation and vulnerability, has never been greater, as the stakes have never been higher. IPCC Secretary Abdalah Mokssit highlighted that the final product of the meeting, the SPM of the WGII contribution to AR6, is highly anticipated by the whole world.

WMO Secretary-General Petteri Taalas said the IPCC Special Report on Global Warming of 1.5°C (SR1.5) was a game changer, leading to 1.5°C being the desired outcome of climate mitigation. He stressed that the impacts of climate change are already visible the world over, adding that the science is understood and accepted by Heads of State, as demonstrated by their statements during the UN Climate Change Conference in Glasgow in November 2021.

UNEP Executive Director Inger Andersen noted the IPCC’s work underpins all climate action. She stressed that acknowledging the science and evidence is only the first step, and highlighted that UNEP’s Adaptation Gap Report 2021 shows the increase in impacts far outpaces efforts to adapt. Bettina Stark-Watzinger, German Federal Minister of Education and Research, outlined her country’s support for the IPCC and its climate action both in Germany and abroad. She called on other governments to support climate research beyond their borders.

In a written statement, UNFCCC Executive Secretary Patricia Espinosa stressed the WGII report is important for both assessing current adaptation efforts and identifying future challenges and opportunities to support countries moving forward, as well as for informing the Global Stocktake and Global Goal on Adaptation.

**Approval of the Provisional Agenda:** Secretary Mokssit introduced the provisional agenda (IPCC-LV/Doc.1), provisional annotated agenda (IPCC-LV/Doc.1, Add.1), and proposal for the organization of work (IPCC-LV/INF.1). The Panel adopted the provisional agenda as presented.

**Adoption of the IPCC-54 and IPCC-54 bis Reports:** Secretary Mokssit introduced the draft reports of IPCC-54 (IPCC-LV/Doc.2) and IPCC-54 bis (IPCC-LV/Doc.3). The Panel adopted both reports.

Chair Lee then suspended IPCC-55 until the completion of WGII’s work.

### Consideration and Approval of the WGII SPM

WGII Co-Chair Debra Roberts opened the 12th session of WGII and invited all to join the WGII “hot air balloon” journey circumnavigating the planet to oversee its vulnerability, adaptation options, potential, and limits.

WGII Co-Chair Hans-Otto Pörtner presented the draft SPM (WGII-12th/Doc.2a, Rev.1), highlighting its focus on the interactions of three coupled systems—climate, biodiversity, and human society. He outlined its structure, comprising a section on observed and projected impacts and risks, followed by “solution” sections addressing adaptation measures and enabling conditions and CRD.

In opening statements, INDIA expressed “very serious concerns” with the report, including what he referred to as: the weak formulation of the concepts of equity and social justice and their narrow application to the national level; the narrow and technical definition of development pathways limited to climate mitigation pathways; literature selection bias; and grossly understated limits to adaptation.

SAUDI ARABIA said the SPM should be clear about the use of scenarios or projections versus observations and lamented that energy security is not mentioned in the text despite evidence of energy poverty in many regions. SAINT KITTS AND NEVIS urged including concrete information in the text about future impacts such as droughts. JAMAICA said the SPM must highlight why 1.5°C must be the temperature goal.

The US urged consistent use of terms across the report. TANZANIA, IRELAND, REPUBLIC OF KOREA, SWITZERLAND, CANADA, and many others emphasized the need for clarity, simplicity, consistency, and traceability. The RUSSIAN FEDERATION suggested the reference to “human-induced” climate change, which excludes consideration of the impacts of natural climate change, be deleted from the WGII report.

SOUTH AFRICA commended the report’s inclusion of a full chapter on Africa under the leadership of an African author, given the region’s vulnerability. CANADA and AUSTRALIA welcomed the attention to Indigenous Peoples and native populations, with CANADA highlighting the presence of the Inuit Circumpolar Council as the first Indigenous organization with observer status in the IPCC.

AUSTRALIA cautioned against the overall negative language on adaptation and, with the RUSSIAN FEDERATION, called for a more balanced approach addressing the value of adaptation in managing risks. AUSTRALIA also objected to “the overdominance of nature-based solutions (NBS),” preferring to give a broader sense of available adaptation options.

During the plenary session on Monday, 21 February, some delegates provided further comments on the report in general. INDIA, supported by SAUDI ARABIA, expressed concerns with

what he perceived as the report's pessimism and placing most responsibility on national and subnational governments, with scant reference to international cooperation. SAUDI ARABIA also expressed concern with the "unbalanced" focus on lower levels of warming.

Delegates then considered the SPM. The different subsections of the SPM were first taken up in plenary, with delegates providing initial comments on each subsection. Delegates then met with authors in contact groups for further line-by-line consideration of the text. All text was then brought back to plenary for approval. In cases where agreement was not reached during an approval plenary session, text could be sent back to contact groups or into "huddles" among the delegates with the most divergent positions and the authors, usually facilitated by an IPCC Vice-Chair, to find compromise language. Throughout this process, the report's authors held regular meetings to consider comments received from delegates and to provide proposals to address these comments. They were also on hand to provide clarification and respond to questions. The outcomes of the authors' meetings and contact group and huddle discussions were captured in conference room papers that were published on the PaperSmart Portal and then discussed in plenary for acceptance by the full Working Group.

#### A. Introduction

Section A contains the introduction to the SPM. Discussing the sentence that recognizes the interdependence of climate, ecosystems and biodiversity, and human societies, INDIA, with SAUDI ARABIA, noted that this list of four elements differs from Figure SPM.1's list of three elements: climate change, biodiversity, and human society/wellbeing.

In a sentence on social justice and diverse forms of knowledge, the EU, with SWEDEN and ARGENTINA, suggested stating that the Assessment Report "considers," rather than "evaluates," the role of social justice. JAPAN and GERMANY suggested referring to "people's perception of" social justice. INDIA and GERMANY preferred Chapter 1 wording from the underlying report on different dimensions of "climate justice," which has an international framework. The US suggested clearly stating the purpose of the report. SAUDI ARABIA suggested deleting reference to "immediate global-scale action to reducing risks," saying this is policy prescriptive. GERMANY, with the UK, asked how Indigenous knowledge relates to IPCC literature, particularly gray literature. ARGENTINA requested adding "ancestral knowledge." SAUDI ARABIA queried "reducing risks" only "from human-induced climate change," saying attribution of climate change is beyond the scope of WGII.

Regarding a sentence noting the assessment is set against the current backdrop of large global trends, INDIA, with SAUDI ARABIA, took issue with the negative framing, citing the possibility of trends with a positive impact. SAUDI ARABIA preferred referring to trends "that may have future impacts on development" rather than "jeopardizing future development" altogether and, with CHINA, cautioned against including reference to the COVID-19 pandemic. Commenting on the list of global trends, SWEDEN and SAUDI ARABIA sought clarification of "modification of natural resources;" IRELAND proposed adding "threats to food production"; UKRAINE requested specifying extreme "climate and weather" events; SPAIN urged mention of unsustainable

consumption "and production," "ecosystem" rather than "land" degradation, and "socio-economic" rather than "social" inequalities, as well as including a reference to "human demographic shifts."

More generally, BELGIUM, opposed by FRANCE, recommended adding definitions of key terms. The US, with the UK and SAINT LUCIA, suggested a box on "core concepts," with language from the Technical Summary and Chapter 1. SWITZERLAND suggested using the definition of "planetary health" from the SROCC. The authors agreed that the use of a core concepts box would reduce the number of footnotes.

After the authors met to address these comments, the Co-Chairs introduced new text and corresponding footnotes for the introductory section, which were discussed in multiple plenary sessions.

TRINIDAD AND TOBAGO, supported by ECUADOR, suggested including the concept of loss and damage in the introduction, noting it is already reflected in Section B (Observed Impacts). She proposed language to reflect that the report also assesses economic and non-economic losses and damages.

Regarding a footnote defining the concept of key risk, the US, supported by GERMANY, called for removing a reference to UNFCCC terminology, saying it implies policy prescriptiveness.

Regarding a paragraph on *adaptation*, LUXEMBOURG proposed integrating the concept of adaptation limits. TRINIDAD AND TOBAGO suggested adding a statement that limits to adaptation exist and will be increasingly transgressed with increasing global warming. GERMANY proposed adding reference to hard and soft limits to adaptation, as well as language to reflect that adaptation limits will not always be increasingly "transgressed" with warming. The final text states that "adaptation is subject to hard and soft limits."

The Group discussed at length a paragraph on *diverse forms of knowledge in understanding and evaluating adaptation, and effective adaptation solutions that conform to the principles of justice*. GERMANY expressed concern with using the term "climate justice," noting the paragraph focuses on justice as a broader concept that also includes procedural justice. The US pointed to language in the report stating that the concept of "climate justice" is used in different ways in different contexts by different communities, noting a specific definition would contradict this. The final text outlines principles of climate justice, while reflecting the concerns raised by the US. Definitions of social and climate justice are included in a footnote.

In a paragraph on *system transitions*, SAINT KITTS AND NEVIS and TRINIDAD AND TOBAGO called for reference to the assessment of economic and non-economic losses and damages, and keeping it separate from the sentence stating that achieving low global warming levels would avoid many limits to adaptation. This was accepted.

**Figure SPM.1:** This figure illustrates that **addressing climate change relies on considering the interactions between climate, biodiversity and human society as coupled systems**. It consists of two panels on: (a) current interactions and trends; and (b) solution options applied in response to climate risks, establishing resilience.

Delegates agreed the figure shows great improvement over previous versions but bemoaned its complexity and lack of clarity. On panel (a), several delegates requested additional elements, such as: economic systems; natural resources, biosphere, and/or

geosphere rather than just “biodiversity”; climate change or climate hazards; and ecosystem services. The authors agreed to improve the language to better reflect these trends.

On panel (b), numerous delegates queried three blue dots outside the main circle, representing “Common goals” of: “From urgent to timely action”; “Ecosystem health, Planetary health”; and “Human health & wellbeing, economic & social resilience.” The authors clarified these are important ideas regarding systems transitions that link to the central concepts of climate and human systems.

JAPAN called for better reflecting the relationship between action (CRD) and outcome (limiting global warming) in panel (b). ARGENTINA urged integrating human health into the figure. SOUTH AFRICA took issue with the word “solutions,” noting that the figure displayed options and measures to reduce risk, but not solutions to climate change. CHILE reiterated that not all risks and impacts will have a solution, noting some are irreparable, and suggested reflecting this in the introductory text to the figure.

Following further consultations, the authors presented a revised figure for consideration. BELGIUM requested text defining “ecosystem transition.” INDIA objected to the revision of the title to include biodiversity, with Co-Chair Pörtner noting that biodiversity loss is a major trend and its inclusion recognizes this and the joint work of IPCC and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The authors agreed to SPAIN’s suggestion to add “rural” to a list of human systems transitions in panel (b). The figure was approved with these and other minor edits.

On the caption, a sentence on meeting the objectives of CRD was modified, in response to BELGIUM and IRELAND, to explain that this requires society and “ecosystems to move over (transition) to a more resilient state.” The caption was approved.

**Box SPM.1. AR6 Common Climate Dimensions, Global Warming Levels and Reference Periods:** In the opening sentence of a paragraph on *assessment of climate risks*, CANADA called for consistency in using “levels” to refer to global warming, not changes in climate. SAUDI ARABIA sought clarification of a statement that “WGII also assesses literature that is based on an integrative Shared Socio-economic Pathways (SSPs)-Representative Concentration Pathways (RCPs) framework where climate projections obtained under the RCP scenarios are analyzed against the backdrop of various SSPs” and asked if the quantitative analysis of development trajectories represented in the pathways includes national and regional information. Co-Chair Pörtner noted the WGII assessment covers a wide range of literature on impacts, but not the most recent scenario developments used by WGI because they were not yet available during the assessment.

INDIA requested acknowledging that RCPs are from AR5 and, with SAUDI ARABIA, called for restating WGI’s qualifiers on the models used in its report, including specific assumptions underlying the SSPs. He also asked if the same “multiple lines of evidence” were used in both WGs.

In a paragraph on *increase in global surface temperature*, GERMANY, CANADA, and IRELAND said reference to increases in temperature since the period 2003-2012 was better detailed by WGI. The US suggested bringing forward language from paragraph A.1.2 of the WGI SPM to help clarify that this statement does not represent additional warming.

Regarding a sentence on global warming of 1.5°C relative to 1850-1900 being reached or surpassed in the near-term, SAINT KITTS AND NEVIS supported using information from WGI and referring to the “likelihood” of exceeding 1.5°C in the near term. GERMANY recommended adding that “in the long term, 1.5°C will not be exceeded in the scenarios with the lowest emissions.”

The REPUBLIC OF KOREA queried the use of phases 5 and 6 of the World Climate Research Programme’s Climate Model Intercomparison Project (CMIP5, CMIP6). Co-Chair Pörtner cautioned that Box SPM.1 should not be a “mini assessment” of WGI scenarios but simply give the context of the models and scenarios used in the WGI report and any information from it that is relevant for the WGII SPM. The authors explained that because WGII literature depends on climate projections of the past, such as CMIP5, WGII used RCP-based projections and variables even though newer literature uses CMIP6. They added that only part of the literature on impacts uses SSP analysis, with the rest relying on other assumptions about the development of societies and other conditions that will affect exposure. Thus, WGII did not use SSPs but incorporates them where appropriate in chapters on regional assessments.

LUXEMBOURG requested clarification in a sentence that for all five illustrative scenarios assessed by WGI, global warming of 1.5°C relative to 1850-1900 will be reached or surpassed in the near-term. It was changed to refer to “at least a greater than 50% likelihood” that global warming will reach or exceed 1.5°C in the near-term, even for the very low GHG emissions scenario.” After lengthy discussion, WGII approved SAUDI ARABIA’s addition of a footnote repeating WGI language specifying the likelihoods of 1.5°C global warming being reached under all five illustrative SSP scenarios.

## **B. Observed and Projected Impacts and Risks**

**B.1:** This subsection addresses **observed impacts from climate change**.

Discussions on the Headline Statement focused on the reference to “human-induced climate change,” with the RUSSIAN FEDERATION and SAUDI ARABIA, opposed by several delegates, preferring deletion of the qualifier “human-induced.” The RUSSIAN FEDERATION noted WGI concluded that 80% of climate change is human-induced and 20% is not. SAUDI ARABIA said both human-induced and natural climate change were assessed, and that the text should therefore reflect this. The authors clarified that the statement is in line with the underlying assessment. WGI Co-Chair Valérie Masson-Delmotte said the statement is also in line with the WGI assessment report, and that the best estimate from scientific evidence is that all the observed warming is equal to human-induced warming.

Several delegates, including the UK and KENYA, expressed concern about the reference to losses and damages “despite adaptation efforts,” noting it suggests adaptation is ineffective. The authors agreed to delete this text. GERMANY, supported by the US and others, suggested replacing “widespread losses and damages to nature and people” with “widespread adverse impacts and related losses and damages to nature and people,” and the authors agreed.

Following consultations in a huddle, IPCC Vice-Chair Ko Barrett reported agreement that the first sentence of the Headline Statement should read: “Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse

impacts and related losses and damages to nature and people, above and beyond natural climate variability.” This was approved with a minor modification.

On a paragraph presenting information on *climate-related extremes at increased frequency, intensity, and duration*, several delegates requested consistency in language. They noted references to “climate change,” “human-induced climate change,” and “anthropogenic climate change” throughout the text. NORWAY said the Paris Agreement specifically refers to human-induced climate change and acknowledged the need to know the extent of such climate change.

The RUSSIAN FEDERATION again requested deletion of “anthropogenic” climate change, stating attribution of climate change is WGI’s purview. He noted “impacts,” unlike “risks,” can potentially be positive, such as more productive ecosystems. He recommended using attributions from the underlying report to specify the extent of uncertainty.

The authors opposed deletion of “anthropogenic,” saying this would not reflect the underlying science, but agreed that attribution required clarification. They said a footnote with a definition of attribution as an evaluation of multiple causes of climate change impacts had been dropped inadvertently and would be restored.

GERMANY requested reference to “biodiversity loss” in examples of impacts of climate change. The US, supported by IRELAND and SPAIN, asked for precise and consistent language and references and for distinguishing between “losses and damages” and “impacts.” He also called for language on adaptation limits as “surpassing the resilience of some ecological and human systems and challenging the adaptation capacities of others,” as contained in Subsection TS.B.2 of the Technical Summary.

On a footnote in the paragraph, the US and SPAIN called for defining “slow-onset events” to indicate timescales and to explain why these events require different assessment, highlighting that the list of examples provided is not exhaustive.

The US, supported by FRANCE, but opposed by TRINIDAD AND TOBAGO, INDIA, SAINT KITTS AND NEVIS, and EGYPT, proposed replacing “losses and damages due to” with “impacts of” tropical cyclones, sea level rise, and heavy precipitation. INDIA, supported by ECUADOR, reiterated that “losses and damages” are not synonymous with “impacts.”

Following further discussions in a huddle, WGII Vice-Chair Joy Pereira reported agreement that “adverse impacts from tropical cyclones, with related losses and damages, have increased due to sea level rise and the increase in heavy precipitation.” A footnote states that “in this report, the term ‘losses and damages’ refers to adverse observed impacts and projected risks and can be economic or non-economic.” WGI Vice-Chair Edvin Aldrian noted that cyclones also decrease precipitation in some areas. With minor additions from INDIA and NORWAY, the sentence and footnote were approved.

Regarding *substantial damages and increasingly irreversible losses from climate change in multiple ecosystems*, FRANCE called for mentioning timeframes for phenomena posing risks to functioning ecosystems and agriculture, as described in Subsections TS.C.1.2 and TS.C.1.3 of the Technical Summary.

The UK, with SWEDEN, requested substantiation on the reference to “hundreds of local extinctions.” NORWAY requested insertion of high confidence language from Cross-Chapter Paper 6: Polar Regions from the underlying report, related to impacts already occurring in the Arctic, many of which are irreversible.

On *observed impacts on food and water security*, NORWAY and INDIA suggested broadening a sentence stating that sudden losses of food production and diet diversity have increased malnutrition. The authors responded that this sentence addresses health impacts of diet diversity rather than availability, reflecting the Executive Summary of Chapter 7 (Health, Wellbeing and the Changing Structure of Communities). After some discussion, the group agreed to refer to sudden losses of food production “and access to food,” and the sentence was approved.

Regarding the statement that “increased extreme events have pushed millions of people into acute food and water insecurity, particularly in Africa, Asia, Central and South America, Small Islands and the Arctic,” the RUSSIAN FEDERATION said this statement does not reflect the situation in the Russian Arctic. He called for qualifying the statement in relation to the Arctic or adding a footnote specifying that the Russian Federation disagrees with this statement. Following further discussions, delegates approved text distinguishing between acute food insecurity (with a footnote defining acute food insecurity) and reduced water security, “with the largest impacts observed in many locations and/or communities in Africa, Asia, Central and South America, Small Islands and the Arctic.”

On the paragraph addressing *impacts on health*, SAUDI ARABIA and INDIA noted insufficient evidence to claim a “very high” confidence level that climate change has adversely affected the mental health of people in all regions. The US, with CANADA, suggested referring to the health of people in all “assessed” regions, for consistency with Figure SPM.2, which authors accepted. A statement that animal and human diseases are emerging in new areas was approved with no comment.

Regarding sentences on the increasing occurrence of climate-related food- and water-borne diseases, incidence of vector-borne diseases, and occurrence of diarrheal diseases, INDIA requested mention of contributions of other socio-economic, development, and demographic factors. The authors were requested to add an overarching sentence at the beginning, to apply generally to all health outcomes. After consultations, the Working Group agreed to a proposal by the authors on an overarching sentence stating that climate change has adversely affected physical health globally and mental health in the assessed regions, and that these impacts are mediated through natural and human systems, including economic and social conditions and disruptions.

In a paragraph on *the impacts of climate change in urban settings*, SPAIN suggested referencing the impacts of disruptions to essential services on the well-being of individuals. This suggestion was accepted.

The authors did not accept a RUSSIAN FEDERATION suggestion to reference potential positive impacts of climate change, such as savings in energy, saying the paragraph is about observed impacts. JAPAN noted that available literature is unclear about whether cold waves will decrease in the coming decades. The authors said the text in the next paragraph (B.1.6) highlights that some regions will benefit economically from a reduction in energy demand. TRINIDAD AND TOBAGO, supported by the UK, the US, and NORWAY, suggested stating that both heatwaves and “extreme heat events” amplify urban heat islands. The authors suggested editing the text to read “hot extremes including heatwaves.” This change was approved.

On a paragraph addressing *adverse economic impacts attributable to climate change*, the RUSSIAN FEDERATION said the opening sentence should discuss impacts without characterizing them as adverse. The authors explained the sentence makes a statement about the net impacts of climate change, with the UK suggesting to clarify that the sentence refers to net global, as opposed to regional, impacts. GERMANY noted the negative impacts of climate change are definitely stronger and called for language to reflect this. KENYA said some of the positive impacts are described later in the paragraph.

PERU, with SAINT LUCIA, ECUADOR, TRINIDAD AND TOBAGO, and ARGENTINA, called for specifying adverse effects for developing countries. The US preferred focusing on sectors globally. INDIA, SAINT LUCIA, TRINIDAD AND TOBAGO, and ARGENTINA, opposed by NORWAY and the US, proposed referring to “economic losses and damages from climate change” instead of “economic damages from climate change.” This proposal was not accepted.

Regarding a paragraph on *climate change contributing to humanitarian crises where climate hazards interact with high vulnerability*, the US requested language on social disruptions of vulnerable populations within developed or developing countries that do not rise to the same level of severity as “humanitarian crises.” The authors cautioned against referring to topics of civil instability. The sentence was not changed.

Medium confidence sentences on climate hazards contributing to the continuation of violent conflicts in regions already experiencing conflict and on displacement and involuntary migration from hazards from climate change generating and perpetuating vulnerability were opposed by INDIA, BRAZIL, and ARGENTINA. UKRAINE and the US preferred retaining them. The authors offered alternative text, stating “in some assessed regions, climate and extreme weather events have had a small, adverse impact on the length, severity, or frequency of existing intrastate violent conflict, but socio-economic conditions are the dominant drivers.” SAUDI ARABIA and INDIA said the text was insufficiently supported by the underlying assessment. GERMANY, NORWAY, the US, FRANCE, SPAIN, IRELAND, and FINLAND stressed the importance of the link between conflict and climate change, calling it a new and highly policy-relevant finding.

Discussions were taken up in a huddle facilitated by IPCC Vice-Chair Ko Barrett, who reported agreed language clarifying that socio-economic conditions are the dominant drivers. INDIA, who had not participated in the huddle, still objected, pointing to a statement in the underlying report that the link was weak. The authors explained that the statement referred merely to normal sampling bias, saying it was still statistically significant and sufficiently supported by an increasing amount of literature. ECUADOR, ARGENTINA, and the RUSSIAN FEDERATION supported INDIA’s call to delete the reference. NORWAY, FRANCE, SPAIN, the UK, ESTONIA, the US, SWEDEN, and SWITZERLAND urged its acceptance based on the authors’ comments. After another huddle, it was approved with the addition of “but the statistical association is weak” at the end of the sentence.

**Figure SPM.2:** This figure addresses the **observed impacts of climate change in ecosystems and human systems** all over the world.

EGYPT said the figure should note there are other diseases in addition to those identified. FRANCE highlighted that the titles of the two panels in the figure should clarify they relate to “observed impacts attributed to climate change,” rather than “observed impacts of climate change.” The RUSSIAN FEDERATION called for clarification that climate change only influences some, not all, of the systems identified in the figure. INDIA noted that mental health is subjective and varies across cultures. He proposed replacing this term with alternative language and noted the evidence provided does not support the reference to Asia suffering high negative mental health impacts. The US requested clarification on the meaning of positive and negative impacts for some categories and, with the REPUBLIC OF KOREA, UKRAINE, and others, questioned the certainty of the specified confidence levels.

Following authors’ proposals to improve clarity, the figure was taken up again in plenary. The RUSSIAN FEDERATION questioned the figure’s presentation of negative impacts on fisheries and aquaculture in the Arctic, saying the opening up of sea ice is a clear benefit of climate change on fisheries in the Arctic. The authors explained that observations indicate overall negative impacts beyond greater access to shipping, given distribution shifts, declines in many species, and declining productivity of fish stocks. FINLAND, NORWAY, DENMARK, and GERMANY supported the authors. The figure was approved as presented.

On the caption, INDIA questioned a reference to mental health and asked for a qualifier referring to other factors. The authors explained why the confidence level and language are accurate, and the caption was approved.

**B.2:** This subsection addresses the **vulnerability and exposure of ecosystems and people**.

Many initial comments involved requests for specification, regional balance, consistency, quantification and related uncertainty ranges, and confidence levels. On the Headline Statement, the authors agreed to a proposal by FRANCE to refer to “historical and ongoing patterns of colonialism,” which was further modified by the US to read “patterns of inequity such as colonialism” for consistency. A sentence noting that about 3.3 billion people live in contexts that are highly vulnerable to climate change, SAUDI ARABIA requested adding “approximately” and a range. Authors agreed to both suggestions.

On *future vulnerability of ecosystems strongly influenced by the past, present, and future development of human society*, delegates questioned the reference to “consumption patterns, including through diets causing high GHG emissions.” They noted that compared to other sectors, such as energy, diets represent a minor contributor to emissions. CHINA added that the reference is ambiguous. The final approved text refers to “unbalanced diets” and includes a footnote defining balanced diets as described in the SRCCCL.

Several delegates noted that food production, water extraction, and urban development will inevitably continue, and called for the text to be rewritten to clarify that they increase ecosystem vulnerability when undertaken unsustainably.

Noting that the main focus of the section is on vulnerability, the UK and SAINT LUCIA questioned the relatively scarce coverage of exposure, with SAINT LUCIA calling for a box defining vulnerability. PERU asked for references to the vulnerability of populations in mountain zones.

On ways to reflect regional differences, INDIA, supported by BRAZIL, objected to reference to “population growth,” noting the phrase has a negative connotation for countries in the Global South, and it is not necessarily a driver of local ecosystem degradation. He proposed, instead, referring to “local social demographic change.” The authors explained population growth appears in the literature as a clear driver for ecosystem vulnerability and demographic change, while important, is not the same. They suggested “demographic pressures” as an alternative. FRANCE, opposed by INDIA, proposed adding “increasing” demographic pressure. This was eventually accepted.

On a sentence that projected climate change, combined with non-climatic drivers, will cause loss and degradation of much of the world’s forests, coral reefs, and low-lying coastal wetlands, AUSTRALIA, supported by SAUDI ARABIA, suggested adding that “while not yet in crisis, coral reefs are under increasing pressure, but targeted measures and management could reduce risk.” FRANCE, TRINIDAD AND TOBAGO, SAINT KITTS AND NEVIS, and SAINT LUCIA objected, with TRINIDAD AND TOBAGO saying coral reefs are already experiencing loss and damage. The sentence was approved as without any changes.

In a paragraph addressing *regions and people with high vulnerability to climatic hazards*, CANADA queried the meaning of “considerable development constraints,” noting this term is not used in the underlying report. NORWAY and CANADA questioned the relatively few references to drivers of vulnerability in ecosystems compared to human systems. In response to a query on “unsustainable development,” the authors clarified it is based on the same indicators used for the Sustainable Development Goals (SDGs) and other internationally agreed processes.

LUXEMBOURG proposed adding reference to “historic and ongoing” socio-economic development, while INDIA called for including “historicity and equity.” FRANCE requested clarification on a reference to “colonialism.” INDONESIA proposed referring to ecosystem services “and functions.”

Calls were made to provide language on possible responses to vulnerability and exposure, with NORWAY, IRELAND, FINLAND, and others suggesting wording on the advantages of protecting areas to improve resilience, or on the vulnerability of key infrastructure when design standards do not anticipate changing climate conditions.

On a sentence stating that national and subnational vulnerability is exacerbated by inequity and marginalization linked to gender, ethnicity, low income, or combinations thereof, especially for Indigenous Peoples in the Amazon and Arctic, the RUSSIAN FEDERATION insisted Indigenous Peoples in his country are often fully integrated into society. He proposed specifying Indigenous Peoples “following traditional lifestyles” or limiting it to “some” Indigenous Peoples. The authors agreed to refer to “many” Indigenous Peoples rather than “some,” and removed references to the Amazon and the Arctic, as proposed by INDIA and ECUADOR.

On the paragraph addressing *future human vulnerability*, the Working Group agreed to a suggestion by GERMANY, supported by IRELAND, INDIA, and others, to add reference to health in a sentence on key infrastructure systems becoming increasingly vulnerable since design standards do not anticipate changing climate conditions.

In a sentence that initially stated that future vulnerability will also rapidly rise in low-lying small island developing states (SIDS) and atolls already characterized by high vulnerability, PERU requested inclusion of mountain regions, noting these are already experiencing glacial retreat, and that the underlying assessment supports the inclusion. This request was accepted. SAUDI ARABIA, opposed by JAMAICA and NORWAY, suggested changing “will also” to “is projected to” rapidly rise. The authors clarified that this sentence is a synthesis statement based on multiple lines of evidence, and therefore “will” is the appropriate term to use. INDIA proposed, and the Working Group accepted, to retain the word “will” but delete the word “future.” The sentence was approved with these amendments.

**Figure SPM:** A figure covering observed human vulnerability, which differs between and within countries and strongly determines how climate hazards impact people and society, was ultimately deleted and therefore has no figure number. Many countries found the figure problematic for its nationally averaging approach and what they considered a misleading representation of their country’s vulnerability.

**B.3:** This subsection addresses **near- to mid-term risks**.

On the Headline Statement, various attempts at wording were proposed to align the text with the WGI finding that there is at least a greater than 50% likelihood that global warming will reach or exceed 1.5°C in the near term, even for the very low GHG emissions scenario. After several consultations, the Working Group approved text stating, *inter alia*, that global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans.

On a paragraph addressing *biodiversity risks*, TRINIDAD AND TOBAGO called for more balance and focus on near-term risk and, supported by SAINT KITTS AND NEVIS, called for including a reference to sargassum. The authors explained the evidence base is not strong enough to attribute the increase in sargassum to climate change. Despite a suggestion by TRINIDAD AND TOBAGO, supported by SAINT KITTS AND NEVIS, to add the reference with a “low confidence” level specified, the reference was not included. A proposal by SOUTH AFRICA to add reference to grasslands and savannas was also not accepted.

Following consultations, the authors presented revised text. SAINT KITTS AND NEVIS questioned why reference to “sea level rising at an accelerating rate” had been replaced with “continued sea level rise.” The authors said both past and current sea level rise are risks, and proposed “continued and accelerating sea level rise,” which was accepted.

**B.4:** This subsection addresses **mid- to long-term risks**.

On the Headline Statement that *beyond 2040, and depending on the degree of warming, climate change is projected to lead to 127 key risks, and a footnote defining key risks*, the US, supported by NORWAY and CANADA, suggested focusing on what the key risks are rather than how the UNFCCC should interpret them, and recommended adding the “burning embers” diagrams in Figure SPM.4 to the list of references. NORWAY, with CANADA, suggested adding that the 127 risks are “to natural and human systems,” to link to the subsequent paragraphs. CAN INTERNATIONAL requested acknowledgement of the number of key risks already observed.

On a paragraph addressing *biodiversity loss, and degradation, damages to and transformation of ecosystems as key risks for every region and escalating with every increment of global warming*,



JAMAICA suggested greater emphasis on the benefits of avoided impacts at lower global warming levels rather than on the risks of higher warming levels. SAUDI ARABIA urged the authors to reflect the variations among regions in terms of biodiversity loss. She also proposed replacing “will continue to escalate with every increment of global warming” with “projected to escalate with every increment of global warming.”

Several delegates asked for clarity around the scenarios and timelines used. INDIA noted that the comparison between 1.5°C and 3°C in the text is a comparison between two extremes and suggested also including scenarios along the range of warming levels.

The RUSSIAN FEDERATION questioned the statement and said not all regions will be impacted in the same way and proposed changing “every region” to “most regions” or to “every assessed region.” The authors noted that the underlying assessment shows that all assessed regions will experience these impacts and agreed to make this clearer in the text.

On a sentence that 9% of species assessed will likely face high risk of extinction at 1.5°C, CAN INTERNATIONAL suggested specifying the total number of species assessed to provide context. FRIENDS WORLD COMMITTEE FOR CONSULTATION (FWCC) supported the idea of emphasizing avoided impacts at lower levels, rather than risks at higher levels. She also noted that 3°C is where the world is heading if action is not taken.

Many of the suggestions were addressed by authors with revised language.

After the paragraph had been approved, BELGIUM expressed concern about possible errors in the paragraph, and reserved the right to keep the Headline Statement open until the problem was resolved. The authors confirmed a mistake had been made in the drafting process, which had to do with the certainty language, and that it could be easily corrected by removing median values and keeping the full ranges. A discussion ensued on whether to re-open the already-agreed paragraph. SAUDI ARABIA, SOUTH AFRICA, and ECUADOR opposed as a matter of procedure and suggested fixing it through the IPCC’s error protocol. Emphasizing the need to ensure the scientific integrity of the IPCC, NORWAY, the US, and LUXEMBOURG cautioned that the error protocol would take weeks and the report was about to be presented to the public. After consultation with the IPCC Legal Officer, Co-Chair Pörtner proposed, and the Working Group agreed, to address the mistake as an editorial correction and the paragraph was thus amended in accordance with the authors’ instructions.

BELGIUM pointed to additional errors in the paragraph relating to the figures on the extinction of species. The authors affirmed that the paragraph and the figures are correct, noting their assessment as expressed in the underlying report and the SPM is based on a greatly updated database, consistent and improved information on tens of thousands of species, and more than triple the number of studies. BELGIUM agreed to approve the text if a footnote is included stating their concerns. Following further consultations, the authors stood by their assessment and Co-Chair Pörtner asked Belgium to follow the IPCC’s error protocol and withdraw the proposed footnote. FINLAND, NORWAY, IRELAND, and LUXEMBOURG supported resolving the issue through the error protocol. BELGIUM agreed to withdraw its proposed footnote and provide written input to trigger the error protocol if the issue could be addressed prior to the publication of the SYR.

On a paragraph addressing *risks in water availability and water-related hazards*, NORWAY suggested identifying the regions most dependent on glacier melt for irrigation. The authors proposed specifying “snowmelt dependent river basins.” SPAIN proposed referring to regions dependent on glacier melt for “water supply” rather than for “irrigation,” noting their needs are for more than irrigation. NORWAY proposed replacing the reference to “hydropower” with “power generation such as hydropower” but the authors explained that most of the available literature only assesses hydropower.

ANTIGUA AND BARBUDA requested inclusion of region-specific risks for SIDS. BRAZIL suggested deleting reference to “lower governance capacity” in a statement that climate change and increased water demand by 2050 will exacerbate existing challenges for water management, particularly in low-income regions with lower governance capacity. ARGENTINA suggested referring to “developing countries” rather than “low-income countries.”

In initial comments on a paragraph on *climate change impacts on food production*, INDIA and JAPAN asked whether the potentially positive role of technological advances and adaptation in food production was considered. NORWAY and IRELAND suggested inserting quantitative information on reductions of main crops from the underlying report. SPAIN, supported by JAMAICA, proposed adding wording on impacts on yields from saltwater damage. JAMAICA also suggested expanding the horizon beyond 2050. The US requested clarification on references to soil function and its projected evolution over time.

In response to comments from CHINA and the RUSSIAN FEDERATION on positive impacts of climate change in some regions, the authors noted that the focus of the paragraph is on the global scale rather than on specific regions, and globally there is generally a projected decline in most areas.

A paragraph on *impacts on health* prompted questions about heatwave exposure, including by the REPUBLIC OF KOREA and SWITZERLAND, with FRANCE, CHILE, and the UK calling for strengthening references to heat-related mortality in line with the underlying report. In response to a question from SPAIN on increases in mosquito-borne diseases other than dengue, such as malaria, the authors explained that the paragraph’s focus on dengue resulted from significant new information since AR5.

SPAIN also queried how “premature death” was assessed, given large variations in life expectancy between countries. SAUDI ARABIA called for specifying “in the assessed regions.” INDONESIA and CHILE questioned what was meant by “without additional adaptation.” The authors recalled that statements in the report depend on existing literature and related confidence assessments.

On *climate change risks in cities and settlements*, IRELAND called for broadening the reference to costs for maintenance and reconstruction of “urban infrastructure.” The authors agreed that infrastructure extends beyond and across urban areas.

CAN INTERNATIONAL questioned the scenarios used for the assessments. Saying high risks appear to be growing until 2040 even under low carbon emissions scenarios, he called for explicitly acknowledging this. JAPAN requested a footnote defining “cities” and “settlements.” The RUSSIAN FEDERATION requested attention to risks to infrastructure in permafrost regions, not just risks in high-temperature countries.

BELIZE requested reflection of the centennial timescales of risks from sea level rise even assuming climate change is stabilized. The authors confirmed information on timescales is available.

Following further discussions in the contact group, the list of types of exposure was adjusted to refer to risks rising rapidly with further “global” warming, especially in “places” already exposed to high temperatures, “along coastlines, or with high vulnerabilities.” IRELAND queried the inclusion of only these factors. INDIA noted divergence between RCP projections in the mid- to long-term. The authors emphasized climate change risks “will” rise rapidly under all scenarios, given a combination of vulnerability and climate trends. They clarified this is based on present movements, not just projections or a climate signal. On a sentence that approximately one billion people in low-lying cities and settlements are projected to be at risk by 2050, in response to INDIA’s request to specify the range of temperatures at which this will happen, the authors proposed adding that the sentence is about population “change” “under all scenarios,” given that up to 2050 the scenarios show very little difference in sea level rise. These additions were accepted.

SAINT KITTS AND NEVIS, with TRINIDAD AND TOBAGO, GRENADA, and SAINT LUCIA, called for language from the underlying report stating that long-term risks from sea level rise are existential threats to low-lying coasts and small islands. The Working Group approved text stating this is true for “some.” Delegates also approved a sentence on costs for maintenance and reconstruction of urban infrastructure increasing with global warming levels, as modified in the contact group.

On a paragraph on *projected global economic damages from climate change increasing with global warming levels*, ANTIGUA AND BARBUDA, supported by CANADA, the UK, and SENEGAL, noted that “almost all,” rather than “some,” estimates are higher now than in AR5. He requested additional contextual information on the pandemic and the current recession and up-to-date information on coastal and other damages from sea level rise. CANADA requested clarification on the consequences of low versus high global warming levels. The UK requested inclusion of examples from the underlying report of impacts of climate change on labor productivity and impacts from sea level rise. SAUDI ARABIA, with INDIA and the RUSSIAN FEDERATION, called for specifying projected “net” global economic damages from climate change, as the report addresses both positive and negative impacts. The US called for better links to the timeframes and related global warming levels given in the Headline Statement.

INDIA asked whether the increase in estimates of projected economic damages beyond those cited in AR5 is due to improvements in models and assessments or because more aspects of infrastructure and systems are now studied. He also requested more information on the overshoot projected for the two 1.5°C scenarios. SPAIN requested clarification of “non-market” economic damages. The RUSSIAN FEDERATION listed examples of economic sectors, including energy, for which conditions in the Arctic are improving, and urged ensuring a balanced approach in this regard. On an expected increase in projected global aggregate economic net damages with global warming levels, SAUDI ARABIA suggested aggregate “net economic” damages.

Many delegates requested inclusion of numbers representing a range of expected economic damages. GERMANY noted that the underlying report shows economic damages increase non-linearly with increasing global warming levels and, supported by

LUXEMBOURG, requested inclusion of this fact. SAINT LUCIA urged inclusion in the SPM of the reference in the underlying report to economic losses up to ten times higher than the range reported in AR5, namely, up to 25% losses in gross domestic product from global warming compared to 2% losses projected in AR5. The UK underlined that policymakers must be made aware of the scale of the risk. She called for inclusion of the best estimate and worst-case scenarios and the in-between range. IPCC Vice-Chair Barrett and the authors explained there is an insufficient basis for this because the estimates provided in the literature vary greatly, due, in part, to the incomparability of the methodologies used. LUXEMBOURG proposed including the estimates provided in AR5.

Revised language by the authors saying that “projected estimates of global aggregate net economic damages generally increase non-linearly with global warming levels” was agreed.

On a paragraph on *displacement increasing with the intensification of floods, cyclones, drought, and sea level rise*, SPAIN requested adding “social, economic, ethnic, or religious conflicts” to a list of outcomes of climate change and other drivers. SOUTH AFRICA and SAUDI ARABIA questioned the connection between conflict and climate change and requested quantification and specification regarding “wider patterns of migration” as an outcome of climate change. JAMAICA, supported by TRINIDAD AND TOBAGO, responded that displacement and conflict are among the worst impacts of climate change, but requested clarification on the differences between displacement and migration. He also requested language from subsection TS.C.7 of the Technical Summary, on increases in frequency and/or severity of floods projected to increase future risk of displacement in the most exposed areas. INDIA, with SAUDI ARABIA, recommended adding to an existing paragraph a qualification that when climate change affects conflict it is not the main driver, and deleting the rest of the paragraph. INDIA also noted that “levels of” development and socio-economic conditions also affect migration.

SAUDI ARABIA queried the conditions under which displacement will occur and its links to adaptation levels. She said WGII’s mandate is not to discuss drivers of conflict unrelated to climate change. CANADA requested specifying “heavy precipitation and associated flooding” and, with TRINIDAD AND TOBAGO, “tropical” cyclones. PERU requested mention of El Niño and its effects on Central and South America when coupled with climate change. FWCC highlighted that the recent Second International Conference on Environmental Peacebuilding, held from 2-4 February 2022, concluded that climate change is a threat multiplier that increases as other drivers of conflict increase.

Regarding the reference to migration and displacement, the authors explained that while migration is a choice determined by numerous factors, displacement is deterministic, with no choice, and will increase because climate change impacts will increase. INDIA said in the near term social and economic drivers will still determine displacement and migration. The authors responded that near-term displacement is addressed in an earlier section. Responding to a question from BELGIUM, the authors noted a lack of literature on migration or displacement from the effects of heatwaves or increasing temperature on population and health. The sentence was approved as presented. A sentence linking climate change to conflict was discussed at length, with INDIA calling the reference to intrastate conflict “intrusive.” Supported by SAUDI ARABIA, he proposed deleting a sentence on climate and weather

extremes severely affecting violent intrastate conflict by increasing vulnerability. SOUTH AFRICA, supported by SAUDI ARABIA and BRAZIL, said directly linking climate change and conflict was a “dangerous” message to send. ARGENTINA said such a link was not a frequent occurrence and suggested modifying the text to reflect this. Reiterating this issue is new in AR6, NORWAY and the UK urged retaining the statements.

SPAIN suggested referring to “interstate,” instead of “intrastate,” conflict, and requested language on competition for resources, such as water. The authors suggested that extremes “increasingly” rather than “severely” affect violent intrastate conflict, and agreed to better reflect that the statement is not so much about increasing conflict as it is about increasing the vulnerability of the people involved.

As a way forward, IPCC Chair Lee suggested inserting text from the Technical Summary, which states that, compared to other socio-economic factors, the influence of climate on conflict is assessed as relatively weak (high confidence), which was agreed.

**Figure SPM.3:** This figure, originally titled **regional and global risks to ecosystems and humans as a result of climate change increasing with the level of global warming**, was generally welcomed, with interventions focusing mostly on traceability, the need for consistency, uncertainty ranges, confidence levels, and design aspects.

There were numerous concerns expressed, however, regarding a panel on illustrative regional key risks, with many objecting to a lack of balance as the figure included Europe and the Mediterranean but no other large areas. In this regard, SAINT KITTS AND NEVIS, supported by BRAZIL, JAPAN, SAUDI ARABIA, and others, cautioned against giving the impression that lack of coverage means lack of risk.

In response to the comments, the authors revised the figure. Changes included a modification of the title to “global and regional risks for increasing levels of global warming,” clarified SSP scenarios, and relabeled bars. On the lack of balance in regional representation, a different listing of regions and various explanations such as on scaling and projection problems for small islands and others, were introduced. With these and additional editorial changes, the figure was approved.

**B.5:** This subsection addresses **complex, compound, and cascading risks**.

In a paragraph on **cascading adverse impacts from climate hazards and resulting risks**, FINLAND and SWITZERLAND asked if reference to systems “impacted by ice melt, permafrost thaw and changing hydrology in polar regions” includes the Arctic and mountainous regions. The authors responded that risks of extinctions of plants after 30-50% loss of snow cover is true for all scenarios, including the Arctic, but evidence on tipping points is lacking for mountainous regions.

On a paragraph addressing **new risks arising from responses to climate change**, TANZANIA, supported by INDIA, asked if the sentence listing the risks includes all new risks. The US, supported by BRAZIL, said risks also arise from implementation and management issues. The US proposed removing mention of solar radiation modification or, supported by SAUDI ARABIA and JAPAN, deleting the entire sentence. SAINT LUCIA, supported by CANADA, FRANCE, GERMANY, SWEDEN, the UK, GRENADA, NORWAY, SWITZERLAND, and LUXEMBOURG, favored keeping the sentence but treating carbon dioxide removal (CDR) and solar radiation modification separately. GERMANY,

with SWEDEN and SWITZERLAND, added that WGII’s mandate is to inform about risks. NEW ZEALAND, with JAPAN and NORWAY, but opposed by LUXEMBOURG and ARGENTINA, suggested referring to adverse side effects of some mitigation “including” CDR rather than “and” CDR options. The authors agreed on mitigation “including” CDR. After consulting, the authors confirmed that risks from mitigation are within WGII’s mandate and are assessed. They proposed referring to new risks arising from responses to climate change, including maladaptation and adverse side effects of some mitigation options, including CDR options, and moving solar radiation modification into a new paragraph.

LUXEMBOURG, the UK, CANADA, and GERMANY, opposed by NORWAY, objected to the fact that CDR was still included under mitigation. NORWAY cautioned against imbalance in treatment of CDR and solar radiation modification. GERMANY expressed concern that the sentence frames CDR as “normal” mitigation, saying this prejudices the work of WGIII, in AR5 it was separate, and CDR encompasses different levels of risk, approaches, and technological maturity.

Following additional consultations, the authors introduced a new paragraph on **solar radiation modification**. The UK and TRINIDAD AND TOBAGO preferred deleting the paragraph, noting insufficient time to properly discuss it. FRANCE and NORWAY urged retaining it, with NORWAY noting that deleting the paragraph would result in solar radiation modification being the only concept from the underlying report not reflected in the SPM. The Working Group agreed to include the paragraph on solar radiation modification approaches, which notes these approaches introduce new risks that are not well understood.

**B.6:** This subsection deals with the **impacts of temporary overshoot**.

On the Headline Statement stating that **human and natural systems will face additional severe risks if global warming transiently exceeds 1.5°C**, the authors did not accept CHINA’s request to replace reference to 1.5°C with “specific levels,” given the Headline Statement would then conflict with subsequent paragraphs. TRINIDAD AND TOBAGO, the UK, SAINT KITTS AND NEVIS, SAINT LUCIA, FRANCE, ANTIGUA AND BARBUDA, SWEDEN, BELIZE, NORWAY, and SPAIN supported the authors. A request from CHINA to lower the confidence level was also rejected. The authors and delegates accepted TRINIDAD AND TOBAGO’s suggestion to add that some impacts “will be irreversible, even if global warming is reduced.” With this and a few minor corrections, the Headline Statement was approved.

On the authors’ suggested subsection title, “Impacts of Transiently Exceeding 1.5°C (Overshoot),” CHINA recommended deleting reference to 1.5°C. SAUDI ARABIA suggested returning to “Climate Targets” from a previous draft. ESTONIA queried use of the term “transiently.” The authors proposed changing the title to “Impacts of Temporary Overshoot,” which was approved.

On a paragraph on **impacts of overshoot**, SAINT KITTS AND NEVIS said the language suggests overshoot is inevitable and is not in line with the underlying assessment. Supported by CANADA, she suggested using language such as “if overshoot occurs.” CANADA called for clarity on whether the WGII authors used overshoot to mean overshooting 1.5°C or sustained overshoot from any global warming level. JAPAN said this section is misleading as it suggests once overshoot continues for months or decades there is no point in trying to return to 1.5°C, as the risks are irreversible.

A sentence on overshoot beyond 1.5°C having multiple severe impacts engendered lengthy debate. CHINA said the evidence in the underlying report on overshoot, and on overshoot beyond 1.5°C specifically, is inadequate to support this paragraph's focus on the 1.5°C level of global warming. He proposed replacing reference to "overshoot beyond 1.5°C" with "additional warming during the overshoot period." SAUDI ARABIA suggested mentioning the relationship between irreversibility and climate resilience. The authors cautioned that the underlying chapter specifically addresses overshoot past 1.5°C, and is based on robust scientific evidence, including text not just on overshoot but on "warming" above 1.5°C and irreversible widespread impacts as well. SAINT KITTS AND NEVIS, the UK, SWEDEN, FRANCE, CHILE, SWITZERLAND, TRINIDAD AND TOBAGO, SPAIN, and many other delegates supported the authors' view. Co-Chair Pörtner added that severe impacts will set in with any overshoot lasting several decades and some will become stronger with every incremental increase in warming and irreversible. CHINA requested changing the confidence level. The authors rejected this suggestion. Co-Chair Pörtner suggested CHINA formulate a footnote on its objection. CHINA offered "This conclusion is based on a limited source of literature," which was also rejected by the authors.

The authors subsequently presented new footnote text stating that "despite limited evidence on the impacts of a temporary overshoot of 1.5°C, a much broader evidence base from process understanding and the impacts of higher global warming levels allows a high confidence statement on the irreversibility of some impacts that would be incurred following such an overshoot." CHINA said it would accept the footnote although it did not agree with the statement. The paragraph and footnote were approved. The final approved text, to which the footnote was added, reads "additional warming, e.g., above 1.5°C during an overshoot period this century, will result in irreversible impacts on certain ecosystems."

On a paragraph on *increase in risk of severe impacts with every additional increment of global warming during overshoot*, and regarding observed and increasing impacts on high-carbon ecosystems, BRAZIL expressed concern about singling out specific sectors to point to challenges from potential amplification of global warming.

INDIA, with IRELAND and the NETHERLANDS, queried the specification that high-carbon ecosystems "currently store 3,000 to 4,000 GtC." Authors said the reason is to highlight what is at stake with the loss of a high-carbon ecosystem and suggested moving the reference to carbon storage in ecosystems to a footnote. They noted that some areas are already shifting from being net sinks to net sources of carbon because of the combination of their weakening sink abilities and an increase in release of GHGs due to decomposition. They noted the Amazon has shifted to become a net source of carbon during the last 20 years.

Following an intervention by CHINA opposing language stating that the potential amplification of global warming would make a return to 1.5°C more challenging, the Working Group agreed to instead refer to a "return to a given global warming level." The paragraph was then approved.

## C. Adaptation Measures and Enabling Conditions

**C.1:** This subsection addresses **current adaptation and its benefits**.

On the Headline Statement on *progress in adaptation planning and implementation observed across sectors and regions*, INDIA requested acknowledgement of uneven distribution, with correlation between high-vulnerability regions and low-income or developing countries. The US suggested opening with the benefits of adaptation and, with the UK and the RUSSIAN FEDERATION, requested replacing or softening reference to missing the opportunity for transformational adaptation to "building towards transformation change." FRANCE cautioned against using the "very" high confidence level. CANADA queried the footnote's mention of "a societally set goal." The RUSSIAN FEDERATION requested examples of progress.

On the increase in adaptation planning and implementation across all regions, the authors clarified that the reference to cities is based on the availability of new evidence that many cities are involved in adaptation. The text, as approved, refers to increases in awareness and in the use of adaptation tools and notes multiple benefits of adaptation.

On a paragraph on the *existence of adaptation gaps between current adaptation levels and the levels needed to enhance climate risk reduction*, SAINT KITTS AND NEVIS called for reference to the shortfall between the promised climate finance and what has been provided. SAUDI ARABIA, supported by CHILE, suggested specifying the levels of adaptation finance provided and the gaps. On a sentence noting the largest adaptation gaps exist among lower income population groups, SAUDI ARABIA proposed replacing "lower income population groups" with "developing countries."

On the sentence stating that at current rates of adaptation planning and implementation the adaptation gap will continue to grow, the US suggested also referencing that "at current mitigation efforts" the adaptation gap will continue to grow. The final text states that despite progress, adaptation gaps exist between current adaptation levels and levels needed to respond to impacts and reduce climate risks, and describes where gaps and constraints exist.

**Figure SPM.4:** This figure depicts two panels: (a) diverse feasible climate responses and adaptation options existing to respond to Representative Key Risks of climate change, with varying synergies with mitigation, and (b) climate responses and adaptation options have benefits for ecosystems, ethnic groups, gender equity, low-income groups, and the SDGs. The original title of the figure, that adaptation, linked with system transitions, can enhance implementation of the SDGs in the near term, was deleted and the titles of the two panels were modified based on discussions in plenary and contact groups.

Discussion began with an explanation from the authors that the assessment depicted incorporates 1300 studies, is global, and only pertains to warming up to 1.5°C due to the paucity of literature.

Numerous participants lauded the authors' efforts but cautioned that the figure was extremely complex. CANADA said the figure is rich with data and information but too complex to communicate effectively and NORWAY requested simplification to provide clear take-home messages for policymakers. SWITZERLAND objected, supporting the figure's level of detail as complementing the text without duplicating it, but called for stronger links to the text. Urging simplification or deletion of the figure, the RUSSIAN FEDERATION asked how the 23 adaptation options depicted were

chosen. The authors said they originated from the SR1.5, SROCC and SRLCC, with the options chosen based on the availability of new literature since then.

TRINIDAD AND TOBAGO, supported by SAINT KITTS AND NEVIS, SAINT LUCIA, and the US, objected to including “planned relocation and resettlement” and “human migration and displacement” as adaptation options. He called for making the footnoted definitions of these terms more prominent and for explicit acknowledgement that these are only actions to be taken after adaptation limits are reached. SAINT LUCIA said the footnote on “safe and orderly” migration does not acknowledge all the factors required and urged clarifying that some options are “responses,” as in Chapter 7, or deleting the figure.

SAINT KITTS AND NEVIS noted highly unequal distribution of financial means for adaptation, and called for a footnote reflecting regional differences in the feasibility of different options. The authors responded that regions vary in the amount of detailed information available. SWEDEN, with NORWAY, requested more specificity on adaptation options and system risks and called for clarifying positive and negative impacts of integrated coastal zone management. FRANCE supported retaining the figure but specifying that adaptation efforts diminish after 1.5°C. The US asked for “super titles” to highlight the figure’s broad messages, suggesting deletion of some elements, and for including detailed in the Technical Summary. INDIA lamented that the figure is “too mitigation-centric.”

Following discussions and revisions to the figure, the final approved figure depicts first feasibility and then synergies with the SDGs, with observed relations with sectors and groups at risk depicted in the second, rather than the first, panel.

On the caption to the figure, ARGENTINA suggested adding “financial” to a list of six “feasibility dimensions.” The authors noted a lack of literature on financing the costs of adapting, and that the six listed dimensions are consistent with the SR1.5’s dimensions. Responding to SAUDI ARABIA, the authors proposed adding a second sentence to the caption stating that “as literature above 1.5°C is limited, feasibility at higher levels of warming may change, which is currently not possible to assess robustly.” The caption, as approved, was changed to refer to “climate responses” and adaptation options, and refers to limitations in literature on 1.5°C and the possibility that feasibility at higher levels may change.

**C.2:** This subsection deals with **future adaptation options and their feasibility.**

On a paragraph addressing *adaptation to water-related risks*, TRINIDAD AND TOBAGO questioned the inclusion of “planned relocation” as an adaptation option and, supported by NORWAY, called for explaining the option in a more nuanced way as was done in the SROCC. NEW ZEALAND supported retaining reference to planned relocation, noting it is a valuable adaptation option to consider.

Delegates called for clarifying and better contextualizing various terms used in the subsection, such as “beneficial outcomes,” “water-related risks,” and “land use change.”

SPAIN commented on the inclusion of irrigation as a short-term adaptation measure, noting it can be either positive or negative, causing, for instance, over-exploitation of water. The RUSSIAN FEDERATION, supported by INDIA, called for a nuanced reference to “water-related risks,” noting examples of benefits relating to increased rainfall and water volume in rivers. INDIA called for

reference to measures such as water storage options. CHILE proposed replacing “water-related risks” with “risks related to excess or scarcity of water,” and supported retaining irrigation as a solution.

Following discussions, the reference to irrigation as an adaptation option was retained but qualified with text noting it needs appropriate management to avoid potential adverse outcomes, which can include accelerated depletion of groundwater and other water sources and increased soil salinization. INDIA opposed this additional text, underscoring that irrigation is a valuable adaptation option. He said if the additional text is retained, there needs to be symmetric treatment of the options, noting agroecology also requires tradeoffs and calling for adding similar qualification to the reference to agroecology as an adaptation option.

On the paragraph addressing *effective adaptation options that enhance food availability and stability*, GERMANY questioned lack of reference to shifting to a plant-based diet as an option. The REPUBLIC OF KOREA and INDIA proposed deleting reference to carbon sequestration, noting this relates to mitigation, not adaptation. Delegates also called for more detail relating to aquaculture and livestock production.

INDIA suggested replacing “agroecology” with “agroecological practices.” ARGENTINA, supported by the US, INDIA, NORWAY and other delegates, proposed deleting reference to “agroecology” and instead referring to ecosystem-based adaptation (EBA). ARGENTINA noted lack of evidence that agroecology supports food security. The approved text refers to effective adaptation options and supportive public policies enhancing food availability and stability and reducing climate risk and provides options for action.

Regarding *adaptation for forests*, the US expressed concern about the reference to “changing management of forests for commodity production.” FINLAND noted that “managing novel pests and diseases and reducing wildfire risks” are adaptation “goals,” not adaptation “options,” and requested the inclusion of policy options for achieving these goals. INDIA noted that although conservation is part of managing forests, the text’s focus on conservation is too one-sided. He called for broader adaptation options for forests, noting forests will also be impacted by climate change.

The approved text describes adaptation options for natural and managed forests, including cooperation and inclusive decision making with local communities and Indigenous Peoples and recognition of inherent rights in many areas.

On a paragraph addressing *options for reducing the vulnerability of biodiversity*, in the sentence stating that to be effective, conservation will increasingly need to respond to and plan for changes in ecosystem structure, biological communities, and species’ distributions, “especially above 1.5°C warming,” the RUSSIAN FEDERATION, supported by SAUDI ARABIA, but opposed by JAMAICA and others, preferred deleting the reference to 1.5°C warming. SAUDI ARABIA said a reference to 1.5°C warming would also require including reference to other warming levels and their implications for conservation. BRAZIL, opposed by TRINIDAD AND TOBAGO, BELIZE, and FRANCE, proposed simply saying “as global warming increases.” The authors suggested adding “and” as 1.5°C is “surpassed” or “exceeded.” TRINIDAD AND TOBAGO, supported by the US, NORWAY, GERMANY, BELIZE, and SWEDEN, proposed “especially as 1.5°C is

approached and even more so if it is exceeded.” SAUDI ARABIA preferred referring to a range of temperatures for policymakers to choose from. TRINIDAD AND TOBAGO’s suggestion was ultimately accepted.

In response to BRAZIL’s questioning whether conservation itself “plans” for changes, the US proposed conservation “actions.” After CHILE suggested adding “protection and restoration,” delegates compromised on NORWAY’s suggestion to refer to “conservation and restoration actions.” The authors did not accept a US suggestion to change “respond to and plan for changes” to “be responsive to and consider changes,” given the need to proactively plan for changes expected in the future. Ultimately, delegates agreed to Co-Chair Pörtner’s suggestion on “the need to be responsive to ongoing changes and plan for future changes,” with an addition from INDIA that this be “as appropriate.” INDIA, supported by the RUSSIAN FEDERATION, asked for reference to “local” changes in ecosystem structure. SWEDEN noted that conservation encompasses all geographical scales. The authors noted various timescales, too, and proposed referring to “at various scales,” which was ultimately accepted.

On a sentence that adaptation responses include facilitating the movement of species to new ecologically appropriate locations, ARGENTINA said the text should refer specifically to EBA, noting this is a more precise reference to biodiversity and the functions of ecosystems that are part of an adaptation strategy.

ARGENTINA proposed adding wording on increasing connectivity between “conserved” and protected areas. NORWAY suggested broadening this to “or” protected areas, which was accepted by the authors. INDIA asked for qualifying this to “where feasible” but the authors did not accept this. CHINA proposed a footnote definition of “effective.” BRAZIL requested a footnote clarifying the nuances of “conservation” and “protection” in the underlying report.

On a sentence stating that “adaptation response options include facilitating the movement of species to new ecologically appropriate locations, particularly through increasing connectivity between conserved or protected areas,” BRAZIL, supported by ARGENTINA, recalled Co-Chair Pörtner’s suggestion to include a footnote distinguishing conservation and protection.

The final approved text refers to conservation, protection, and restoration measures for terrestrial, freshwater, coastal, and ocean ecosystems, together with targeted management for adaptation to unavoidable impacts.

On *effective EBA*, BELIZE highlighted the need for a caveat stating that the potential of EBA rapidly diminishes as warming increases. The UK supported this proposal, noting EBA will only be effective under the lowest levels of warming. SOUTH AFRICA questioned the relevance of text stating that “trees and other vegetation provide local cooling and shade,” noting trees and vegetation provide more benefits than the two specified.

Several delegates wanted this paragraph to include references to NBS. FRANCE said the text should link EBA and NBS, and should provide definitions of each. Several delegates called for using the IUCN’s definition of NBS, while some objected, noting there is no UN definition of NBS and IUCN is not a UN body nor is it strictly an intergovernmental body.

Discussion on inclusion of the term NBS continued when addressing a footnote proposed by the authors to clarify the difference between EBA and NBS. This was taken up by a huddle

facilitated by IPCC Vice-Chair Thelma Krug. SOUTH AFRICA, with INDIA and BRAZIL, objected to the use of NBS, saying it is a non-scientific concept. INDIA said the problem was the word “solutions” which, he said, “brushed the need for mitigation under the carpet,” and that the term comes from a European highly urbanized context. He preferred EBA or “nature-based adaptation” as broader and non-policy-prescriptive. A proposal by ARGENTINA to add reference to the Convention on Biological Diversity (CBD) in the footnote on EBA and NBS was opposed by INDIA, the US and others.

After further consultations, the authors proposed a replacement footnote stating that “A related concept, extensively used in the scientific literature and assessed in the underlying report, is NBS, which form a broader set of approaches, including those that contribute to adaptation and mitigation. The term is not universally accepted and is the subject of ongoing debate.” SOUTH AFRICA, INDIA, and ECUADOR insisted that the NBS concept is highly problematic and that just because it exists in the literature does not mean it should be taken up by the IPCC. They called for its removal or, as suggested by INDIA, limiting it to Section D (CRD) and not having it in Section C linked to adaptation.

In contrast, the UK, CHILE, FRANCE, BELGIUM, the US, AUSTRALIA, and others stressed the policy-relevance of the term and supported retaining it alongside EBA. The EU suggested adding language on the limitations and potential problems related to NBS. BRAZIL and ARGENTINA preferred a reference in the footnote to both EBA and NBS but agreed to the formulation by the authors noting the contested nature of the latter. GERMANY and FRANCE objected to the Chair’s proposal to delete the footnote and refer to NBS in a different section. Noting the prevalence of the concept in scientific literature, FRANCE added that not mentioning NBS here would be policy prescriptive, as it would appear a deliberate decision had been made to omit the concept.

SOUTH AFRICA proposed adding “with safeguards” where NBS is used in the footnote. He cautioned against sending a wrong message that NBS is a “solution” to climate change. Co-Chair Pörtner suggested referring to NBS as a “range of approaches and safeguards,” which delegates accepted. FRANCE, with the US, BELGIUM, and the EU, opposed authors’ proposed wording for the last sentence, stating that “in some countries there is significant opposition to the use of the term because it may give a false impression of the extent to which specific local, nature-based interventions can address global climate change.” SOUTH AFRICA rejected its deletion. In response to BELGIUM’s comment that “NBS” comes from the scientific literature, SOUTH AFRICA said the underlying report also uses “nature-based interventions” and “nature-based approaches.” The EU responded that the last sentence reflects political discourse, not the science.

The paragraph that was ultimately approved provides information on effective EBA for reducing a range of climate change risks to people, biodiversity, and ecosystem services, with multiple co-benefits. The footnote, as approved, notes that EBA is recognized internationally under the CBD, but that NBS is widely but not universally used in the scientific literature. The final sentence was modified to state that the term is the subject of ongoing debate, with concerns that it may lead to the misunderstanding that NBS on its own can provide a global solution to climate change.

On a paragraph addressing *feasible adaptation options for urban systems and their effectiveness*, INDIA opposed reference to “social infrastructure” in a sentence noting that the effectiveness of adaptation options depends on “coordinated responses across physical, natural and social infrastructure” and suggested referring instead to “socio-economic circumstances.” GERMANY noted the underlying assessment supports reference to “social infrastructure,” which includes schools and hospitals. The authors agreed, noting this term is supported in the literature and defined in the glossary. They suggested stating that “adaptation options exist for urban systems across all socio-economic contexts.” INDIA noted this suggests there are adaptation options for all circumstances whereas the language should specify that socio-economic circumstances should be considered as limits to adaptation. The authors proposed, and the Working Group accepted, retaining “social infrastructure” and inserting text stating that the feasibility and effectiveness of adaptation options are constrained by capacity.

TRINIDAD AND TOBAGO requested inclusion of more information on coastal adaptation and opposed the treatment of planned relocation as an adaptation option. He pointed to a distinction between an adaptation option and a response to loss and damage, noting planned relocation is the latter. NEW ZEALAND preferred retaining planned relocation as an adaptation option. The authors proposed text that “planned relocation is considered an adaptation option of last resort due to high economic and socio-cultural costs.”

The final text, as approved, ultimately emphasizes that the feasibility and effectiveness of adaptation responses for urban systems is constrained by institutional, financial, and technological access and capacity.

In response to several countries’ requests, authors proposed a new paragraph to address the *distinctive and severe adaptation challenges posed by sea level rise*. Proposals to improve clarity were suggested by INDIA and CANADA, but SAINT KITTS AND NEVIS stressed the need for a strong link with WGI language and the group agreed to the authors’ proposal. They also agreed to a suggestion by NORWAY to include reference to subsidence alongside ongoing sea-level rise.

The approved text refers to slow onset changes and increased frequency and magnitude of extreme sea level events that will escalate in the coming decades and describes responses to ongoing sea level rise and land subsidence.

On *feasible adaptation options within energy system transitions*, the authors, responding to questions and comments received from delegates, proposed revised language on how energy generation diversification, including with renewable energy resources, generation that can be decentralized, and demand-side management, can reduce vulnerabilities to climate change, especially for rural populations.

Pointing out that wind and solar are not applicable to all regions, JAPAN called for adding small-scale hydroelectric as another decentralized option, to which the authors agreed. INDIA, opposed by GERMANY, objected to emphasizing decentralization. The authors agreed to add “depending on context.” The text, as approved, lists the most feasible adaptation options but also now lists forms of energy generation diversification that can reduce vulnerabilities to climate change especially in rural populations.

On the paragraph on *adaptation options for migration and conflict*, language on how adaptation and development contribute to peace by addressing the drivers that lead to conflict and vulnerability was discussed multiple times. SAUDI ARABIA and INDIA questioned various formulations and the basis for the assertions, with the authors confirming the multiple lines of evidence and confidence in the statement. SAUDI ARABIA preferred to refer to “in assessed regions.”

The approved text highlights:

- increasing adaptive capacities minimizes the negative impacts of climate-related displacement and involuntary migration;
- some development reduces underlying vulnerabilities associated with conflict;
- adaptation contributes by reducing the impacts of climate change on climate-sensitive drivers of conflict; and
- risks to peace are reduced by, *inter alia*, advancing women’s empowerment.

**Figure SPM:** A figure on ecosystem health influencing prospects for climate-resilient development was ultimately deleted and therefore is not numbered. The figure contained two panels asserting: human activities that degrade ecosystems also drive global warming and negatively impact nature and people; and human activities that protect, conserve, and restore ecosystems contribute to CRD. Several delegations said the figure was too “simplistic” and presented a “black and white” view of the world.

**C.3:** This subsection addresses **limits to adaptation**.

On a paragraph on *soft limits to adaptation having been reached*, the US, supported by the REPUBLIC OF KOREA, INDIA, CANADA, IRELAND, CHINA, SWITZERLAND, CHILE, CUBA, and TANZANIA, queried the term “soft adaptation limits.” The US preferred “constraints.” With SPAIN, he said adaptive capacity is met and exceeded only in some specific systems and contexts. The REPUBLIC OF KOREA proposed a footnote clarifying adaptation limits. BELIZE, with INDIA, proposed drawing from Figure TS.7 – VULNERABILITY, panel (d) on adaptation constraints, from the Technical Summary. SAINT LUCIA noted the underlying report refers to the need for financial resources to overcome some constraints and called for including this reference.

SPAIN, with IRELAND and the UK, requested more, or more useful, examples on where limits have been reached, such as production facilities in coastal areas and big farms. SWITZERLAND preferred streamlining examples. CANADA preferred “inequity” over “inequality” for marginalized groups and called for examples of inequity increasing exposure. CHINA requested a footnote defining different kinds of successful adaptation, maladaptation, efficiency, and feasibility and suggested drawing guidance from Figures 1.5, 1.7, and 16.1 in the underlying report. The authors replied the SROCC uses “adaptation limits,” distinguishing between “hard” and “soft,” and cited evidence in the underlying report that soft limits are already being reached.

The text, as approved, says soft limits to some human adaptation have been reached, but can be overcome by addressing a range of financial, governance, institutional and policy constraints, and also refers to other constraints, including inequity and poverty and lack of climate literacy.

On *financial constraints as important determinants of soft limits to adaptation across sectors*, TANZANIA suggested they are the “main determinant” of soft limits. MEXICO requested reference to “regions.” SAUDI ARABIA: questioned whether “limits” refers

to all sectors; asked about causes of insufficient global financial flows and “constrained implementation of adaptation options,” and, with ARGENTINA, suggested substituting “developing countries” for “low-to-middle income countries.” The US and UKRAINE preferred the original wording. The US suggested contextualizing it within overall “development” and, with SWITZERLAND, added that addressing institutional and governance constraints can also increase financial flows. UKRAINE noted that financing also matters to economies in transition. INDIA noted an earlier draft reference to “widening gaps in adaptation finance,” with only half going to developing countries. He urged inclusion of the underlying report’s wording both on the gap between costs and the finance allocated and on costs as a proportion of national income for developing countries significantly greater since AR5, therefore making adaptation harder.

SAINT KITTS AND NEVIS suggested elevating references in paragraph TS.D.10.2 of the Technical Summary, that: estimated global and regional costs of adaptation vary widely due to differences in assumptions, methods, and data, with most recent estimates higher than AR5 numbers; and median estimated costs for developing country adaptation from recent studies being USD 127 and 295 billion per year for 2030 and 2050, respectively. She also referred to paragraph TS.C.10.1 of the Technical Summary, which states many key risks are projected to intensify rapidly in almost all regions, causing damages to assets and infrastructure and losses to economic sectors, and entailing large recovery and adaptation costs, if warming is not limited to 1.5°C.

ARGENTINA, the US, and SWITZERLAND requested clarification on current global financial flows being insufficient and constraining implementation. MEXICO noted they are also “insensitive to national capacities or climate needs.”

Some discussion ensued regarding a revised sentence stating that although global tracked climate finance has shown an upward trend with the majority coming from public sources, only 4 to 8% was allocated to adaptation. The US opposed this sentence, noting the numbers provided are low and based on a single study, and could be misleading. IRELAND and FRANCE concurred, saying they are low in comparison to those provided by the Organisation for Economic Co-operation and Development.

Following additional consultations, the authors proposed slightly revised language stating that “although global tracked climate finance has shown an upwards trend, the vast majority was allocated to mitigation; adaptation finance has come predominantly from public sources.” INDIA asked that the specific numbers be kept as it addressed one of the key issues in adaptation. The US, IRELAND, FRANCE, and AUSTRALIA opposed, cautioning against false precision.

The text, as finally agreed, states that financial constraints are important determinants of soft limits to adaptation across sectors and all regions. The paragraph does not include specific numbers but states that “although global tracked climate finance has shown an upwards trend since AR5, current financial flows for adaptation, including from public and private finance sources, are insufficient for and constrain implementation of adaptation options, especially in developing countries.” It also states that the overwhelming majority of global tracked climate finance was targeted to mitigation while a small portion was targeted to adaptation and that adaptation finance has come predominantly from public sources.

On *many natural and human systems nearing their adaptation limits*, the US, FRANCE, and IRELAND favored “capacities” over “limits” and differentiation between natural and human systems. On a sentence on ecosystems that are already reaching or surpassing adaptation limits, ARGENTINA requested including Latin America and the Andes among affected regions listed. FINLAND asked whether “polar and mountain ecosystems” cover the Arctic. SAINT KITTS AND NEVIS asked whether “adaptation limits” in this paragraph are hard or soft, and whether reference to hard limits on freshwater resources above 1.5°C includes coastal settlements. GERMANY called for reference to “large regional variations” in limits at lower global warming levels.

JAPAN, supported by INDIA, suggested referring to “some” current growing areas or indicating relevant regions and crops. SPAIN preferred “water security” over reference to “some water management measures” reaching hard limits at 3°C warming, or, with INDIA, more specification. CHINA asked what the hard limits are and whether they apply at higher latitudes. INDIA noted the underlying report’s reference to the “human and financial resources” needed for “transitioning from incremental to transformational adaptation.” CANADA responded that transitioning to transformational adaptation can overcome some limits, such as through economies of scale. Draft text giving examples of adaptation limits at specific levels of warming above 1.5°C and language on transitioning to transformational adaptation to overcome soft adaptation limits was moved elsewhere.

#### **C.4:** This subsection deals with **avoiding maladaptation.**

In general comments, SAUDI ARABIA noted the first three paragraphs repeatedly introduce the concept of maladaptation, with recommendations only given in the fourth. She requested information on long-term impacts of maladaptation. The US emphasized transitional and transformative, rather than transactional and discrete, steps for adaptation.

On the Headline Statement on *increased evidence of maladaptation across many sectors and regions*, INDIA called for including a figure from the underlying report, which shows successful or maladaptive interventions as two ends of a continuum of risk management strategies. SAUDI ARABIA requested replacing “many” regions with “some” and queried whether saying that maladaptive responses to climate change create “lock-ins” of vulnerability is too deterministic. These comments prompted no changes. The Headline Statement was approved with one change, to refer to “implementation of adaptation actions” rather than implementation of investment.

On a paragraph on *single-sector or single-risk actions that prioritize short-term gains leading to maladaptation*, SAINT KITTS AND NEVIS, supported by CANADA, requested clarification on how a sentence on sea level rise as a severe adaptation challenge relates to maladaptation, noting earlier lengthy discussions in another paragraph on coastal adaptation. VENEZUELA, supported by INDIA, suggested specifying “non-integrated” single-sector actions leading to maladaptation, with INDIA cautioning that short-term gains should sometimes be prioritized. The authors said the paragraph stresses that adaptation takes place over time so short-term actions influence what options are available in the long-term, with “maladaptation” referring to those not beneficial in the long term. CHINA, with INDIA,



requested clarifying the role of sea walls in fighting sea level rise, saying in the short-term they are useful, although in the long term, high sea level rise will lead to migration and displacement.

JAPAN noted that measures to avoid maladaptation vary by region and requested alignment with Chapter 6 of the underlying report, including by: adding that sea walls “effectively” reduce impacts to people and assets in the short term; and deleting reference to impacts happening “much earlier under low-likelihood rapid sea level rise due to Antarctic ice sheet melt.” These suggestions were accepted, although his suggestion for considering optimal or low-regret measures, given the financial and economic impacts of climate change, was not. CANADA called for aligning the reference to sea level rise with WGI language for consistency. The UK and SWITZERLAND suggested including more details about sea levels. This was not accepted as this is discussed elsewhere.

The final text reads, *inter alia*, that the implementation of maladaptation actions that focus on sectors and risks in isolation and on short-term gains can result in infrastructure and institutions that are inflexible and/or expensive to change.

In a paragraph on *biodiversity and ecosystem resilience decreased by maladaptive actions*, SAUDI ARABIA called for guidance on avoiding these consequences. INDIA questioned the “high confidence” level, saying previous conclusions about adaptation were based on ecological theory rather than observation. At VENEZUELA’s request, the authors noted numerous examples, from the sectoral and regional chapters, of ecosystem resilience being reduced by adaptation measures, saying decision-making on protection must consider humans and nature.

The paragraph was accepted with the addition of fire suppression in naturally fire-adapted ecosystems as a further example of maladaptation and a final sentence that considering biodiversity and autonomous adaptation in long-term planning processes reduces the risk of maladaptation.

In a paragraph on *effects of maladaptation on Indigenous Peoples, ethnic minorities, and disadvantaged groups*, CANADA, supported by SAUDI ARABIA, preferred referring to “inequity” rather than “inequality,” saying inequity emphasizes systems of oppression. This was accepted. MEXICO, supported by SAINT LUCIA and TRINIDAD AND TOBAGO, said migration is not an adaptation option but a strategy for survival given the effects of climate change. TRINIDAD AND TOBAGO, opposed by the RUSSIAN FEDERATION, said presenting migration as an “adaptation option” sends a very dangerous message, reflecting a policy bias that would hinder adaptation. The US suggested referring to “subsidized insurance options” instead of “migration.”

Reference to migration and irrigation from groundwater as examples of maladaptation were removed. The final text refers to maladaptation especially affecting marginalized and vulnerable groups adversely, gives examples of effects of maladaptation, and notes different forms of knowledge that can help prevent maladaptation.

**C.5:** This subsection addresses **enabling conditions**.

On a paragraph on *political commitment and follow-through across all levels of government accelerating implementation of adaptation actions*, SAUDI ARABIA requested its deletion, noting it is policy prescriptive. FINLAND commended the paragraph’s acknowledgement of the contributions of social movements and stakeholders to transforming society. SAINT LUCIA, the US, and IRELAND called for revising the “misleading” message that

“benefits could only become visible in the next decade or beyond” to also mention near-term benefits of investments in climate change adaptation. VENEZUELA emphasized the importance of capacity building in investments of financial, human, and political resources for implementing adaptation actions. INDIA pointed to the inability to mobilize resources, saying developing countries continue to call for climate change finance to be grants, not loans. He stressed accountability and transparency of adaptation commitments to those who did not create the problem but suffer its impacts.

On a sentence on accelerating commitment and follow-through, SAUDI ARABIA, with INDIA, but opposed by FINLAND, suggested replacing “climate-related litigation” with “climate governance” in a list of actions that can accelerate commitment and follow-through. The authors rejected this suggestion, noting many places where climate-related litigation is being used and the substantial literature, as reflected in Chapter 17.4 of the underlying report. The US clarified that climate-related litigation can sometimes discourage action. NORWAY, supported by SAUDI ARABIA, suggested referring to climate litigation “in some parts of the world.” CAN INTERNATIONAL said climate-related litigation is a fundamental component of the polluter pays principle and climate justice. Ultimately, the text was approved with the addition of NORWAY’s proposal to include climate-related litigation in a list of actions that promote the acceleration of commitment and follow-through.

The final text says, *inter alia*, that implementing actions can require large upfront investments of human, financial, and technological resources, with some benefits only becoming visible in the next decade or beyond, and listing some examples of actions.

On a paragraph on *institutional frameworks, policies and instruments for adaptation*, INDIA stressed reference to how adaptation goals integrate into the large process of development. The RUSSIAN FEDERATION suggested replacing “opportunities” with “options” and specifying options for integrating adaptation into existing frameworks, with better links between these and the list of instruments that strengthen adaptation responses in the following sentence. SAUDI ARABIA, opposed by FINLAND, the US, and NORWAY, requested deleting the list of instruments as not comprehensive. NORWAY emphasized the importance of coordination among actors at different government levels.

The approved text reads that institutional frameworks, policies, and instruments that set clear adaptation goals and define responsibilities and commitments, and that are coordinated amongst actors and governance levels, strengthen and sustain adaptation actions, and present examples of such instruments.

On *enhancing knowledge on impacts, risks, and their consequences*, the RUSSIAN FEDERATION preferred deleting “impacts.” This was accepted. BRAZIL, with INDIA, requested adding that “national capacity building” will enhance such knowledge, with INDIA noting the need for “inclusive knowledge production” that recognizes developing countries’ views. VENEZUELA called for noting how and to what degree knowledge is shared. The US emphasized “peer to peer” capacity building and knowledge networks to educate the most vulnerable. INDIA called for specifying knowledge exchange without barriers, noting the pandemic showed intellectual property rights as a major barrier globally. This was not accepted.

After contact group consultations on a sentence listing top-down, bottom-up, and co-produced processes, the authors opposed INDIA's suggestions to replace "co-produced" with "participatory" processes and "citizen science" with "peoples' science movements," saying most literature assessed uses "co-produced" and "citizen science." CANADA suggested referring to processes "and sources." INDIA queried "interactive modelling." The authors said "participatory modelling" would be acceptable. With these two changes the sentence and paragraph were approved.

The approved text states that enhancing knowledge on risks, impacts, and their consequences, and available adaptation options promotes societal and policy responses, and refers to "a wide range of top-down, bottom-up and co-produced processes and sources" of knowledge.

On *access to financial and technological resources for implementation of adaptation*, MEXICO suggested a mix of instruments can lead to broader impacts. GRENADA, with BRAZIL, said higher levels of finance are critical to enhancing adaptation implementation, calling for inclusion of quantitative information on adaptation costs in developing countries. INDIA called for: restoring text from a previous version indicating that building capacity and removing barriers to climate funding can support adaptation and is fundamental for achieving climate justice for highly vulnerable countries; referencing adaptation gaps; and acknowledging the limitations of private finance.

Regarding a sentence on building capacity and removing barriers to accessing finance to accelerate adaptation, the US sought clarification and specificity on "removing barriers to accessing finance," expressing concern this could also result in the removal of social and environmental safeguards. INDIA cautioned that an increased understanding of risk could lead to capital flight from where it is needed most.

INDIA said accelerating "implementation" of adaptation was too narrow and preferred accelerating adaptation. NORWAY supported the point raised by India, noting implementation might not include research, for example, which also requires finance. He said the original formulation did not include mention of implementation.

The authors suggested reducing, rather than removing, barriers to adaptation finance and reverting to the original formulation of accelerating adaptation. INDIA preferred the stronger language on "removing" barriers. The authors said removing "some" barriers is consistent with the references provided in the sentence. The sentence was agreed with these modifications.

SAINT KITTS AND NEVIS stressed scaling up adaptation finance in line with international commitments and proposed stating that financial resources "are required for implementation." CHINA called for adding quantitative information on demand for adaptation finance in developing countries and reference to insufficiency of adaptation funding. SWITZERLAND suggested adding guarantees and equity to the examples of financial instruments, noting these do not increase sovereign debt. SPAIN suggested, *inter alia*, referencing public-private partnerships, regulatory simplification, and greater fiscal responsibility.

Favoring the text as presented, the US noted that financing adaptation "enables" both developing and developed countries and said investing in resilient infrastructure is needed at all levels. BELIZE, supported by INDIA but opposed by the US, called for inclusion of numbers from paragraph TS D.10.2 of the Technical Summary, which states that "median (and ranges) estimated costs

for developing country adaptation from recent studies are USD 127 (15-411) and 295 (47-1088) billion per year for 2030 and 2050, respectively." The US suggested instead reflecting the underlying report on methodological challenges associated with estimating adaptation costs. The authors noted the challenges but said this paragraph is on mechanisms essential to adaptation. A proposal by the authors to merge this sentence with the next one, on access to and mobilization of financial resources being essential, was opposed by INDIA.

The US requested clarification and specificity on "removing barriers to accessing finance," or replacing it with "enabling" or "enhancing" finance. INDIA, supported by the authors, objected, saying this would change the meaning. Delegates agreed to specify "some" barriers to accessing finance but BELIZE's proposal for including the TS B.10.2 numbers was not accepted.

As approved, the paragraph refers to adaptation finance needs estimated to be higher than those presented in AR5, and to building capacity and removing some barriers to accessing finance for accelerating adaptation. It then gives examples of public and private finance instruments and technical resources and some of their uses.

On *monitoring and evaluation of adaptation to enable effective adaptation*, IRELAND suggested clarifying what this entails and why some countries are not undertaking it. The RUSSIAN FEDERATION added that monitoring and evaluation "may be needed to reduce risk and exploit beneficial opportunities." SPAIN suggested referring to "regional" as well as local- and national-level monitoring and evaluation implementation.

The final text, as approved, reads, *inter alia*:

- monitoring and evaluation of adaptation are critical to tracking progress;
- most adaptation monitoring is focused towards planning and implementation but monitoring of outcomes is critical for tracking the effectiveness and progress of adaptation; and
- monitoring and evaluation facilitates learning and signals when additional adaptation action may be needed.

#### **D. Climate Resilient Development**

Many initial comments on this section revolved around the need to provide clarity on the concept of CRD and its linkage with mitigation and sustainable development. IRELAND, for example, with the REPUBLIC OF KOREA, the UK, and others, supported including a better explanation of CRD, where it exists, and how it can be enhanced or undermined. CHINA also requested reference to more concrete measures that promote the pathways leading to CRD.

INDIA objected to the narrow understanding of development in terms of climate change and to its link with mitigation in the concept of CRD. FWCC suggested referring to "sustainable and climate resilient development" instead of only CRD. INDIA also stressed the need to include references to historic emissions and expressed concern with giving the impression that responsibility rests solely within national governments, given limits to adaptation in some countries and areas and unsustainable consumption in developed countries.

SAINT KITTS AND NEVIS, supported by the UK and the US, called for clarifying there is no CRD without stringent mitigation. GERMANY highlighted the need to clarify constraints associated with increased levels of warming.

SAINT LUCIA and JAMAICA stressed SIDS' unique vulnerability and proposed adding regional references, as well as examples such as on distributed energy systems or debt-for-nature

swaps and the challenges associated with pursuing these options. SENEGAL, supported by FWCC, called for reference to least developed countries as well and to debt burdens. On the chapeau to this section, INDIA, supported by CAN INTERNATIONAL, argued that equity is a fundamental component of system transitions, and requested its inclusion. The authors proposed language to reflect this, which was agreed, and the chapeau was approved.

**D.1:** This subsection addresses **conditions for CRD**.

On a paragraph addressing *possible multiple pathways to CRD*, delegates discussed extensively the issue of whether to include reference to the limits to CRD posed by warming beyond 1.5°C and 2°C. GERMANY, SAINT KITTS AND NEVIS, the UK, the US, CANADA, CHILE, FRANCE, CAN INTERNATIONAL, FWCC, and others supported explicit reference to global warming levels. CHINA, INDIA, and others noted this is covered in a subsequent subsection and understood that the focus of this subsection is on CRD and the SDGs more broadly.

The Working Group also discussed how to refer to past and current choices. Following interventions by delegates, the authors proposed text referencing the rapidly narrowing window of opportunity to enable CRD, and the fact that past choices have already eliminated some CRD pathways. INDIA and SAUDI ARABIA called for reference to past choices as limiting pathways to CRD, whereas the US sought a formulation for also including current choices. The US said both past and current choices have eliminated some CRD pathways, while some past choices have also opened up CRD opportunities, and that this statement is therefore not factually accurate.

With respect to constraints on CRD pathways, SAUDI ARABIA preferred mentioning increased global warming levels more generally, rather than specifying 1.5°C, as others proposed, and noted past choices have already constrained CRD. CHILE suggested “progressively constrained CRD pathways with every increment of warming.” SAINT KITTS AND NEVIS, supported by GERMANY, urged maintaining reference to 1.5°C, noting difficulties in achieving CRD pathways if this level is exceeded.

INDIA requested adding reference to the remaining carbon budgets to the text. The authors said the paragraph addresses past development choices, which led to past emissions and will lead to future warming scenarios, not the remaining carbon budget. The Working Group did not agree to include reference to carbon budgets in this paragraph.

The final text states, *inter alia*, that CRD pathways are progressively constrained by every increment of warming, particularly beyond 1.5°C, social and economic inequalities, the balance between adaptation and mitigation varying by national, regional and local circumstances and geographies, according to capabilities including resources, vulnerability, culture and values, past development choices leading to past emissions and future warming scenarios, bounding the CRD remaining, and the ways in which development trajectories are shaped by equity, and social and climate justice.

**Figure SPM.5:** This figure visualizes the **rapidly narrowing window of opportunity to enable CRD** and includes panels on: societal choices about adaptation, mitigation, and sustainable development; illustrative development pathways; and actions and outcomes characterizing development pathways.

LUXEMBOURG, NORWAY, FRANCE, UKRAINE, ESTONIA and others welcomed this figure, noting it highlights the importance of mitigation and its connection to adaptation, while INDIA and others found it problematic. The NETHERLANDS questioned its added value.

SAUDI ARABIA objected to the focus on mitigation and said the figure should focus on adaptation. BRAZIL noted that addressing mitigation in this context should be accompanied by reference to means of implementation and support. ANTIGUA AND BARBUDA expressed concern with mitigation choices not properly reflected in the graph.

CHINA and SAUDI ARABIA suggested showing a range of warming pathways other than those related to either 1.5°C or 2°C. The authors clarified that the figure builds on a figure from AR5, scaled not to temperatures but to the manner in which CRD is enabled, while showing that warming creates future risks and challenges to sustainable development and adaptation. They explained the intention of the figure is to show the narrowing window of opportunity and the importance of continuous societal choices, as well as of mitigation and adaptation affecting future options.

Following contact group discussions, the authors presented revisions to the figure, including: text additions along the pathways to emphasize key moments; references to the contextual nature of constraints and the multi-scalar dimension of CRD; and clearer labeling of CRD. SAINT KITTS AND NEVIS, supported by TRINIDAD AND TOBAGO and BELIZE, stressed the need to include reference to a 1.5°C warming limit and temperature stabilization scenarios. INDIA and SAUDI ARABIA called for including reference to past emissions.

CANADA proposed reference to the “rapidly” narrowing window of opportunity and, with the US and the UK, emphasizing the period between now and 2030, given how critical it is for CRD. BRAZIL, supported by ARGENTINA, called for reference to means of implementation, finance, and support for capacity strengthening in developing countries.

The figure was then sent back to the contact group for further revisions. Presenting a revised figure to the Working Group, the authors said the figure includes dimensions that enable actions and gives more visibility to the pre-2022 period. They highlighted carbon budget is not included in the figure as its link with CRD is not explicit in the report.

INDIA reiterated that the list of past conditions must include emissions, which was added to the figure. With SAUDI ARABIA and BRAZIL, INDIA supported including a timeline that goes farther back than 2015. CHILE and the NETHERLANDS agreed the past should not be overly prominent and said they could accept mention of past emissions. The US supported starting with 2015. The final version of the figure does not refer to past timelines.

On the figure’s caption, the US requested reference to the SDGs. The authors suggested stating that inadequate progress toward the SDGs by 2030 reduces CRD prospects, which was accepted. TANZANIA queried use of the term planetary health in this context, with the US requesting its deletion, which was also accepted.

INDIA supported reference to the remaining carbon budget and opposed a suggestion to instead mention GHG emissions, noting carbon budget speaks to limits. The UK said carbon budget does not contribute to a narrowing window but is synonymous with it. The US, with NORWAY, expressed concern with introducing

carbon budgets in this context, with the US adding that the authors did not assess how carbon budget is related to CRD. SWEDEN suggested that including reference to carbon budgets in connection with a narrowing window of opportunity might be viewed as an opportunity to use the remaining budget. Following additional consultations, the caption was approved.

The final text refers to the narrowing window of opportunity to shift to more CRD futures as reflected by adaptation limits and increasing climate risks, considering the remaining carbon budgets.

**D.2:** This subsection addresses **enabling CRD**.

On a paragraph addressing *how CRD is advanced*, IRELAND, supported by the UK and NEW ZEALAND, proposed adding reference to climate information services and knowledge, with the UK adding incorporation of local and Indigenous knowledge.

CHINA, supported by the US, INDIA, BRAZIL, SAUDI ARABIA, UKRAINE, and others, called for reference to international cooperation. INDIA also emphasized historical responsibility, financial support and technology transfer, and sustainable lifestyles.

Regarding a reference to “rights-based approaches,” the OFFICE OF THE UN HIGH COMMISSIONER FOR HUMAN RIGHTS, supported by FWCC, suggested adding “human” to refer to “human rights-based approaches” in accordance with UN practice. CAN INTERNATIONAL suggested language to reflect existing inequities. These suggestions were not taken on, however. In response to a question from SAUDI ARABIA on the acceptability of observer organizations giving textual suggestions, the IPCC Legal Advisor clarified that the IPCC welcomes interventions and suggestions from civil society. She also clarified that contact groups are open ended, so while civil society representatives and other observers can participate and provide comments, they may not debate text. She added that if members object to their commenting, they must remain silent.

SAUDI ARABIA objected to the term “low regrets” saying it is unfamiliar to decision-makers. FRANCE and GERMANY recalled that the term was defined and approved in AR5, but INDIA and SAUDI ARABIA opposed the definition’s references to “stranded investments.” The authors proposed a footnote with an updated definition of low regrets based on AR5, with the addition of words from the underlying report, as suggested by SAUDI ARABIA. With this, the paragraph was agreed.

In a paragraph on *role of governance in contributing to more effective and enduring adaptation outcomes and enabling CRD*, INDIA objected to a reference to inclusive governance “leading” to more effective and enduring adaptation outcomes. The Working Group agreed to the role of governance in contributing” to such outcomes.

The Working Group also addressed a sentence on inclusive processes strengthening the ability of governments and other stakeholders to jointly consider factors such as the rate and magnitude of change and uncertainties, associated impacts, and timescales of different CRD pathways given different scenarios of future global warming. The authors proposed adding text on “past emissions,” noting this is based on delegates’ comments and is consistent with the literature. The US noted warming is only one of many climate impacts and suggested stating instead “given past and predicted climate scenarios.” This was not taken on.

The US requested inserting factors to be considered given “development choices influencing” emissions and different scenarios

of future global warming. INDIA suggested specifying “historical” emissions and scenarios of future global warming. Following further discussions, the reference was changed to “past development choices leading to past emissions and scenarios of future global warming” and the sentence and paragraph were approved.

**D.3:** This subsection addresses **CRD for natural and human systems**.

On the Headline Statement that *the global trend of urbanization offers an opportunity to advance CRD*, SAUDI ARABIA requested clarification of a “critical” versus a “time-limited” opportunity. The authors responded that “time-limited” refers to the near term of 2020-2030. The US asked whether “integrated and inclusive planning” means investment is “integrated” and asked for sources on urban areas’ CRD supporting supply chains. He asked to reinstate specificity on financial flows “from markets and remittances” from a previous SPM draft. SAINT KITTS AND NEVIS sought reference to urbanization creating “challenges,” not just opportunities. This was accepted. JAPAN called for reference to the “interdependence” of rural and urban areas. The authors agreed to add examples.

Regarding a paragraph that states *taking integrated action for climate resilience today is easier and more effective than retrofitting future urban design, infrastructure, and land use*, INDIA said the text emphasizes building for CRD, which is directed at developing countries, more than retrofitting, which is directed at developed countries. He underlined that both building for CRD and retrofitting are important and called for balanced text. New text was proposed for insertion, which states, “Taking integrated action for climate resilience to avoid climate risk requires urgent decision making for the new built environment and retrofitting existing urban design, infrastructure and land use.” With this, the paragraph was approved.

**D.4:** This subsection addresses **biodiversity and CRD**.

On the Headline Statement *that safeguarding biodiversity and ecosystems is fundamental to CRD*, BRAZIL cautioned this is only part of the solution. LUXEMBOURG, with NORWAY and INDIA, called for linking the Headline Statement more closely to its subparagraphs, and suggested elevating a statement from a paragraph in this subsection, that 1.5°C warming makes biodiversity and ecosystem services adaptation progressively harder. On conserving approximately 30-50% of the Earth’s land, LUXEMBOURG and INDIA noted many methods of conservation. INDIA, with JAPAN, requested deletion of the 30-50% figure. SAUDI ARABIA requested clarification of whether the 30-50% figure is based on projections or observations, cautioning against policy prescriptiveness. ARGENTINA said the gap between 30% and 50% suggests a lack of clarity, noting different types of ecosystems with different functions and resilience. The authors said multiple independent and diverse studies support the 30-50% quantification.

INDIA said inclusion of numbers has serious implications for Indigenous Peoples and would lead to maladaptation. FINLAND supported including the numbers, noting Indigenous Peoples also live in conservation areas. The US, with FRANCE, added that the numbers are highly policy relevant and supported by the science.

The authors clarified that effective conservation does include areas under control of Indigenous management, and providing numbers, which have been peer reviewed, gives an idea of the scale involved. The Working Group agreed to retain the numbers. With

the addition of text mentioning the threats climate change poses to biodiversity and ecosystems and their roles in adaptation and mitigation, the Headline Statement was agreed.

On the paragraph on **building the resilience of biodiversity and supporting ecosystem integrity**, FRANCE requested reinsertion of previous draft language that “limiting warming to 2°C and protecting 30% of high biodiversity regions in Africa, Asia and Central and South America was estimated to reduce risk of species extinctions by half.” The US called for “high confidence” in relation to a statement that CRD pathways support climate-resilient biodiversity and ecosystem integrity. The paragraph also includes a footnote defining ecosystem integrity.

Several delegates also called for this paragraph to include reference to NBS. Some noted that a similar discussion was being held under subsection C.1. In discussions under both subsections (C.1 and D.4) delegates debated whether and where to include a reference to NBS. BELGIUM, supported by the US, REPUBLIC OF KOREA, and FRANCE, said NBS is relevant for this paragraph as it is used in the scientific literature and in numerous UN contexts, including IPBES and UNEP, and appears in the WGII AR6 glossary. INDIA, SOUTH AFRICA, ARGENTINA and BRAZIL objected to reference to NBS. The authors said “NBS” is common in the scientific literature and is broader than EBA, which pertains to adaptation in the natural environment. They proposed a footnote explaining this relationship, noting the SPM must be evidence-based, scientifically robust, and relevant to policymakers as well as to the underlying report. FRANCE, with the EU, supported the authors’ call for a footnote on the link between NBS and EBA. Delegates could not agree to refer to NBS and the final approved text therefore does not include reference to NBS.

On a paragraph that **protecting and restoring ecosystems is essential for maintaining and enhancing the resilience of the biosphere**, participants discussed a sentence addressing the adverse impacts of poorly implemented land-based mitigation measures, with the EU expressing concern particularly on afforestation of peatland. The agreed sentence reads “documented examples of adverse impacts of land-based measures intended as mitigation, when poorly implemented, include afforestation of grassland, savannas and peatlands, and risks from bioenergy crops at large scale to water supply, food security and biodiversity.”

The US suggested that protecting and restoring ecosystems “presents opportunities for,” rather than “is essential for” maintaining and enhancing the resilience of the biosphere, but this was not agreed. BELIZE suggested noting “opportunities,” not just adverse impacts, of land-based mitigation, and adding impacts on oceans to a list of examples of impacts. FRANCE called for reintegrating previous draft language on a 38% overlap between areas of high carbon storage and high intact biodiversity globally, only 12% of which is protected, to catalyzing action. The authors said this information is only based on one study, thus inappropriate for the overarching SPM. Responding to several countries’ concerns over whether degradation and loss of ecosystems is “a cause of GHG emissions,” the authors said the message is the impact of climate change on those carbon stocks and sinks and its interaction with land use and management. They added that land use accounts for 10% of GHGs, with some scenarios showing much higher future emissions, and that ecosystem protection is an adaptation measure. BRAZIL said not all bioenergy crops create risks to other environmental goals.

On **biodiversity and ecosystem services’ limited capacity to adapt**, SOUTH AFRICA, BRAZIL, and ARGENTINA called for deleting reference to NBS, or, in the case of ARGENTINA, replacing it with EBA. FRANCE sought reintegration of previous draft wording that under higher warming levels, NBS will increasingly be under threat. SAUDI ARABIA urged deletion of wording that biodiversity and ecosystem services’ limited capacity to adapt to increasing global warming levels “will make CRD progressively harder to achieve beyond 1.5°C.” The Working Group agreed to replace NBS with EBA and the paragraph was approved.

**D.5:** This subsection addresses **disruptions to human and natural systems caused by climate change**.

On the Headline Statement on **achieving CRD**, the RUSSIAN FEDERATION with SAUDI ARABIA, proposed “with the aim of keeping global warming below 1.5°C” in the near term instead of “especially with the possibility of exceeding 1.5°C.” SAINT KITTS AND NEVIS asked for clarification on the “possibility” of exceeding 1.5°C. The UK offered “and especially if 1.5°C global warming is exceeded.” SAUDI ARABIA preferred that societal choices “will contribute to,” rather than “determine,” the extent of higher or lower CRD, but this was not accepted.

On a sentence stating that past and current development trends have not advanced CRD, INDIA stressed the need to send a positive message while acknowledging problems in the past. A sentence was added at the end of the paragraph stating that “these prospects are constrained by past development, emissions and climate change, and enabled by inclusive governance, adequate and appropriate human and technological resources, information, capacities and finance.”

In a paragraph on **CRD challenges**, SAINT KITTS AND NEVIS suggested the scope and options for CRD will “be further undermined if global warming levels exceed 1.5°C.” The authors agreed to consider this. SAUDI ARABIA called for mention that CRD is already challenged by global warming levels and suggested replacing “will” with “are projected to.” The authors agreed to her request to add “deserts” to the list of regions/subregions where climate impacts are already advanced, and the text was agreed with these changes.

On a paragraph on **inclusive governance and rapidly scaled-up investment, and institutional capacity building**, MEXICO, with FRANCE and the US, requested specifying the direction of investments and aligning investment and institutional capacity building. INDONESIA said “rapidly scaled-up investment” can be positive or negative and preferred stating that CRD will be advanced quickly by building local capacities. SAINT LUCIA, supported by BRAZIL and INDIA, requested quantitative specification of financial needs.

The US suggested saying CRD “is also enabled by” international cooperation and financial assistance rather than “advances more quickly,” which was agreed. CANADA suggested referring to “flexible” CRD, not “timely” or “anticipatory,” and referring to “all actors.” SWITZERLAND called for reference to “scaled-up domestic and international public and private investment.” ECUADOR requested reference to “ancestral” knowledge, but this was not included. The final text refers to, *inter alia*, inclusive governance, investment aligned with CRD, access to appropriate technology and rapidly scaled-up finance, and capacity building of governments at all levels, the private sector, and civil society

to enable CRD. It also mentions CRD is enabled by increased international cooperation, including mobilizing and enhancing access to finance.

On *climate change as a threat to human well-being and planetary health*, NORWAY and LUXEMBOURG requested specifying threats. CHINA, with SAUDI ARABIA and the RUSSIAN FEDERATION, queried use of the term “planetary health.” The RUSSIAN FEDERATION suggested referring to a rapidly closing window of opportunity “for CRD” rather than “to secure a liveable and sustainable future for all.” The NETHERLANDS and NORWAY requested a timeline for the closing window and substantiation of “liveable” from the underlying report. SAUDI ARABIA queried whether the threat is observed or projected and, with INDIA, requested deleting reference to any further delay in global action missing a brief and rapidly closing window of opportunity and adding reference to equity and national circumstances. INDIA called for more specification of actions needed for adaptation. NORWAY and LUXEMBOURG urged specifying global action “on mitigation and adaptation.” The authors cited references to queried terms, with WGII Co-Chair Pörtner adding that “planetary health” is well established in the scientific literature. Several delegates welcomed the strong message of this last SPM paragraph.

### ***Closing of WGII-12***

The Working Group completed its work, approving the SPM late Saturday night, 26 February. Co-Chair Roberts announced that the full text of the approved SPM would be posted to the online portal early on Sunday morning to give delegates the opportunity to peruse it ahead of its formal approval.

Lamenting a leak to the media prior to the lifting of the embargo on the report, the RUSSIAN FEDERATION urged against such leaks, noting it “gives a sensational flavor” to the debate. He said presenting the results in a united manner will ensure the final product has a higher value.

The INUIT CIRCUMPOLAR COUNCIL noted her organization is the first Indigenous organization accredited as an IPCC observer. She noted expertise provided to the SROCC and the WGII report’s Cross-Chapter Paper on the Polar Regions and applauded recognition, in the SPM, of Indigenous knowledge in successful adaptation. She urged delinking Indigenous knowledge from local knowledge, noting they are not the same. She expressed interest in working with the IPCC to improve the participation of Indigenous Peoples in the IPCC and hoped to bring their expertise to the AR7 process.

On Sunday morning, 27 February, the WGII-12 plenary reconvened to approve the SPM and accept the underlying scientific-technical assessment, which were then submitted to IPCC-55 for its acceptance.

### ***Closing of IPCC-55***

On Sunday morning, after the closing of WGII-12, IPCC Chair Lee opened the resumed IPCC-55 plenary and introduced the SPM and underlying scientific-technical assessment, as approved by WGII-12. The WGII-12 contribution to the AR6 was accepted by the Panel.

**Place and date of IPCC-56:** IPCC Secretary Mokssit announced that IPCC-56, including the WGIII approval session, will take place from 21 March to 1 April 2022, in a virtual session hosted by the UK.

**Closing Statements:** BELGIUM stressed expeditious implementation of the IPCC error protocol should problems be found with regard to how risks of species extinction increase with global warming.

Thanking everyone for their concern and support, UKRAINE stressed that climate change and the war in her country had the same roots in fossil fuel dependence. She expressed regret that the news about the war would compete with the IPCC report and hoped that the world would not surrender in trying to build a climate-resilient future in the same way that Ukraine will not surrender. She also said Ukraine’s delegation would continue to contribute to the IPCC at WGIII despite having now been forced to leave their homes.

The RUSSIAN FEDERATION thanked Ukraine and presented an apology on behalf of Russians who were not able to prevent the conflict, saying they “failed to find any justification for the attack.” He also expressed “huge admiration” for the Ukrainian delegation who had continued to work and express itself during this time.

In their closing statements, delegates expressed solidarity with Ukraine and thanked the WGII Co-Chairs, interpreters, the IPCC Secretariat’s information technology team, and others for their support at a challenging meeting. BELGIUM and CANADA called for much shorter reports. TRINIDAD AND TOBAGO and SAINT KITTS AND NEVIS expressed disappointment with the SPM’s lack of a clear statement and numbers on the damages to SIDS’ economies, given the existential risk that climate change presents to them and the policy-relevant nature of this information. CANADA welcomed the participation of the Inuit Circumpolar Council as the first Indigenous Peoples’ organization to hold observer status in the IPCC. In response to a question by the NETHERLANDS on the limited participation of observer organizations, Secretary Mokssit assured the Panel of the Secretariat’s commitment to ensuring an equal chance of participation of both delegations and observer organizations.

SAINT KITTS AND NEVIS lamented that critical sections addressed during the second week were not given adequate attention due to lack of time. Noting that a few delegates seemed to take up a lot of the negotiation time, she stressed the need to ensure more equitable allocation of time to allow for all countries’ interventions.

SWITZERLAND hoped the AR7 could address tipping points and their consequences, noting the large-scale socio-economic impacts on tipping points is highly policy relevant. He looked forward to welcoming everyone to Geneva to approve the SYR.

SOUTH AFRICA thanked Germany, Norway, and New Zealand for providing support for establishing a TSU in South Africa. He expressed hope that the model implemented in South Africa could be replicated in other countries in the Global South. He also looked forward to the special report on cities.

AUSTRALIA commended the increased integration across Working Groups, underscored the need to enhance engagement of observers, and lamented the absence of many developing country participants, including those from Pacific SIDS. He hoped participation could be improved at IPCC-56.

IPCC Chair Lee reported that this approval session recorded the highest ever number of registered delegates, showing the ever-increasing relevance of IPCC reports. He noted that delegates’ and authors’ dedication and spirit of cooperation enabled the provision of a robust report despite the difficulties of working virtually to both produce the assessment and then come together to approve the SPM. Chair Lee declared the meeting closed at 9:51 am UTC.

## A Brief Analysis of IPCC-55 and WGII-12

### *It's worse than you think*

For two weeks, delegates and scientists worked remotely together in front of their computers to go through the Intergovernmental Panel on Climate Change (IPCC) Working Group II (WGII) contribution to the Sixth Assessment Report (AR6) and approve its Summary for Policymakers (SPM), assessing the latest science on the impacts of climate change, vulnerability, and adaptation possibilities. Outside the meeting, there was no good news to be found: war had broken out in Ukraine, energy prices—particularly for oil—were soaring, and many feared further price hikes and even more conflict. Greenhouse gas emissions, after decreasing during the first year of the COVID-19 pandemic, were also increasing, and were expected to continue to do so given renewed investment in coal-fired power plants and fossil fuels amid concerns about energy security. All the while, extreme events and reports of the negative impacts of climate change on species and ecosystems continued unabated. The world is seemingly further away from international collaboration and effective climate change action than even a few months ago.

It is perhaps fitting that the WGII report also does not contain good news. As a summary of impacts across both human and natural systems, the report recounts widespread losses and damages to nature and people. Some of these impacts are irreversible. Adaptation is no longer possible in several cases, including for some warm water coral reefs, coastal wetlands, and polar and mountain ecosystems. For those systems still able to adapt, there is a rapidly closing window of opportunity, with options foregone for every degree of warming.

These findings are now accepted by all governments, after they were reviewed line-by-line, revised, and adopted. This analysis presents a brief overview of the process of approval of the SPM, highlights some of the main issues under discussion, and outlines some of the report's key findings.

### *Can you hear me now?*

As evidence of climate change continues to accumulate, so does the IPCC's experience in conveying this evidence. Despite the increasing amount of literature to assess and the extraordinary process it requires (hundreds of scientists and reviewers, tens of thousands of scientific papers, tens of thousands of reviews), the IPCC continues to provide the most widely accepted information on climate change and its impacts, and continues to improve its procedures. The number of scientists and sources from developing countries is still far lower than from developed countries, but the WGII AR6 report includes more regional climate change information than ever before, which is of critical importance for decision makers. This report also had a larger number of women participating than ever, even though women are still not at parity with men.

This continuous learning and improvement now include the ability to hold meetings online, following the success of IPCC Working Group I (WGI), which approved its report on the physical basis for climate change online during the summer of 2021. Technological glitches [and stable internet] notwithstanding, this meeting had the highest number of delegates ever registered for an approval session. A dedicated website (PaperSmart Portal) allows delegates, to some extent, to keep up with discussions in the different contact groups and prepare for each day's schedule.

Meeting online has also opened up the possibility for delegates to submit suggestions in written form when time in plenary begins to shrink.

Of course, virtual meetings still have major drawbacks, and always will. Particularly for small delegations, the schedule is grueling. The need to enable participation of delegates and authors in every time zone often means well over 12 hours of work every day and night, in this case for almost 14 straight days. Authors also have a demanding schedule, working—or “wording”—on the fly and online as they coordinate their responses to reply to proposals and questions as they arise in the discussions. The commitment by scientists for this unpaid work is astounding and admirable. While some of these challenges are also faced at in-person meetings, many participants agree there is no replacement for personal contact to build trust, share information and impressions, help assuage concerns, and facilitate cooperation. Face-to-face interactions between government delegates, scientists, and observers, as well as targeted one-on-one discussions between “interested” delegations will lead, more often than not, to better understanding, and, ideally, better outcomes.

### *The report and its SPM*

The AR6 WGII report recognizes that not only are ecosystems affected by climate change, but that those impacts have negative consequences for human well-being. This is front and center. This report is also clear on the importance of addressing social inequities and inclusive decision making. There is no climate-resilient development without healthy ecosystems and increased social justice. The report thus speaks of the all-encompassing “planetary health.”

In fact, compared to previous assessment cycles, the AR6 WGII report shows even greater integration of the natural and social dimensions of the impacts of climate change. This integrated approach is laid out explicitly in a section on climate-resilient development. It is also evident in the attention to “complex, compound and cascading risks”: impacts that cascade through natural and human systems, often compounding with impacts from other human activities, in a process of amplification and reinforcement.

Likewise, adaptation is not possible without mitigation; long gone are the days when one could keep those conversations separate. This doesn't mean, however, that during the WGII SPM approval session all mitigation-related terms were easily accepted. For example, there were protracted discussions on “nature-based solutions,” with some developing countries objecting to the (misleading) word “solutions” and the problematic emphasis on land and forestry-based mitigation measures.

The wealth of information in this WGII report is also delivered with greater levels of confidence than in previous reports. “Very high” and “high” confidence statements easily outnumber “medium” confidence ones. This is only partly to do with the increased amount of literature. There are now accounts of real events: we are already living through climate change, not just seeing it on the horizon. The report often states that impacts “will” happen, not “are projected” to happen, given multiple lines of evidence and observations.

Other new or enhanced features in the report include an entire sub-section on maladaptation, and clearer mention of adaptation limits, the potential of cities and urban areas, impacts on mental health, and the importance of Indigenous and local knowledge and of the involvement of Indigenous Peoples and vulnerable

communities in decision making. There are also more references to losses and damages, and to the links between climate change and conflict, as well as first-time references to rights-based approaches, colonialism, and climate litigation.

### Looking ahead

It is the responsibility of scientists to convey their findings no matter how depressing they are. Yet this is the first time the opening remarks to an IPCC meeting included words of caution on communicating key messages to policymakers without, in the words of World Meteorological Organization Secretary-General Petteri Taalas, raising “apocalyptic fears” among young people. As Inger Andersen, the United Nations Environment Programme’s Executive Director said, the best way to address climate anxiety is by taking action. In this sense, it was welcome to hear government calls for more “actionable” language, and for using science’s potential to inspire—for example, by referring to the benefits of protecting more areas instead of to their limited number.

The IPCC will convene again just weeks from now to take up the WGIII AR6 contribution on mitigation. Heated debates on issues such as solar radiation management over the past two weeks are a sign of the complicated discussions to come.

In the world of multilateral environment governance, many other processes will be using the IPCC AR6 report as an important input, particularly the United Nations Framework Convention on Climate Change’s Global Stocktake and Global Goal on Adaptation. The IPCC report is also expected to inform discussions at the UN Environment Assembly on the launch of a process to address marine plastic pollution—one of the intersecting and compounding drivers discussed in the WGII report.

It is important to remember that despite the report’s sobering conclusions, the IPCC still argues that, according to the science, avoiding the worst impacts of climate change is still technically possible if we act quickly. As WGII Co-Chair Hans-Otto Pörtner has said, the bottleneck to action has always been insufficient political will. And this, unlike some degree of sea level rise, can be overcome.

### Upcoming Meetings

**IPCC-56:** IPCC-56 will take place in conjunction with the 14th session of WGIII, which will focus on the approval of the WGIII contribution to the AR6, which assesses mitigation of climate change. **dates:** 21 March – 1 April 2022 **location:** virtual **www:** [www: www.ipcc.ch/calendar](http://www.ipcc.ch/calendar)

**Seventh Our Ocean Conference:** This conference will identify solutions to sustainably manage marine resources, increase the ocean’s resilience to climate change and safeguard its health for generations to come. The conference will focus on, among others: marine protected areas for communities, ecosystems, and climate; confronting the ocean-climate crisis; and creating sustainable blue economies. **dates:** 13-14 April 2022 **location:** Palau **www:** [ourocean2022.pw](http://ourocean2022.pw)

**SEforALL Forum 2022:** The 2022 Sustainable Energy for ALL (SEforALL) Forum will focus on the theme, “Building Speed, Reaching Scale, Closing the Gap.” It aims to provide a global platform to mobilize resources, connect partners and showcase action to realize the promise of the sustainable energy revolution for everyone. The event will bring together energy stakeholders to take stock of progress towards implementing SDG 7 (affordable

and clean energy). It will also seek to raise ambition of nationally determined contributions (NDCs) under the Paris Agreement on climate change. **dates:** 17-19 May 2022 **location:** Kigali, Rwanda. **www:** [www: www.seforall.org/forum](http://www.seforall.org/forum)

**Bonn Climate Change Conference:** The 56th sessions of the UNFCCC Subsidiary Body for Implementation (SBI) and Subsidiary Body for Scientific and Technological Advice (SBSTA) will prepare for the 27th meeting of the Conference of the Parties, which is scheduled to take place in November 2022 in Egypt. **dates:** 6-16 June 2022 **location:** Bonn, Germany **www:** [unfccc.int/event/first-sessional-period-2022](http://unfccc.int/event/first-sessional-period-2022)

**IPBES-9:** IPBES-9 will consider the thematic assessment of the sustainable use of wild species, and the methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services. It will also consider the scoping report for a methodological assessment of the impact and dependence of business on biodiversity and nature’s contributions to people. **dates:** 3-9 July 2022 **location:** Bonn, Germany **www:** [ipbes.net/](http://ipbes.net/)

**IPCC-57:** IPCC-57 will meet to, among other things, approve the AR6 Synthesis Report’s SPM. **dates:** 26-30 September and 1-6 October (TBC) **location:** Geneva, Switzerland **www:** [www: www.ipcc.ch/calendar](http://www.ipcc.ch/calendar)

For additional upcoming events, see: [sdg.iisd.org/](http://sdg.iisd.org/)

### Glossary

AR5	Fifth Assessment Report
AR6	Sixth Assessment Report
AR7	Seventh Assessment Report
CDR	Carbon dioxide removal
COP	Conference of the Parties
CRD	Climate-resilient development
EBA	Ecosystem-based adaptation
FWCC	Friends World Committee for Consultation
GHGs	Greenhouse gases
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
NBS	Nature-based solutions
RCP	Representative Concentration Pathways
SDGs	Sustainable Development Goals
SIDS	Small island developing states
SPM	Summary for Policymakers
SR1.5	Special Report on Global Warming of 1.5°C
SRCCCL	Special Report on Climate Change and Land
SROCC	Special Report on Ocean and Cryosphere in a Changing Climate
SSP	Shared Socio-economic Pathways
SYR	Synthesis Report
TS	Technical Summary
TSU	Technical Support Unit
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WG	Working Group
WMO	World Meteorological Organization