



SECTION 12

Thematic Reviews

12.1. Climate Change

State of Climate in 2022

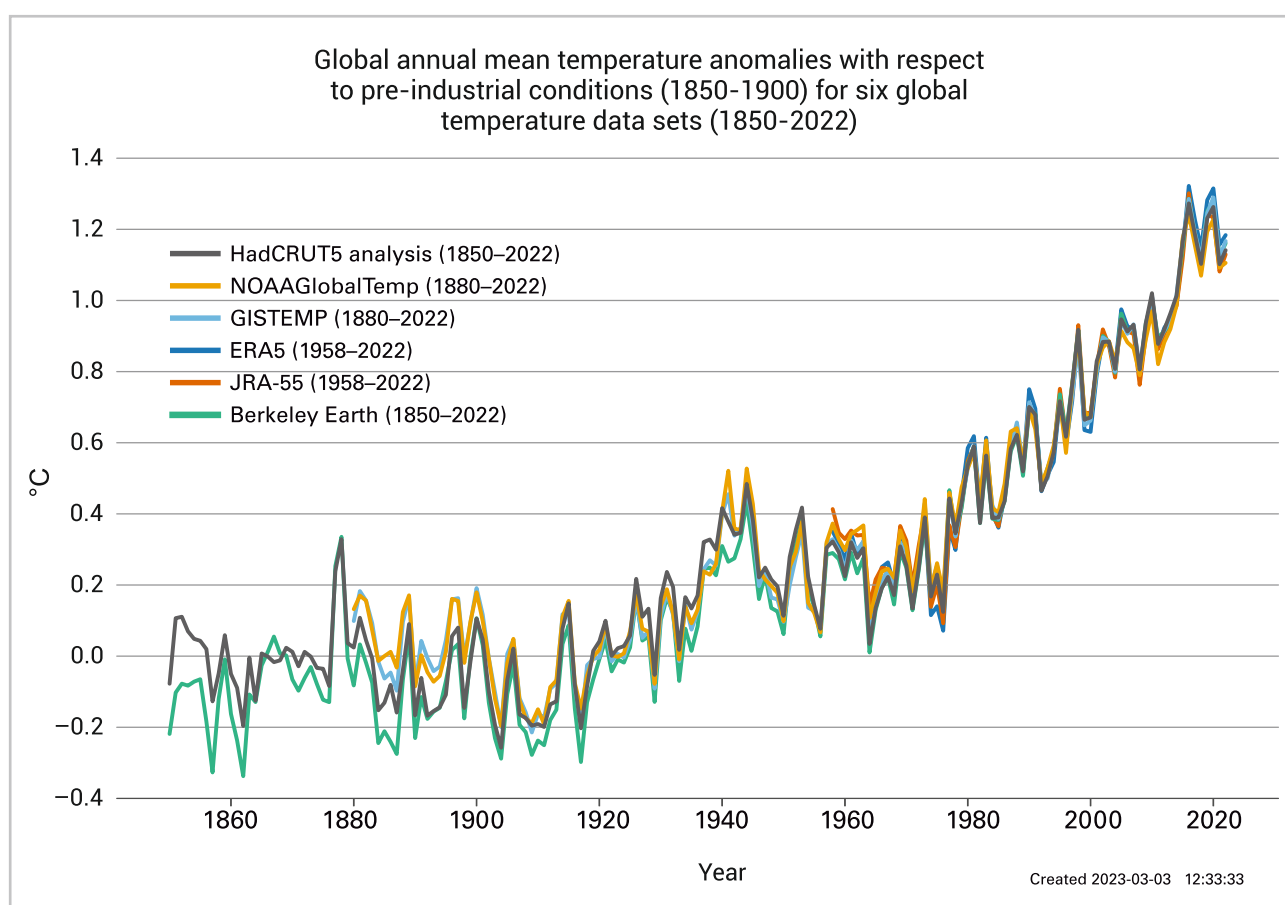
According to WMO annual [report](#), from mountain peaks to ocean depths, [climate change](#) continued its advance in 2022. Droughts, floods and heatwaves affected communities on every continent and cost many billions of dollars. Antarctic sea ice fell to its lowest extent on record and the melting of some European glaciers was, literally, off the charts.

The new WMO report is accompanied by a [story map](#), which provides information for policy makers on how the climate change indicators are playing out, and which also shows how improved technology makes

the transition to renewable energy cheaper and more accessible than ever.

Key messages

Temperature. The global mean temperature in 2022 was 1.15 [1.02-1.28] °C above the 1850-1900 average. The years 2015 to 2022 were the eight warmest in the 173-year instrumental record. The year 2022 was the fifth or sixth warmest year on record, despite ongoing La Niña conditions.



Greenhouse gases. Concentrations of the three main greenhouse gases – carbon dioxide, methane and nitrous oxide – reached record highs in 2021, the latest year for which consolidated global values are available (1984-2021). The annual increase in methane concentration from 2020 to 2021 was the highest on record. Real-time data from specific locations show that levels of the three greenhouse gases continued to increase in 2022.

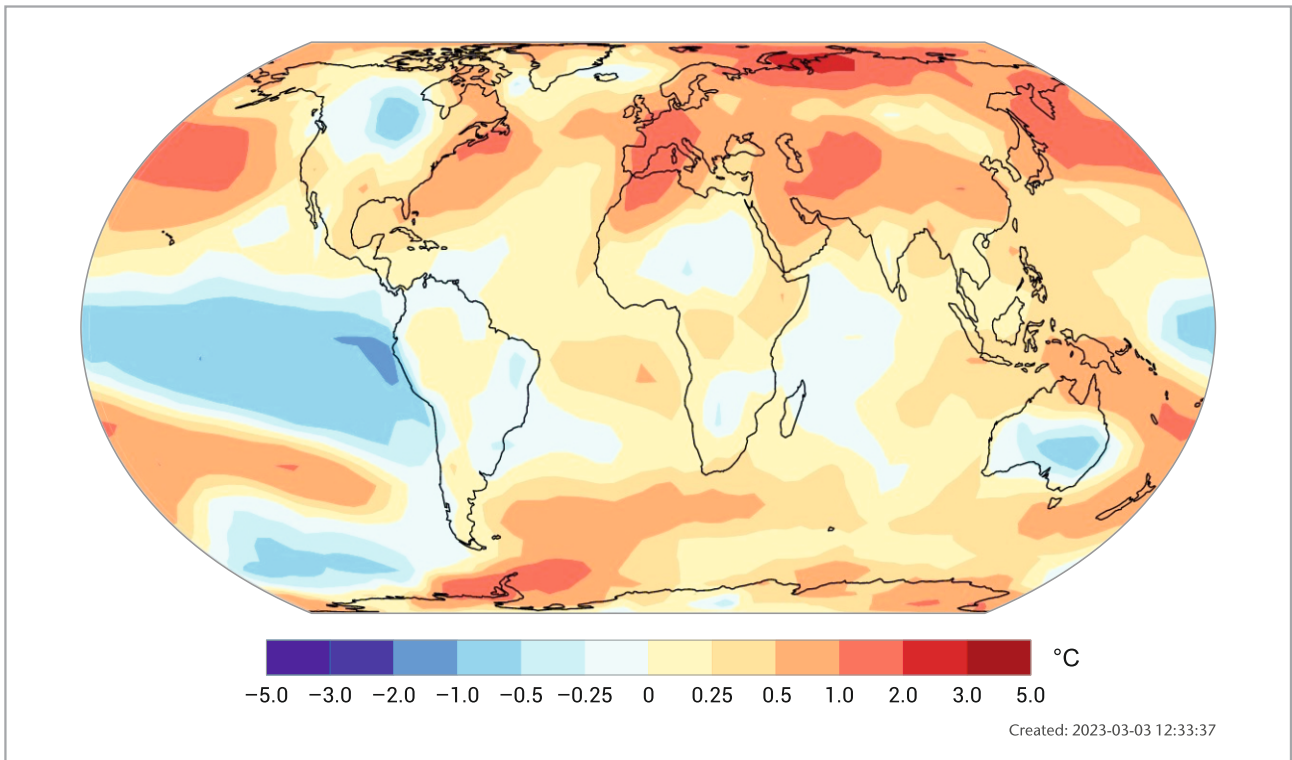
Glaciers. In the hydrological year 2021/2022, a set of reference glaciers with long-term observations experienced an average mass balance of -1.18 metres water equivalent (m w.e.). This loss is much larger than

the average over the last decade. Six of the ten most negative mass balance years on record (1950-2022) occurred since 2015. The cumulative mass balance since 1970 amounts to more than -26 m w.e.

The European Alps smashed records for glacier melt due to a combination of little winter snow, an intrusion of Saharan dust in March 2022 and heatwaves between May and early September.

In Switzerland, 6% of the glacier ice volume was lost between 2021 and 2022 – and one third between 2001 and 2022. For the first time in history, no snow survived the summer melt season even at the very

Near-surface temperature differences between 2022 and the 1991-2020 average.
The map shows the median anomaly calculated from six data sets

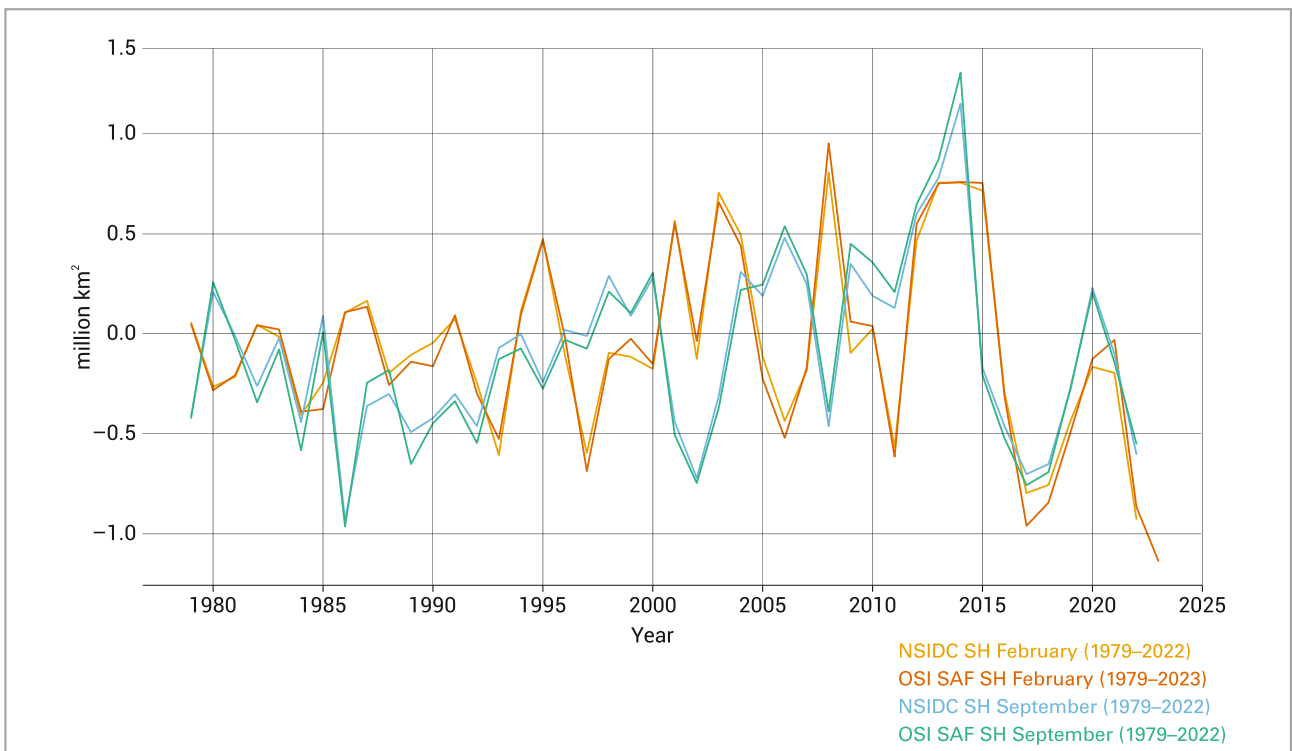


highest measurement sites and thus no accumulation of fresh ice occurred. Measurements on glaciers in High Mountain Asia, western North America, South America and parts of the Arctic also reveal substantial glacier mass losses. There were some mass gains in Iceland and Northern Norway associated with

higher-than-average precipitation and a relatively cool summer.

According to the IPCC, globally the glaciers lost more than 6000 Gt of ice over the period 1993-2019. This represents an equivalent water volume of 75 lakes

Antarctic sea-ice extent (million km²)
Difference from 1991-2020 average



the size of Lac Lemman (also known as Lake Geneva), the largest lake in Western Europe.

The Greenland Ice Sheet ended with a negative total mass balance for the 26th year in a row.

Sea ice in Antarctica dropped to 1.92 million km² on February 25, 2022, the lowest level on record and almost 1 million km² below the long-term (1991-2020) mean. For the rest of the year, it was continuously below average, with record lows in June and July.

Arctic sea ice in September at the end of the summer melt tied for the 11th lowest monthly minimum ice extent in the satellite record.

Ocean. Ocean heat content reached a new observed record high in 2022. Around 90% of the energy trapped in the climate system by greenhouse gases goes into the ocean, somewhat ameliorating even higher temperature increases but posing risks to marine ecosystems. Ocean warming rates have been particularly high in the past two decades. Despite continuing La Niña conditions, 58% of the ocean surface experienced at least one marine heatwave during 2022.

Sea level. Global mean sea level (GMSL) continued to rise in 2022, reaching a new record high for the satellite altimeter record (1993-2022). The rate of global mean sea level rise has doubled between the first decade of the satellite record (1993-2002, 2.27 mm/yr) and the last (2013-2022, 4.62 mm/yr).

For the period 2005-2019, total land ice loss from glaciers, Greenland, and Antarctica contributed 36% to the GMSL rise, and ocean warming (through thermal expansion) contributed 55%. Variations in land water storage contributed less than 10%.

Ocean acidification. CO₂ reacts with seawater resulting in a decrease of pH referred to as 'ocean acidification'. Ocean acidification threatens organisms and ecosystem services. The IPCC Sixth Assessment Report concluded that "There is very high confidence that open ocean surface pH is now the lowest it has been for at least 26 [thousand years] and current rates of pH change are unprecedented since at least that time."

Socio-economic and environmental impacts

Drought. Drought gripped East Africa. Rainfall has been below-average in five consecutive wet seasons, the longest such sequence in 40 years. As of January 2023, it was estimated that over 20 million people faced acute food insecurity across the region, under the effects of the drought and other shocks.

Precipitation. Record breaking rain in July and August led to extensive flooding in Pakistan. There were over 1,700 deaths, and 33 million people were affected, while almost 8 million people were displaced. Total damage and economic losses were assessed at US\$30 billion. July (181% above normal) and August

(243% above normal) were each the wettest on record nationally.

Heatwaves. Record breaking heatwaves affected Europe during the summer. In some areas, extreme heat was coupled with exceptionally dry conditions. Deaths associated with the heat in Europe exceeded 15,000 in total across Spain, Germany, the UK, France, and Portugal.

China had its most extensive and long-lasting heat-wave since national records began, extending from mid-June to the end of August and resulting in the hottest summer on record by a margin of more than 0.5°C. It was also the second-driest summer on record.

Food insecurity. As of 2021, 2.3 billion people faced food insecurity, of which 924 million people faced severe food insecurity. As of October 2022, several countries in Africa and Asia (such as Ethiopia, Nigeria, South Sudan, Somalia, Yemen, and Afghanistan) and the Caribbean (Haiti) experienced starvation or death and required urgent humanitarian action. In these countries, the key drivers and aggravating factors for acute food insecurity were conflict/insecurity, economic shocks, political instability, displacement, dry conditions and cyclones.

Displacement. In Somalia, almost 1.2 million people became internally displaced by the catastrophic impacts of drought on pastoral and farming livelihoods and hunger during the year, of whom more than 60,000 people crossed into Ethiopia and Kenya during the same period. Concurrently, Somalia was hosting almost 35,000 refugees and asylum seekers in drought-affected areas. A further 512,000 internal displacements associated with drought were recorded in Ethiopia.

The flooding in Pakistan affected some 33 million people, including about 800,000 Afghan refugees hosted in affected districts. By October, around 8 million people have been internally displaced by the floods with some 585,000 sheltering in relief sites.

Environment. Climate change has important consequences for ecosystems and the environment. For example, a recent assessment focusing on the unique high-elevation area around the Tibetan Plateau, the largest storehouse of snow and ice outside the Arctic and Antarctic, found that global warming is causing the temperate zone to expand.

Climate change is also affecting recurring events in nature, such as when trees blossom, or birds migrate. For example, flowering of cherry blossom in Japan has been documented since AD 801 and has shifted to earlier dates since the late nineteenth century due to the effects of climate change and urban development. In 2021, the full flowering date was 26 March, the earliest recorded in over 1200 years. In 2022, the flowering date was 1 April.

Not all species in an ecosystem respond to the same climate influences or at the same rates. For example,

spring arrival times of 117 European migratory bird species over five decades show increasing levels of mismatch to other spring events, such as leaf out and insect flight, which are important for bird survival. Such mismatches are likely to have contributed to

population decline in some migrant species, particularly those wintering in sub-Saharan Africa.

Source: WMO,
https://library.wmo.int/doc_num.php?explnum_id=11593

Climate Change Agreement

All five Central Asian countries ratified the Paris Agreement to address the climate change threats and take appropriate measures. As of February 2023, 195 members of UNFCCC are parties to the agreement. One of important aspects of the Paris Agreement is that developing countries also have to cut emissions along with developed countries.

A massive shift away from fossil fuels and towards renewable sources will be needed for [countries](#) to

comply with their obligations under the Paris Agreement and shift to a low-carbon and sustainable energy system. Today, fossil fuels account for 95% of total energy supply in the 5 countries of Central Asia. Analysis published by UNECE as part of its [Carbon Neutrality Toolkit](#) shows that under a business-as-usual scenario aiming at strengthening energy resilience to prevent blackouts and ensure reliable supply, the region would need to invest some \$1.407 trillion between 2020 and 2050.

Climate Change Conference COP27²⁹¹

The United Nations Climate Change Conference COP27 brought together more than 45 000 delegates in Shark El Sheikh from 6 to 18 November.

COP27 resulted in countries delivering a [package of decisions](#) that reaffirmed their commitment to **limit global temperature rise to 1.5 degrees Celsius** above pre-industrial levels. The package also strengthened action by countries to cut greenhouse gas emissions and adapt to the inevitable impacts of climate change, as well as boosting the support of finance, technology and capacity building needed by developing countries.

Governments took the decision to establish **new funding arrangements**, as well as a dedicated fund, to assist developing countries in responding to loss and damage. Governments also agreed to establish a 'transitional committee' to make recommendations on how to operationalize both the new funding arrangements and the fund at COP28 next year. The first meeting of the transitional committee is expected to take place before the end of March 2023. Parties also agreed on the institutional arrangements to operationalize the Santiago Network for Loss and Damage, to catalyze technical assistance to developing countries that are particularly vulnerable to the adverse effects of climate change.

COP27 saw **significant progress on adaptation**, with governments agreeing on the way to move forward on the Global Goal on Adaptation, which will conclude at COP28 and inform the first Global Stocktake, improving resilience amongst the most vulnerable. New pledges, totaling more than \$230 million, were made to the Adaptation Fund at COP27. These pledges will help many more vulnerable communities

adapt to climate change through concrete adaptation solutions. COP27 President Sameh Shoukry announced the Sharm el-Sheikh Adaptation Agenda, enhancing resilience for people living in the most climate-vulnerable communities by 2030. UN Climate Change's Standing Committee on Finance was requested to prepare a report on doubling adaptation finance for consideration at COP28 next year.

The cover decision, known as the [Sharm el-Sheikh Implementation Plan](#), highlights that a global transformation to a low-carbon economy is expected to require investments of at least \$4-6 trillion a year. Delivering such funding will require a swift and comprehensive transformation of the financial system and its structures and processes, engaging governments, central banks, commercial banks, institutional investors and other financial actors. Serious concern was expressed that the goal of developed country Parties to mobilize jointly \$100 billion per year by 2020 has not yet been met, with developed countries urged to meet the goal, and multilateral development banks and international financial institutions called on to mobilize climate finance.

At COP27, deliberations continued on setting a '**new collective quantified goal on climate finance**' in 2024, taking into account the needs and priorities of developing countries.

The [World Leaders Summit](#), held over two days during the first week of the conference, convened six high-level roundtable discussions. The discussions highlighted solutions – on themes including food security, vulnerable communities and just transition – to chart a path to overcome climate challenges and how to provide the finance, resources and tools to effectively deliver climate action at scale.

²⁹¹ Source: <https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries>; <https://news.un.org/ru/story/2022/11/1434977>

Young people in particular were given greater prominence at COP27, with UN Climate Change's Executive Secretary promising to urge governments to not just listen to the solutions put forward by young people, but to incorporate those solutions in decision and policy making. Young people made their voices heard through the first-of-its-kind pavilion for children and youth, as well as the first-ever youth-led Climate Forum.

In parallel with the formal negotiations, the **Global Climate Action space** at COP27 provided a platform for governments, businesses and civil society to collaborate and showcase their real-world climate solutions. The **UN Climate Change High-Level Champions** held a two-week programme of more than 50 events. This included a number of major African-led initiatives to cut emissions and build climate resilience, and significant work on the mobilization of finance.

The highlights of the meeting included, among others, the **launch** of the **first report of the High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities**. The report slammed greenwashing – misleading the public to believe that a company or entity is doing more to protect the environment than it is – and provided roadmap to bring integrity to net-zero commitments by industry, financial institutions, cities and regions and to support a global, equitable transition to a sustainable future.

Other announcements at COP27:

- Countries launched a **package of 25 new collaborative actions** in five key areas: power, road transport, steel, hydrogen and agriculture.

- The Egyptian leadership also announced the **Food and Agriculture for Sustainable Transformation** initiative or FAST, to improve the quantity and quality of climate finance contributions to transform agriculture and food systems by 2030. This was the first COP to have a dedicated day for Agriculture, which contributes to a third of greenhouse emissions and should be a crucial part of the solution.

- UN Secretary-General António Guterres **announced a \$3.1 billion plan** to ensure everyone on the planet is protected by early warning systems within the next five years.

- The UN Secretary-General's **High-Level Expert Group on Net-Zero Commitments** published a report at COP27, serving as a how-to guide to ensure credible, accountable net-zero pledges by industry, financial institutions, cities and regions.

- The G7 and the V20 ('the Vulnerable Twenty') launched the **Global Shield against Climate Risks**, with new commitments of over \$200 million as initial funding. Implementation is to start immediately.

- Announcing a total of \$105.6 million in new funding, Denmark, Finland, Germany, Ireland, Slovenia, Sweden, Switzerland, and the Walloon Region of Belgium, stressed the need for even more support for the **Global Environment Facility funds** targeting the

immediate climate adaptation needs of low-lying and low-income states.

- Meanwhile, former US Vice-President and climate activist Al Gore, with the support of the UN Secretary-General, presented a **new independent inventory of greenhouse gas emissions** created by the Climate TRACE Coalition. The tool combines satellite data and artificial intelligence to show the facility-level emissions of over 70,000 sites around the world, including companies in China, the United States and India. This will allow leaders to identify the location and scope of carbon and methane emissions being released into the atmosphere.

- The new Indonesia Just Energy Transition Partnership, announced at the G20 Summit held in parallel with COP27, will mobilize \$20 billion over the next three to five years to accelerate a just energy transition.

- Important progress was made on forest protection with the launch of the **Forest and Climate Leaders' Partnership**, which aims to unite action by governments, businesses and community leaders to halt forest loss and land degradation by 2030.

Central Asian countries at COP27

Regional statement of the CA countries. During the **8th meeting** of representatives of the ministries of foreign affairs and parliamentarians of Central Asian countries "Towards a regional coherence and cooperation of the countries of Central Asia in the field of climate policy, finance and implementation of Nationally Determined Contributions (NDCs)" at COP27, they announced a **regional statement** "Voice of Central Asia" on behalf of the governments of the Central Asian countries. The regional statement is to call the attention of the world community and international financing institutions to vulnerability of the region to climate change, emphasize the readiness of the Central Asian countries to strengthen international cooperation on the measures taken by the countries to adapt to and mitigate climate change and to strengthen regional cooperation on transboundary issues, as well as to attract climate financing in the region.

Position of NGOs and youth of the CA countries. Central Asian NGOs **urged** the governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, the UN, the EU, and the international and business communities to revise and significantly strengthen national and regional climate commitments. To prevent the climate crisis and negative consequences in Central Asia, emissions must be reduced by at least 30% by 2030 and reach zero balance by 2050. However, the commitments proposed by the CA countries are not sufficient. Arguments about the difficulties of achieving carbon neutrality, when examined in detail, turn out to be not so significant, but at the same time, the social and economic benefits of reducing emissions and adaptation for human health, employment and national economies are obvious! Representatives of youth networks in Central Asia – young climate and water experts, CALP graduates and members of the Working Group of the First in Central Asia RCOY CA made a separate statement.

Climate Change Reports

IPCC has completed two parts of its Sixth Assessment Report²⁹²

The **second part** of the report entitled “Climate Change 2022: Impacts, Adaptation & Vulnerability”²⁹³ identifies and describes the risks associated with global climate change: these relate to changes in global ecosystems and to concrete effects on people in multiple spheres, from agriculture and health care to demography. One of the main conclusions is that adaptation still lags behind climate change. The overshoot of the 1.5°C limit will lead to irreversible transformations in Earth ecosystems, with the currently available adaptation tools turning out to be ineffective. In this context, the main task before humanity is to cut greenhouse gas emissions drastically.

The **third part** entitled²⁹⁴ “Climate Change 2022: Mitigation of Climate Change” included detailed assessments of GHG emissions, pathways of their short-, middle- and long-term reduction, and detailed assessment of contributions by economic sectors to climate change. The report also addresses COVID-19, climate policies, sustainable development and international cooperation in the context of responses to climate change. By expert assessments, growth in anthropogenic emissions has persisted across all major groups of GHGs from 2010 to 2019, albeit at different rates. The annual growth was 1.3% and reached 59 ± 6.6 GtCO₂-eq in 2019.

The authors note that the COVID-19 pandemic could impede the achievement of SDGs, while taking away political and financial capacities from climate actions. Nevertheless, studies of previous post-shock periods have shown that these are crisis periods that can encourage new behaviors, weaken existing systems, and initiate rapid reforms. Limiting warming to 2°C relative to the pre-industrial level by the end of the century is possible by authors' opinion only if enough stringent restrictive measures are observed. To this end, for instance, energy generation from oil must be reduced by 2030 by 10% relative to 2019 and by 2050 by 40%; that from gas, by 15% and 30%, respectively. Around the 2070s it is expected to reach global net zero CO₂ emissions.

This will require deep decarbonization of all economic sectors that will be facilitated by a wide circle of decision makers. Governments and public institutions may contribute to climate mitigation through a legal framework for recommended climate policy measures and economic support of these measures and diversification of their implementers. The legal framework should include establishment of land rights, state support to new technologies, adoption of standards for transport vehicles and emission regulation, and assessment of ecosystem services.

10 New Insights in Climate Science 2022 are based on the assessment of more than 60 leading world experts. This year the authors reveal the complexities of the interactions between climate change and other risks, such as conflicts, pandemics, food crises and underlying development challenges.

1. Questioning the myth of endless adaptation: Limits to adaptation are being breached already in different places across the world. Climate adaptation will become increasingly difficult as we approach 1.5°C or 2°C above pre-industrial temperatures. Existing adaptation efforts are falling short of adequately reducing risks from past, current and future climate change, leaving the most vulnerable particularly exposed to climate impacts. Adaptation cannot substitute for ambitious mitigation efforts. Even effective adaptation will not avoid all losses and damages, and new limits to adaptation can emerge in the shape of conflicts, pandemics and pre-existing development challenges. Deep and swift mitigation is critical to avoid widespread breaching of adaptation limits.

2. Vulnerability hotspots cluster in 'regions at risk': Approximately 1.6 billion people live in vulnerability hotspots, a number projected to double by 2050. Climate-driven hazard mortality is 15 times higher in hotspot countries than in the least-vulnerable countries. Vulnerability – the susceptibility to be adversely affected by climate-driven hazards – is a product of structural inequality in human-environmental systems. It clusters in major “regions at risk”: in parts of Central America, Asia and the Middle East, and in Africa across the Sahel, Central and East Africa. Communities in these regions at risk are increasingly exposed to climate change and climate-related hazards, where resilience (physical, ecological and socioeconomic) decreases with worsening levels of inequality, state fragility and poverty. Habitat degradation is putting many ecosystems in Arabian Peninsula and CA at high risk of structural and dynamic change, reducing their climate mitigation capability. It also decreases the ecosystem services and resources those habitats can provide, threatening the adaptive capacity of marginalized groups.

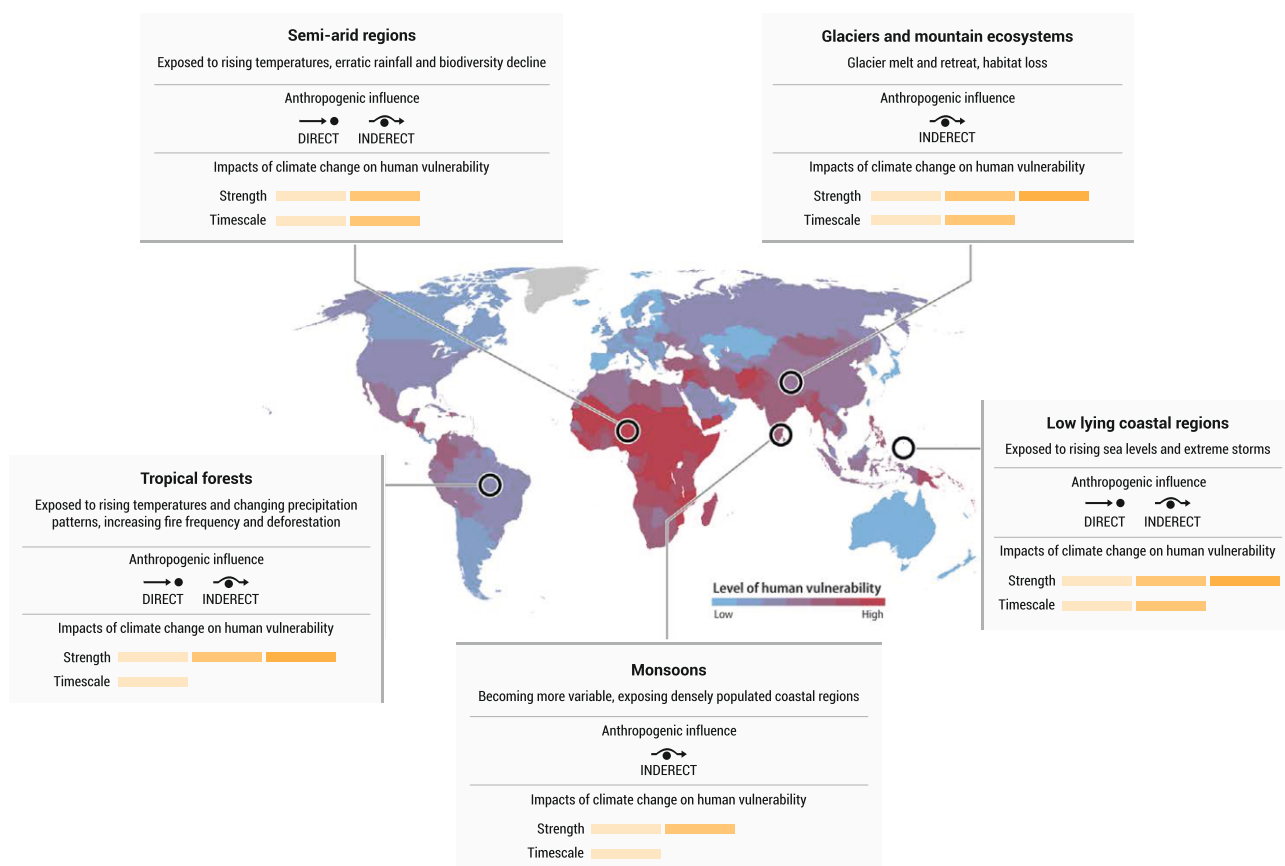
Schematic diagram illustrating systematic human vulnerability on a scale of seven vulnerability categories (adapted from Birkmann et al., 2021) is shown below.

It also highlights climate system components and ecosystems most relevant to human vulnerability from direct (e.g. deforestation) and indirect (e.g. global warming due to greenhouse gas emissions) anthropogenic influence.

²⁹² the first part was published in 2021 [Water Yearbook](#)

²⁹³ issued on February 28

²⁹⁴ issued on April 4



3. New threats on the horizon from climate-health interactions: Compounding and cascading risks due to climate change are adversely impacting human, animal and environmental health. Heat-related deaths, wildfires bringing physical and mental health impacts, and increasing risks of outbreaks of infectious diseases are all related to climate change.

4. Climate mobility: from evidence to anticipatory action. Involuntary migration and displacement will increasingly occur due to climate change-related slow-onset impacts and the rising frequency and intensity of extreme weather events. Climate change and related impacts can also result in many people losing their capacity to adapt by moving away. Thus, anticipatory humanitarian actions to assist climate-related mobility and minimize displacement are critical.

5. Human security requires climate security: Climate change exacerbates existing vulnerabilities in human security (caused by governance and socioeconomic conditions), which can lead to violent conflict. Effective and timely mitigation and adaptation strategies are required to strengthen human security and, by extension, national security. These must be pursued in parallel with concerted efforts to provide for human security to reduce the risks of increasing violent conflict and promote peace.

6. Sustainable land use is essential to meeting climate targets: Agricultural intensification that is long-term sustainable is preferable to further expansion into natural areas, when proper policies are in place to limit increased land conversion. Efforts to increase food

production through enhanced yields and system integration while minimizing adverse ecological impacts can likewise do much to further food security. However, the higher the degree of warming, the less likely the current assumptions about the capacity of land systems to deliver these co-benefits will apply.

7. Private sustainable finance practices are failing to catalyze deep transitions needed to meet climate targets. The large majority of today's sustainable finance practices are designed to fit into the financial sector's existing business models rather than to allocate capital in ways that would provide the most impact on combating climate change.

8. Loss and Damage: the urgent planetary imperative. Losses and damages are already happening and will increase significantly on current trajectories, but rapid mitigation and effective adaptation can still prevent many of these. A coordinated, global policy response to losses and damages is urgently needed.

9. Inclusive decision-making for climate-resilient development: Being inclusive and empowering in all forms of decision-making has been shown to lead to better and more just climate outcomes.

10. Breaking down structural barriers: multidimensional structural barriers arising from the current resource-intensive economy and its vested interests in maintaining the status quo are inhibiting transformational change. Integration of justice and equality aspects in global agreements, decision making processes, and production and consumption mecha-

nisms, de-risking of decarbonisation investments and radical revision of how we track progress will strengthen climate actions and remove the deep-rooted inequalities.

UNEP published the 13th edition of the Emissions Gap Report for 2022 entitled “The Closing Window – Climate crisis calls for rapid transformation of societies”. The Report finds that the international community is falling far short of the Paris goals, with no credible pathway to 1.5°C in place. Only an urgent system-wide transformation can avoid climate disaster.

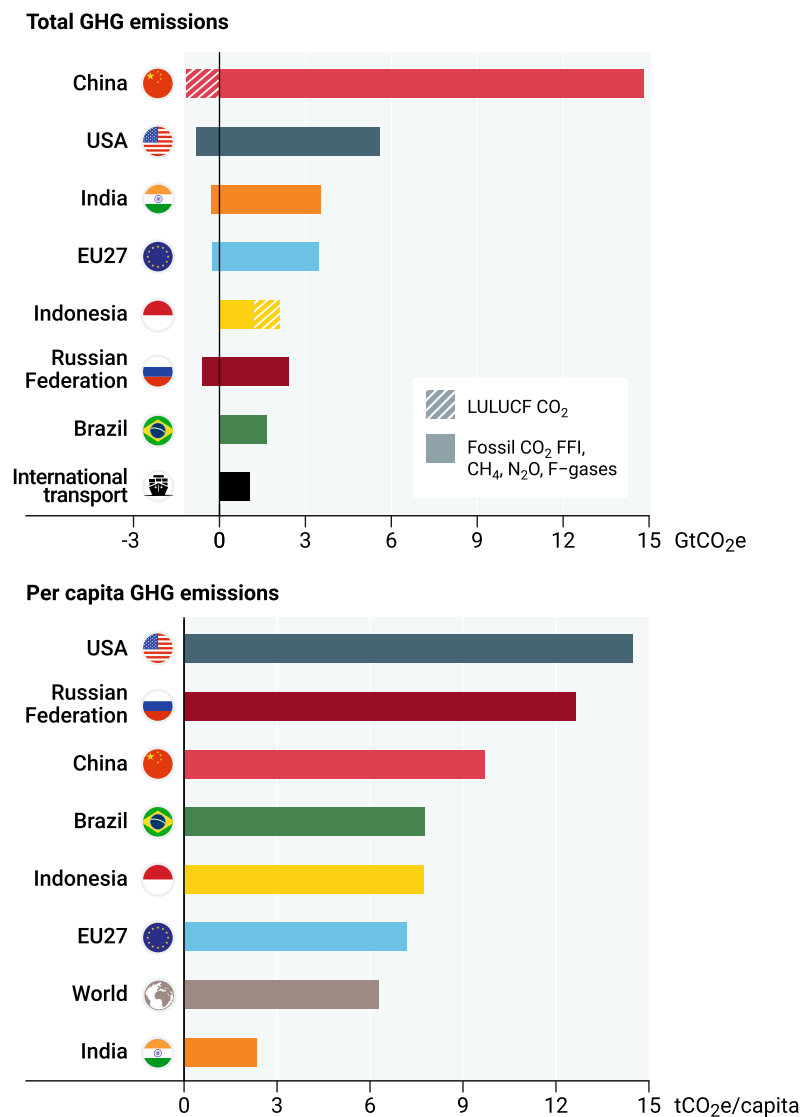
1. Testimony to inadequate action on the climate crisis and the need for transformation. Countries' new and updated NDCs submitted since COP26 reduce projected GHG emissions in 2030 by only 0.5 gigatons of CO₂ equivalent (GtCO₂e), compared with emissions projections based on mitigation pledges at the time of COP26. To get on track for limiting global war-

ming to 1.5°C, global annual GHG emissions must be reduced by 45 per cent compared with emissions projections under policies currently in place in just eight years, and they must continue to decline rapidly after 2030, to avoid exhausting the limited remaining atmospheric carbon budget.

2. Global GHG emissions could set a new record in 2021. Global GHG emissions for 2021, excluding LULUCF²⁹⁵, are preliminarily estimated at 52.8 GtCO₂e, a slight increase compared to 2019, suggesting that total global GHG emissions in 2021 will be similar to or even break the record 2019 levels.

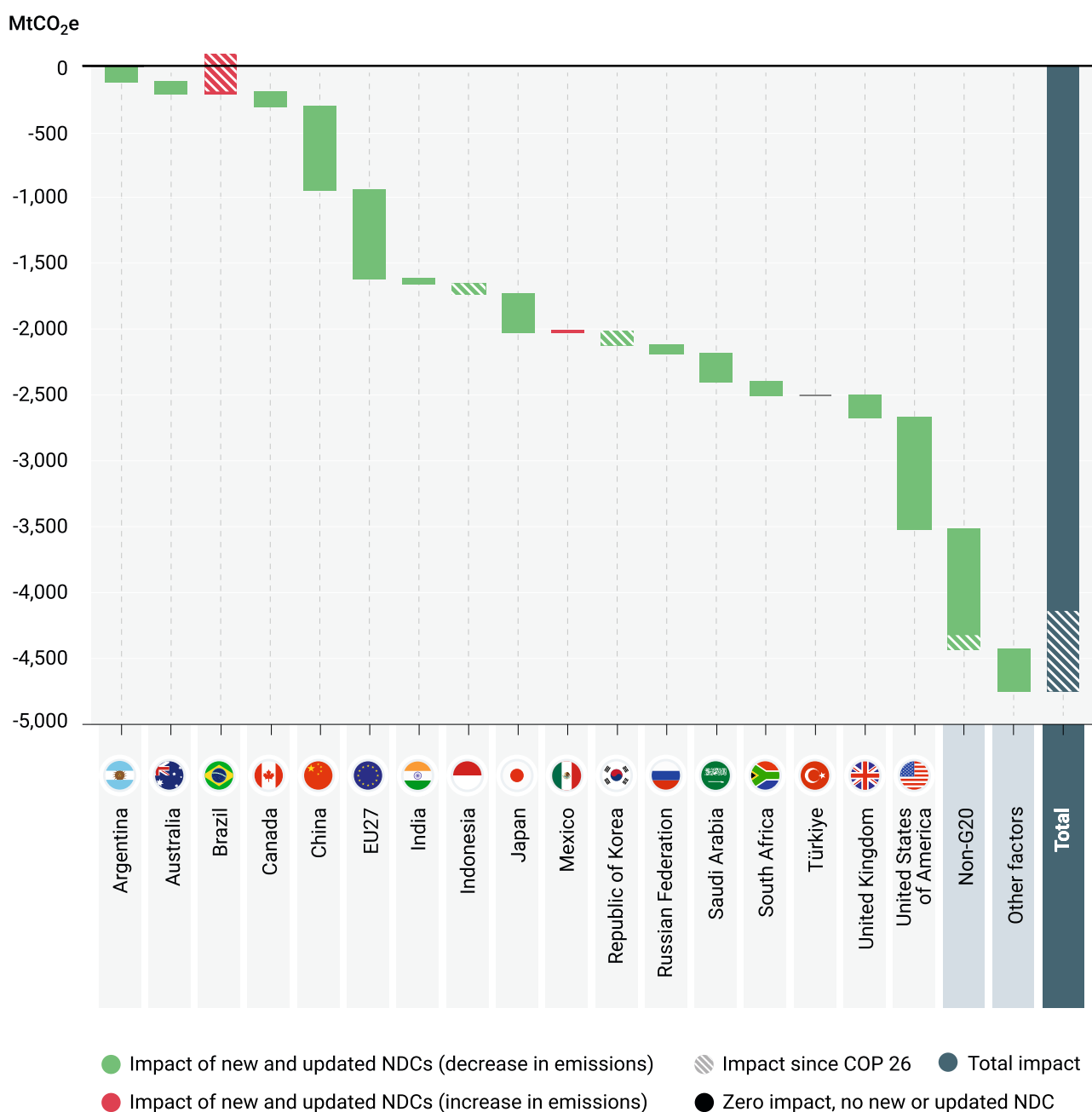
3. GHG emissions are highly uneven across regions, countries and households. Per capita emissions vary greatly across countries. World average per capita GHG emissions (including LULUCF) were 6.3 tCO₂e in 2020. India remains far below the world average at 2.4 tCO₂e.

Total and per capita GHG emissions of major emitters in 2020, including inventory-based LULUCF



²⁹⁵ estimates of land use, land-use change and forestry (LULUCF) are currently only available up to 2020, limiting the analysis of total global GHG emissions for 2021

Impact on global GHG emissions in 2030 of new and updated unconditional NDCs relative to initial NDCs



4. Despite the call for countries to “revisit and strengthen” their 2030 targets, progress since COP26 is highly inadequate.

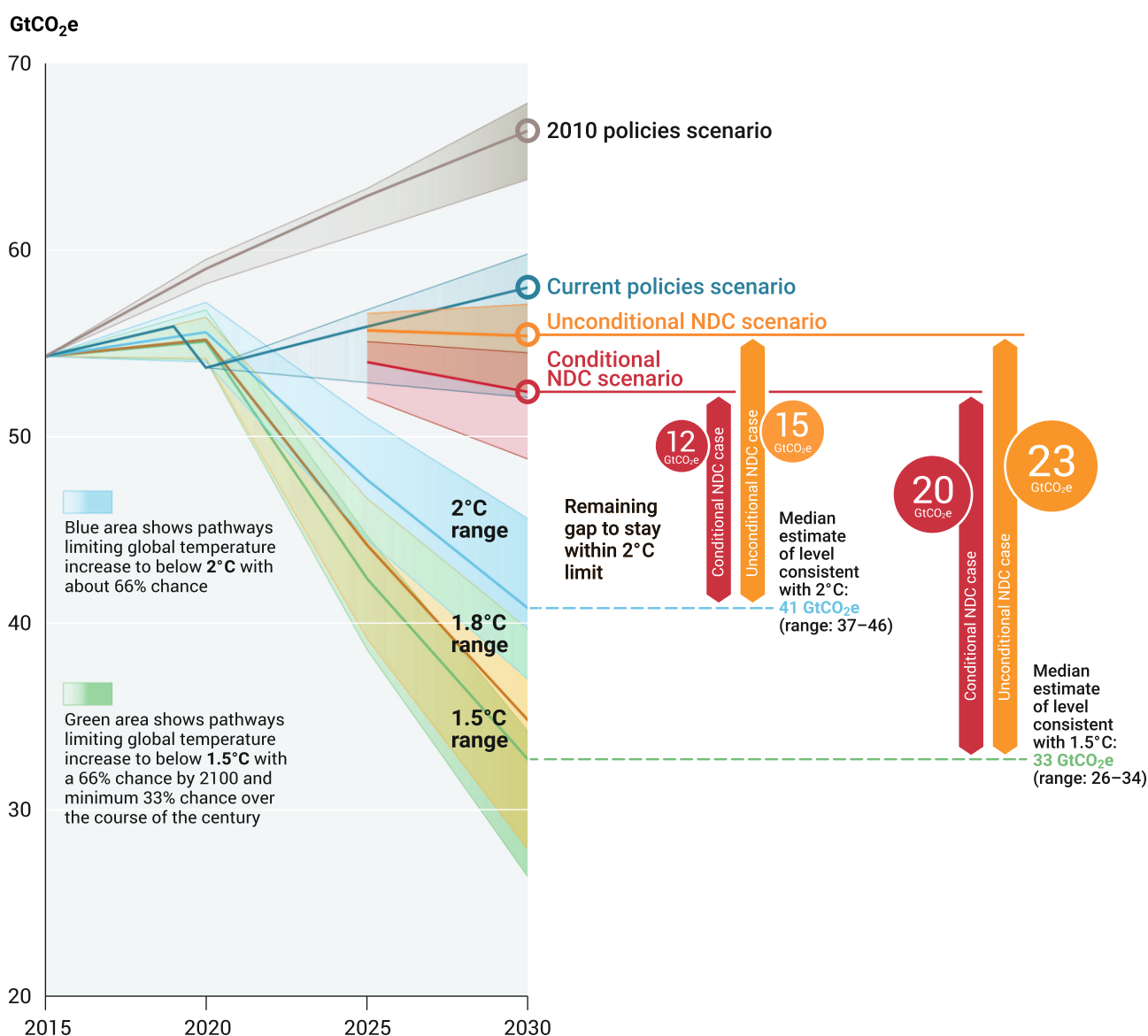
NDCs submitted since COP26 take only 0.5 GtCO₂e, less than one per cent, off projected global emissions in 2030. Between 1 January 2020 and 23 September 2022, 166 parties representing around 91 per cent of global GHG emissions had submitted new or updated NDCs, up from 152 parties as of COP26.

5. G20 members are far behind in delivering on their mitigation commitments for 2030, causing an implementation gap. Most of the G20 members have just started the implementation of policies and actions to

meet their new targets. The G20 members would collectively fall short of achieving their NDCs by 2030 if stronger measures are not taken.

6. Globally, the NDCs are highly insufficient, and the emissions gap remains high. Current commitments by countries as expressed in their unconditional and conditional NDCs for 2030 are estimated to reduce global emissions by 5 and 10 per cent respectively, compared with current policies and assuming that they are fully implemented. To get on track for limiting global warming to below 2.0°C and 1.5°C, global GHG emissions must be reduced by 30 and 45 per cent respectively, compared with current policy projections.

Global GHG emissions under different scenarios and the emissions gap in 2030 (median estimate and tenth to ninetieth percentile range)



7. Without additional action, current policies lead to global warming of 2.8°C. Implementation of unconditional and conditional NDC scenarios reduces this to 2.6°C and 2.4°C, respectively. A continuation of the level of climate change mitigation effort implied by current unconditional NDCs is estimated to limit warming over the twenty-first century to about 2.6°C (range: 1.9–3.1°C) with a 66 per cent chance, and warming is expected to increase further after 2100 as CO₂ emissions are not yet projected to reach net-zero levels.

8. The credibility and feasibility of the net-zero emission pledges remains very uncertain.

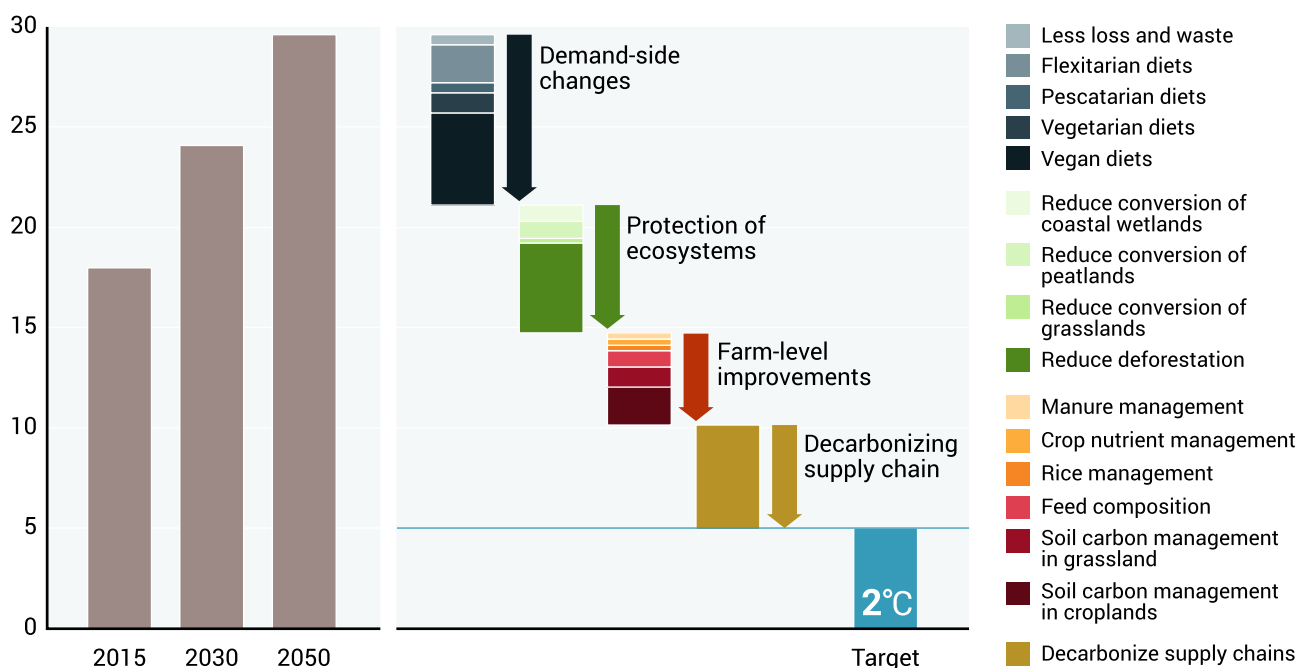
9. Wide-ranging, large-scale, rapid and systemic transformation is now essential to achieve the temperature goal of the Paris Agreement. The following broad portfolio of key actions to initiate and advance the transformation must be undertaken,

tailored to the specific context of each of the four sectors: (1) avoiding lock-in of new fossil fuel intensive infrastructure; (2) enabling the transition by further advancing zero-carbon technologies, market structures and plans for a just transformation; (3) applying zero-emissions technologies and promoting behavioural change to sustain and deepen reductions to reach zero emissions.

10. The food system accounts for one third of all emissions, and must make a large reduction. The largest contribution stems from agricultural production (7.1 GtCO₂e, 39%) including the production of inputs such as fertilizers, followed by changes in land use (5.7 GtCO₂e, 32%), and supply chain activities (5.2 GtCO₂e, 29%). The latter includes retail, transport, consumption, fuel production, waste management, industrial processes and packaging. Projections indicate that food system emissions could reach ca 30 GtCO₂e/year by 2050.

Food systems emissions trajectory and mitigation potentials by transformation domain

GHG emissions (GtCO₂e)



11. Realignment of the financial system is a critical enabler of the transformations needed. A global transformation to a low-carbon economy is expected to require investments of at least \$4-6 trillion a year, a relatively small (1.5-2%) share of total financial assets managed, but significant (20-28%) in terms of the additional annual resources to be allocated. Delivering such funding will require a transformation of the financial system and its structures and processes, engaging governments, central banks, commercial banks, institutional investors and other financial actors.

The 6th Yearbook of Global Climate Action was published in 2022. It outlines what is needed to accelerate sectoral systems transformation, features case studies of real-world climate action projects, highlights some key global climate action topics – particularly regionalization and accountability. It also highlights what needs to be achieved in 2023, particularly with regard to the Global Stocktake and the work being done on implementing the improved Marrakech Partnership.

Significant and Major Events

The UN Security Council held two “Arria-formula” meetings: (1) at ministerial level on climate finance as a means to build and sustain peace in conflict, post-conflict and crisis situations (9 March, UAE); (2) on the theme “Climate, Peace and Security: Opportunities for the UN Peace and Security Architecture” (29 November, New York) (see Security Council).

Third UN Climate and SDG Synergies Conference brought together more than 2,000 participants (July 20-21, Tokyo, hybrid format). It generated an impressive range of potential solutions and proposals for how to better integrate efforts to tackle these interlinked global crises and accelerate action to address the climate emergency and recent reversals in achieving the Sustainable Development Goals.

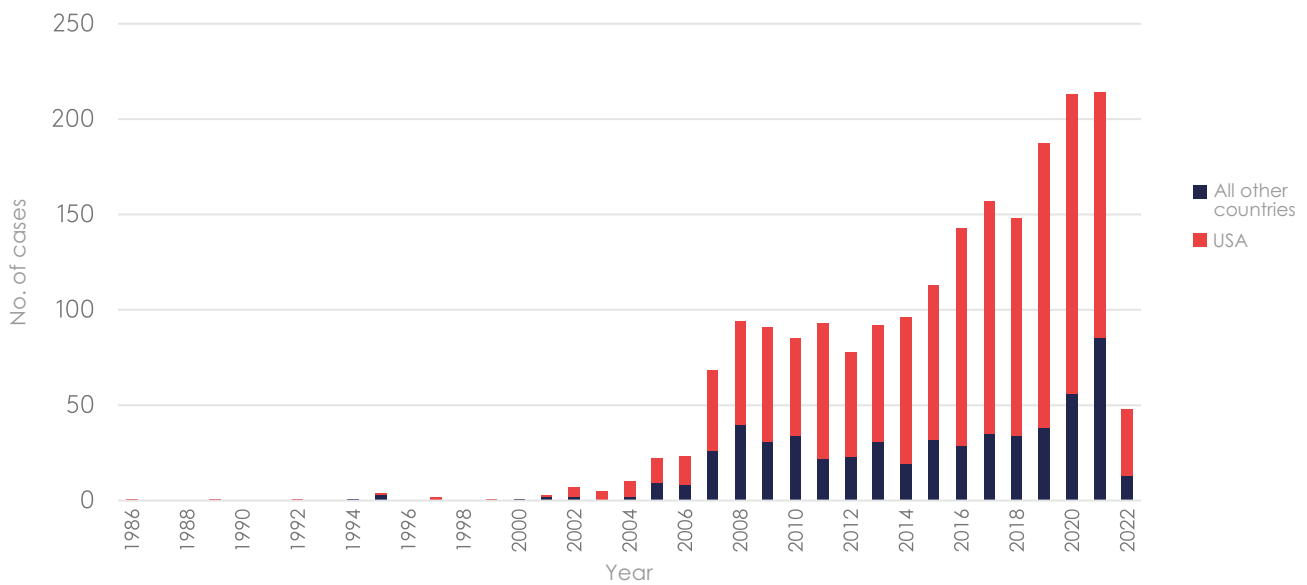
Global trends in climate change litigation in 2022. 2,002 cases of climate change litigation were identified from around the world, as of May 2022 (see Figure below). Of these, 1,426 were filed before courts

in the United States, while the remaining 576 were filed before courts in 43 other countries and 15 international or regional courts and tribunals. Outside the US, Australia (124 cases), the UK (83) and the EU (60) remain the jurisdictions with the highest volume of cases.

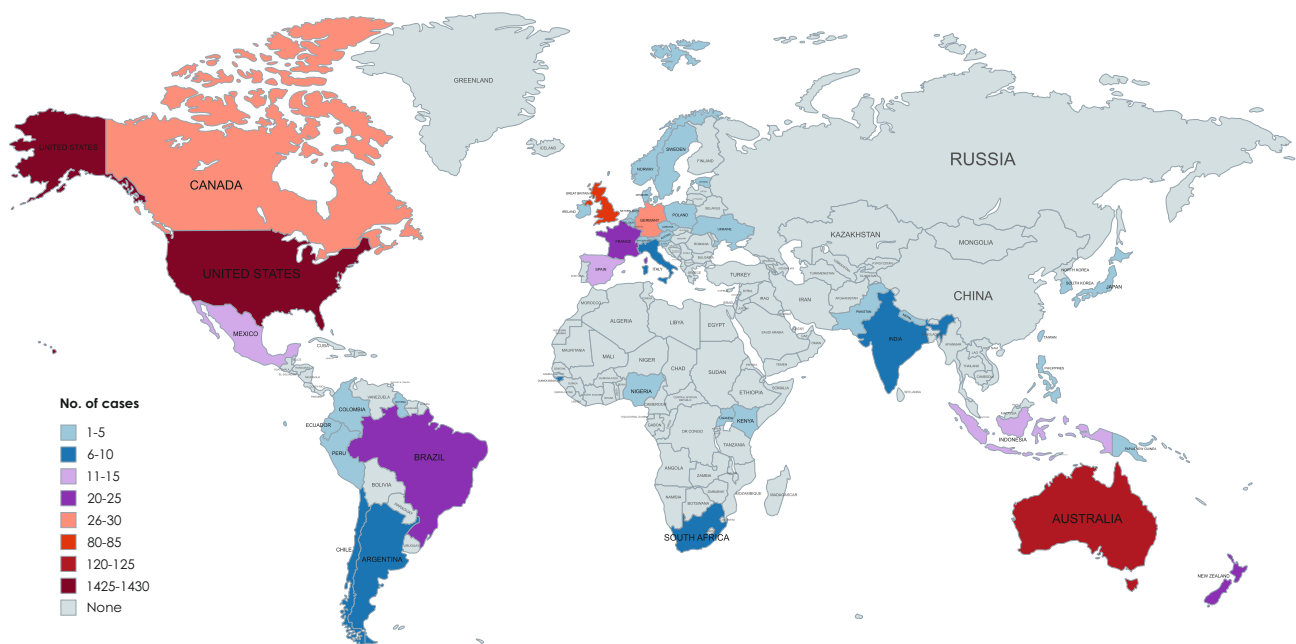
Data from the past 12 months confirms that litigation continues to expand as an avenue for action on climate change. While the number of cases in the US was lower than in previous years – likely down to the change in federal government – 2021 saw the highest number of recorded cases outside the US.

Globally, the cumulative number of climate change-related litigation cases has more than doubled since 2015. Just over 800 cases were filed between 1986 and 2014, and over 1,200 cases have been filed in the last eight years, bringing the total in the databases to 2,002. Roughly one-quarter of these were filed between 2020 and 2022.

Total climate change cases over time, US and non-US (up to 31 May 2022)



Number of climate litigation cases around the world, per jurisdiction (up to 31 May 2022)



Source: Setzer J. and Higham C. (2022) Global trends in climate change litigation: 2022 snapshot. London: Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, Sabin Center for Climate Change Law, <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/08/Global-trends-in-climate-change-litigation-2022-snapshot.pdf>

Remarkable climate change litigation cases in 2022

In Australia a court moved to block an \$8.4bn coal mine development in Queensland on human rights grounds in a landmark case that highlights the

mounting legal challenges to fossil fuel extraction around the world. The court said that the project would have infringed on the rights of First Nations people in Queensland because of its climate impact.

On November 16, the first hearing took place in Germany to force carmaker BMW to "drastically reduce" the CO₂ emissions of its vehicles, and that by October 31, 2030, BMW must build new passenger cars that emit a maximum of 604 million tons of CO₂, or prove greenhouse gas neutrality for any CO₂ emissions beyond this.

Greta Thunberg jointly with more than 600 children and young adults in Aurora eco-movement has filed

a lawsuit against the Swedish state for climate inaction. The activists claim the Swedish state to acknowledge its climate policy be flawed.

Greenpeace filed a case before the court against the UK Government for potential disruption of climate goals. The green lobbyists try to stop issuing more than 100 new licenses for oil and gas exploration in the North Sea. They believe that licensing of fuel mining companies will be a real catastrophe that undercuts any hope for the achievement of the Paris Agreement. This will make it impossible to limit the global temperature growth to 1.5°C. British authorities refused to comment the legal challenge, insisting on the need to increase national energy security through development of local energy sources.

The Fridays for Future movement activists filed a climate change litigation case against the Government of Russia for the first time. The litigants claimed

the Government to annul the statement in the Presidential decree on cutting of greenhouse gas emissions that says by 2030 the GHG emissions shall be reduced to 70% relative to 1990. While the activists claim for the emissions reductions down to 31%.

American teenagers v. United States climate change lawsuit. The Juliana v. the United States continued in 2022. Twenty one American teenagers filed a class action lawsuit against the US Government. Their complaint asserts that, through the government's affirmative actions that cause climate change, it has violated the youngest generation's constitutional rights to life, liberty, and property, as well as failed to protect essential public trust resource. *State of things:* the youth plaintiffs continue awaiting a ruling on their Motion for Leave to File a Second Amended Complaint, the favorable decision on which would enable them to proceed to trial.²⁹⁷

12.2. Progress in Integrated Water Resources Management and Transboundary Water Cooperation in Central Asia (SDG 6.5)

Prepared by D.R. Ziganshina (SIC ICWC)

This survey as a regular part of the Thematic Review tracks progress in achieving the Sustainable Development Goals in Central Asia. Here we review the progress made by the CA countries in integrated water resources management (IWRM) and transboundary water cooperation under SDG 6.5.

SDG 6.5 is formulated as follows: by 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.

To monitor progress in achieving this goal, SDG 6.5.1 tracks the degree of IWRM implementation, while SDG 6.5.2 considers the percentage of transboundary basin area within a country that has an operational arrangement for water cooperation.

Globally, the UN-Water Integrated Monitoring Initiative for SDG 6 (IMI-SDG6) coordinates reporting on SDG6 (IMI-SDG6). As the custodian of SDG indicator 6.5.1, the United Nations Environment Programme (UNEP) established a specialized IWRM technical support service, which developed the 2023 [Monitoring guide](#).

The United Nations Economic Commission for Europe (UNECE) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) are the cus-

todians of SDG indicator 6.5.2. They developed the Step-by-step monitoring methodology for SDG indicator 6.5.2²⁹⁸ (2020 version) and the Guide to reporting under this indicator²⁹⁹.

This summary report is based on formal country reporting verified by the UN custodian organizations (UNECE, UNESCO, and UNEP) within the reporting rounds 2017 and 2020³⁰⁰.

Globally, the degree of IWRM implementation is 54% (SDG indicator 6.5.1, 2020)

Hopefully this summary will help the countries prepare their reports under the third reporting round 2023 and allow identifying issues that need assistance of development partners.

²⁹⁷ <https://www.ourchildrenstrust.org/juliana-v-us>

²⁹⁸ https://unece.org/DAM/env/water/activities/Reporting_convention/SDG_652_Step-by-step_methodology_2020_ENG.pdf

²⁹⁹ https://unece.org/sites/default/files/2021-02/ece_mp.wat_60_eng_web.pdf

³⁰⁰ UNEP – indicator 6.5.1 custodian via the UNEP-DHI IWRM data portal; UNECE and UNESCO – indicator 6.5.2 custodians, <https://sdg6data.org/en/indicator/6.5.2>; national country reports on SDG indicator 6.5.2 are available on <https://unece.org/national-country-reports-sdg-indicator-652>

Progress in IWRM at all levels (SDG indicator 6.5.1)

186 countries submitted their national reports on indicator 6.5.1 in 2017 and 2020. All the CA countries also submitted their reports on this indicator in 2020. The degree of IWRM implementation is assessed through the **four key components**: (1) enabling environment; (2) institutions and participation; (3) management instruments; and, (4) financing.³⁰¹

In 2020, given the maximum score of 100, Kazakhstan (46), Tajikistan (46) and Uzbekistan (48) showed **me-**

dium-low degree of IWRM implementation, while Kyrgyzstan was close to **low** degree (31) and Turkmenistan (64) reported on **medium-high** degree. Two countries that submitted national reports in 2017 demonstrated progress: Kazakhstan improved the overall indicator from low to medium-low, whereas Uzbekistan added three scores to its medium-low status (Table 1). Overall, the CA countries, except for Turkmenistan, show the lower than global (54) degree of IWRM implementation.

Table 1. Degree of IWRM implementation in CA countries, 2017 and 2020
(SDG indicator 6.5.1)

	KZ		KG		TJ		TM		UZ		Global
	2017	2020	2017	2020	2017	2020	2017	2020	2017	2020	2020
1. Enabling environment	29	37		27		49		63	38	41	57
2. Institutions and participation	24	51		30		43		48	53	53	58
3. Management instruments	40	51		43		48		63	56	60	55
4. Financing	28	43		23		42		80	34	37	43
Average score	30	46		31		46		64	45	48	54

Note: Degree of implementation (scores): ■ very high (91-100) ■ high (71-90) ■ medium-high (51-70)
■ medium low (31-50) ■ low (11-30) ■ very low (0-10)
■ no data

Source: Country reports in 2017 and 2020, <http://iwrmdataportal.unepdhi.org/country-reports>

Table 2. Rating of enabling environment for IWRM by CA countries
(SDG indicator 6.5.1)

	KZ	KG	TJ	TM	UZ
1.1. What is the status of policies, laws and plans to support IWRM at the national level?					
<i>a. National water resources policy</i>	40	40	60	60	60
<i>b. National water resources law(s)</i>	20	50	50	60	30
<i>c. National (IWRM) plans</i>	20	20	50	60	30
1.2. What is the status of policies, laws and plans to support IWRM at other levels?					
<i>a. Sub-national water resources policies</i>	40	10	40	60	40
<i>b. Basin/aquifer management plans based on IWRM</i>	20	20	50	60	30
<i>c. Arrangements for transboundary water management</i>	80	30	60	80	70
<i>d. Sub-national water resources regulations (laws, degrees, resolutions, etc.)</i>	40	20	30	60	30
Average Enabling environment score	37	27	49	63	41

Note: Degree of implementation (scores): ■ very high (91-100) ■ high (71-90) ■ medium-high (51-70)
■ medium low (31-50) ■ low (11-30) ■ very low (0-10)

Source: Country reports, 2020, <http://iwrmdataportal.unepdhi.org/country-reports>

³⁰¹ <http://iwrmdataportal.unepdhi.org/>, <https://sdg6data.org/country-or-area/>

Under component 1, the countries assess their efforts in creating enabling environment for IWRM as **low** (Kyrgyzstan), **medium-low** (Kazakhstan, Tajikistan and Uzbekistan) and **medium-high** (Turkmenistan). Tajikistan and Turkmenistan rate their national water policies, laws and plans as medium-high (50-60). In turn, Uzbekistan gives medium-high score to its national water policy (60) but is not satisfied with laws and plans to support IWRM (30). Kazakhstan is even more dissatisfied with the status of laws and plans (20). Kyrgyzstan considers it achieved medium-low results (40-50) in policies and laws, and much more needs to be done in planning (20 of 100). Responses on subnational strategies and regulations demonstrate the importance of focusing on this level in all CA countries, except for Turkmenistan. Arrangements for transboundary water management (1.2.c) have got high or medium scores in all the countries, except for Kyrgyzstan (30), which considers them unsatisfactory (Table 2).

Under component 2, capacities and participation of **institutions and other stakeholder groups** that help to support implementation, including institutional capacity and effectiveness, inter-sectoral coordination, stakeholder participation and gender equality in the CA countries, are assessed as **low** (Kyrgyzstan), **medium-low** (Tajikistan and Turkmenistan), and **medium-high** (Kazakhstan and Uzbekistan) (Table 3).

Business participation in water resources development and management and organizational framework for transboundary water management were assessed as **very high** by Kazakhstan and **high** by Turkmenistan. Kazakhstan also gives high rating to public participation at national and sub-national levels, while Turkmenistan assesses as high its basin organizations and sub-national authorities. Kyrgyzstan gives medium-low rating to its institutions at national level and is not satisfied with progress at the sub-national level. Tajikistan gave high scores to national government authorities' capacity for leading implementation of IWRM (60) and organizational framework for transboundary water management (60). Overall, Uzbekistan assesses the status of institutions for IWRM implementation at the national and other levels as medium-low or medium-high.

Kazakhstan is highly dissatisfied with **absence** of gender-specific aspects in water laws and plans. Judging from low scores, this is an issue in all the countries.

Participation of business and sub-national authorities in planning processes in Kyrgyzstan, the public at the local level in Turkmenistan, and vulnerable groups in Tajikistan and Turkmenistan are rated as **critically low**.

Table 3. Rating of institutions and participation for IWRM implementation by CA countries
(SDG indicator 6.5.1)

	KZ	KG	TJ	TM	UZ
2.1. What is the status of institutions for IWRM implementation at the national level?					
a. National government authorities' capacity for leading implementation of IWRM plans	20	40	60	60	60
b. Coordination between national government authorities representing different sectors on water resources, policy, planning and management	40	40	50	40	60
c. Public participation in water resources policy, planning and management at national level	80	40	40	20	50
d. Business participation in water resources development, management and use	100	10	40	80	40
e. Developing IWRM capacity	40	30	50	50	60
2.2. What is the status of institutions for IWRM implementation at other levels?					
a. Basin/aquifer level organizations for leading implementation of IWRM plans	20	20	50	80	60
b. Public participation in water resources policy, planning and management at the local level	80	50	30	10	60
c. Participation of vulnerable groups of population in water planning and management	60	20	10	10	40
d. Gender-specific objectives in water laws/plans, etc.	0	30	30	20	40
e. Organizational framework for transboundary water management	100	40	60	80	70
f. Sub-national authorities for leading implementation of IWRM	20	10	50	80	40
Average Institutions and participation score	51	30	43	48	53

Note: Degree of implementation (scores): ■ very high (91-100) ■ high (71-90) ■ medium-high (51-70)
■ medium low (31-50) ■ low (11-30) ■ very low (0-10)

Source: Country reports, 2020, <http://iwrmdataportal.unepdhi.org/country-reports>

Assessment of management instruments that enable decision makers and users to make rational and informed choices between alternative actions (**Component 3**) generally is **medium-high** (Kazakhstan, Turkmenistan and Uzbekistan) or **medium-low** (Kyrgyzstan and Tajikistan). Such instruments include management programs, water resources and their load monitoring, knowledge sharing and capacity building (Table 4).

Only Kyrgyzstan expressed deep concern about management instruments at basin level. High scores (80) again were given by Kazakhstan and Turkmenistan to transboundary data and information sharing between countries. Turkmenistan is also satisfied with data and information sharing within the country at all levels.

Under component 4, the status of financing for water resources development and management is asses-

Table 4. Rating of IWRM management tools by CA countries
(SDG indicator 6.5.1)

	KZ	KG	TJ	TM	UZ
3.1. What is the status of management instruments to support IWRM implementation at the national level?					
a. National monitoring of water availability (includes surface and/or groundwater, as relevant to the country)	40	30	50	70	70
b. Sustainable and efficient water use management from the national level, (includes surface and/or groundwater, as relevant to the country)	60	60	60	50	60
c. Pollution control at the national level	40	60	40	50	50
d. Management of water-related ecosystems at the national level	40	60	40	60	60
e. Management instruments to reduce impacts of water-related disasters at the national level	60	40	50	60	70
3.2. What is the status of management instruments to support IWRM implementation at other levels?					
a. Basin management instruments	60	20	50	60	60
b. Aquifer management instruments	40	40	50	60	60
c. Data and information sharing within countries at all levels	40	40	40	80	60
d. Transboundary data and information sharing between countries	80	40	50	80	50
Average Management instruments score	51	43	48	63	60

Table 5. Rating of financing for water resources development and management by CA countries
(SDG indicator 6.5.1)

	KZ	KG	TJ	TM	UZ
4.1. What is the status of financing for water resources development and management at the national level?					
a. National budget for water resources infrastructure (investment and recurrent cost)	40	20	50	80	50
b. National budget for the IWRM elements (investment and recurrent costs)	40	20	50	70	30
4.2. What is the status of financing for water resources development and management at other levels?					
a. Sub-national or basin budgets for water resources infrastructure (investment and recurrent costs)	20	20	30	80	40
b. Revenues raised for financing IWRM elements	40	30	40	70	30
c. Financing for transboundary cooperation	100	30	40	100	50
d. Sub-national or basin budgets for the IWRM elements (investment and recurrent costs)	20	20	40	80	20
Average Financing score	43	23	42	80	37

Note: Degree of implementation (scores): ■ very high (91-100) ■ high (71-90) ■ medium-high (51-70)
■ medium low (31-50) ■ low (11-30) ■ very low (0-10)

Source: Country reports, 2020, <http://iwrmdataportal.unepdhi.org/country-reports>

sed as **low** (Kyrgyzstan), **medium-low** (Kazakhstan, Tajikistan and Uzbekistan) and **high** (Turkmenistan). Kazakhstan and Turkmenistan gave the highest score to their efforts for financing transboundary coopera-

tion. Virtually all the countries, except for Turkmenistan, express particular concerns about the status of financing for water resources development and management at sub-national or basin level (Table 5).

Progress in transboundary water cooperation (SDG indicator 6.5.2)

Indicator 6.5.2 looks at the area of a country within transboundary basins and assesses the extent to which that area is covered by operational cooperation arrangements. "Arrangement" refers to a bilateral or multilateral treaty, convention, agreement or other arrangement between riparian States that provides a framework for cooperation on transboundary water management. For an arrangement for cooperation between the riparian States to be considered operational, the following **four criteria** need to be in place: (1) there is a joint body or mechanism in place; (2) there are regular (at least once per year) meetings between riparian countries; (3) a joint or coordinated water management plan or joint objectives have been established; and, (4) regular exchanges (at least once per year) of data and information take place.

There are 286 transboundary river and lake basins and 592 transboundary aquifer systems in the world. According to data of the 2023 reporting round, only 24 countries of 153 countries comprising transboundary rivers, lakes and/or aquifers have 100% of their transboundary basin area covered by operational

arrangements.³⁰² From the 2020 reporting results, the global indicator of the percentage of transboundary basin area in a country covered by an operational arrangement of transboundary cooperation is 58%. The average value for this indicator is 65% in relation to transboundary river and lake basins (data from 115 countries) and 42% in relation to transboundary aquifers (for available 94 countries).³⁰³

On average, 58% of transboundary basin area within a country is covered by operational arrangements for water cooperation (SDG indicator 6.5.2, 2022)

Table 6. Percentage of transboundary basin area within CA countries that has an operational arrangement for water cooperation (SDG indicator 6.5.2)

Country	6.5.2 Percentage of transboundary basin area covered by operational arrangement for water cooperation (%)					
	Total		Transboundary river and lake		Transboundary aquifer	
	2017	2020	2017	2020	2017	2020
Kazakhstan	72	63.22	100	100	0	0
Kyrgyzstan	– ³⁰⁴	27.2	–	29.91	–	0
Tajikistan	–	–	–	–	–	–
Turkmenistan	NaN ³⁰⁵	NaN	NaN	66.02	NaN	NaN
Uzbekistan	NaN	69.59	59.3	100	NaN	0
Global	59.16	58 ³⁰⁶	63.28	64 ³⁰⁷	48.52	42 ³⁰⁸

Source: UNECE and UNESCO, 2017 and 2020, <https://www.sdg6data.org/indicator/6.5.2>

³⁰² UN-Water, UNECE, UNESCO, 2021. Progress on Transboundary Water Cooperation: Global status of SDG indicator 6.5.2 and acceleration needs, 2021. https://unece.org/sites/default/files/2021-12/SDG652_2021_2nd_Progress_Report_ENG_web.pdf

³⁰³ UN-Water, UNECE, UNESCO, 2021. Progress on Transboundary Water Cooperation: Global status of SDG indicator 6.5.2 and acceleration needs, 2021. https://unece.org/sites/default/files/2021-12/SDG652_2021_2nd_Progress_Report_ENG_web.pdf

³⁰⁴ report was not submitted

³⁰⁵ NaN: indicates that the indicator value is not available

³⁰⁶ by combining data from 2017 and 2020, 101 countries that share transboundary rivers, lakes and aquifers now have a full value for the SDG indicator 6.5.2, compared with 67 countries in 2017. Therefore this does not mean the decrease in the value of the indicator as compared to 2017

³⁰⁷ the transboundary river and lake basin component is available for 115 countries in 2020, compared with only 89 in 2017. Therefore this does not indicate to a lack of progress

³⁰⁸ the transboundary aquifer component of the indicator was available for 94 countries in 2020 compared with 65 in 2017. Lowering of the indicator value reflects the fact that the additional 29 countries with an aquifer component value report in general a lower value than the initial 65 countries

Meanwhile, **100% of transboundary river or lake basin area in Kazakhstan and Uzbekistan, 66%, in Turkmenistan, and 30% in the Kyrgyz Republic are covered by operational arrangements for cooperation**, i.e. there is a joint body, mechanism or commission for transboundary cooperation; riparian states meet regularly (at least once per year) at political or technical levels; joint objectives, strategy, joint or coordinated management or action plan are established by riparian states; and, there is regular exchange (at least once per year) of data and information (Table 6).

These results are consistent with those on transboundary cooperation under SDG indicator 6.5.1.

As mentioned earlier, arrangements for transboundary water management (1.2.c.) and organizational framework for transboundary water management (2.2.e.) had very high or medium-high rating in all the countries, except for Kyrgyzstan. Kazakhstan and Turkmenistan are satisfied with transboundary data and information sharing, while other countries consider the latter as medium-low (Table 7).

Table 7. Rating of transboundary cooperation for IWRM implementation by the countries
(SDG indicator 6.5.1)

	KZ	KG	TJ	TM	UZ
Enabling environment: 1.2. What is the status of policies, laws and plans to support IWRM at other levels?					
c. Arrangements for transboundary water management	80	30	60	80	70
Institutions and participation: 2.2. What is the status of institutions for IWRM implementation at other levels?					
e. Organizational framework for transboundary water management	100	40	60	80	70
Management instruments: 3.2. What is the status of management instruments to support IWRM implementation at other levels?					
d. Transboundary data and information sharing between countries	80	40	50	80	50
Financing: 4.2. What is the status of financing for water resources development and management at other levels?					
c. Financing for transboundary cooperation	100	30	40	100	50

Note: Degree of implementation (scores): ■ very high (91-100) ■ high (71-90) ■ medium-high (51-70)
■ medium low (31-50) ■ low (11-30) ■ very low (0-10)

Source: Country reports, 2020, <http://iwrmdataportal.unepdhi.org/country-reports>

The status of financing for transboundary cooperation is assessed as very high by Kazakhstan and Turkmenistan, medium-low by Tajikistan and Uzbekistan and low by Kyrgyzstan. Generally, two downstream countries – Kazakhstan and Turkmenistan – are more satisfied with the status of transboundary cooperation. One should note that this assessment refers to cooperation not only within the Aral Sea basin but also within other basins to which these countries are riparian.

The global value for the aquifer component of the indicator is 42% as of 2020 (Table 6) that is lower than

the overall value of this indicator (58%). The data on aquifers was reported by lower countries. This reflects that there is lack of knowledge and understanding of physical characteristics of transboundary aquifers in riparian states and the cooperation arrangements for aquifers are limited.

Kazakhstan, Kyrgyzstan, and Uzbekistan reported the data on aquifers in 2020, while Kazakhstan submitted such data in 2017 also. The aquifer component value of the indicator is '0' in all the cases that means that no groundwater is covered by operational arrangements.

Conclusion and next steps

The CA countries and the world in general shall make much more efforts to achieve SDG 6.5, namely by 2030, implement IWRM at all levels, including through transboundary cooperation as appropriate. As of 2020, the value of indicator 6.5.1 is lower than 50 in all CA countries, except for Turkmenistan. It is necessary to accelerate progress twice and even more in some cases.

Ensure timely and better quality reporting. In the first reporting round, country reports on SDG indicator 6.5.2 were submitted by Kazakhstan, Turkmenistan and Uzbekistan but the indicator value was verified for Kazakhstan and Uzbekistan only. In the second reporting round, Kyrgyzstan also submitted its report and reporting was improved by Kazakhstan, Turkmenistan and Uzbekistan.

Country engagement in workshops organized by UNECE and UNESCO, as well as supporting guidance material, strengthened the quality of reporting. Submission of country report by Tajikistan in the third reporting round would help to have a more comprehensive picture of the status of cooperation in Central Asia.

As to indicator 6.5.1, all CA countries submitted their reports in the second monitoring round as compared to the first round, when only Kazakhstan and Uzbekistan submitted reports.

Revise priority areas. Monitoring through good quality and regular reporting informs countries and development partners of where to focus efforts. In particular, **monitoring of SDG indicator 6.5.1** in CA countries demonstrates the need to focus on the following areas:

- (a) planning processes at all levels;
- (b) IWRM implementation at sub-national and/or basin levels;
- (c) building capacities in gender mainstreaming;
- (d) enhanced engagement of stakeholders, including the public and vulnerable groups in IWRM processes;
- (e) national monitoring of water availability and data sharing at all levels within a country;
- (f) management instruments at aquifer level;
- (g) financing for all levels.

Globally, in addition to tracking implementation of individual components, development of national IWRM Action Plans is encouraged.

The SDG 6 IWRM Support Programme offers technical and financial support in developing such a plan (sdg6iwrmsp@gwp.org). The available IWRM Action Plans can be checked on the [Results Map](#).

Monitoring of transboundary water cooperation indicators revealed general positive trend and satisfaction of the countries in this area, except for Kyrgyzstan. As to river or lake basins, the fuller coverage by operational arrangements is demonstrated by Kazakhstan and Uzbekistan.

According to the second monitoring round, Uzbekistan increased the indicator from 59.3 to 100% by viewing cooperation under umbrella of the ICWC, which fully covers the territories of Syr Darya and Amu Darya basins in Uzbekistan under its jurisdiction.

Nevertheless, significant data gaps still exist, especially in relation to transboundary aquifers in all the

countries. The average value for indicator 6.5.2 could not be derived for Turkmenistan as the latter did not provide information on transboundary aquifers.

Although Kazakhstan, Kyrgyzstan and Uzbekistan submitted data on transboundary aquifers, neither country reported on availability of any arrangement for transboundary aquifer.

This indicates to a need to fill gaps in the data, especially on extent and dynamics of transboundary aquifers, and increase efforts to adopt arrangements for transboundary aquifers and ensure that all transboundary water bodies are covered by operational arrangements by 2030. These efforts should be backed by capacity building in transboundary water assessment.

Enhance cooperation between the countries in the process of national reporting in relation to transboundary aspects. While SDG indicator 6.5.2 invites countries to submit national reports, first and second reporting rounds in 2017/2018 and 2020/2021 showed benefits of coordination between countries when completing these reports.

Coordination allows countries to improve the overall quality of data, reach a common understanding of the challenges, opportunities and priorities for a water body, and provides an opportunity for countries to set common targets, such as the development of a new or revised agreement, the establishment or reinvigoration of a joint institutional body, or the adoption of a basin management plan.³⁰⁹

UNECE and UNESCO made recommendations to consider the possibility of such coordination in the third reporting exercise, 2023, on SDG indicator 6.5.2. Enhanced cooperation between the CA countries in the recent years allowed the countries speak with one voice at COP conferences in Glasgow (2021) and Sharm El Sheikh (2022) and during the UN Water Conference in New York (2023).

ICWC as the mechanism of water cooperation operating for over 30 years could be a coordination platform on SDG indicator 6.5.2 for the CA countries.

National coordinators of indicators play a critical role. In most countries, coordinators are related to ministries which are responsible for water management.

The coordinator bears overall responsibility for organization of monitoring, including stakeholder consultations and reporting.

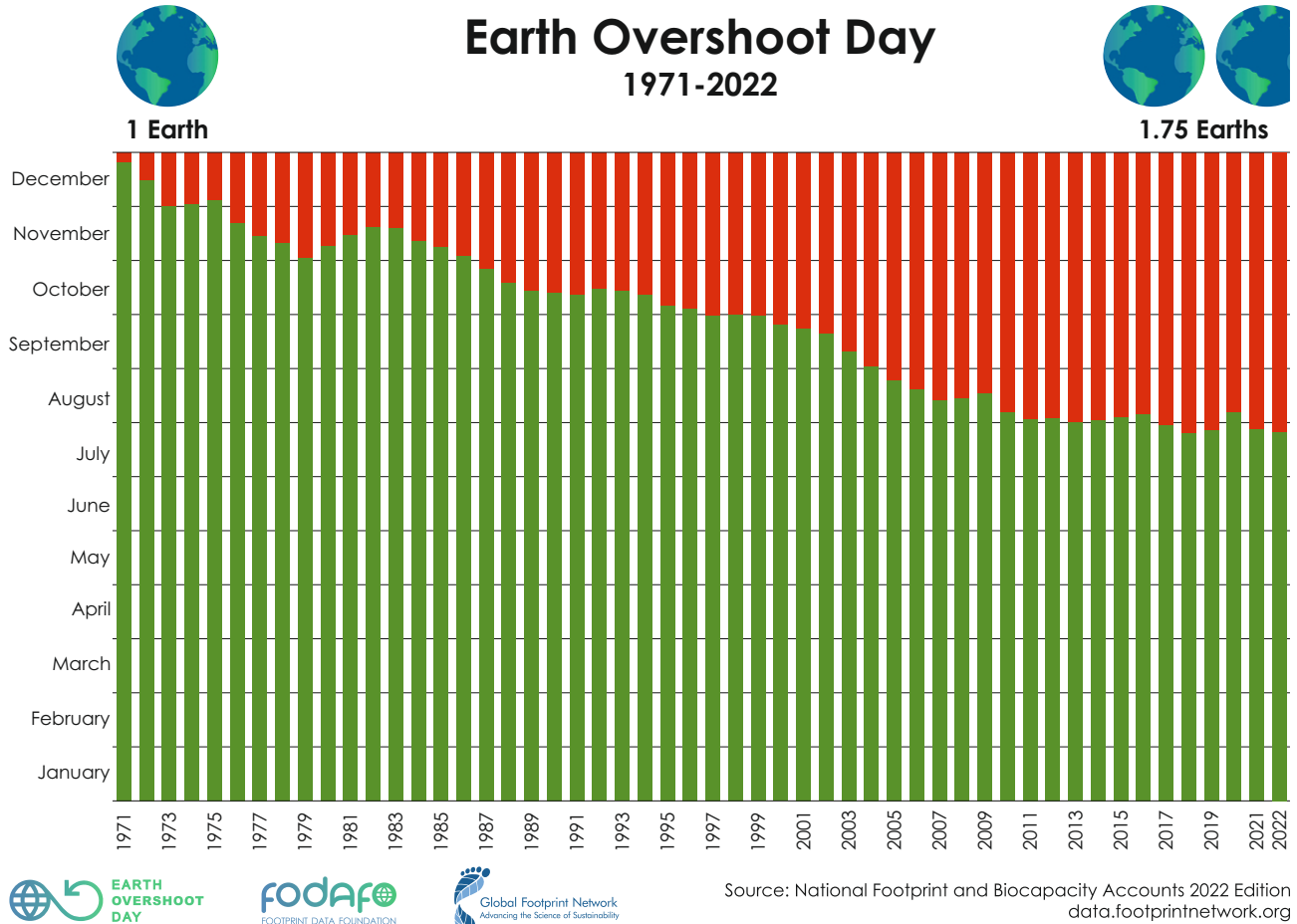
If necessary, they may apply to technical support services: UNEP (iwrmsdg651@un.org) on SDG indicator 6.5.1 and UNECE (transboundary_water_cooperation_reporting@un.org) and UNESCO (transboundary_water_cooperation_reporting@unesco.org) on SDG indicator 6.5.2.

³⁰⁹ <https://unece.org/third-reporting-exercise-2023-sdg-indicator-652>

12.3. Earth Overshoot Day 2022

Earth Overshoot Day 2022 falls on 28 July. This day marks the date when we have used all the biological resources that the Earth can renew during the entire year.

In 1970, the population consumed just as much resources as our planet could renew during the year. In 2021, humanity needed 1.7 such planets for comfortable life.



The Earth Overshoot Day can be calculated for each country. A Country Overshoot Day reflects the ecological footprint of a country by comparing the population's demand and the nation's biocapacity.

On a planetary scale, reducing the ecological footprint is linked to preserving and restoring ecosystems. If we restore 350 ha of forest that has disappeared in recent years, this would **move the date 8 days**.

The global campaign for sustainable development will be decided in cities. 80% of all people is expected to live in urban areas by 2050. Smart city planning and urban development strategies are instrumental to making sure there is enough biological regeneration to avoid excessive human demand that would erode it. 17% of the total carbon footprint left by humans comes from car emissions. Cutting emissions by as little as 50% would **move the date 13 days back**.

The **carbon emissions** make up 57% of humanity's ecological footprint. Over 150 years ago, the carbon footprint of humanity was close to zero. If we want to limit the global temperature increase to below 2°C,

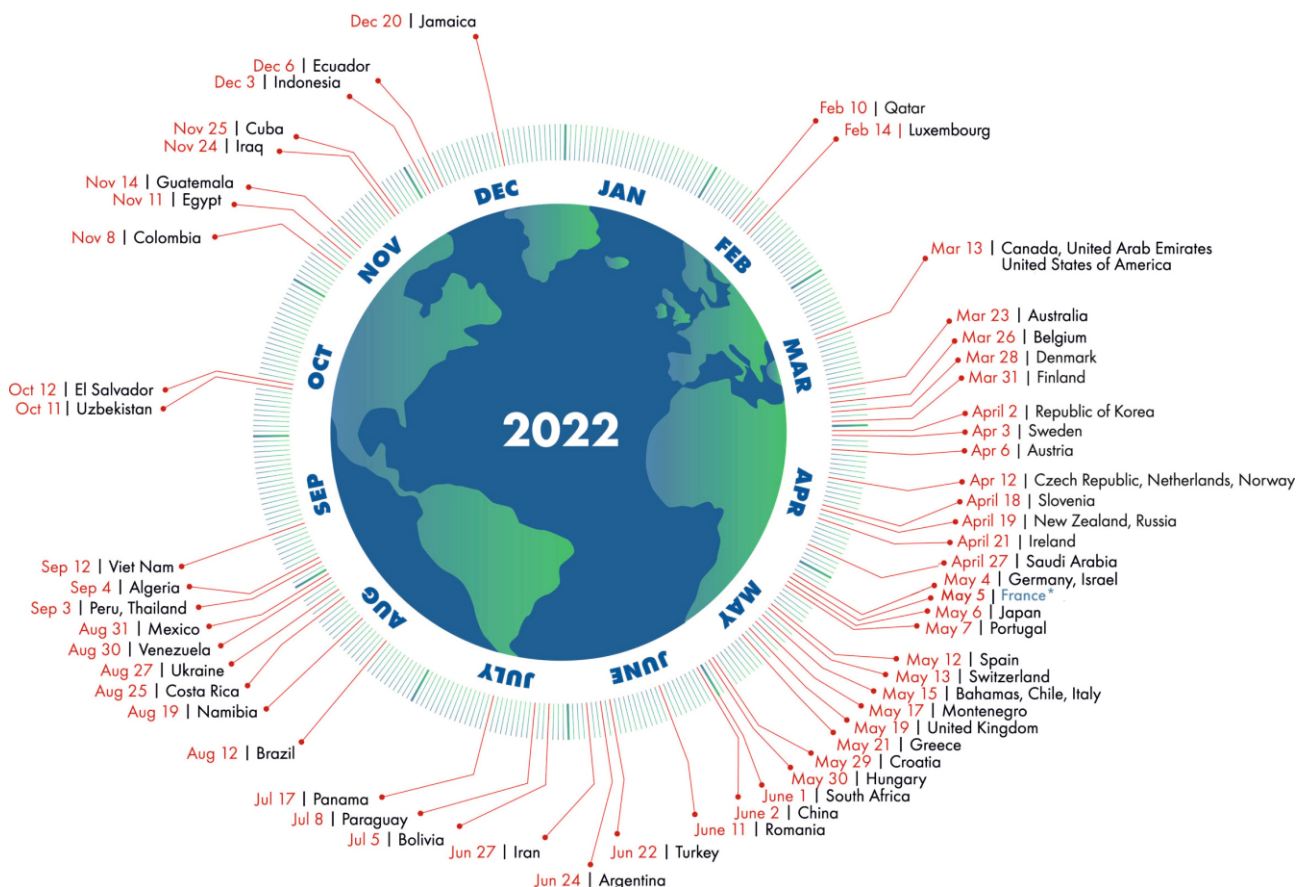
the carbon footprint would have to be zero again before 2050. Existing off-the-shelf, commercial energy-efficiency technologies for buildings, industrial processes, and electricity production could move **Overshoot Day at least 21 days**, without any loss in productivity or comfort. Reducing the carbon component of humanity's Ecological Footprint by 50% would **move Earth Overshoot Day by 93 days**, or more than three months.

Half of Earth's biocapacity is used to feed humanity. About one third of the food produced in the world for human consumption gets lost or wasted. 40% of all food gets wasted in the US. This is comparable to the ecological footprint of Sweden and Colombia cumulatively. If we cut food waste in half worldwide, we would **move Overshoot Day 13 days**.

Food production is a very energy-intensive process, especially as concerns the animal husbandry. China has started a program aimed to reduce meat consumption by 50%. If successful, this will move the date **5 days back**. If we reduce global meat consumption by 50%, we would **move Overshoot Day 17 days**.

Country Overshoot Days 2022

When would Earth Overshoot Day land if the world's population lived like...



For a full list of countries, visit overshootday.org/country-overshoot-days.
 *France Overshoot Day updated April 20, 2022 based on nowcasted data. See overshootday.org/france.
 Source: National Footprint and Biocapacity Accounts, 2022 Edition
data.footprintnetwork.org



12.4. Biodiversity: Highlights of 2022 and Related Activities in Central Asia

Prepared by Z.R. Yarullina, D.R. Ziganshina (SIC ICWC)

Great things are accomplished with huge resources. However, the nature gives great gifts for free.

(A.I. Herzen)

The 2019 Water Yearbook provided an overview of major trends in global biodiversity based on the assessments by IPBES, OECD and FAO.³¹⁰ Here we summarize key findings of the 15th Conference of the Parties to the Convention on Biological Diversity (COP15) held in 2022, as well as the priorities and activities of the Central Asian countries on biodiversity protection.

Introduction

Biodiversity is the diversity of all different kinds of life and a measure of complexity of biological system and heterogeneity of its elements. Biodiversity is all the

³¹⁰ PBES (2019) The global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; FAO (2019) The State of the World's Biodiversity for Food and Agriculture, J. Bélanger & D. Pilling (eds.); OECD (2019) Biodiversity: Finance and the Economic and Business Case for Action, report prepared for the G7 Environment Ministers' Meeting, 5-6 May, 2019

different kinds of life you'll find in one area – the variety of animals, plants, fungi, and even microorganisms like bacteria and their interactions within and between species and their habitats.

While there is a growing recognition that biological diversity is a global asset of tremendous value to present and future generations, the number of flora and fauna species continues rapidly declining. The loss of biodiversity results from destruction of natural habitats, overexploitation of natural resources, water and soil pollution, and the invasive alien species.

The main causes of biodiversity damage and disturbance are as follows:

- ❑ **degradation or complete destruction of natural habitats** due to urbanization, tourism development, farming expansion, and growing transport, fisheries, mining and forestry infrastructures;

- ❑ **intensive and inconsistent use** of wild plants, timber, animals and resulting products (excess fishing or hunting, deforestation, etc.) for local or international trade combined with illegal trade;

- ❑ **water, soil and air pollution** by industrial, agricultural and household wastes;

- ❑ **introduction of invasive exotic species;**

- ❑ **climate change** disturbing habitats of species, forcing them to relocate or adapt to new conditions.

Convention on Biological Diversity and Outcomes of COP15

The global agreement for biodiversity is the [Convention on Biological Diversity](#)³¹¹. The three **main objectives** of the Convention are: (1) the conservation of biological diversity; (2) the sustainable use of its components; (3) the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. 196 countries, including the CA countries, are the parties of the Convention, as of January 2023.

The parties to the Convention took on the **core obligations** in part of implementation of measures for: conservation and sustainable use of biodiversity by developing and implementing national strategies, plans or programs (Article 6); identification and monitoring of components of biological diversity and organization of this data (Article 7); in-situ conservation by establishing a system of protected areas and a regulatory-legal framework for management of the

FACTS AND FIGURES

- ❑ *Current negative trends in biodiversity will undermine progress towards 80% of the assessed targets of 8 Sustainable Development Goals.*
- ❑ *Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions.*
- ❑ *1 million animal and plant species are now threatened with extinction.*

areas to maintain and restore viable populations of species in natural surroundings (Article 8); ex-situ conservation by implementing measures for the recovery and rehabilitation of components of biological diversity outside their natural habitats (Article 9); sustainable use of components of biological diversity by integrating consideration of the conservation and sustainable use of biological resources into decision-making and regulation (Article 10); impact assessment and minimizing adverse impacts by introducing appropriate procedures requiring environmental impact assessment and implementing actions for prevention of threats to biological diversity (Article 14).

COP15 and key messages

The 15th Conference of the Parties to the Convention on Biological Diversity was held in Montreal, Canada on 7-19 December³¹². The Parties to the Convention expressed their concern that "while there has been encouraging progress towards achievement of the Aichi Biodiversity Targets, national targets set by Parties through their national biodiversity strategies and action plans were collectively not commensurate with the level of ambition set out in the Aichi Biodiversity Targets and implementation has been limited".³¹³

Decisions. To accelerate efforts in this direction, a [package of documents](#) was adopted by the Conference, including the Kunming-Montreal Global

³¹¹ adopted at the UN Conference on Environment and Development (1992, Rio de Janeiro). Entered into force on 29 December 1993

³¹² first stage of COP15 was held in Kunming, China in 2021

³¹³ CBD/COP/DEC/15/3 [Decision 15/3](#) Review of progress in the implementation of the Convention and the Strategic Plan for Biodiversity 2011-2020 and the achievement of the Aichi Biodiversity Targets

Biodiversity Framework and the related monitoring framework; mechanisms for planning, monitoring, reporting and review; resource mobilization strategy; capacity-building and development and technical and scientific cooperation actions; and, arrangements on digital sequence information on genetic resources. Also, the Parties have agreed upon the Gender Plan of actions, the long-term strategic approach to mainstreaming biodiversity within and across sectors, the recommendations from the United Nations Permanent Forum on Indigenous Issues to the Convention on Biological Diversity, and actions relative to sustainable wildlife management, biodiversity and health, biodiversity and climate change, and synthetic biology.

One of big achievements of the Conference is the 30x30 commitment to protect 30% of the planet and 30% of degraded ecosystems by 2030. Among other goals and tasks, it is outlined in the [Kunming-Montreal Global Biodiversity Framework](#). This Framework builds on the Strategic Plan for Biodiversity 2011-2020, its achievements, gaps, and lessons learned, and the experience and achievements of other relevant multilateral environmental agreements. The Framework is an ambitious plan to implement broad-based action to bring about a transformation in our societies' relationship with biodiversity by 2030, in line with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, and ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled.

The Kunming-Montreal Global Biodiversity Framework has **four long-term goals** for 2050 and **23 action-oriented global targets** for urgent action over the decade to 2030. These are summarized below.

1. Reducing threats to biodiversity

- bring the loss of areas of high biodiversity importance close to zero (*Target 1*);
- restore at least 30% of areas of degraded terrestrial, inland water, and marine and coastal ecosystems (*Target 2*);
- create conditions for effective conservation and management of at least 30% of terrestrial and inland water areas, and of marine and coastal areas (*Target 3*);
- halt human induced extinction of known threatened species and recover and conserve species, in particular threatened species (*Target 4*);
- ensure that the use, harvesting and trade of wild species is sustainable, safe and legal (*Target 5*);
- eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services (*Target 6*);
- reduce excess nutrients lost to the environment by at least half and the overall risk from pesticides and highly hazardous chemicals (*Target 7*);
- minimize the impact of climate change (*Target 8*);

2. Meeting people's needs through sustainable use and benefit-sharing

- ensure that the management and use of wild species are sustainable, thereby providing benefits for people, especially those in vulnerable situations (*Target 9*);
- ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably (*Target 10*);
- restore, maintain and enhance nature's contributions to people (*Target 11*);
- increase the area and quality of green and blue spaces in urban and densely populated areas (*Target 12*);
- take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits (*Target 13*);

3. Tools and solutions for implementation and mainstreaming

- full integration of biodiversity and its multiple values into policies, regulations, planning, strategies, assessments and national reports (*Target 14*);
- take measures to encourage and enable business for regular monitoring, assessment and transparent disclosure of their risks, dependencies and impacts on biodiversity (*Target 15*);
- ensure that people are encouraged and enabled to make sustainable consumption choices, reduce the global footprint of consumption in an equitable manner (*Target 16*);
- establish, strengthen capacity for, and implement in all countries, biosafety measures (*Target 17*);
- progressively reduce by at least \$500 billion subsidies harmful for biodiversity (*Target 18*);
- mobilize at least \$200 billion per year to implement national biodiversity strategies and action plans (*Target 19*);
- strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation (*Target 20*);
- ensure that the best available data, information and knowledge are accessible (*Target 21*);
- ensure the full, equitable, inclusive, and effective representation and participation of indigenous peoples and local communities in decision making (*Target 22*);
- ensure gender equality in the implementation of the Framework through a gender-responsive approach, where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention (*Target 23*).

As a whole, the Framework aims to restore degraded ecosystems, prevent the introduction of invasive alien species, reduce ecosystem pollution, including by pesticides, hazardous chemicals and plastics, improve management of areas under fisheries, agriculture and forestry, conduct regular monitoring and assessment of impact on biodiversity from large transnational companies and financial institutions and ensure transparency of this data. It also identifies the role of indigenous people and local communities in conservation, restoration and sustainable use of biodiversity. Besides, it makes provision for annual allocation of \$200 billion for financing biodiversity related projects.

Each of the Framework's targets will be supported by effective mechanisms for planning, monitoring, reporting and review.

Reflection of activists on the Conference outcomes

Decisions adopted at the Conference were viewed as a historical deal to stop destruction of the Earth's ecosystems and preserve global biodiversity largely because of the adopted '30x30' goal and the agreement to allocate \$200 billion per year for environmental initiatives. The recognition of the indigenous people and women's rights, the local environmental initiatives, the effective area protection, and the security and rights of nature activists were applauded.

At the same time, the outcomes were also criticized. There is not a strong scientific argument behind 30% as the threshold for staving off species loss, [experts](#) said. Additionally, it is not clear from the agreement, what should count as protection. For instance, some countries might allow people to live within protected areas or promote indigenous stewardship of these lands. Some might even allow for extractive industries to operate under permits and regulation. In other cases, conservation areas are off limits to everyone. Representatives of African countries, home to tropical rainforests, are concerned that developing countries have no funds for financing conservation effects and need support from developed countries to implement the agreed targets.

Executive Director of the Global Forest Coalition, Simone Lovera is [concerned](#) with a number of lost opportunities in the package of adopted decisions. *First*, she noted the absence of comprehensive technology horizon scanning. Activists hoped for strong texts on, for example, a horizon scanning mechanism for new technologies, or measures to reduce the risks of synthetic biology, genetically modified organisms, false climate solutions like bioenergy and carbon capture and sequestration, or the privatization and commercialization of genetic information through digital sequence information systems. *Second*, important proposals that would hold corporations legally accountable for damage caused to biodiversity were removed from the final Global Biodiversity Framework (GBF) text, while the targets deal-

ing with the role and accountability of the private sector and consumers were watered down to weak phrases. *Third*, deleted from the text were references to the need to change diets and/or food systems in general to reduce the impact of, in particular, unsustainable livestock farming, which is a primary cause of biodiversity loss and climate change. *Fourth*, she worries about weak implementation mechanisms that provide no guarantee that the lofty recommendations in the GBF will actually lead to concrete action on the ground.

Simone Lovera considered it ugly that the GBF risks corporate capture through private sector financing since, *per se*, the Framework opens the door for greenwashing (and potentially even whitewashing, as even illegally acquired money seems to be welcome) practices. Even uglier was the inclusion of "biodiversity offsets and credits" because one cannot simply replace a destroyed ecosystem with another ecosystem. Many [NGOs and rightsholder groups](#) were against the inclusion of the term "nature-based solutions" in the GBF since the so-called "nature-based solutions" tend to reinforce existing gender injustices by ignoring the rights, needs and livelihoods of rural women, girls and other underrepresented groups and frequently represent [fraud schemes](#) covering up projects that actually have a negative effect on the nature and climate.

The way forward

The success of the Framework and other Conference decisions will depend on how urgently countries, the private sector and civil society implement and mobilize resources. First, this means early revisiting and strengthening of existing national biodiversity strategies and action plans.

It is important to remember that the global community as a whole, including the CA countries, has failed on biodiversity conservation targets. Almost all targets set by the international community for 2020 have not been achieved.

Biodiversity priorities and activities of the Central Asian countries

This subsection discusses efforts made by the CA countries for fulfillment of their obligations under the Convention on Biological Diversity.

Regulatory and framework program

Based on obligations under the Convention on Biodiversity, the CA countries have adopted a number of legal documents in part of management and protection of the natural environment, including water and land, air, flora and fauna. A separate law regulating the matters related to the *use and protection of natural areas* is effective in all the CA countries.³¹⁴

³¹⁴ Laws on specially protected natural areas in Kazakhstan (175-III of 07.07.2006), Kyrgyzstan (18 of 03.05.2011), Tajikistan (788 of 26.12.2011), Turkmenistan (286-IV of 31.03.2012), and Uzbekistan (710-II of 03.12.2004)

The countries also have regulations concerning:

□ *Control and monitoring of natural environment.* For instance, the law on state monitoring of natural environment is under development in Turkmenistan. Provisions of the draft law are developed in line with international conventions and agreements and the Turkmenistan strategic priorities, such as conservation of biodiversity, sound use of natural resources, and protection of ecosystems. The Regulation on national environmental monitoring³¹⁵ was accepted for bringing into effect in Uzbekistan. The document provides for monitoring of flora and fauna.

□ *Control of bio-resources use, exportation and importation* which is valid for all users of fauna. All the CA countries trade animals and plants, with some of these countries also serving as transit points. All the countries, except for Turkmenistan, are Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and have

been implementing the Convention and related enforcement activities for many years.

□ *Environmental impact assessment* and measures for prevention or elimination of biodiversity risks (environmental expertise). Such regulations set key guidelines for documentary justification of actions that potentially affect the natural environment in given area.

Since *environmental control* is the key enforcement mechanism of environmental regulations, government bodies have powers to exercise control over compliance with the regulations, to stop or suspend illegal nature use or other harmful impact on the natural environment, as well as the right to give instructions which are binding for elimination of the causes and the consequences of offenses.

The CA countries have adopted its own **strategies and national plans** for biodiversity conservation (see key documents in the Table below).

Concepts and strategies	Main goals and priorities
Republic of Kazakhstan	
Concept for transition of the Republic of Kazakhstan to green economy ³¹⁶	<ul style="list-style-type: none"> □ preservation and efficient management of ecosystems; □ forestry management; □ fishery management; □ wild life management; □ eco-tourism.
Concept for conservation and sustainable use of biodiversity in the Republic of Kazakhstan until 2030 ³¹⁷	<ul style="list-style-type: none"> □ formation of a representative environmental network; □ conservation of rare and endangered species; □ conservation of genetic resources, ensuring access to them and their fair and equitable utilization; development of a system of biodiversity monitoring based on the ecosystem approach; □ improvement of the system and mechanisms for management of specially protected natural areas in line with the biodiversity conservation goals; □ conservation and sustainable use of forest ecosystems and resources; □ conservation, reproduction and sound use of wild life resources; □ conservation, reproduction and sound use of fish resources and sustainable development of fishery; □ conservation and restoration of agro-biodiversity; □ strengthening and improvement of natural environment and conservation of soil.
Kyrgyz Republic	
Green Economy Development Programme for 2019-2023 in the Kyrgyz Republic	<ul style="list-style-type: none"> □ regulation of load on natural ecosystems; □ conservation and restoration of natural environment; □ sustainable use of ecosystem services; □ integration of ecosystem valuation into development planning; □ building environmental culture among population.

³¹⁵ approved by the Cabinet of Ministers of Uzbekistan on 05.09.2019

³¹⁶ approved by Presidential Decree No.577 of 30.05.2013

³¹⁷ developed as part of the GEF/UNDP/MEWR RK project "Planning biodiversity conservation at the national level to support the implementation of the CBD 2011-2020 Strategic Plan in the Republic of Kazakhstan"

Concepts and strategies	Main goals and priorities
Concept of Kyrgyzstan as a green economy country ³¹⁸	<ul style="list-style-type: none"> □ adopt a unified ecosystem classification system, define standards for the relevant ecosystems for future monitoring of their state; □ integrate ecosystem approach into sector-specific development plans and local management plans; □ account for the value of ecosystems and biodiversity in industrial and municipal planning, use of pastures and other agricultural lands; □ account for seasonal migration zones, quiet zones and wildlife corridors in pasture management plans and linear infrastructure projects □ develop programs for restoration of particularly valuable ecosystems for conservation of globally significant biodiversity; □ implement a system of biodiversity offsets by entities causing inevitable harm to biodiversity; support local initiatives promoting participation in biodiversity damage compensation schemes; □ expand protected areas (PA) up to 10% of the country land area; □ involve local communities in promotion of local tourism products associated with protected areas (eco-, agro- and ethnic tourism, extreme tourism, mountaineering, agriculture certified with a PA label); □ facilitate development of sustainable tourism (eco-, agro- and ethnic tourism) with due regard to the tourist capacity of natural areas; □ introduce incentives for biodiversity-friendly economic activities; support biodiversity focused PPPs.
On priorities for conservation of biodiversity in the Kyrgyz Republic until 2024 and the Action Plan for implementation of these priorities in 2014-2020 ³¹⁹	<ul style="list-style-type: none"> □ mainstream biodiversity conservation in the activities of government bodies and public organizations; reducing the pressure on biodiversity and facilitating its sustainable use; □ improve protection and monitoring of ecosystems and species diversity; □ increase social significance of biodiversity and ecosystem services, the benefits of sustainable provision of ecosystem services and traditional technologies.
Republic of Tajikistan	
National strategy and action plan on conservation of biodiversity until 2020 ³²⁰	<ul style="list-style-type: none"> □ modernization of the system of protected areas; □ sustainable use of biodiversity of natural ecosystems and agro-ecosystems; □ rational use of biotechnology; □ development and strengthening of political, institutional, legislative frameworks, and capacity building of human resources; □ equal sharing of benefits from the use of biological resources; □ NGO involvement in biodiversity conservation; □ improvement of policies, legislation and institutional framework; □ spatial planning and biodiversity conservation programs; □ biodiversity research and biodiversity monitoring; □ training and education of the population; □ strengthening of the financial support mechanisms for biodiversity conservation activities; □ information, coordination and cooperation; □ establishment of mediation mechanism; □ international cooperation; □ development of a special legislative act to regulate activities in the habitats of migratory species of animals within low-mountain semi-savanna (savanna-like) ecosystems.

³¹⁸ approved by Resolution of the Parliament 2532-VI of 28.06.2018

³¹⁹ approved by PPKR 131 of 17.03. 2014

³²⁰ developed as part of the project "Supporting Tajikistan in updating the National strategy for biodiversity and development of the Fifth national report on biodiversity", with the financial support of GEF and UNEP

Concepts and strategies	Main goals and priorities
Turkmenistan	
National biodiversity strategy of Turkmenistan for 2018-2023	<ul style="list-style-type: none"> □ strengthen control over environmental legislation implementation, including biodiversity-related legislation; □ ensure sustainable use of human-influenced ecosystems (pastures, arable lands, reservoirs, forests, hunting grounds); □ maintain a balance between the economy and biodiversity while developing extractive industries; □ develop protected areas to improve nature conservation and social and economic benefits of biodiversity; □ improve understanding and awareness of the importance and benefits of biodiversity and ecosystem services.
Republic of Uzbekistan	
Strategy for the Conservation of Biological Diversity in the Republic of Uzbekistan for 2019-2028 ³²¹	<ul style="list-style-type: none"> □ mainstream biological diversity issues in the activities of government authorities, public administration and society as a whole; □ reduce direct pressures on biological diversity, ensure sustainable use of its components in productive landscapes; □ develop the system of protected areas, enhance the benefits of ecosystem services; □ improve the efficiency of conservation and sustainable use of biological diversity through planning, capacity building and development of financing mechanisms; □ increase ecosystem representativeness of protected areas; □ increase the number of unique natural objects in the PA system; □ increase the number of rare and endangered plant species under territorial protection (PA categories I-IV); □ develop and regularly update the national database of biological diversity used for food production and agriculture; □ determine the main habitats of wild relatives of cultivated plants; □ develop and launch implementation of the State Programme of Conservation and Sustainable Use of Biological Diversity Components Used for Food Production and Agriculture.
Concept of environmental protection of the Republic of Uzbekistan until 2030 ³²²	<ul style="list-style-type: none"> □ increase the area and density of forest plantations and improve their quality; □ expand and develop the PA network; □ step up measures to bring the area of PA categories I-V to 7% of the country land area by December 1, 2021; □ implement measures to ensure biological safety; □ study international experience; □ draft the Law of the Republic of Uzbekistan "On biological safety"; □ improve the legislative framework for the conservation of biological diversity.
Strategy for transition of the Republic of Uzbekistan to green economy for 2019-2030 ³²³	<ul style="list-style-type: none"> □ improve water use, prevent further salinization and deterioration of land quality; □ restore degraded pastures and introduce mechanisms for sustainable pasture management; □ introduce organic farming methods; □ diversify crops (expansion of perennial tree plantings and perennial grasses); □ create soil-protective forest plantations and afforest degraded land (agricultural afforestation); □ introduce in the process of forest development and tree planting local plant species that are resistant to salinity, drought and other hazardous phenomena and risks; □ maintain the system of natural lakes within the area of the Aral Sea; □ implement large-scale measures for afforestation on the exposed bed of the Aral Sea and prevent desertification.

³²¹ approved by the Cabinet of Ministers of Uzbekistan (Resolution 484 of 11.06.2019)

³²² approved by Presidential Decree UP-5863 of 30.10.2019

³²³ approved by Government Resolution PP-4477 of 04.10.2019

Concepts and strategies	Main goals and priorities
<p>“Green space” project aimed to increase tree plantations³²⁴</p>	<ul style="list-style-type: none"> □ improve the management system in the area of tree planting and care; □ carry out research and analysis for determination of soil-climatic and other characteristics of regions, based on scientific approaches, and subsequent regional mapping; □ increase the number of nurseries, localize imported ornamental trees fit to climate of country regions, proceeding from soil fertility; □ create 'green parks' and 'public green parks' in country regions; □ revisit the system of tree watering and ensure its efficient performance; □ assign persons, who will be responsible for every tree and introduce relevant incentive mechanisms; □ strengthen responsibility for damaging or destruction of trees and further enhancement of public control in this area.

National country reports on the Convention

In due time, the CA countries prepare and submit their reports to the Secretariat of the Convention on Biological Diversity. As of 01.01.2023, each of the countries has prepared six national reports³²⁵ in line with reporting guidelines. The reports cover the period from 2013 to 2017, contain final reviews of results achieved through implementation of the Strategic Plan for the Conservation and Sustainable Use of Biodiversity for 2011-2020 and targets for conservation and sustainable use of biodiversity adopted in Aichi, including relevant national targets. Country reports are the important tool for the Conference of the Parties to track implementation and also the tool for planning biodiversity conservation activities at national level by providing analysis and monitoring needed for making timely decisions.

Future tasks

UNECE Environmental Performance Review identified a number of issues related to biodiversity conservation in CA. In particular, these are the declining trends in populations of several threatened species; all main representatives of natural and semi-natural ecosystems, providing important ecosystem services and habitats for the diversity of species increasingly threatened by anthropogenic pressures and adverse effects of ongoing global climate changes; countries particularly affected by adverse effects of climate changes, resulting in desertification, land degradation, and large-scale environmental disasters, e.g., in the Aral Sea region. Based on the assessment results, experts identified as a priority the need for undertaking urgent ecosystem restoration measures and enhancing spatial ecological connectivity (also, in transboundary scale) of ecosystems, which is particularly important during the 2021-2030 UN Decade on Ecosystem Restoration.

Also, the *Analytical review of biodiversity and significant ecosystems conservation priorities in Central Asia*³²⁶ highlights that the countries of Central Asia have gained a unique biodiversity but natural areas are under great pressure since a substantial part of population in Central Asia still lives in rural areas relying heavily on natural resources as means of existence.

Despite all efforts, forest cover in Central Asia has recently been declining for many reasons, including urbanization, agricultural development, climate change, growing demand for timber, and expansion of plantations for species not typical for the region.

The economic, political, social, cultural challenges the region faces are often at variance with the goals of ecosystem conservation, and therefore new, sustainable approaches to dealing with issues of the day are required, since biodiversity degradation will lead to an increase in poverty, inequality, conflict, migration flows and reduce the ability of local communities to resist the impact of climate change.

The analysis identified key areas of activity, prospects for effective cooperation and provided recommendations for the achievement of concrete results on biodiversity protection and conservation in the CA countries, including the following:

- align the national biodiversity targets with the UN SDG15 adopted by all CA countries;
- harmonize national biodiversity terminology in the region with the Multilateral Environmental Conventions glossaries;
- set the targets and time frames for all national biodiversity goals;
- improve the legal framework on transboundary protected areas and biosphere reserves;

³²⁴ launched by Presidential Decree UP-46 of 30.12.2021

³²⁵ see 6th national report on: Kazakhstan, <https://www.cbd.int/doc/nr/nr-06/kz-nr-06-en.pdf> Kyrgyzstan, <https://chm.cbd.int/database/record?documentID=243111>; Tajikistan, <https://chm.cbd.int/database/record?documentID=247273> Turkmenistan, www.cbd.int/doc/nr/nr-06/tm-nr-06-ru.pdf Uzbekistan, <https://www.cbd.int/doc/nr/nr-06/uz-nr-06-en.pdf>

³²⁶ produced within the framework of the EU-funded project “European Union – Central Asia Water, Environment and Climate Change Cooperation (WECCOOP)”

- develop a mechanism for the assessment of the economic value of biodiversity and ecosystem services;

- identify areas that have to be preserved and have a high conservation value, but have no conservation status or special regime of use;

- strengthen financial support mechanisms for biodiversity conservation activities;

- build the capacity of personnel of government bodies in charge of biodiversity management;

- widen engagement of local communities and the public concerned in environmental activities, empower social movements and groups;

- impose a moratorium on the development and use of pristine/primary forests in Central Asia, establish protection regimes for this type of ecosystems;

- develop and maintain cross-border cooperation between the countries of Central Asia;

- exchange genetic resources through international institutions and gene banks;

- interact with international development agencies and financial organizations to attract international experience and resources for biodiversity conservation;

- develop the Red List of Ecosystems of Central Asia.

12.5. Construction of the Qosh-Tepa Canal in northern Afghanistan (March 2022-March 2023)

On 10 December 2018, a **feasibility study** for the Qosh-Tepa Irrigation Scheme and Power Generation was launched at the Office of the President in Kabul, Afghanistan. The feasibility study was completed in 2018-2019 by AACS Consulting and BETS Consulting Services Ltd as part of the USAID Strengthening Watershed and Irrigation Management (SWIM) project implemented by AECOM International Development, Inc./DT Global. The request for expression of interest was announced by AECOM on 20 March 2018. The feasibility study worth of \$3.6 million was conducted in coordination with the Ministry of Agriculture, Irrigation and Livestock, Ministry of Energy and Water, and National Environmental Protection Agency of Afghanistan. The feasibility study has not been published finally.

The construction of the Qosh-Tepa irrigation canal was inaugurated on 30 March 2022. The canal will originate on the left bank of the Amu Darya in Balkh province. The canal will pass from Kaldar through Dawlat Abad (*Balkh*), Faizabad, Aqcha (*Jowzjan*) to And-Khoy (*Faryab*) for irrigation of land in these provinces.

General information. The total length of the Qosh-Tepa canal will be 290.5 km, with the width of 100 m and the depth of 8.5 m. The main canal is 208.307 km and the two branches are 37.369 km and 44.909 km long, respectively. The system will include 27 secondary canals stretching to 502 km in total.

The total command area of the canal is 550,000 ha, and the gross irrigated area is 331,500 ha, while irrigable area is 276,500 ha in Balkh, Jowzjan, and Faryab provinces. About 230.3 thousand ha of land is planned to be irrigated by gravity and 46.2 thousand ha by lift irrigation. In general, up to 6 billion m³ of Amu Darya flow will be abstracted annually to meet the project's irrigation demand.

Implementation. The project is to be implemented in 6 years in three phases. The first phase is 108 km, which is expected to be completed by June 2023. The se-

cond and third phases, which combined make up 177 km, are expected to be completed within five years by 2028.

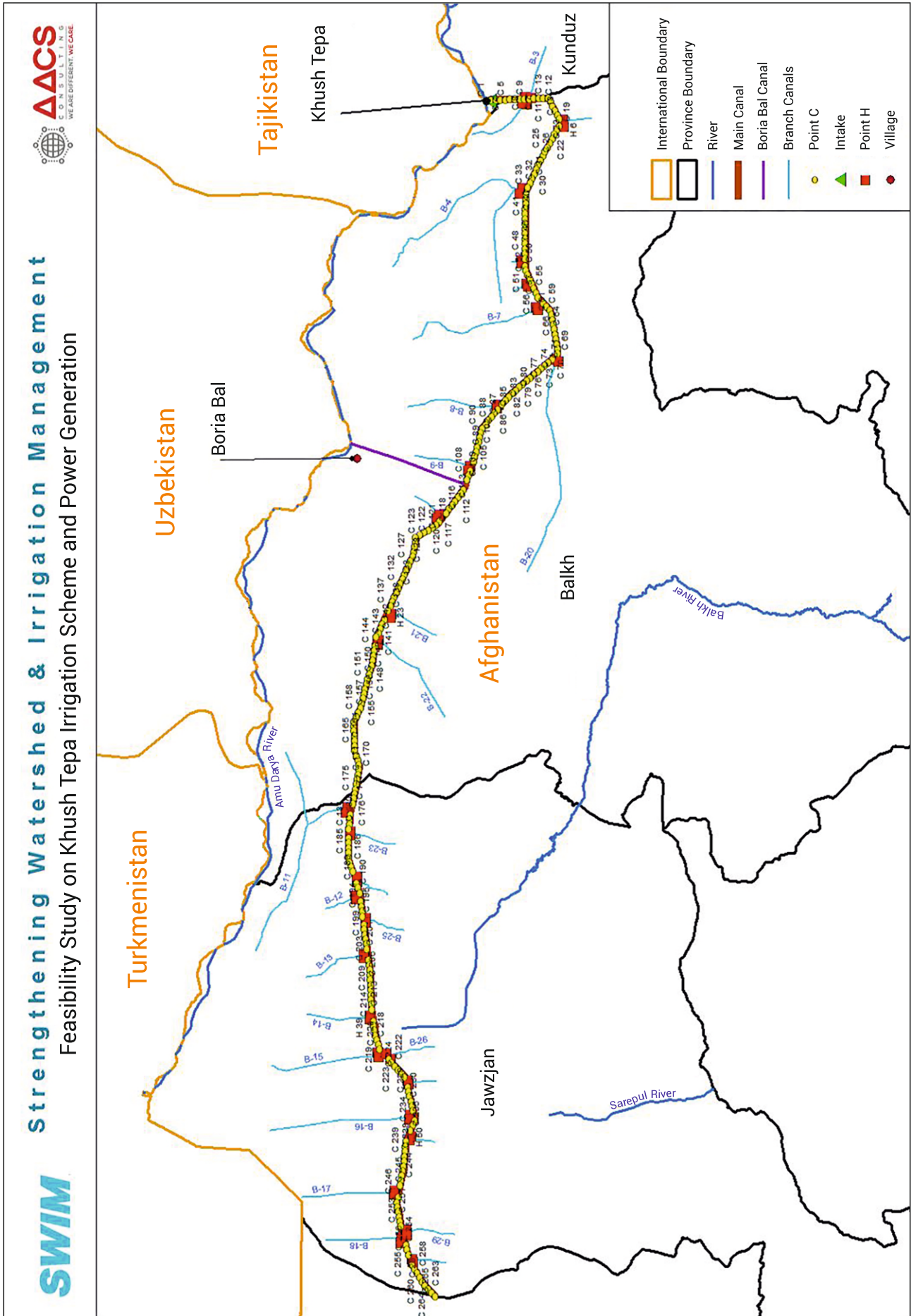
The project is implemented by the national development company of Afghanistan. The Melli company under the Ministry of Finance have got a contract for construction from the former government. On 22 February 2023, it was announced that a joint committee would be formed of the Administrative Office of the Islamic Emirate, Ministry of Agriculture, Irrigation and Livestock, and National Development Company for further coordination of activities on the Qosh-Tepa Canal.

Financing. The total project cost will depend on the design chosen and may vary from \$676 million to \$1.951 billion. The financing was stated to get funding from national budget. According to the Ministry of Finance (MoF), the government allocated 7 billion Afs (approx. \$79 million) for the Qosh-Tepa canal in 2022 budget.

Pace of construction since March 2022 till March 2023. 45 km of the Qosh Tepa canal have been completed by November 2022 and over 100 km by March 2023. A water filled section of the canal stretched to 33.3 km in March 2023.

By 20 November 2022, up to 4,000 people were engaged and 2.6 thousand pieces of heavy equipment were used in the construction. Local authorities stated that construction work was speeded up at the end of 2022 and, thus, the project was expected to be completed ahead of its due date. As of January 2023, the construction work was underway in 120 locations and nearly 6,000 people were working in the project. The first phase of 108 km long is to be completed in the next six months (June 2023).

The National Development Corporation said on 2 January 2023 that it will **change the route of the Qosh Tepa Canal** in northern Balkh province in order to



Source: AACS Consulting request for proposal for "Geotechnical Site Investigation" RFP No.: AACS-KTISPGF5/2019-0002. March 13, 2019

protect historical structures situated between Kaldar and Dawlat Abad districts. Changing the canal's route will cost an additional 3 million Afghani.

Dialogue with riparian countries. The canal will divert water from the Amu Darya River shared by Afghanistan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The above feasibility study didn't seem to make an assessment of the potential impacts of planned activities on the riparian countries. No official notifications have been sent to neighboring countries prior to the start of the project.

In December 2022, President of Uzbekistan, Shavkat Mirziyoyev considered it necessary to initiate a dialogue on joint construction of the new canal in the Amu Darya Basin together with the interim government of Afghanistan and the international community in line with international norms and with account of the interests of all countries in the region.

The Deputy Prime Minister for Economic Affairs, Mullah Abdul Ghani Baradar Akhund in his [Twitter](#) account wrote on 22 March 2023 that Uzbekistan had expressed readiness to work together with Afghanistan's technical teams to improve the efficiency of the Qosh Tepa Canal project along with other infrastructure projects. The Afghanistan's right to water in the Amu Darya River under international law and with full account of country's privileges and rights was noted. He assured that the completion of the Qosh-Tepa Project would enhance bilateral relations between the two neighboring countries.

Norms of international law. No general water cooperation agreement exists for the Amu Darya riparian countries. The water use relations between the CA countries are governed by the Agreement on Cooperation in the Field of Joint Management of the Use and Conservation of Water Resources in Interstate Sources (1992 Almaty Agreement) that retained the water allocation quotas in the Amu Darya Basin for Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan set in 1987. The presumed water diversion by Afghani-

stan of 2.1 km³/year was deducted in the allocations from available usable water resources.

Agreements between the CA countries (as legal successors of USSR regarding boundary areas) and Afghanistan do not cover the issue of water sharing of the Amu Darya but establish the general order of frontier water use. The 1958 Treaty concerning the regime of the Soviet-Afghan state frontier sets that: (1) in the use of frontier waters, and of the waters of rivers which flow to the frontier or into frontier waters, the mutual rights and interest of both Contracting Parties shall be respected (Article 7); (2) matters concerning the use of waters shall be governed by special agreements (Article 16); (3) the diversion of water and other matters associated with the use of frontier waters shall be agreed on (Article 18); (4) any constructions likely to influence the flow of water or cause damage thereto shall not be erected except by agreement between the two Parties (Article 19).

Afghanistan is not a party of the [UN Convention](#) on the law of non-navigational uses of international watercourses (New York, 1997) and the [UNECE Convention](#) on the protection and use of transboundary watercourses and international lakes (Helsinki, 1992) that contain the most comprehensive list of rights and obligations as concerns transboundary water. Meanwhile, many provisions of the global water conventions are the norms of customary international law that all states are bound to adhere to.³²⁷ These include: (1) utilization of a watercourse in an equitable and reasonable manner; (2) taking all appropriate measures to prevent, control and reduce transboundary impact; (3) provision of minimum river flow for environment; (4) cooperation with riparian states in good faith in order to attain optimal utilization and adequate protection of an international watercourse. Minimum procedural obligations that are recognized as customary law are: (1) regular data and information exchange with riparian countries; (2) consultation with each other on transboundary water; (3) prior notification regarding planned activities; (4) transboundary environmental impact assessment.

12.6. Public Private Partnership in Irrigation: What are the lessons for Central Asia?

The irrigation sector of all Central Asian countries is in serious need for investment to improve water use efficiency and modernize aging infrastructure. Currently, the government bears the main burden for financing water in all Central Asian countries. However, to improve the situation, countries are looking also for other options such as public private partnership (PPP) arrangements.

PPP is one of the sophisticated financing modalities, which is very different from traditional procurement. It allows bigger participation from the private entity

by means of financial structure and engineering, technology and innovation, and risk-sharing schemes. PPP performance is based on service quality and delivery, not on inputs; and contract period is defined by the project life cycle. Consequently, it requires comprehensive understanding and sufficient endowment from the public sector. It also introduces the benefits of market incentives for the public sector.

The Central Asia enacted PPP laws demonstrating political commitment to use PPP as a tool to attract foreign and local investments. The countries differ

³²⁷ Customary international law consists of rules that come from "a general practice accepted as law" and exist independent of treaty law

however in the number of PPP projects implemented and in the priority sectors for PPP investments.

In **Kazakhstan**, out of the \$195.6 billion investments tracked between 2000 and 2019, water projects (which include water supply, irrigation, and water resources management projects) are limited to only \$471 million; while energy projects account for more than half of Kazakhstan's planned and under construction infrastructure projects at around \$112.5 billion (58%).

Between 2006 and 2010, investment in the sector was less than \$20 million annually, which was inadequate to maintain millions of hectares of irrigation facilities.

Although investment resumed in 2014 and 2015, reaching \$250 million, water demand is rising in Kazakhstan, with projections that by 2030, demand will outstrip all possible water supplies.

In **Kyrgyzstan**, out of \$140 million investments in 6 PPP projects only one is in the water and sewerage sector, with the largest share of ICT projects.

In **Tajikistan**, 5 PPP projects accounting for \$961 million investments in total are reported between 1999 and 2020.

In **Uzbekistan**, for the period of 2019-2022, the highest number of PPPs projects was recorded in the water management sector (157 out of 423 PPPs projects in different sectors) accounting for \$29.82 million.

Based on few examples of PPPs in the irrigation sector, this review will draw some lessons for Central Asian countries informing their endeavours to implement successful PPP projects.

PPP refers to a long-term contractual arrangement between public (national, state, provincial, or local) and private entities through which the skills, assets, and/or financial resources of each of the public and private sectors are allocated in a complementary manner, thereby sharing the risks and rewards, to seek to provide optimal service delivery and good value to citizens. In a PPP, the public sector retains the ultimate responsibility for service delivery, although the private sector provides the service for an extended time. All contracts such as performance-based contracts (management and service contracts), lease-operate-transfer, build-own-operate-transfer, design-build-finance-operate, variants, and concessions are considered as various forms of PPP.

Source: ADB, [Public-Private Partnerships. Guidance note on procurement](#)

Examples of PPP in irrigation projects

Olmos irrigation project in Peru

The **Olmos Irrigation Project** (hereinafter, Proyecto Especial Olmos Tinajones, PEOT) is a set of engineering works, consisting of 3 main components: (i) the transfer of water through a 20 km Trans-Andean Tunnel and the Limón Dam, which started operating in 2012; (ii) the generation of hydroelectric power; and (iii) the implementation of irrigation infrastructure.

A 44 million m³ capacity dam (Limon Dam) and the trans-Andean tunnel were to be constructed with the purpose of transferring the water from the Huanca-bamba River, on the Atlantic watershed, to the Pacific watershed for agricultural and power generation purposes in the new Olmos Valley.

In July 2004, the legal framework for the procurement procedure for the PEOT was set and transfer works were awarded by the Regional Government of Lambayeque (GORE Lambayeque) to the Olmos Transfer

Concessionaire (Concesionaria Traspase Olmos, CTO).

In 2004, the GORE Lambayeque, in the framework of Legislative Decrees No.994 and No.1012 and their respective regulations supporting private investment in irrigation projects, awarded the works that allow for the diversion of water from the Atlantic watershed to the Pacific watershed, to the Olmos Transfer Consortium of the Odebrecht Group for a period of 20 years at a cost of \$185 million, of which \$77 million funded by the Andean Development Corporation (CAF).

In June 2010, another concession contract was signed between GORE Lambayeque and H2Olmos, a private company created in 2009, in order to manage the distribution of water for the irrigation component of the PEOT.

In October 2010, the economic compensation contract was signed between GORE Lambayeque and

the private company SINERSA S.A. (Sindicato Energético) dedicated to the construction of electricity generation plants, their operation and administration, and the trade of energy (as part of the hydro-power component).

In 2012, the public tendering process was developed by GORE Lambayeque and H2OImos for the award of the lands of the "new Olmos valley", as part of the irrigation component.

In November 2014, the irrigation works was inaugurated and the transfer and irrigation works was put into operation. New concession contracts for more hydropower plants to be built in the area are being currently planned and negotiated.

Zambia's Kaleya and Manyonyo schemes

So far, there have not been many examples in sub-Saharan Africa of PPPs involving irrigated agriculture. Some of them are found in Zambia, which has developed models of inclusive PPPs with smallholders. These PPPs have in common that smallholders have established farmer-owned liability companies to run profitable commercial businesses.

The farmers are organized in water user associations, which are represented on the management board of irrigation projects along with representatives of the government and the farmers' union. While the farmers hire irrigation professionals to run the irrigation scheme profitably, the management units organize agricultural production in parallel, assuring professional cultivation.

The [Kaleya irrigation scheme](#) has 161 farmers cultivating 2,165 ha in Southern Zambia's Kafue River basin. Irrigation infrastructure was publicly financed,

but operation and maintenance has always been the responsibility of the Kaleya Smallholders Company Ltd. (KASCOL), a private company owned by independent individual and institutional investors. Smallholder farmers collectively hold 19% of the company's shares.

KASCOL owns the land and recruits farmers by offering them land on a four-year lease base. It holds a water-use permit but receives additional bulk water in drought periods supplied by Zambia Sugar Plc. at an advantageous fee. On-farm irrigation and farming operations are carried out by farmers on their individual (leased) plots. Benefits from this arrangement have been manifold, but farmers particularly complain about the short-term land lease arrangement.

The Manyonyo smallholder irrigation scheme is located in the same river basin. It was initiated by the Zambian Ministry of Agriculture, who assisted farmers in forming a liability company and running the irrigation scheme. Each of the 145 households contributed four hectares of their land which are clustered into and managed as one single farm. The farmers maintain their property as well as individual land titles, thus guaranteeing membership to the scheme but also reversibility of membership.

The company holds a group permit for water abstraction from the river. The water infrastructure is constructed by using public funds and is leased out to the farmer-company through a suitable PPP arrangement. The company is a stand-alone firm, but its production is sold to nearby Zambia Sugar Plc.

The model provides security for smallholders vis-a-vis the (farmer-owned) company and its management. These farmer-owned companies are often linked to large enterprises (e.g. Zambia Sugar) as contract farmers (Kaleya Smallholders Company Ltd.), but some, such as the Manyonyo smallholder irrigation scheme, are also stand-alone firms.

In one or the other way, smallholders contribute to debt financing (cash or land contributions) and share operation and maintenance costs of providing irrigation services. Individual farmers can benefit from improved income, job opportunities and the dividends generated by their equity stake in the collective company. Finally, involving local communities in PPPs is in many cases also a means to integrate them in larger value creation and rural development by improving e.g. access to electricity, health services and transportation.

The projects in Zambia successfully address two other common challenges of irrigation schemes: inequitable water distribution and frequently unclear water and land ownership and use rights.

Concerning water distribution, farmers at the head of a canal are often privileged compared to "downstream" users at the tail end. In cases where water provided by the PPP does not cover all water needs,



financially strong farmers are privileged as they can invest in deep drilling to complement this, while poorer farmers cannot do so and are in addition faced with rapidly sinking water tables due to the boreholes of their rich neighbours. Such situations arise where farmers are very heterogeneous, as in the Moroccan El Guerdane case.

Morocco's El Guerdane project

The [El Guerdane project](#), operational since 2009, is considered as the first public-private partnership in

irrigation in which the private partner participates not only in the financing and construction, but also in the operation and maintenance of the system. In contrast to the [Zambian cases](#), the private partner is not involved in agricultural development.

A complex of two dams feeds a 90 km irrigation canal to carry 45 million m³ of water per year to the 300 km distribution network that makes up the El Guerdane scheme situated in a highly water-scarce valley. The project is designed to supply 597 citrus farms, covering 9,600 out of the 30,000 irrigable hectares.



The \$80 million of investment costs was covered by the Moroccan State (48%), the National Investment Company (SNI, 44%) and the farmers involved (8%).

However, the project has contributed to increasing inequalities between family farming and agro-investors: the investment costs required, the type of crop targeted (citrus fruits), the quality requirements for export and the political choice to initially restrict call for tenders to pre-selected farmers have marginalized smallholders.

The average size of project farmers' plots is one indicator of this trend: they cultivate an average of 16 ha – more than five times the average size of farms in the project's immediate surroundings in Taroudant. Moreover, the project provides water to only a small proportion of the farmers in the region (597 farms,

equivalent to about 11% of the total number of farms in the area).

The collective ownership chosen for the PPPs in Zambia instead provides for an innovative solution to these two distribution challenges; at least until now, inequitable water distribution has not been reported. The collective model also helps to address the challenging issue of unclear water and land use rights, which is particularly complex in settings with many smallholders.

Hybrid and sometimes contradictory forms of collective and individual land, water and other resource ownership and user rights coexist in a continuum from customary tenure systems to formal ownership systems, often with the state as final custodian and owner. Mostly, these tensions are not clarified and formalized.

The resulting uncertainty is detrimental to investments, regardless of who invests, not only in irrigation but also in all kinds of machinery, equipment and long-term land improvement. The way land can or cannot be used as collateral has implications for the ability of individual actors to engage in PPPs.

Lessons Learned

The most commonly used [contractual forms of PPP](#) in the irrigation sector include:

- *Operation, Management and Maintenance (OMM) contract*, under which the private sector is engaged to undertake operation, management and maintenance of infrastructure services for defined recipients. The private sector provides a service for which it receives a fee (either from the government or from users). Where rehabilitation or construction works are required, they can also be part of the contract. Assets are publicly financed, and this is an appropriate form of contract where there is limited scope to raise private capital.

- *Infrastructure concession*, under which the private sector is engaged to raise commercial finance for infrastructure development and then construct, operate, manage and maintain the infrastructure. Investment and financing costs must be recovered through fees (either from the government or from users). End user risk is significant in irrigation projects where often the users are not fully defined at the beginning of the project (it depends on how many farmers take up the water from the system). It might be possible to share end user risk between the public and private parties, for instance with a guarantee on minimum revenue. The investment may be undertaken in whole or in part by the private sector where for instance there is grant funding available to bear some of the investment cost.

- *Farm service agreement*, under which the private sector can also partner with smallholder farmers and communities for the provision of farm-level services. Services might be on-farm, such as planting, harvesting and water application; or off-farm, such as storing, processing and marketing (e.g. outgrower services). Such farm services, by improving the agricultural performance of water users, are likely to improve the viability of irrigation infrastructure. The level of investment private finance required depends on the services provided. Farm services can be integral or separate from infrastructure OMM contract.

- *Hub farm agreement*, under which the private sector can be engaged to undertake commercial agricultural production through a land concession or lease. This might be on unoccupied land owned by

the government or third parties, or community land held under collective title (or especially consolidated) and leased in return for a fee of share in commercial operations. The hub farm has purely commercial aims, and will require a certain scale in order to offer commercial opportunities (especially for food crops). Private capital is required for on-farm investments, while irrigation fees can reflect any or all infrastructure related costs (e.g. OMM, investment and finance).

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Key [legal issues](#) that arise in irrigation PPPs include (while some of the legal issues are not confined to irrigation PPPs they can take on a new dimension and complexity when applied to irrigation):

- *Land ownership* – all irrigation projects are dependent on land ownership – both in relation to the land that is needed for the project, and also in relation to the customers for the project, the farmers, and their legal interest in the land. Some countries limit land ownership to locals or may prohibit ownership in private hands. There may also be restrictions on land use, irrigation or types of irrigation may be restricted – and the rules may vary within a country from state to state or county to county.

- *Water extraction* – there may be limitations on levels of water extraction, both at national and international level. If extraction from a river or other water source is subject to international waterways, then there may be restrictions on the amount of water that can be extracted. The regimes for charges for water extraction may be complex and/or vague. These will be key issues in a PPP as the private provider will want to ensure a steady revenue stream and so will want to be sure of the price that it is buying raw water, the price that it can on sell irrigation water and the quantities that it can extract and sell.

- *Public Sector Counterpart* – in irrigation PPPs it can be difficult to ascertain which public institution will be responsible for developing the project and the signatory to the project agreement – in most emerging markets where PPPs have been used for developing irrigation systems, the national entity in charge of irrigation services would be the counterpart to the PPP contract.

Although PPP policies and projects are at various stages of maturity, **some lessons**³²⁸ can be drawn from

³²⁸ Sources used: The International Journal for Rural Development “Rural 21”, Issue 01/20 ; OECD Studies on Water, Water Governance in Peru, 2021; UNECE National PPP Readiness Assessment Report: Tajikistan, November 2013

irrigation PPPs implemented in different parts of the world:

- PPP arrangements require *country- and site-specific solutions* and must address the risks of the various parties involved, including nature, to ensure that such projects are development-friendly and economically viable while protecting natural resources.

- *Look beyond the irrigation scheme* as such since potential socioeconomic and environmental benefits and threats extend way beyond the geographical area of the scheme. Primarily targeting financially strong farmers or not actively supporting the smaller ones creates an unequal race for access to potentially irrigable land and sometimes scarce water resources. Neither does it necessarily assure an optimal return on investment since smaller farmers can be very efficient in value and employment creation, also compared to larger entities. Finally, the public sector must ensure the long-term ecological viability of a project as well.

- PPPs in irrigation need to be embedded in *comprehensive development plans* and include specific support measures to ensure sustainable and equitable development. This may include access to extension services and financial products, input supply, and – above all – access to stable markets. The PPPs we reviewed in Zambia and Morocco have in common that smallholders have established farmer-owned liability companies to run commercial businesses. These companies have entered into contracts with private sector companies for irrigation management, service provision and market access. Farmers are represented on the management boards of their companies. For such arrangements, smallholders need long-term support along with assistance in designing contracts and acquiring management skills. If one compares the Zambian schemes with the Moroccan El Guerdane, these PPPs are better characterized as PPPs in irrigated agriculture, i.e. investments in agricultural production that include irrigation components.

- PPPs, when properly implemented, can help reduce a nation's *infrastructure deficit*. With a strong enabling environment, PPPs can help to fulfil the vision for the nation's infrastructure needs by setting goals to align departmental policies, attracting private sector investment and expertise, ensuring best value from government investments, and optimizing project risk allocation. The PPP model has in-built mechanisms which reduce the potential for schedule slippage and cost overruns in delivering

major projects, and can accelerate availability of service improvements.

- *Taking smallholders concerns, but also local government and administrations capacities*, into account when developing PPPs in irrigation is a key prerequisite for achieving mutual benefits. Successful irrigation PPPs which are not only able to mobilize investment but also provide long-term perspectives for local smallholders require sound design and monitoring of networks and contracts with respect to equitable cost-benefit sharing and environmental impacts. However, many smallholders as well as local administrations currently lack the capacities to fully oversee potential impacts of such projects and related contracts.

- *Encourage dialogue between stakeholders* for more integrated and resilient water governance. In the Olmos Irrigation Project case, for example, it was suggested to create the River Basin Council as a multi-stakeholder platform that could help improve plans and dialogues across players in the old and new parts of the Olmos Valley, as well as between the peasant communities established upstream and the water users downstream. Also, the distribution arrangement established in the concession contract between GORE Lambayeque and H2Olmos could be modified in order to accommodate demands from the small and medium-sized farmers in the "old" valley, where appropriate, in order to stimulate economic development across this area of the basin. This represents an opportunity for local, regional and national governments to work together to ensure the legal framework surrounding the PEOT adapts to present and future demands.

- Local, regional and national governments should join forces to ensure *greater data collection and monitoring*. Collecting, using and disseminating more data will not only reinforce the technical solutions but they will also encourage greater transparency and stakeholder engagement. However, this measure would require a clear allocation of responsibilities across authorities and agreement on what should be prioritised in terms of data collection, as well as the target groups.

- *Good planning and timely execution*. It is better to come up with a few selected prioritized and well-prepared projects that the government has carefully defined than a long list of several projects intended to attract any type of investor that the government does not actually have the capacity to deal with. Management of deal flow is equally important to make investors know what to expect, and to attract the most ready and matching bidders.

