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CLOSING THE GAP: INVESTING IN NATURAL CAPITAL TO MEET THE SDGS

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The Green Growth Knowledge Partnership (GGKP) is a global community of organizations and experts committed to collaboratively generating, managing and sharing green growth knowledge. Led by the Global Green Growth Institute (GGGI), Organisation for Economic Co-operation and Development (OECD), United Nations Environment Programme (UNEP), United Nations Industrial Development Organization (UNIDO) and World Bank Group, the GGKP draws together over 90 partner organizations.

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ACKNOWLEDGEMENTS

The Green Growth Knowledge Partnership (GGKP) convenes inter-institutional expert groups to identify and address critical knowledge gaps in green growth theory and practice. The neutral, collaborative expert groups focus on knowledge generation, synthesis and on-the-ground application by partners and in-country stakeholders.

The GGKP Secretariat commissioned the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) to prepare this report. The report recommends an action agenda for policymakers based on an assessment of the costs and benefits of meeting select nature-related SDG targets in 40 countries. This global analysis identifies key areas of action for countries to pursue to address multiple developmental needs while strengthening natural capital assets.

It builds off a series of reports produced by the GGKP and the Basque Centre for Climate Change, which aim to measure the costs and benefits of natural capital investment to meet national SDG targets worldwide. The series addresses a key knowledge gap identified by the GGKP Natural Capital Expert Group on the provision of natural capital data and methods to inform national green growth plans.

This publication was produced by James Vause, Hannah Grice, Alena Cierna, Sebastien Kaye, Alfred Muge and Justine Lancelin of UNEP-WCMC, with contributions and review from Brittany King (GGKP), Anil Markandya (Basque Centre for Climate Change) and Suzette P. Galinato (Basque Centre for Climate Change and Washington State University).

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EXECUTIVE SUMMARY

A healthy planet is essential both for human progress and for maintaining life on Earth. This is reflected in the Sustainable Development Goals (SDGs), which recognize that social, economic and environmental objectives cannot be met independently and must be addressed together.

Unfortunately, evidence in this report shows a significant gap between the state of the planet now and the state that it needs to be in to meet the SDGs. For 40 countries – which are home to 78% of the world's population – the investment needed to close this gap is estimated at $7.4 trillion. This is based on an analysis of nine targets across eight different SDGs.

The report, however, also reveals that the incentive to close this gap is enormous; the benefits are likely to exceed $152 trillion. This is an extraordinary return of over $20 for every $1 invested.

Additionally, by delivering the interventions required to close the natural capital gap, the world will have taken action to tackle the climate crisis, made investments preventing nearly 4.5 million premature deaths, protected over 28 million hectares of important ecosystems, restored over 250 million hectares of degraded agricultural land and saved more than 18 billion tons of natural resources.

Making these investments is particularly important now.

The COVID-19 pandemic and the conflict in Ukraine have in many instances slowed and, in some cases, reversed progress towards meeting the SDGs (United Nations 2022). In addition, as the world passes the mid-point of efforts to implement the SDGs, it is clear that there has simply not been enough investment in nature in recent years. This failure is to everyone's detriment.

This report, *Closing the Gap: Investing in Natural Capital to Meet the SDGs*, proposes that it is possible to remedy the problem by rethinking the relationship that exists between the economy and nature. It makes a powerful case for society to enact system-wide change by adapting its economic systems so that they protect and improve the health of the planet, as recommended at the Stockhom+50 international meeting.[1]

Exploring the data underpinning this report produces a range of insights that can help prioritize direct investments in natural capital where the benefits to society are likely to be greatest. For example, the highest return on investment (measured by the benefit delivered per dollar of investment) in most countries came from protecting and maintaining natural ecosystems (32 out of 40 countries) and restoring degraded agricultural land (7 out of 40 countries). The greatest net benefits (overall benefits minus costs) summed up across all 40 countries are delivered by closing the natural capital gap with respect to its impact on air quality.

The relevance of *Closing the Gap* goes far beyond the 2030 SDG timeframe as the interventions that it proposes are essential for catalysing fundamental changes that are needed to establish planetary and social stability for the long-term future. Reforming the relationship between the economy and nature has the potential to do this, reverse a decades-long trajectory of decline, and result in a world where people and nature can thrive together.

1 See section V: Outcome of the International Meeting in the Official Report of Stockholm+50, UN document A/CONF.238/9, available at: https://undocs.org/Home/Mobile?FinalSymbol=A%2FCONF.238%2F9&Language=E&DeviceType=Desktop&LangRequested=False

INTRODUCTION

The UN Sustainable Development Goals (SDGs) serve as a shared blueprint for countries addressing critical problems that are interconnected, such as poverty, health, education, economic growth and the environment. If they are to be achieved, a wide range of SDG targets require improvements in the natural environment. In natural capital terms, this may relate to the quantity, or extent of natural capital (e.g. hectares of forest), or its quality/condition (e.g. concentration of pollutants in the atmosphere).

This report focuses on 40 countries from different regions and provides estimates of the natural capital gap that these countries need to close to meet a subset of nature-related SDG targets (see Table 1). The report offers monetary estimates of the costs and benefits of closing the gap, and demonstrates that the benefits gained by meeting the nature-related SDG targets far outweigh the financial cost of the necessary investment.

In total, the 40 countries selected represent:

80%	**78%**	**78%**	**81%**	**61%**
of world GDP	of the global human population	of global arable land areas	of global greenhouse gas emissions	of the world's coastline

Key definitions

Natural capital is a natural asset that generates goods and services that have economic value. It includes geology, soil, air, water and all living things. The value of natural capital is measured as the discounted sum of the value of the rents generated over its lifetime.

Natural capital gap is a quantitative indicator of how much natural capital would have to be increased from the current levels to meet the relevant SDG targets.

Benefit-to-cost ratio (BCR) in this context is the ratio of the increase in the value of the natural capital stock to the present value of the expenditures required to achieve that increase. It is used here as an indicator of where the greatest gains in natural capital can be made.

The analysis presented builds on a series of technical reports, which include details of the underlying method and calculations that this report draws from. These technical reports can be found here. The methodological approach used for assessing the natural capital gap and associated costs and benefits was developed by the Green Growth Knowledge Partnership (GGKP) Natural Capital Expert Group. While there are previous studies that estimate the costs and benefits of meeting SDG targets, GGKP's work is the first to estimate these through a natural capital lens highlighting a universal need to improve the state of natural capital if the SDGs are to be met.

Summary of the underpinning methodology

This report distils the key findings from an assessment of the natural capital gap to meet the nature-related SDG targets specified in Table 1 (those where the natural capital gap and the costs and benefits of closing the natural capital gap could be estimated based on globally available data) for the 40 countries listed in Table 2. It aims to provide insights into how the natural capital gap varies around the world, and response options to help close this gap that is articulated as a global action agenda.

Although considering as wide a range of benefits as possible within the scope of the exercise, the study that serves as the basis for this report does not include a detailed assessment of the social benefits of meeting the nature-related SDG targets. Investing in natural capital can also deliver benefits such as reducing inequality, protecting the cultural heritage of communities and Indigenous Peoples, providing education services and improving mental health, which will directly and indirectly positively impact various aspects of the economy and people's well-being, suggesting the total benefits may be underestimated.

Table 1: Nature-related SDG targets considered in the report

SDG	SDG target/s	Relevant natural capital	Natural capital change
	2.4 – Productive and sustainable agriculture	Agricultural land	Restoration of degraded agricultural land
	3.9 – Reduction of mortality rate due to hazardous chemicals, air, water and soil pollution and contamination	Air quality/water quality	Reduction of pollutants in air and water
	6.1 & 6.2 – Adequate and equitable access to safe water and sanitation services		
	11.6 – Reduction of environmental impacts, including air quality and waste management		
	9.4 – More environmentally sustainable infrastructure and industries	Atmosphere to sustain a stable climate	Reductions in emissions of GHGs
	13.2 – Integration of climate change measures into national policies, strategies and planning		
	12.2 – Sustainable management and efficient use of natural resources	Terrestrial biomes that deliver materials	Reduced utilization of natural materials in consumption and production sectors
	15.1 – Conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services	Terrestrial biomes that deliver ecosystem services, i.e. forests, wetlands, protected areas	Increased flow of ecosystem services (ESS) from the terrestrial systems through reduced deforestation, reduced loss of wetlands and increase in protected areas

Source: Table adopted from Markandya and Galinato (2021)

Table 2: Countries selected for in-depth analysis of financial needs

Country	Income classification	Region
Democratic Republic of the Congo (DRC)	Low income	Sub-Saharan Africa
Ethiopia		Sub-Saharan Africa
Madagascar		Sub-Saharan Africa
Uganda		Sub-Saharan Africa
Algeria	Lower-middle income	Middle East & North Africa
Angola		Sub-Saharan Africa
Cameroon		Sub-Saharan Africa
Egypt		Middle East & North Africa
India		South Asia
Indonesia		East Asia & Pacific
Iran (Islamic Republic of)		Middle East & North Africa
Kenya		Sub-Saharan Africa
Morocco		Middle East & North Africa
Nigeria		Sub-Saharan Africa
Pakistan		South Asia
Papua New Guinea		East Asia & Pacific
Philippines		East Asia & Pacific
Senegal		Sub-Saharan Africa
Tanzania		Sub-Saharan Africa
Ukraine		Europe & Central Asia
Argentina	Upper-middle income	Latin America & Caribbean
Brazil		Latin America & Caribbean
China		East Asia & Pacific
Colombia		Latin America & Caribbean

Malaysia	Upper-middle income	East Asia & Pacific
Mexico		Latin America & Caribbean
Peru		Latin America & Caribbean
Russian Federation		Europe & Central Asia
South Africa		Sub-Saharan Africa
Thailand		East Asia & Pacific
Türkiye		Europe & Central Asia
Australia	High income	East Asia & Pacific
Canada		North America
France		Europe & Central Asia
Germany		Europe & Central Asia
Japan		East Asia & Pacific
Saudi Arabia		Middle East & North Africa
Spain		Europe & Central Asia
United Kingdom		Europe & Central Asia
United States		North America

Source: World Bank (2022). Any differences from the source report (GGKP, 2024) relate to changes in the recorded income status between the time of the original cost-benefit analysis and the development of this summary report. The data in the key messages relate to the income groupings as presented in this table.

The report is made up of three main sections:

- The first provides a breakdown of the natural capital gap data across the 40 countries examined in detail. It looks at the variation in natural capital gaps around the world both geographically and in relation to other variables such as national income and human population.
- This is followed by a proposed action agenda to respond to the global natural capital gap.
- The final section offers a country-specific analysis, looking at the costs and benefits of closing the natural capital gap in each of the 40 countries examined in detail.

The annex to this report provides a summary of the methodological approach to measuring the natural capital gap and estimating the costs and benefits of closing it. It highlights where countries examining their natural capital gaps using locally available data may also be able to extend the analysis beyond what was achievable using consistent data sets across many countries.

OVERLOOKED POTENTIAL: GLOBAL, REGIONAL AND NATIONAL BENEFITS OF CLOSING THE NATURAL CAPITAL GAP

The natural capital gap is large. For the 40 countries examined, investment needed across nine key SDG targets is estimated at $7.4 trillion for the period up to 2030. The benefits of closing the natural capital gap are larger.

Closing the gap across all 40 countries will generate benefits with a present value of over $152 trillion, delivering an average benefit of $20 for every $1 invested in closing the natural capital gap. Protecting and restoring natural and agricultural ecosystems to the extent required to meet the SDGs will see their economic value alone increase by over 200%.

In biophysical terms, closing the natural capital gap across the SDG targets examined will avoid nearly 4.5 million premature deaths each year and reduce natural resource extraction by more than 17.5 billion tons over the period 2021 to 2030. Over the same period, closing the natural capital gap would see: more than 250 million hectares of agricultural land restored; more than 27 million hectares of deforestation avoided; an increase in terrestrial and marine protected area cover by 396,000 and 218,000 hectares, respectively; and a wide range of benefits to people delivered.[2]

In monetary terms, every nature-related SDG target analysed has a positive benefit-to-cost ratio – as a whole and at the individual country level.

Table 3: Selected biophysical impacts of closing the natural capital gap*

Hectares (2021-2031)	
Degraded agricultural land restored	251,200,000
Forest losses avoided	27,400,000
Wetland losses avoided	20,000
Increases in terrestrial protected areas coverage	396,000
Increases in marine protected areas coverage	218,000

Annual health benefits	
Premature deaths avoided	4,500,000
Gains in disability-adjusted life years	57,000

Tons of natural resources saved (2021-2030)	
Metals	12,790,000,000
Biomass	5,320,000,000

*All figures displayed here have been rounded.

2 Aggregate numbers presented in this section, including Table 3, represent sums across the 40 countries examined in detail. They are, therefore, different to the world estimates presented in the underlying analysis in GGKP (2023). Table 3 removes any potential benefits of improving the state of natural capital beyond what is required to meet the relevant SDG targets, even where the underpinning analysis suggests such benefits are likely to be delivered in the period up to 2030.

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of the top 10 list of countries with the greatest net benefit from closing the natural capital gap, five were in East Asia and the Pacific.

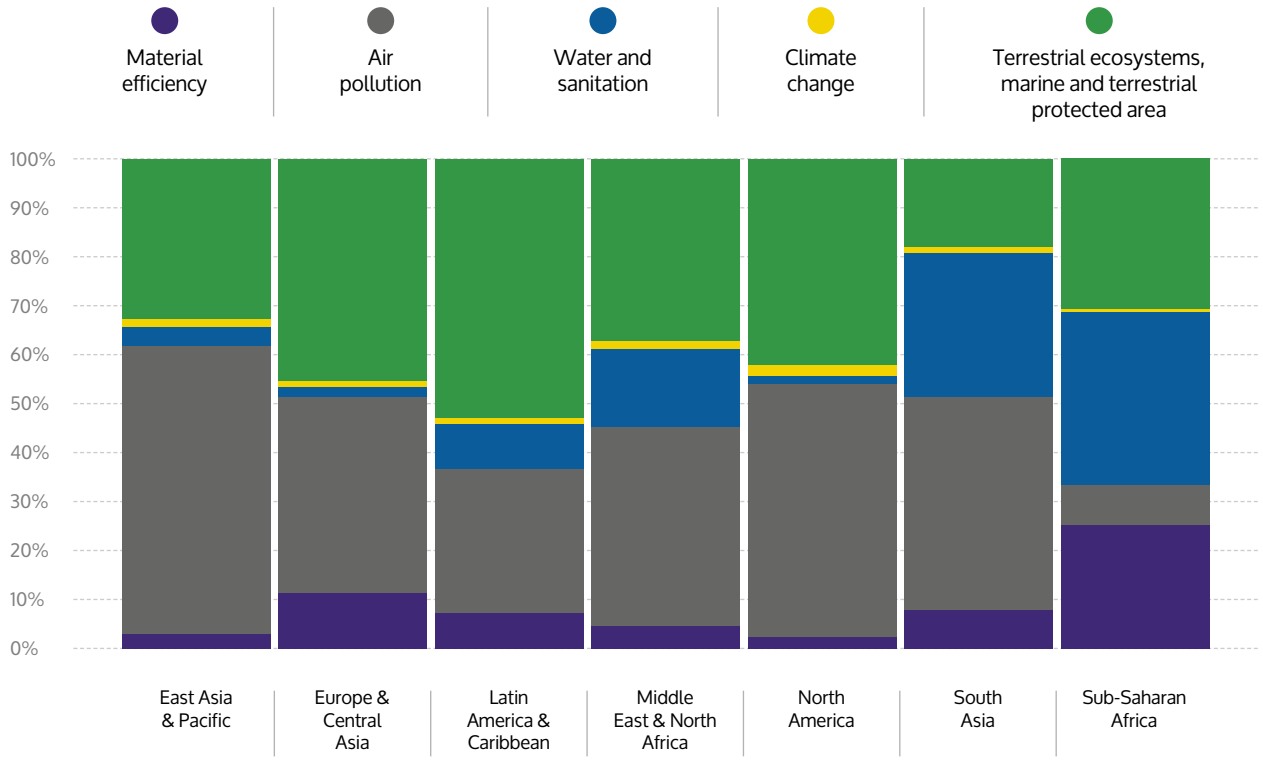
Natural capital gaps vary around the world

The composition of the natural capital gap varies around the world.[3] Despite this variation, two aspects of the natural capital gap – protecting and maintaining important ecosystems and tackling air pollution – have universally high returns on investment across the globe.

Of the 40 countries examined, eight were in East Asia and the Pacific region. Five of those eight were in the top 10 countries in terms of the overall magnitude of the net benefits of closing the natural capital gap at a country level.

Where access to clean water and sanitation remains a challenge, the benefits of closing the natural capital gap related to water quality are also significant. They yield large health benefits – measured in the analysis in terms of annual increases in disability adjusted life years. This reflects the gain in years of life in better health that result from lower exposure to water-borne diseases, for example.

Figure 1: Share of net benefit from closing the natural capital gap



3 The analysis by country and region in the following section is based on the estimates of natural capital gaps and the costs and benefits of closing those which have been assessed based on globally available data. The full methodology and data used to calculate these are detailed in the accompanying technical report available at https://www.greengrowthknowledge.org/working-group/natural-capital. In this context, they are used to illustrate how the costs and benefits of closing the natural capital gap may vary between countries, regions and income groups. For countries wishing to estimate natural capital gaps using national data, the method, including extensions beyond the SDG targets examined in this paper, is described in the annex to this document. In addition, it should be noted that the analysis presented in this report was conducted prior to the Russian Federation invasion of Ukraine. As such, the conclusions drawn may not reflect the current geopolitical landscape and do not capture any implications arising from the conflict.

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of the top 10 list of countries benefitting most from closing natural capital gaps relative to pre-pandemic GDP levels (2019), seven of the 10 were in sub-Saharan Africa.

Lower-income countries will benefit more relative to GDP

Looking at the share of the net benefits of closing natural capital gaps across countries, relative to the share of GDP for each country within the sample, shows that gains from closing the natural capital gap are disproportionate to national income. Those countries in the lower-income categories derive a far greater share of net benefits from closing the natural capital gap relative to GDP than those in high-income countries.

In absolute terms, for the countries classified as low income by the World Bank, the annual net benefits of closing the natural capital gap were, on average, greater than pre-pandemic (2019) GDP.

Table 4: The relative benefits of closing the natural capital gap by World Bank income classification

	Number of countries in sample	Number of times share of net benefits derived by income group exceeds the share of national income of that income group within the sample*
Low income	4	8.66
Lower-middle income	16	4.05
Upper-middle income	11	1.34
High income	9	0.30

*This number is calculated by dividing the share of the net benefits of closing the natural capital gap across all 40 countries examined (organized by income group) by the share of pre-pandemic GDP across all 40 countries examined that fell to countries within the same income groups. For example, if a country represents 1% of the GDP of the 40 countries, but receives 4% of the net benefits of closing the natural capital gap overall, the number would be 4, whereas for another country that represents 50% of GDP, but only expects to receive 25% of the net benefits from closing the natural capital gap overall the number would be 0.5. A number greater than one indicates that countries within that income group are expected to benefit disproportionately (relative to GDP) from closing their natural capital gaps.

Improving the condition of ecosystems is a global priority

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of the net benefits of closing the natural capital gap result from improving the state of ecosystems. It is the only gap that is a consistent priority across all world regions and income groups.

State of the world's ecosystems

The data reveal that the need to invest in ecosystems is a natural capital issue requiring global action. Deficiencies in state of natural ecosystems[4] make up over one-third of the natural capital gap across the 40 countries examined. The top five countries in terms of benefits per capita from closing the natural capital gap with regard to ecosystems span five different regions and all World Bank-classified income groups. Furthermore, closing the natural capital gap associated with the condition of ecosystems appears in both the top three priority gaps at a regional level and within the top three country-level gaps in each region (ranked according to the net benefits of closing gaps). This highlights the extent to which the benefit of intact and healthy ecosystems has been neglected and the need for widespread effort to address this, for both people and nature.

4 Captured by targets and benefits relating to reductions in the rate of loss of forests and wetlands, as well as increased in the coverage of marine and terrestrial protected areas.

Table 5. Top priority natural capital gaps across regions and countries

	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	North America	South Asia	Sub-Saharan Africa
	Regional priorities (gaps that would deliver the greatest total benefits if closed)						
1							
2							
3							
	Biggest benefits within the region						
1	China	Russian Federation	Peru	Iran (Islamic Republic of)	US	India	Nigeria
2	Papua New Guinea	Russian Federation	Brazil	Saudi Arabia	Canada	India	Madagascar
3	Indonesia	Germany	Brazil	Morocco	Canada	India	Angola
Countries*	**8**	**7**	**5**	**5**	**2**	**2**	**10**

*Number of countries in region in 40 country sample

Air pollution | Ecosystems | Water and sanitation | Agricultural land remediation

Potential to collaborate on shared interests across smaller country groups

Beyond the ecosystem-related SDG targets, which are universally significant, potential coalitions of interest in other SDG targets were visible, for example:

- The same three countries (China, India and the United States) made up the top three countries in terms of net benefits with respect to closing natural capital gaps around air pollution, climate change[5] and material efficiency.
- More broadly, large industrial producers dominated the top 10 countries in terms of net benefits for increasing material efficiency.
- The greatest net benefits from closing the natural capital gap with respect to water and sanitation were in lower and upper-middle-income countries with large populations (e.g. the top three countries were India, Nigeria and Indonesia).

By working together, these country groups could avoid any competitive disadvantages that occur through costs to economic sectors, which need to change behaviours (e.g. to address pollution or material efficiency goals) and could share best practices and new technologies where appropriate for other issues such as water and sanitation.

5 More details on how climate change is captured in the underpinning analysis can be found on page 55.

A GLOBAL ACTION AGENDA TO CLOSE THE NATURAL CAPITAL GAP

The scale of the benefits associated with closing the natural capital gap raises the question of why such investment opportunities are not being taken up by governments. There are several potential reasons for this, which include that:

- Irrespective of the benefits, the scale of the required investment is large. This is a barrier, as it requires the mobilization of resources, especially at a time when resources are scarce.
- The costs of inaction and influence of perverse subsidies are generally not accounted for when considering which type of interventions to invest in.
- Natural capital concerns are often siloed, with investment needs seen as a bill for the public sector to handle or only the concern of environmental protection budgets in spite of drivers of decline in the state of natural capital being prevent across both the public and private sector.
- This siloed view of natural capital limits decision-makers' ability to understand the benefits closing the natural capital gap will have across a nexus of social and economic as well as environmental issues.
- The invisibility of connections between natural capital and mainstream measures of economic performance can also create a barrier, especially as the benefits of natural capital investment often fall primarily outside markets and can be more difficult to measure.
- Likewise, where the costs of improving and maintaining the state of the natural capital stock fall in sectors exposed to international trade, competitive pressures and the fear of losing export markets may limit action if there is no international cooperation.

The global action agenda that follows addresses these and other barriers and provides priorities to help close the natural capital gap, both in the short term to accelerate progress towards meeting the SDGs and beyond to create an enabling environment in which economic interests, institutions and regulations work to restore and reinforce the foundations of planetary and social stability.

Action: Recognize the hidden economic threats associated with the decline of natural capital

Closing the gap with respect to the state of ecosystems needed to meet the SDGs requires an increase in the value of the natural capital stock of over 219%.[6] The global deficiency of natural capital has been driven by the systematic undervaluation of nature in economies around the world. Failing to correct this and drive resources towards closing the natural capital gap now will not only mean that the world misses out on the benefits of meeting the SDGs, but it will also result in wider economic and social costs in the future.

Economic development that relies on ever-diminishing stocks of natural capital, is not sustainable or stable (Dasgupta, 2021). Recent analyses have shown significant threats to economic growth (Johnson et al., 2021) and financial stability (Agarwala et al., 2022) associated with natural capital decline. This highlights that society can 'pay now' to protect and improve the state of natural capital (with the associated benefits), or 'pay later' through the economic damage as a result of inaction (Agarwala et al., 2022).

Scenario analyses show the ramifications of allowing the natural capital gap to continue to grow and the state of natural capital to decline, projecting that under current trends, for example, by 2050 up to 5 billion people face the threats of higher water pollution levels and reduced nutritional security associated with pollination deficiencies (Chaplin-Kramer et al., 2019). Similarly, the Organisation for Economic Co-operation and Development (OECD) has projected that direct impacts of increases in health care costs, reductions in labour productivity and agricultural yield associated with air pollution will equate to 1% of global GDP by 2060 (OECD, 2016).

6 Value in this context describes a monetary estimate of the social welfare benefits derived from natural capital stock.

The World Economic Forum's Global Risks Report 2022 reflects the peril of inadequate action, with environmental risks including biodiversity loss dominating world and country-level leaders' impressions of the most severe risks on a global scale over the next 10 years (WEF, 2022).

Economic and development planning and financial regulation need to become nature-smart to avoid these risks being realized (Johnson et al., 2021).

Removing economic incentives that encourage unsustainable use of natural capital

In 2020, the OECD estimated global spending on biodiversity (from public and private sources) to be in the range of $78 billion to $91 billion, at the same time highlighting that governments spend around $500 billion on subsidies that are potentially harmful to biodiversity (OECD, 2020). As the Dasgupta Review highlights, beyond those subsidies that are assessed as likely to be directly harmful to biodiversity, a wider set of subsidies incentivize the consumption of benefits from nature such as water, fish, agricultural output, or energy (and therefore still encourage excessive harvesting and use of natural resources). These incentives are significant – $5 trillion to $7 trillion per year – and reflect a choice in the use of resources. However, it is one which amplifies problems with regard to the undervaluation of natural capital stocks in market transactions, and therefore contributes to the persistence and broadening of natural capital gaps. Subsidy reform is challenging given the financially vested interests that subsidies themselves create, but they must be tackled – with measures to support those who lose out where appropriate – to ensure more efficient and sustainable resource use.

Action: **Act now to protect the benefits of natural assets that remain**

Protected areas and natural habitats, such as forests and wetlands, are important and largely irreplaceable. This report shows how important they are to people. **Looking across investments in forests, wetlands and protected areas, based on the median average, benefits exceeded costs by approximately 49 times, as part of a strategy to meet the SDGs.**

Protecting natural assets now, particularly ecosystems that are still intact and functioning at a high level, is also the better economic choice, rather than allowing them to degrade and restoring them later; it is a higher investment and more challenging task to attempt to recreate ecosystems and the services they provide once their foundations and biodiversity have been damaged. If tipping points are transgressed, some of these losses may be irreversible (Pörtner et al., 2021).

The urgency of action is emphasized in this context by estimates that the costs of action to address the loss of nature will double if action is delayed to the end of the decade (NHM & Vivid Economics, 2021).

Protected areas: Safeguarding biodiversity, ecosystem services and people

The scale of benefits available from protecting important habitats suggests that it should be possible to extend networks of protected areas in a way that benefits people and nature. This is exemplified by an analysis of Natural World Heritage Sites, which are recognized for their outstanding global biodiversity values, yet also provide significant local benefits. For example, two-thirds of Natural World Heritage Sites have been assessed to be important in delivering water services and nearly half of the same sites help protect soils and reduce flood risks for local populations (Osipova et al., 2014).

For the expansion of protected areas to be fair and just, it is important to consider the distribution of costs and benefits. At the local level, this means recognizing that people are part of ecosystems and safeguarding the rights of those people who live within the landscapes subject to protection. For example, where tropical forests have been subject to commodity-driven deforestation this has often resulted in the displacement of Indigenous Peoples and local communities (IP and LCs); efforts to protect forest and forest biodiversity from

the same threat have previously ignored or diminished the rights of these communities (Kothari, Corrigan, Jonas, Neumann, & Shrumm, 2012). Establishing Indigenous and Community Conserved Areas (ICCAs) in such areas can improve local livelihoods and management capacity, leading to a more equitable distribution of benefits (Tran, Ban, & Bhattacharyya, 2019) but to extend their role further efforts are still needed to secure legal tenure rights, support Indigenous leadership in decision-making processes, and mobilize funding (Tran, Ban, & Bhattacharyya, 2019).

Action: Prioritize natural capital as a solution to development challenges to connect agendas and channel finance

While the benefits of investments in natural capital far outweigh the costs, mobilizing resources to meet the investment needed – estimated at $7.45[7] trillion for the period 2021-2030 – remains a challenge.

The investment gap can be overcome by putting nature at the core of how human development challenges are addressed and economic prosperity is promoted. By connecting agendas and recognizing the potential for natural capital assets to contribute to meeting more than one SDG target simultaneously, as well as other environmental and development goals, governments can deliver greater benefits while using financial resources as efficiently as possible, and draw those financial resources needed from a greater range of sources.

Maximizing the full benefits of investing in natural capital means recognizing the multiple outcomes from improved environmental quality and incorporating this into decisions and choices across multiple agendas that impact and depend upon the state of the natural environment.

Connecting the biodiversity and climate agendas

With climate change becoming a more dominant driver of biodiversity loss, and well-functioning ecosystems being important from both a mitigation and adaptation perspective, the need to maximize the synergies and minimize the trade-offs between investments to meet climate and nature goals is critical. Similarly, investments in natural capital for biodiversity as well as climate mitigation and adaptation benefits become an immediate priority.

The joint report from IPBES and the IPCC confirms this: The mutual reinforcing of climate change and biodiversity loss means that satisfactorily resolving either issue requires consideration of the other, as well as the fact that the adaptive capacity of most ecosystems and social-ecological systems will be exceeded by unabated anthropogenic climate change, and significant adaptive capacity will be required to cope with residual climate change even under ambitious emissions reduction (Pörtner et al., 2021).

Action: Build a common understanding and commitment to nature-based solutions

Nature-based solutions (NbS) were defined by the UN Environment Assembly in 2022 as actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits[8]. Understood as such, they present an opportunity to deliver benefits across multiple SDG targets.

7 This figure covers the 40 countries and represents the investment need in present value terms.

8 Document UNEP/EA.5/Res.5 available here.

Using investments in nature to address a wide range of social, economic and environmental challenges needs a new skill set for those seeking solutions and those providing them. Improvements in knowledge and experience will be needed to help identify where NbS can deliver similar or better outcomes than standard 'grey infrastructure' solutions. Designing and delivering NbS will also need different skills than those required to engineer grey solutions. As such, commitment is required to build experience and to ensure that NbS options are recognized, funded and used.

Recognizing the potential for nature-based solutions – water and cities

UNEP's State of Finance for Nature Report estimates a need to triple current spending on NbS by 2030, and quadruple current spending by 2050. Doing so means identifying investment opportunities and increasing investment from sources beyond the public sector (UNEP, 2022).

Using water as an example, it has been estimated that for one in six cities — roughly 690 cities serving more than 433 million people globally — the cost of investing in nature to protect the source of the cities' water could be fully funded from financial savings associated with reduced water treatment costs (Abell, et al., 2017).

Research by the International Institute for Sustainable Development (IISD) has estimated that 11% of global infrastructure needs could be met through investments in natural capital rather than human-made alternatives, at lower costs, and with wider benefits (Bassi, Bechauf, Casier, & Cutler, 2021). Yet in cities, for example, in spite of growing knowledge around the potential of NbS, estimates suggest only 0.3% of infrastructure spending invests in nature (WEF, 2022).

With more than 55% of the world's population living in urban areas today – a proportion expected to increase to 68% by 2050 (United Nations, 2018) – effective and sustainable urban planning and management are critical.

Action: **Invest in natural capital for poverty alleviation**

Investments to close natural capital gaps can also deliver benefits for SDG targets beyond those which measure the state of natural capital. For example, improving the state of natural capital can be integrated with efforts to address poverty (SDG1), reduced inequalities (SDG10), gender equality (SDG5), and decent work (SDG8). Identifying a viable portfolio of these development options will be important – especially in the context of net zero and a just transition – and require an assessment of where and how quickly the fossil fuel industry and other unsustainable industries will decline and what alternative opportunities can be created in these areas.

Inclusive development through protecting and maintaining natural capital

Protecting and restoring nature can also support some of the most vulnerable people in the world. Estimates have highlighted that between 47% and 89% of real income of the rural poor in Indonesia, India and Brazil is made up of benefits delivered by nature (TEEB, 2010). These benefits are lost when the natural capital assets that they rely on are damaged or destroyed.

Recent research by the World Wide Fund for Nature (WWF) and International Labour Organization (ILO) (2020) looked at employment opportunities associated with investments in nature for wider benefits as described above. In the case studies examined, on average roughly 350 jobs were created per US$1 million invested. Investing in nature can create sustainable employment opportunities in rural areas where alternative employment opportunities may involve damage to or destruction of natural capital assets.

This is particularly important for gender equality as women, especially those from poor and marginalized communities, are disproportionately affected by climate change and degradation of natural ecosystems given, for example, their role in ensuring water and fuel supplies (OECD, 2021, UN Women, 2022). Likewise there is broad evidence which suggests that women's participation can catalyse change, and is essential to implement improvements in the management and natural resources, highlighting that gender and environment goals in the SDGs can be mutually reinforcing (OECD, 2021).

This research shows that natural capital gaps in the context of the SDGs are comparatively low for many targets across OECD countries (the median value of the increase in the natural capital stock required to meet the SDGs was only 45% for OECD countries, compared to 241% for non-OECD countries). However, this analysis neglects the transboundary dependence of countries on natural capital around the world, especially for higher-income economies.

(OECD, 2021; UN WOMEN, 2022)By focusing on reducing barriers to trade, such as tariffs to create "level" playing fields without stimulating investment in environmental protection, trade has amplified risks associated with ecological decline and incentivized overconsumption through keeping market prices, but not economic and environmental costs, low (Dasgupta, 2021).

Through supply chains, these ecological risks have become global – the World Economic Forum has estimated over 50% of world GDP is moderately or highly dependent upon the state of nature (WEF, 2020). Analysis for the World Bank shows the impacts of ecological collapses will be focused in the poorest countries where production has often shifted from developed countries and where access to global markets cannot mitigate the economic impacts of losses (Johnson et al., 2021).

Trade regulation that creates a level playing field for competition on solid ecological foundations should catalyse global investment in ecological stability.

Action: **Move beyond GDP as an indicator of economic progress**

While GDP has increased, this research shows that the natural capital-related benefits the world is missing out on through a failure to maintain nature capital stocks are equivalent to at least $156 trillion.

GDP does not measure changes in human welfare, nor give any indication of whether the economic activity that it measures can be sustained. There is widespread acknowledgement of this within the economics profession (Stiglitz et al., 2009), with Dasgupta (2021) highlighting that economic growth should "serve our values, not direct them".

To measure the potential for sustainable increases in human well-being, economies need to examine the assets that underpin the population's lifestyle and livelihoods. This can be measured as the value of capital stocks (or wealth), which necessarily includes natural capital. Increases in wealth, or the asset base, per capita indicate the potential for sustainable increases in human welfare.

At present, natural capital is the only component of wealth facing net worldwide decline (Zenghelis et al., 2020); and natural capital decline negatively affected the growth of inclusive wealth per capita (measured across produced, human and natural capital) in 151 of the 163 countries analysed in the Inclusive Wealth Report 2023 (UNEP, 2023).

Beyond GDP

To counter the fact that GDP neglects natural capital and societies' dependence on the health of the planet, some countries are experimenting with different measurement frameworks that capture a broader range of issues that influence human well-being. For example, New Zealand introduced the Living Standards Framework (LSF) that focuses on policy impacts across different dimensions of well-being, as well as the long-term and distributional issues and implications of policy. It captures the contribution of the natural environment as part of the country's wealth. Bhutan uses the Gross Happiness Index to measure the happiness and well-being of the population, which includes indicators of ecological diversity and resilience, and to guide the formulation of policies that will improves its index score.; the index includes indicators of ecological diversity and resilience.

Action: **Support efforts to measure what matters**

As highlighted by the IPBES Values Assessment (IPBES, 2022), the causes of the global biodiversity crisis and the opportunities to address them are tightly linked to how nature is valued in political and economic decisions at all levels and that most policymaking approaches have prioritized a narrow set of values at the expense of both nature and society.

This report reflects an approach to capturing some of the wider values of nature in the context of sustainable development. A crucial step in building a response to shortages of natural capital is recognizing where those deficiencies lie, what is driving the decline of natural capital, who is impacted by this, and where and how; all of which rely on data.

The report is a first step, covering a subset of relevant SDG targets and countries. Scaling up and repeating this analysis will help understand how the natural capital gap is changing around the world and where efforts need to be prioritized both globally and at a country level.

Data collection processes already exist whereby countries are collating information on the values of nature, for example as part of natural capital accounts or within national ecosystem assessments, which should be built upon where possible. Such data and knowledge – where generated – also needs to be deployed beyond national policy choices. This means ensuring data and knowledge are accessible, and understood at different levels across governments as well as throughout the private sector. This gives an important role to efforts such as the Science Based Targets Network (SBTN) and the Taskforce on Nature-related Financial Disclosures (TNFD), which are engaging business and finance sector interests in the state of nature.

Natural capital accounting and its role in greening development

Natural capital accounting can be useful in identifying policy needs and evaluating their impact. Defined as a process that measures and values the stocks of ecosystems and other natural resources and the flows of services they provide, natural capital accounting enables decision-makers to appreciate the value of the benefits to societies and industries from nature and incorporate environmental and economic prosperity into their planning (UNEP-WCMC, 2022). The UN System of Environmental Economic Accounting - Ecosystem Accounting (SEEA-EA) provides an internationally agreed framework that can be used to measure ecosystems as natural capital assets, and a component of inclusive wealth.

Uganda is a prime example of a country that has become a regional leader in natural capital accounting. Since 2015, the Government of Uganda has been working towards integrating biodiversity into national accounting processes to support the Uganda Green Growth Development Strategy (National Planning Authority, 2022). The combination of environmental and economic information has allowed natural capital accounting to identify economic activities that are underutilizing or destroying natural resources in the country (Darwin Initiative, 2019). Ugandan's wealth profile features natural capital as the second most important factor after human capital (Darwin Initiative, 2019). Recently, the country has published three novel sets of natural capital accounts for fisheries, land/soils and tourism (NEMA, 2021; Darwin Initiative, 2019). The accounts on tourism and biodiversity showcased a potential dual effect of tourism investments, both natural capital and complementary infrastructure to support tourism, in accelerating a green socio-economic transition while creating more sustainable employment for local people.

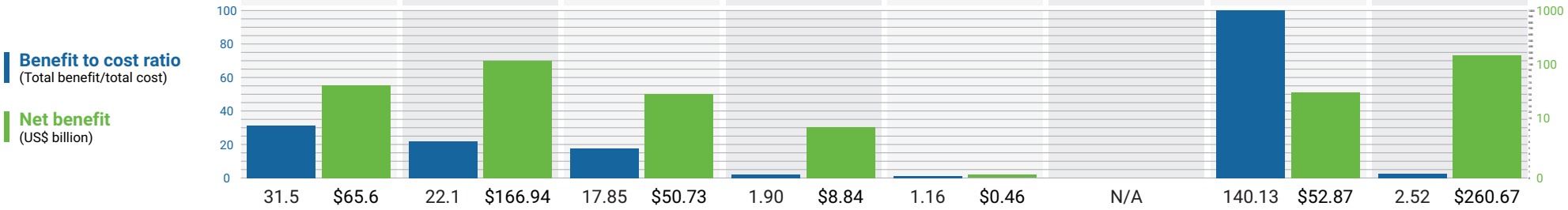
COSTS AND BENEFITS OF CLOSING THE NATURAL CAPITAL GAP IN 40 COUNTRIES

The following section distils the key findings from an assessment of the natural capital gap to meet the nature-related SDG targets for 40 countries from around the world (GGKP In litt.). The cost-benefit calculations are based on the methodology outlined in an earlier publication *The Natural Capital Gap and the SDGs: Costs and Benefits of Meeting the Targets in Twenty Countries* (GGKP 2021), which estimated the cost of closing the natural capital gap in order to meet the nature-related SDG targets for 20 countries. This methodology was developed by the Green Growth Knowledge Partnership (GGKP) Natural Capital Expert Group.

The following country-specific analyses include estimates of the monetary costs and benefits (US$) of meeting a selection of nature-related SDGs based on the amount of natural capital that would be needed to meet specific targets. They aim to highlight potential areas of 'value for money' when investing in nature by identifying which SDG targets provide the highest returns on investment. It is important to note that the underlying methodology may not consider the full scope of social benefits that are likely to result from investing in natural capital, including reduced inequality and improved well-being. As such, the analysis may underestimate the benefits of investment in natural capital, but provides a signpost to potential priorities which countries may wish to build from in establishing plans to close natural capital gaps.

ALGERIA

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation **	Wetlands	Protected areas
Cost (US$ billion)	$2.15	$7.91	$3.01	$9.83	$2.82	N/A	$0.38	$171.15
Benefit (US$ billion)	$67.75	$174.85	$53.74	$18.67	$3.28	N/A	$53.25	$431.82

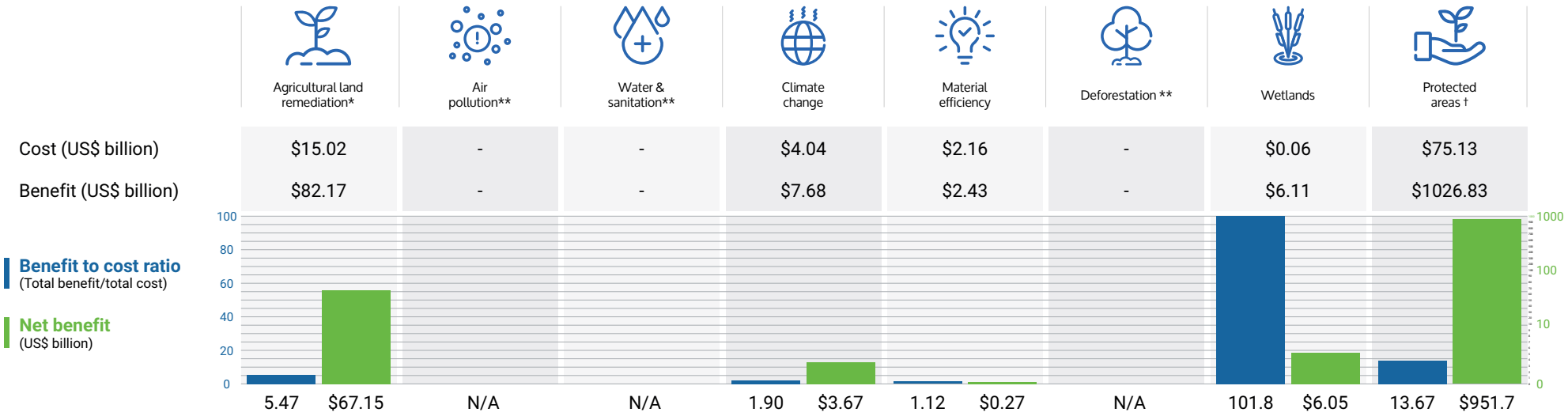


* Algeria currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Algeria from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Algeria is 4, meaning that, on average, every $1 invested in closing the natural capital gap will bring $4 in benefits. The total potential net benefit for Algeria is $606.12 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 141.1, through the value of ecosystem services provided. This represents a net benefit of $52.87 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 31.5. The net value of returns is $65.6 billion.
- Investment in **improving water and sanitation** (SDG3 and SDG11) has a BCR of 17.9. The net value of returns is $50.7 billion.

ANGOLA



* Angola currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

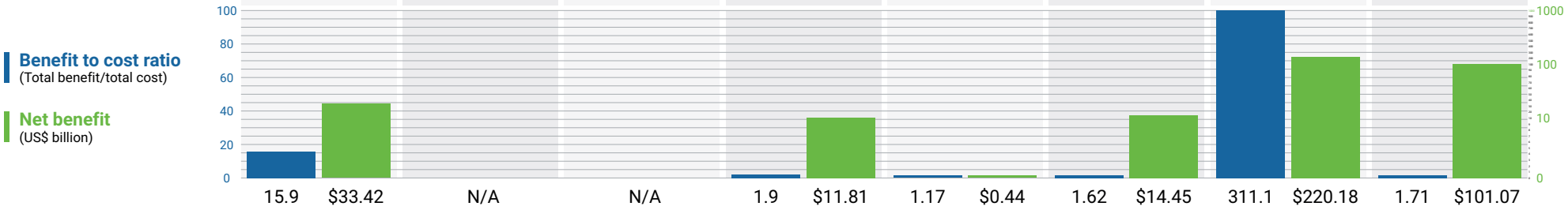
** Costs not reported as no benefit data available.

† The net benefits of increasing protected areas in Angola are comparatively large in part because the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Angola is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Angola is 11.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $11.7 in benefits. The total potential net benefit for Angola is $1.02 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 103.4, through the value of ecosystem services provided. This represents a net benefit of $6.05 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 13.7. Meeting these targets by 2030 result in an estimated net benefit of $951.69 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 5.5. The net value of returns is $67.15 billion.

ARGENTINA

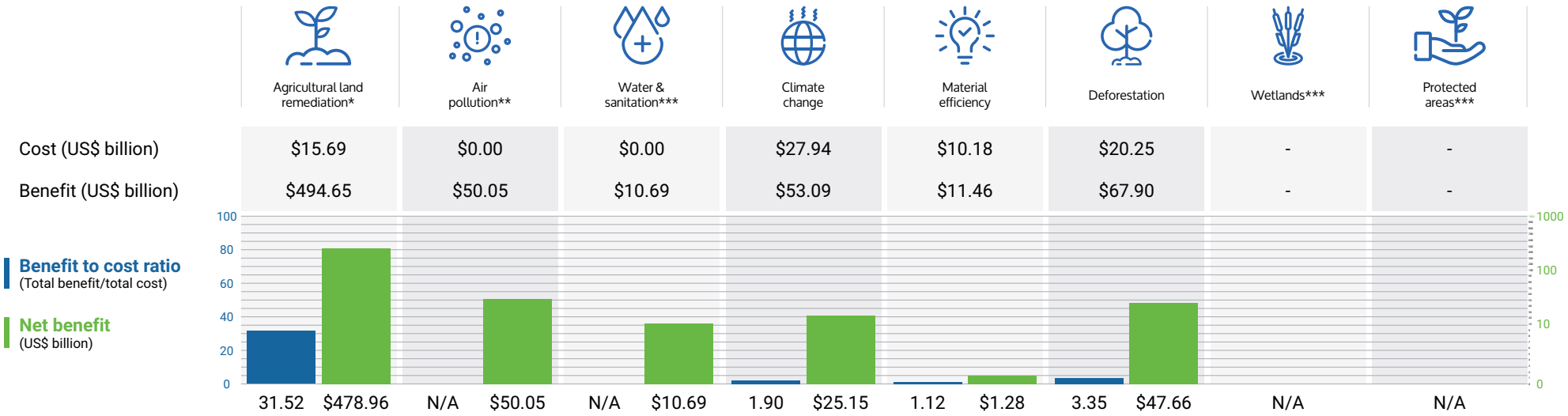
	Agricultural land remediation	Air pollution*	Water & sanitation*	Climate change	Material efficiency	Deforestation	Wetlands	Protected areas
Cost (US$ billion)	$2.24	-	-	$13.12	$2.48	$23.18	$0.71	$141.34
Benefit (US$ billion)	$35.66	-	-	$24.93	$2.92	$37.63	$220.89	$242.41



* Costs not reported as no benefit data available..

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Argentina is 3.08, meaning that, on average, every $1 invested in closing the natural capital gap will bring $3.08 in benefits. The total potential net benefit for Argentina is $381.36 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 309, through the value of ecosystem services provided. This represents a net benefit of $220.2 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 15.9. Meeting these targets by 2030 result in an estimated net benefit of $33.42 billion.
- Investment in **climate change mitigation** (SDG9 and SDG13) has a BCR of 1.9 and would yield a net benefit of $11.81 billion.

AUSTRALIA



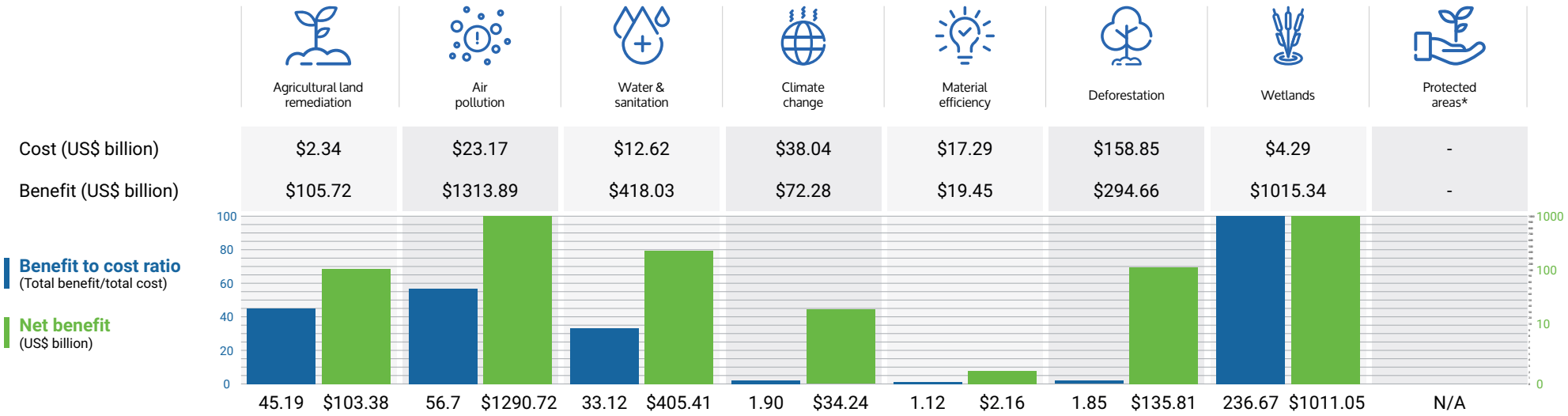
* Australia currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** Where there are benefits of closing the natural capital gap, but with no cost attributed, this reflects that the relevant SDG target is technically satisfied but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

*** Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Australia is 9.3, meaning that, on average, every $1 invested in closing the natural capital gap will bring $9.3 in benefits. The total potential net benefit for Australia is $613.78 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **restoring degraded agricultural land** (SDG2). Investment in restoration results in an estimated BCR of 31.5, through the value of ecosystem services provided. This represents a net benefit of $478.96 billion.
- Investment in **halving the rate of deforestation** (SDG15) has a BCR of 3.4. Meeting these targets by 2030 result in an estimated net benefit of $47.66 billion.
- Investment in **climate change mitigation** (SDG9 and SGD13) has a BCR of 1.9 and would yield a net benefit of $25.15 billion.

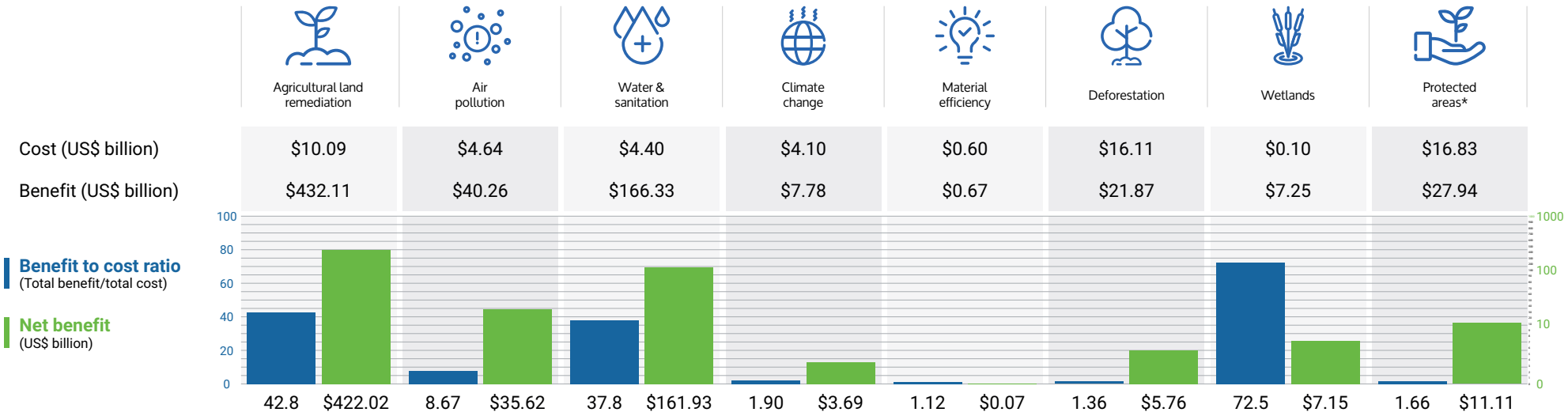
BRAZIL



* Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Brazil is 12.6, meaning that, on average, every $1 invested in closing the natural capital gap will bring $12.6 in benefits. The total potential net benefit for Brazil is $2.98 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 236.4, through the value of ecosystem services provided. This represents a net benefit of $1.1 trillion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 56.7. Meeting these targets by 2030 result in an estimated net benefit of $1.29 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 45.2 and would yield a net benefit of $103.38 billion.

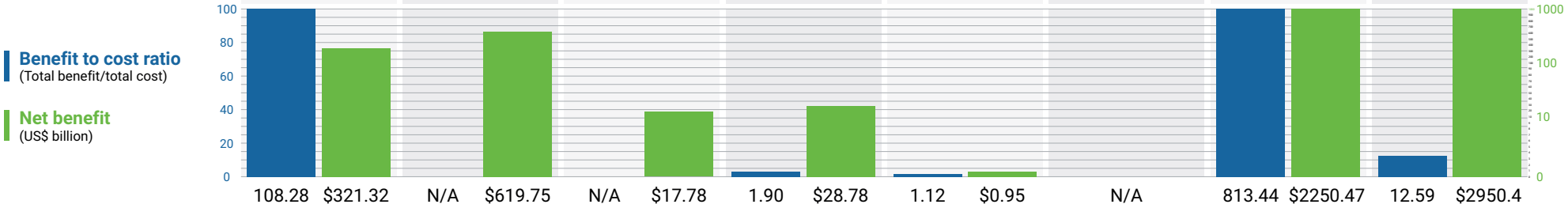
CAMEROON



- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Cameroon is 12.4, meaning that, on average, every $1 invested in closing the natural capital gap will bring $12.4 in benefits. The total potential net benefit for Cameroon is $647.34 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 73, through the value of ecosystem services provided. This represents a net benefit of $7.15 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 42.8. Meeting these targets by 2030 results in an estimated net benefit of $422.02 billion.
- Investment in **improving water quality and sanitation** (SDG3 and SDG11) has a BCR of 37.8 and would yield a net benefit of $161.92 billion.

CANADA

	Agricultural land remediation*	Air pollution**	Water & sanitation**	Climate change	Material efficiency	Deforestation***	Wetlands	Protected areas*
Cost (US$ billion)	$3.00	$0.00	$0.00	$31.98	$7.67	-	$2.77	$254.52
Benefit (US$ billion)	$324.32	$619.75	$17.78	$60.76	$8.62	-	$2253.24	$3204.91



* Canada currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

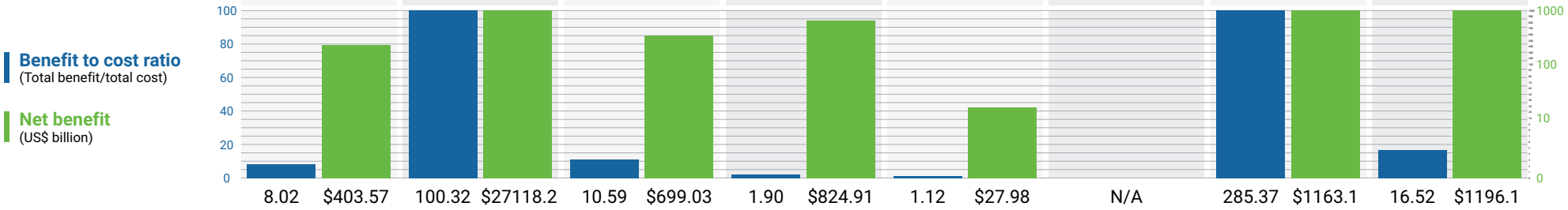
** Where there are benefits of closing the natural capital gap, but with no cost attributed, this reflects that the relevant SDG target is technically satisfied but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

*** No net deforestation was reported in Canada from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Canada is 21.6, meaning that, on average, every $1 invested in closing the natural capital gap will bring $21.6 in benefits. The total potential net benefit for Canada is $6.18 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 812.9, through the value of ecosystem services provided. This represents a net benefit of $2.46 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 108.3. Meeting these targets by 2030 result in an estimated net benefit of $321.32 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 12.6 and would yield a net benefit of $2.95 trillion.

CHINA

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas
Cost (US$ billion)	$57.47	$273.05	$72.87	$916.53	$224.23	-	$4.09	$77.07
Benefit (US$ billion)	$461.04	$27391.21	$771.90	$1741.44	$252.21	-	$1167.15	$1273.18

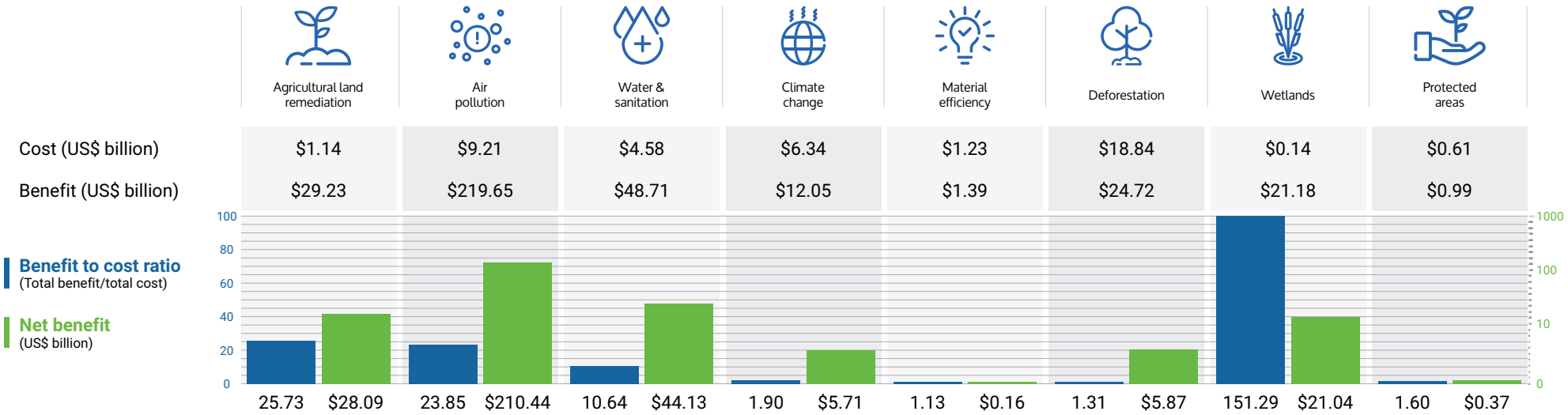


* China currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in China from 2000 to 2015 (World Bank 2017).

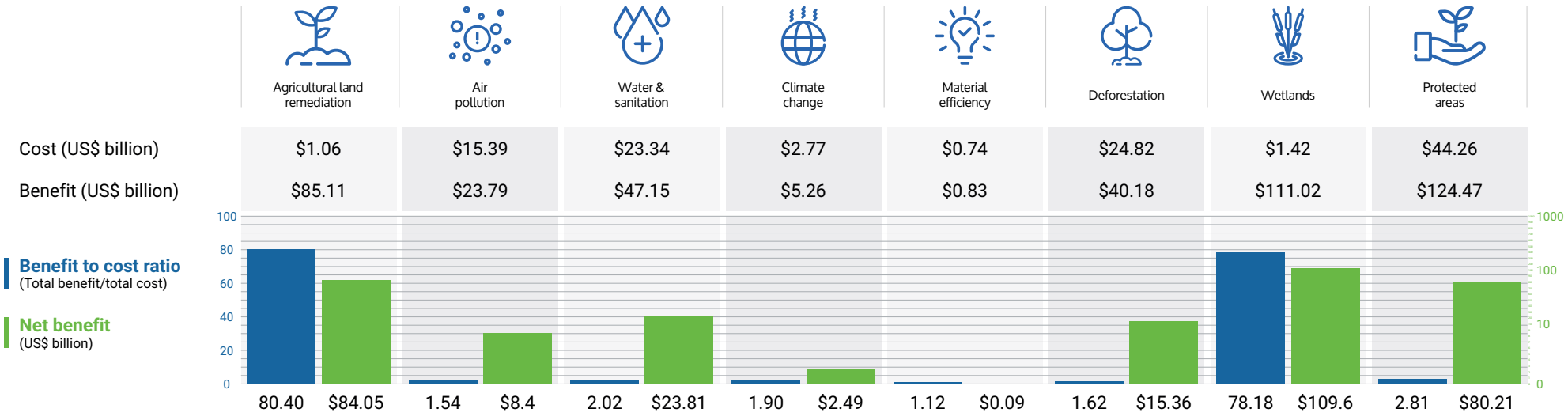
- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in China is 20.3, meaning that, on average, every $1 invested in closing the natural capital gap will bring $20.3 in benefits. The total potential net benefit for China is $31.43 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands (**SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 285.4, through the value of ecosystem services provided. This represents a net benefit of $1.16 trillion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 100.3. Meeting these targets by 2030 result in an estimated net benefit of $27.12 trillion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 16.5 and would yield a net benefit of $1.2 trillion.

COLOMBIA



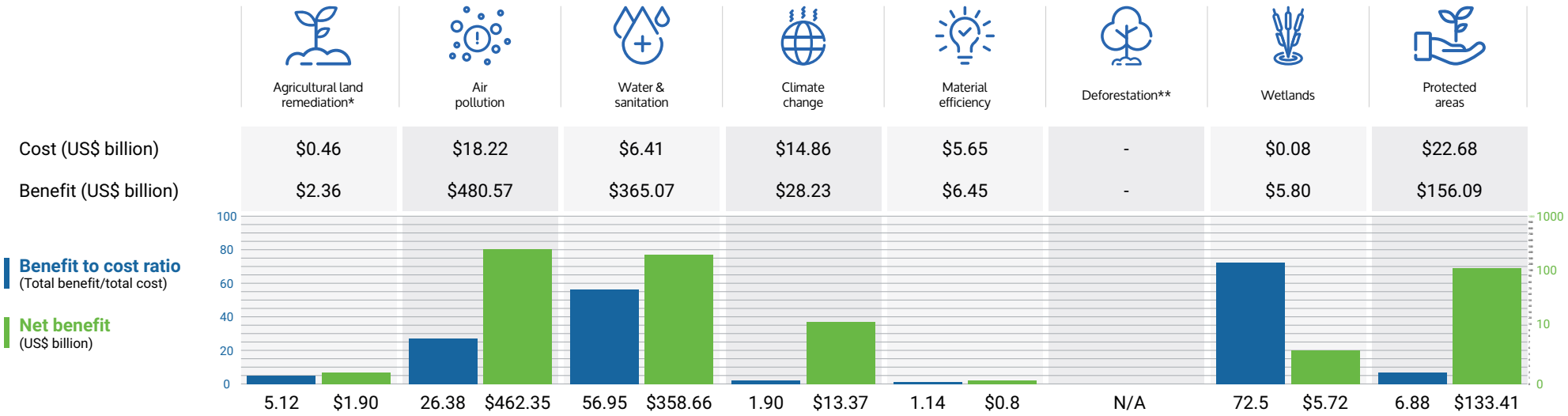
- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Colombia is 8.5, meaning that, on average, every $1 invested in closing the natural capital gap will bring $8.5 in benefits. The total potential net benefit for Colombia is $315.8 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 151.2, through the value of ecosystem services provided. This represents a net benefit of $21.04 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 23.8. Meeting these targets by 2030 result in an estimated net benefit of $210.44 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 25.7 and would yield a net benefit of $28.09 billion.

DEMOCRATIC REPUBLIC OF THE CONGO (DRC)



- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in DRC is 3.85, meaning that, on average, every $1 invested in closing the natural capital gap will bring $3.85 in benefits. The total potential net benefit for DRC is $324 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **agricultural land remediation** (SDG2). Investment in restoring degraded agricultural land results in an estimated BCR of 80.4, through the value of ecosystem services provided. This represents a net benefit of $84.05 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 78.2. Meeting these targets by 2030 result in an estimated net benefit of $109.6 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 2.8 and would yield a net benefit of $80.21 billion.

EGYPT



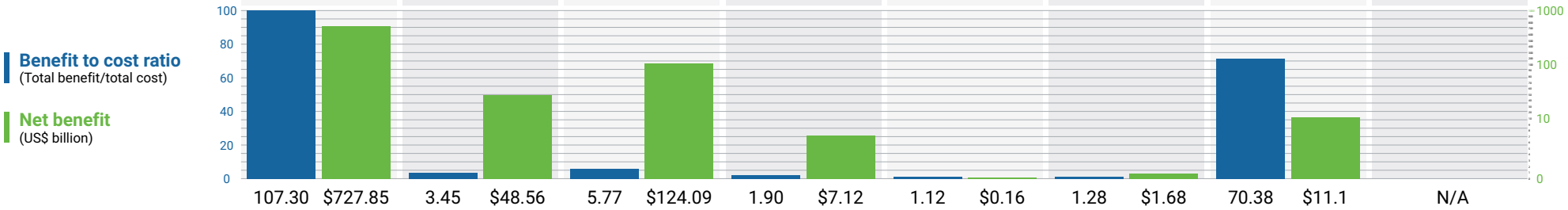
* Egypt currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Egypt from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Egypt is 15.3 meaning that, on average, every $1 invested in closing the natural capital gap will bring $15.3 in benefits. The total potential net benefit for Egypt is $976.2 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 73.6, through the value of ecosystem services provided. This represents a net benefit of $5.72 billion.
- Investment in **improving water quality and sanitation** (SDG3 and SDG11) has a BCR of 57.. Meeting these targets by 2030 results in an estimated net benefit of $358.66 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 26.4 and would yield a net benefit of $462.4 billion.

ETHIOPIA

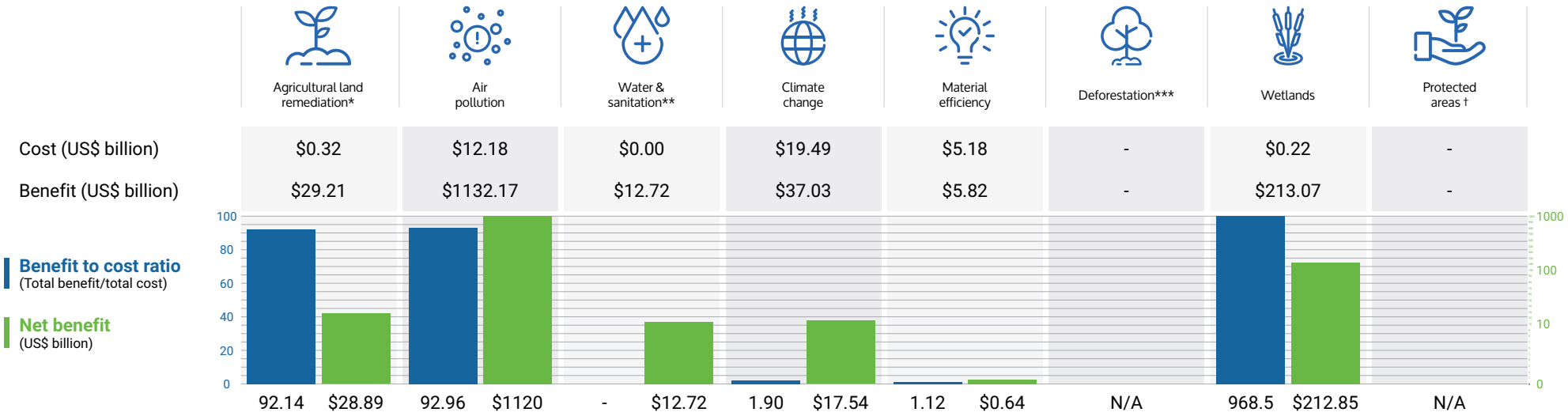
	Agricultural land remediation	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation	Wetlands	Protected areas*
Cost (US$ billion)	$6.85	$19.79	$25.99	$7.91	$1.30	$5.98	$0.16	-
Benefit (US$ billion)	$734.69	$68.35	$150.08	$15.04	$1.46	$7.66	$11.26	-



* Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Ethiopia is 14.5, meaning that, on average, every $1 invested in closing the natural capital gap will bring $14.5 in benefits. The total potential net benefit for Ethiopia is $920.6 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **agricultural land remediation** (SDG2). Investment in restoring degraded agricultural land results in an estimated BCR of 107.3, through the value of ecosystem services provided. This represents a gain of $727.85 billion.
- Investment in **halving the rate of wetland loss** (SDG 15) has a BCR of 68.6 and would yield a net benefit of $11.09 billion.
- Investment in **improving water quality and sanitation** (SDG3 and SDG11) has a BCR of 5.8. Meeting these targets by 2030 results in an estimated net benefit of $124.1 billion.

FRANCE



* France currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

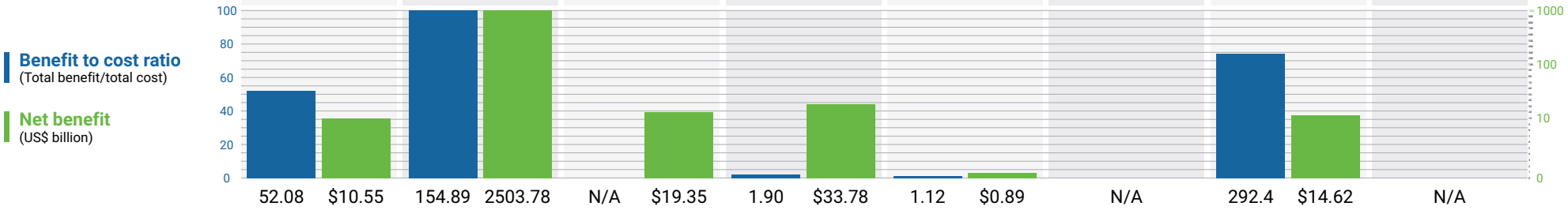
** Where there are benefits of closing the natural capital gap but with no cost attributed – this reflects that the relevant SDG target is technically satisfied, but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

† Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in France is 38.3, meaning that, on average, every $1 invested in closing the natural capital gap will bring $38.3 in benefits. The total potential net benefit for France is $1.39 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 974, through the value of ecosystem services provided. This represents a net benefit of $212.8 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 92.9 and would yield a net benefit of $1.12 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 92.1. Meeting these targets by 2030 result in an estimated net benefit of $28.89 billion.

GERMANY

	Agricultural land remediation*	Air pollution	Water & sanitation**	Climate change	Material efficiency	Deforestation***	Wetlands	Protected areas †
Cost (US$ billion)	$0.21	$16.27	$0.00	$37.54	$7.20	-	$0.05	-
Benefit (US$ billion)	$10.76	$2520.05	$19.35	$71.32	$8.09	-	$14.62	-



* Germany currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** Where there are benefits of closing the natural capital gap, but with no cost attributed. This reflects that the relevant SDG target is technically satisfied, but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

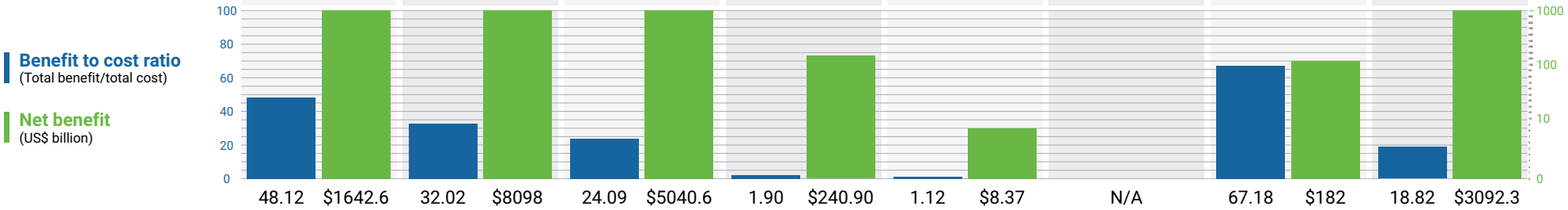
*** No net deforestation was reported in Germany from 2000 to 2015 (World Bank 2017).

† Relevant Aichi target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Germany is 43.1, meaning that, on average, every $1 invested in closing the natural capital gap will bring $43.1 in benefits. The total potential net benefit for Germany is $2.58 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 282.6, through the value of ecosystem services provided. This represents a net benefit of $14.57 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 155 and would yield a net benefit of $2.5 trillion.
- Investment in **restoring degraded agricultural land** (SDG 2) has a BCR of 52.1. Meeting these targets by 2030 result in an estimated net benefit of $10.55 billion.

INDIA

	Agricultural land remediation	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation*	Wetlands	Protected areas**
Cost (US$ billion)	$34.86	$261.08	$218.28	$267.66	$66.62	-	$2.75	$173.53
Benefit (US$ billion)	$1677.46	$8359.06	$5258.92	$508.56	$74.99	-	$184.75	$3265.80

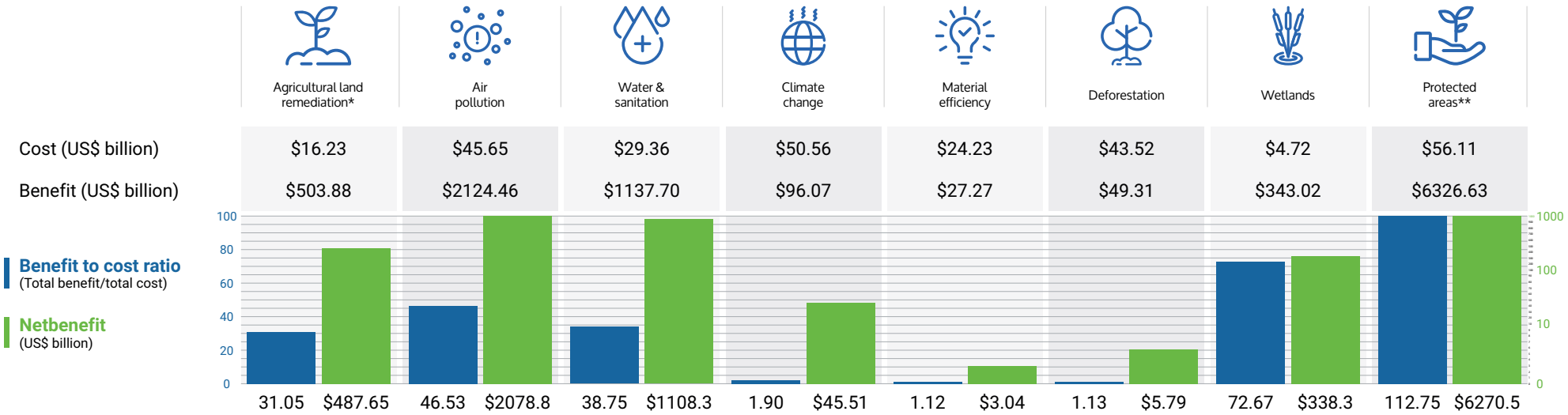


* No net deforestation was reported in India from 2000 to 2015 (World Bank 2017).

** The net benefits of increasing protected areas in India are very large, in part because the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in India is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in India is 18.9, meaning that, on average, every $1 invested in closing the natural capital gap will bring $18.9 in benefits. The total potential net benefit for India is $18.3 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 67.1, through the value of ecosystem services provided. This represents a net benefit of $182 billion.
- Investments in **restoring degraded agricultural land** result in an estimated BCR of 48.1 and would yield a net benefit of $1.64 trillion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 32 and would yield a net benefit of $8.1 trillion.

INDONESIA

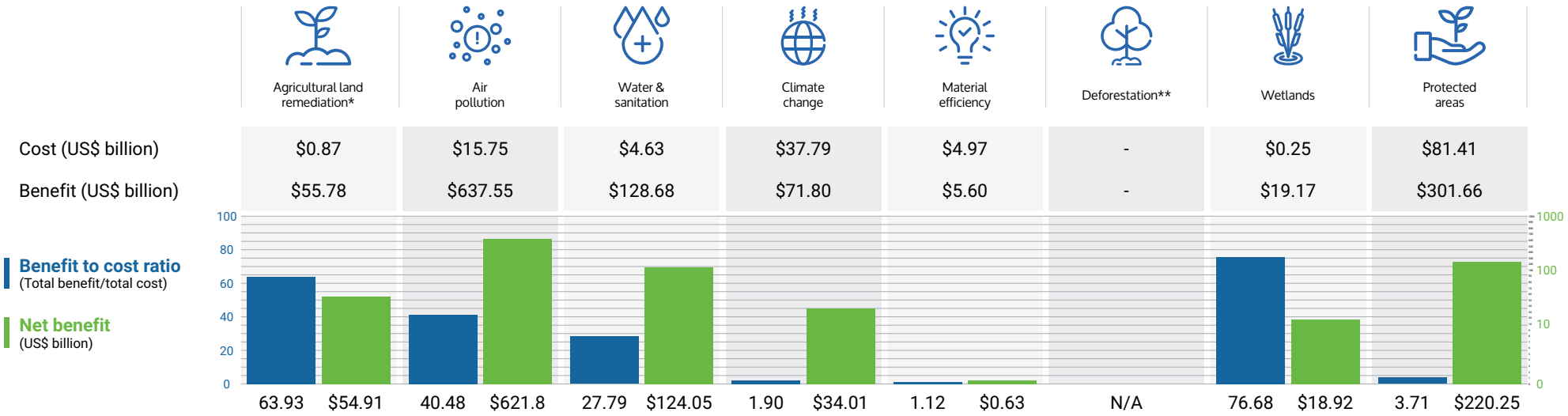


* Indonesia currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** The net benefits of increasing protected areas in Indonesia are very large in part because the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Indonesia is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Indonesia is 39.2, meaning that, on average, every $1 invested in closing the natural capital gap will bring $39.3 in benefits. The total potential net benefit for Indonesia is $10.3 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investment in meeting protected area targets results in an estimated BCR of 112.8, through the value of ecosystem services provided. This represents a net benefit of $6.27 trillion.
- Investments in **halving the rate of reduction of wetlands** (SDG15) result in an estimated BCR of 72.6 and would yield a net benefit of $338.3 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 46.5 and would yield a net benefit of $2.08 trillion.

IRAN (ISLAMIC REPUBLIC OF)



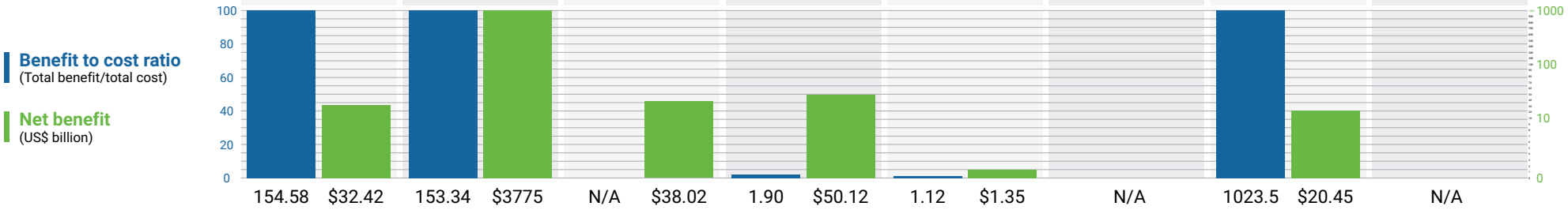
* Iran(Islamic Republic of). currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Iran(Islamic Republic of). from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in the Islamic Republic of Iran is 8.4, meaning that, on average, every $1 invested in closing the natural capital gap will bring $8.4 in benefits. The total potential net benefit for the Islamic Republic of Iran is $1.07 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 75.6, through the value of ecosystem services provided. This represents a net benefit of $18.91 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 63.9 and would yield a net benefit of $54.91 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 40.5. Meeting these targets by 2030 result in an estimated net benefit of $621.8 billion.

JAPAN

	Agricultural land remediation*	Air pollution	Water & sanitation**	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas †
Cost (US$ billion)	$0.21	$24.78	$0.00	$55.69	$10.82	-	$0.02	-
Benefit (US$ billion)	$32.63	$3799.71	$38.02	$105.81	$12.17	-	$20.47	-



* Japan currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

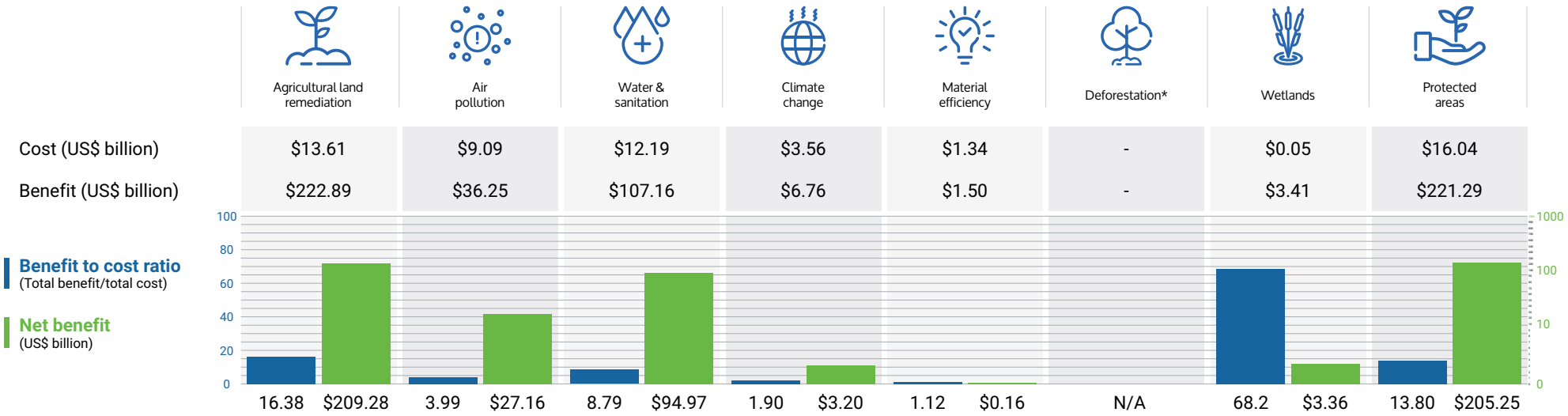
** Where there are benefits of closing the natural capital gap, but with no cost attributed. This reflects that the relevant SDG target is technically satisfied, but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

*** No net deforestation was reported in Japan from 2000 to 2015 (World Bank 2017).

† Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Japan is 43.8, meaning that, on average, every $1 invested in closing the natural capital gap will bring $43.8 in benefits. The total potential net benefit for Japan is $3.92 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 899.6, through the value of ecosystem services provided. This represents a net benefit of $20.45 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 153.3 and would yield a net benefit of $3.77 trillion.
- Investment in **restoring degraded agricultural land** (SDG 2) has a BCR of 154.6. Meeting these targets by 2030 result in an estimated net benefit of $32.42 billion.

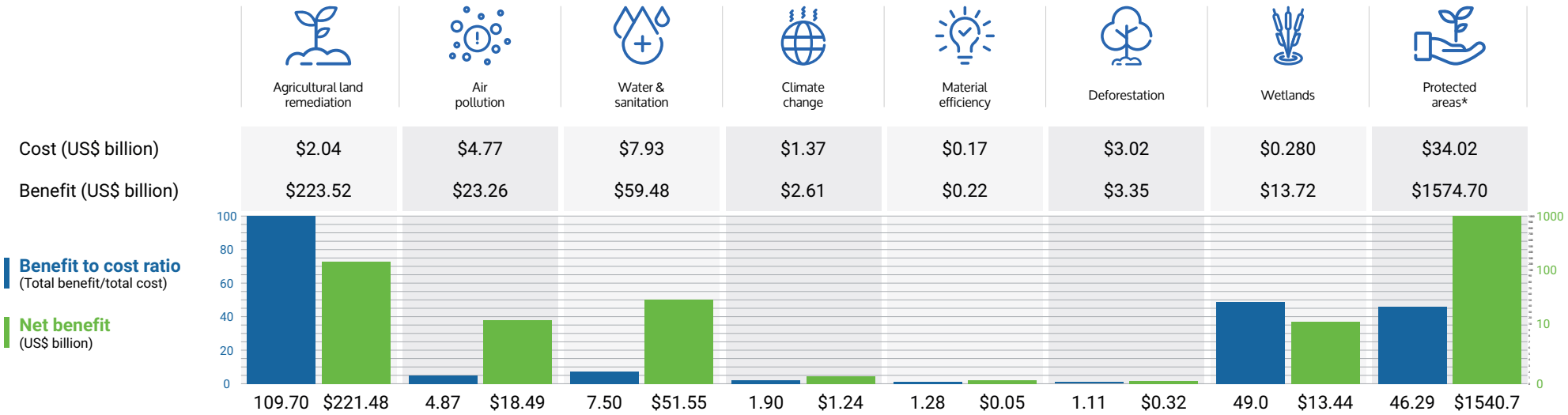
KENYA



* No net deforestation was reported in Kenya from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Kenya is 10.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $10.7 in benefits. The total potential net benefit for Kenya is $543.38 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 65.8, through the value of ecosystem services provided. This represents a net benefit of $3.36 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 16.4. Meeting these targets by 2030 results in an estimated net benefit of $209.28 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 13.8 and would yield a net benefit of $205.25 billion.

MADAGASCAR

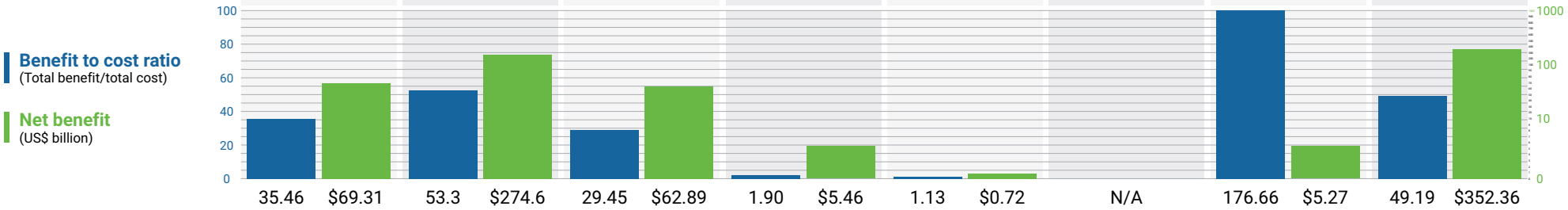


* The net benefits of increasing protected areas in Madagascar are very large as the net benefits of increasing marine protected area coverage per hectare are estimated to be large (based on global data) and to meeting the SDGs in Madagascar is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Madagascar is 35.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $35.7 in benefits. The total potential net benefit for Madagascar is $1.86 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **restoring degraded agricultural land** (SDG2). Investment in agricultural land remediation results in an estimated BCR of 109.7, representing a net benefit of $221.48 billion.
- Investments in **having the rate of wetland loss** (SDG15) result in an estimated BCR of 49, through the value of ecosystem services provided. This represents a net benefit of $12.31 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 46.3 and would yield a net benefit of $1.54 trillion.

MALAYSIA

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas
Cost (US$ billion)	$2.01	$5.25	$2.21	$6.06	$5.73	-	$0.03	$7.31
Benefit (US$ billion)	$71.32	$279.85	$65.10	$11.52	$6.45	-	$5.30	$359.67

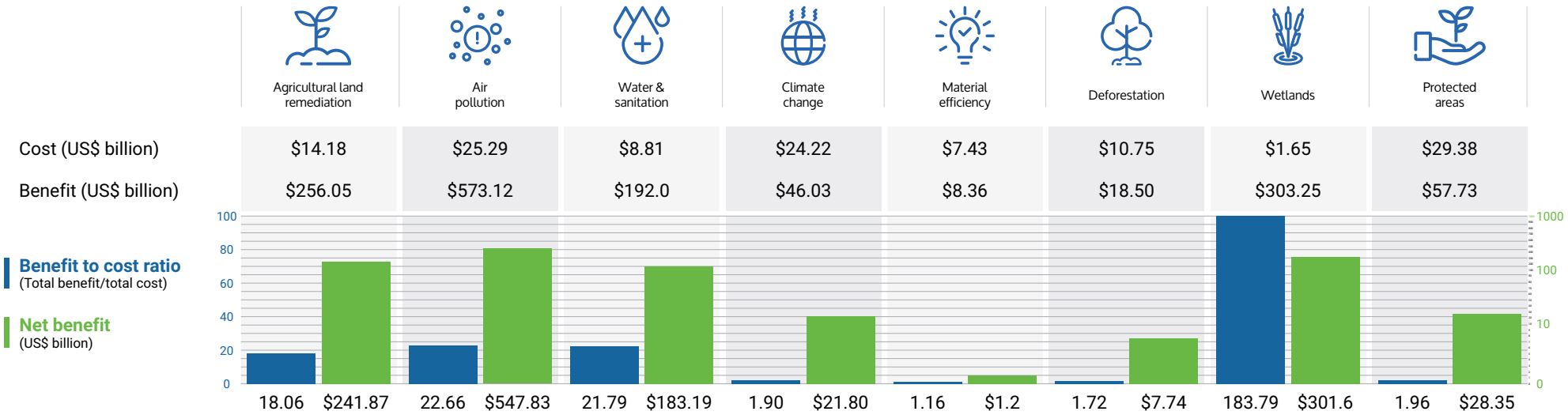


* Malaysia currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Malaysia from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Malaysia is 27.9, meaning that, on average, every $1 invested in closing the natural capital gap will bring $27.9 in benefits. The total potential net benefit for Malaysia is $770.62 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 203.9, representing a net benefit of $5.28 billion.
- Investments in **improving air quality** (SDG3 and SDG11) result in an estimated BCR of 53.3, through the value of ecosystem services provided. This represents a net benefit of $274.6 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 49.2 and would yield a net benefit of $352.36 billion.

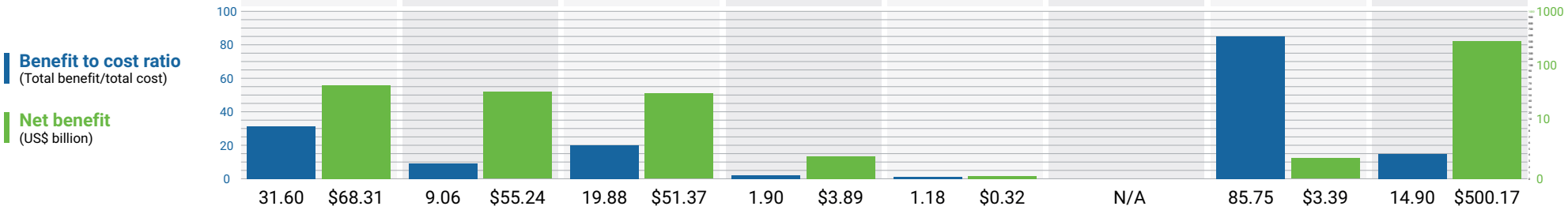
MEXICO



- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Mexico is 11.95, meaning that, on average, every $1 invested in closing the natural capital gap will bring $11.95 in benefits. The total potential net benefit for Mexico is $1.33 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 184.1, representing a net benefit of $301.61 billion.
- Investments in **water quality and sanitation** (SDG3 and SDG11) result in an estimated BCR of 21.8, through the value of ecosystem services provided. This represents a net benefit of $183.19 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 22.7 and would yield a net benefit of $547.83 billion.

MOROCCO

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas
Cost (US$ billion)	$2.23	$6.85	$2.72	$4.32	$1.72	-	$0.04	$35.98
Benefit (US$ billion)	$70.55	$62.09	$54.09	$8.20	$2.04	-	$3.43	$536.15

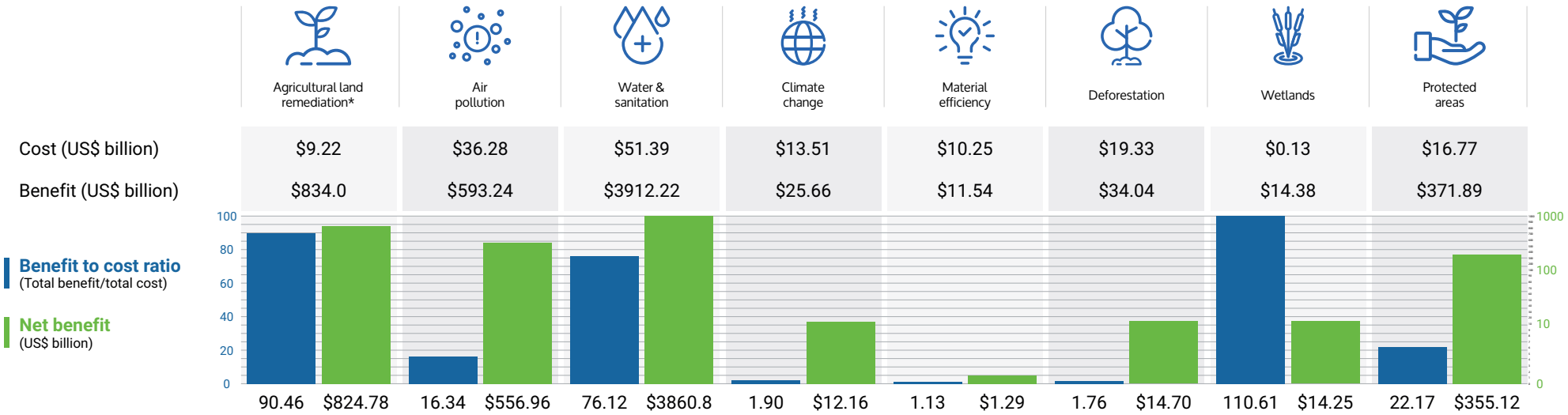


* Morocco currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Morocco from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Morocco is 13.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $13.7 in benefits. The total potential net benefit for Morocco is $682.69 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 85.8 through the value of ecosystem services provided. This represents a net benefit of $3.39 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 31.6. Meeting these targets by 2030 results in an estimated net benefit of $68.31 billion.
- Investment in **water quality and sanitation** (SDG3 and SDG11) has a BCR of 19.9. Meeting these targets by 2030 results in an estimated net benefit of $51.37 billion.

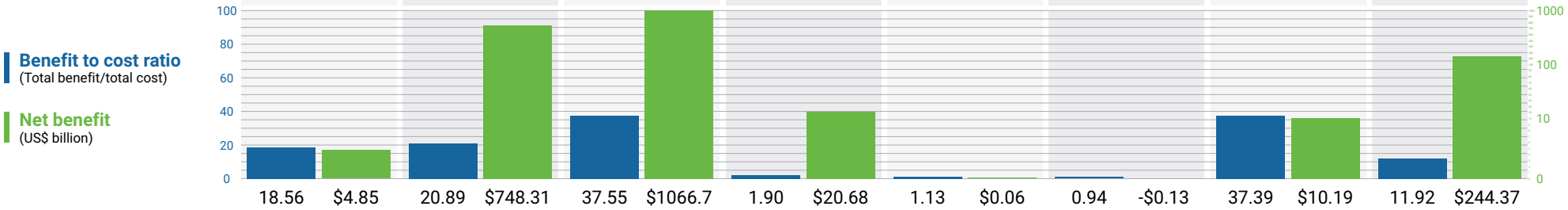
NIGERIA



- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Nigeria is 36.95, meaning that, on average, every $1 invested in closing the natural capital gap will bring $36.95 in benefits. The total potential net benefit for Nigeria is $5.64 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 108.5, through the value of ecosystem services provided. This represents a net benefit of $14.24 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 90.5. Meeting these targets by 2030 results in an estimated net benefit of $824.78 billion.
- Investment in **water quality and sanitation** (SDG3 and SDG11) has a BCR of 76.1 and would yield a net benefit of $3.86 trillion.

PAKISTAN

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation*	Wetlands	Protected areas
Cost (US$ billion)	$0.28	$37.62	$29.18	$22.98	$0.46	$2.57	$0.28	$22.36
Benefit (US$ billion)	$5.12	$785.93	$1095.92	$43.66	$0.52	$2.43	$10.47	$266.73

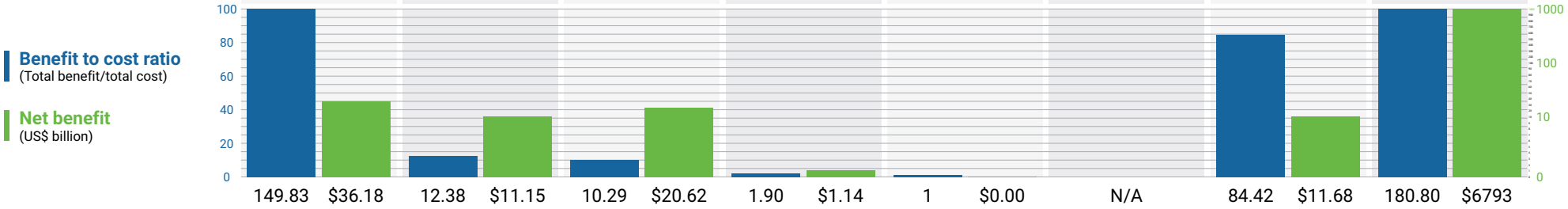


* Investing in halving the rate of deforestation in Pakistan results in a BCR of 0.95, meaning there are negative returns.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Pakistan is 19.1, meaning that, on average, every $1 invested in closing the natural capital gap will bring $19.1 in benefits. The total potential net benefit for Pakistan is $2.1 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investments in halving the rate of wetland loss result in an estimated BCR of 37.7, through the value of ecosystem services provided. This represents a net benefit of $10.19 billion.
- Investment in **water quality and sanitation** (SDG3 and SDG11) has a BCR of 37.56 and would yield a net benefit of $1.07 trillion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 20.9 and would yield a net benefit of $748.32 billion.

PAPUA NEW GUINEA

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas***
Cost (US$ billion)	$0.24	$0.98	$2.22	$1.27	$0.03	-	$0.14	$37.78
Benefit (US$ billion)	$36.42	$12.13	$22.84	$2.41	$0.03	-	$11.82	$6830.78



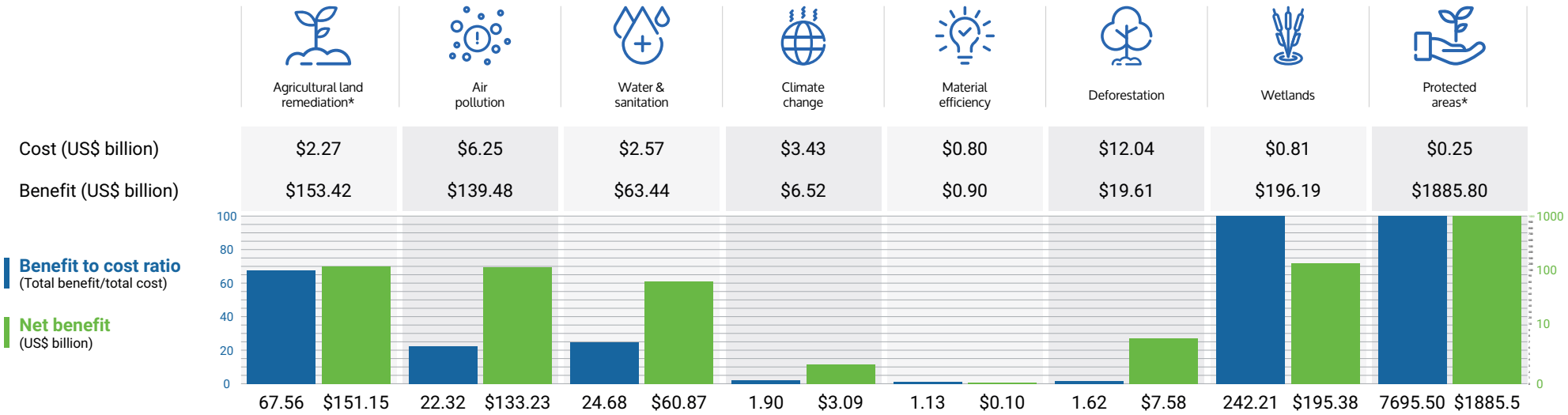
* Papua New Guinea currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Papua New Guinea from 2000 to 2015 (World Bank 2017).

*** The net benefits of increasing protected areas in Papua New Guinea is very large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Papua New Guinea is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Papua New Guinea is 162, meaning that, on average, every $1 invested in closing the natural capital gap will bring $162 in benefits. The total potential net benefit for Papua New Guinea is $6.87 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investments in meeting protected area targets result in an estimated BCR of 180.8, through the value of ecosystem services provided. This represents a net benefit of $6.79 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 149.8 and would yield a net benefit of $36.18 billion.
- Investment in **wetlands** (SDG15) has a BCR of 83.3 and would yield a net benefit of $11.68 billion.

PERU

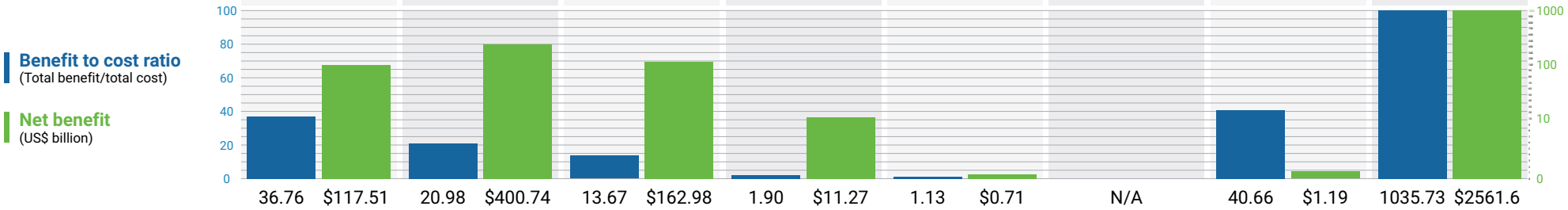


* The net benefit of increasing protected areas in Peru is very large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Peru is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Peru is 86.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $87.7 in benefits. The total potential net benefit for Peru is $2.44 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investments in meeting protected area targets result in an estimated BCR of 7,695.5, through the value of ecosystem services provided. This represents a net benefit of $1.89 trillion.
- Investment in **wetlands** (SDG15) has a BCR of 242.1. Meeting these targets by 2030 result in an estimated net benefit of $195.38 billion.
- Investment in restoring **degraded agricultural land** (SDG2) has a BCR of 67.6 and would yield a net benefit of $151.15 billion.

PHILIPPINES

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas***
Cost (US$ billion)	$3.29	$20.05	$12.86	$12.52	$5.66	-	$0.03	$2.48
Benefit (US$ billion)	$120.79	$420.79	$175.84	$23.78	$6.37	-	$1.22	$2564.04



* The Philippines currently do not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

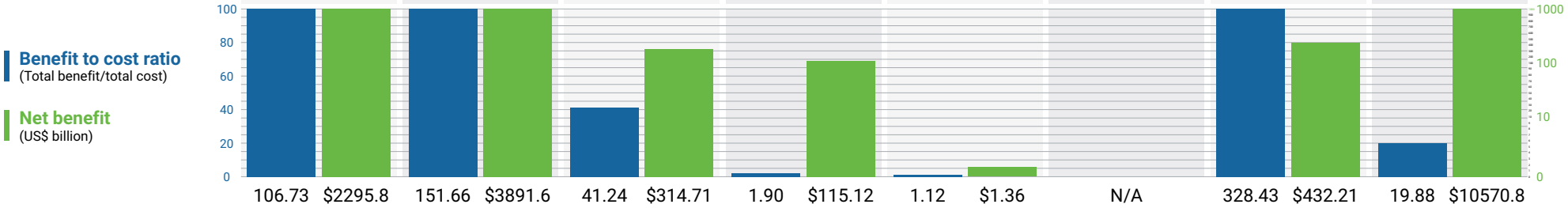
** No net deforestation was reported in the Philippines from 2000 to 2015 (World Bank 2017).

*** The net benefit of increasing protected areas in the Philippines is very large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in the Philippines is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in the Philippines is 58.2, meaning that, on average, every $1 invested in closing the natural capital gap will bring $58.2 in benefits. The total potential net benefit for Philippines is $3.26 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investments in meeting protected area targets result in an estimated BCR of 1,035.7, through the value of ecosystem services provided. This represents a net benefit of $2.56 trillion.
- Investment in **wetlands** (SDG15) has a BCR of 36.8 and would yield a net benefit of $1.19 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 36.8 and would yield a net benefit of $117.51 billion.

RUSSIAN FEDERATION

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas***
Cost (US$ billion)	$21.71	$25.83	$7.82	$127.91	$10.99	-	$1.32	$559.62
Benefit (US$ billion)	$2317.55	$3917.44	$322.53	$243.03	$12.35	-	$433.53	$11130.50



* The Russian Federation currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

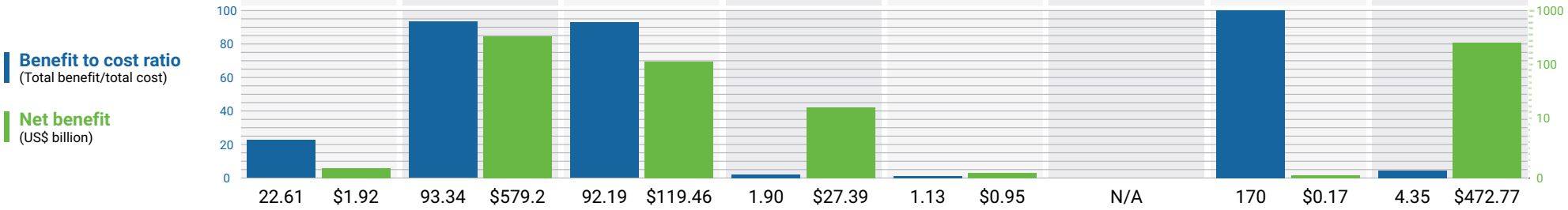
** No net deforestation was reported in the Russian Federation from 2000 to 2015 (World Bank 2017).

*** The net benefit of increasing protected areas in the Russian Federation is very large, partly as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in the Russian Federation is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in the Russian Federation is 24.3, meaning that, on average, every $1 invested in closing the natural capital gap will bring $24.3 in benefits. The total potential net benefit for the Russian Federation is $17.62 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investments in halving the rate of wetland loss result in an estimated BCR of 327.2, through the value of ecosystem services provided. This represents a net benefit of $432.21 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 151.7. Meeting these targets by 2030 result in an estimated net benefit of $3.89 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 106.7 and would yield a net benefit of $2.3 trillion.

SAUDI ARABIA

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas
Cost (US$ billion)	$0.09	$6.27	$1.31	$30.43	$7.55	-	$0.001	$141.04
Benefit (US$ billion)	$2.01	$585.47	$120.77	$57.82	$8.50	-	$0.17	$613.81

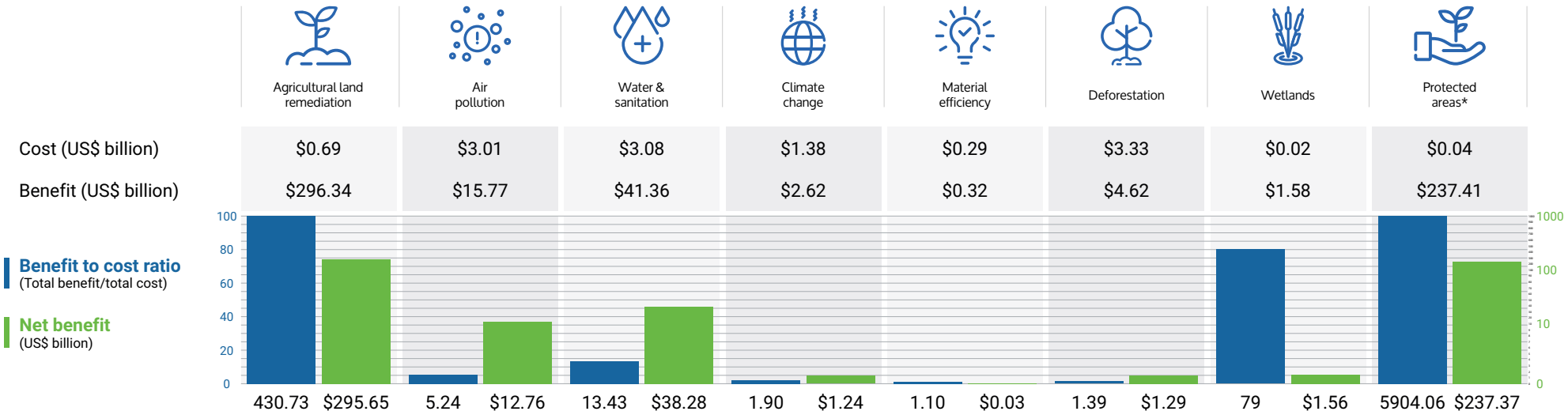


* Saudi Arabia currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Saudi Arabia from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Saudi Arabia is 7.4, meaning that, on average, every $1 invested in closing the natural capital gap will bring $7.4 in benefits. The total potential net benefit for Saudi Arabia is $1.2 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investments in halving the rate of wetland loss result in an estimated BCR of 184.3, through the value of ecosystem services provided. This represents a net benefit of $170 million.
- Investment in **improving water quality and sanitation** (SDG3 and SDG11) has a BCR of 92.1 and would yield a net benefit of $119.44 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 93.3 and would yield a net benefit of $579.2 billion.

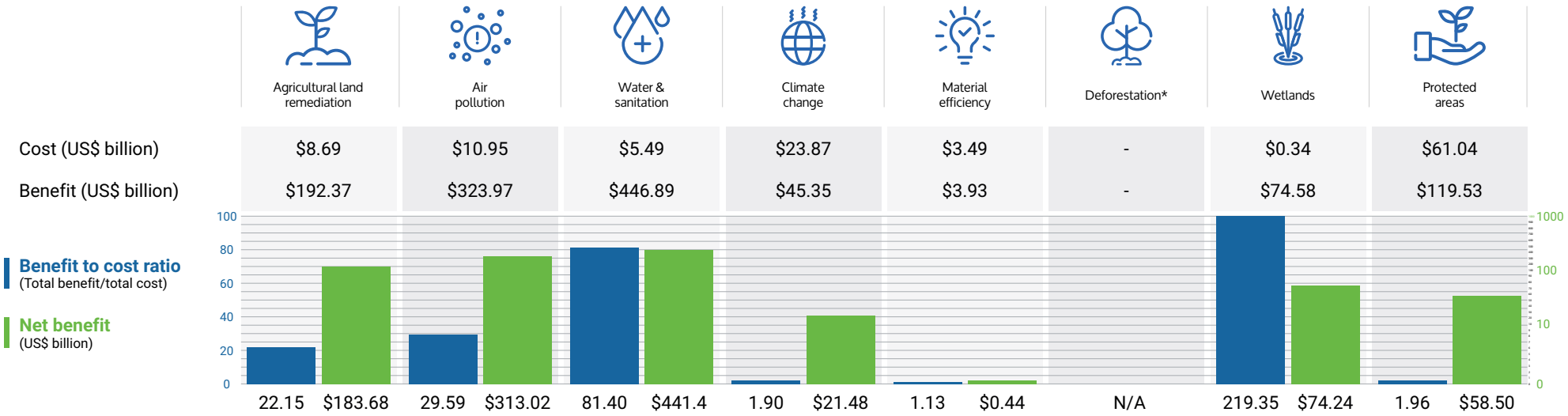
SENEGAL



* The net benefit of increasing protected areas in Senegal is comparatively large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Senegal is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Senegal is 50.8, meaning that, on average, every $1 invested in closing the natural capital gap will bring $50.8 in benefits. The total potential net benefit for Senegal is $588.2 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investment in meeting protected area targets results in an estimated BCR of 5904.1, through the value of ecosystem services provided by marine protected areas. This represents a net benefit of $237.37 billion.
- Investment in **restoring degraded agricultural land** (SDG 2) has a BCR of 430.7. Meeting these targets by 2030 results in an estimated net benefit of $295.65 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 80.6 and would yield a net benefit of $1.56 billion.

SOUTH AFRICA

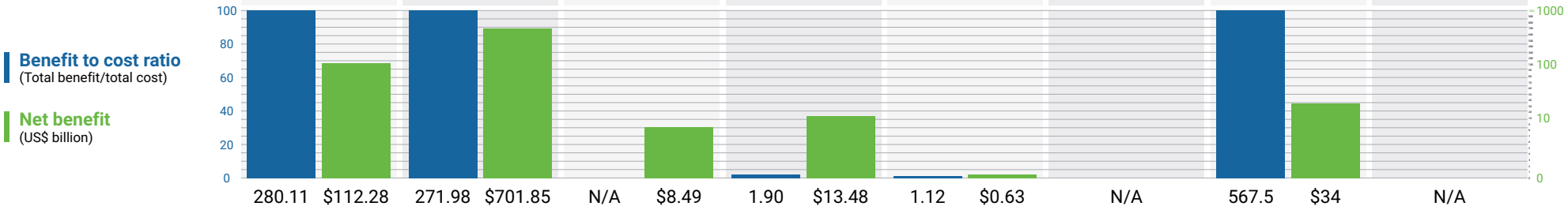


* No net deforestation was reported in South Africa from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in South Africa is 10.6, meaning that, on average, every $1 invested in closing the natural capital gap will bring $10.6 in benefits. The total potential net benefit for South Africa is $1.09 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investment in halving the rate of wetland loss results in an estimated BCR of 221, through the value of ecosystem services provided. This represents a net benefit of $74.24 billion.
- Investment in **water quality and sanitation** (SDG3 and SDG11) has a BCR of 81.4. Meeting these targets by 2030 results in an estimated net benefit of $441.39 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 29.6 and would yield a net benefit of $313.02 billion.

SPAIN

	Agricultural land remediation*	Air pollution	Water & sanitation**	Climate change	Material efficiency	Deforestation***	Wetlands	Protected areas †
Cost (US$ billion)	$0.40	$2.59	$0.00	$14.97	$5.07	-	$0.06	-
Benefit (US$ billion)	$112.68	$704.44	$8.49	$28.45	$5.70	-	$34.05	-



* Spain currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** Where there are benefits of closing the natural capital gap, but with no cost attributed. This reflects that the relevant SDG target is technically satisfied, but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

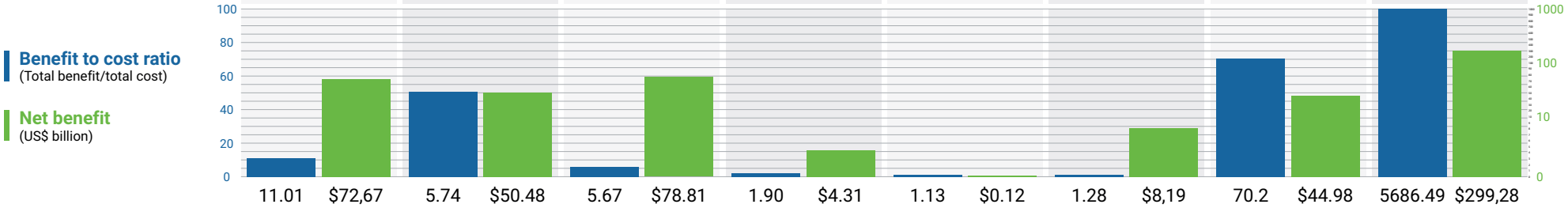
*** No net deforestation was reported in Spain from 2000 to 2015 (World Bank 2017).

† Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Spain is 38.7, meaning that, on average, every $1 invested in closing the natural capital gap will bring $38.7 in benefits. The total potential net benefit for Spain is $870.71 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investments in halving the rate wetland loss result in an estimated BCR of 539.9, through the value of ecosystem services provided. This represents a net benefit of $33.98 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 272.3 and would yield a net benefit of $701.85 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 280.1. Meeting these targets by 2030 result in an estimated net benefit of $112.28 billion.*

TANZANIA

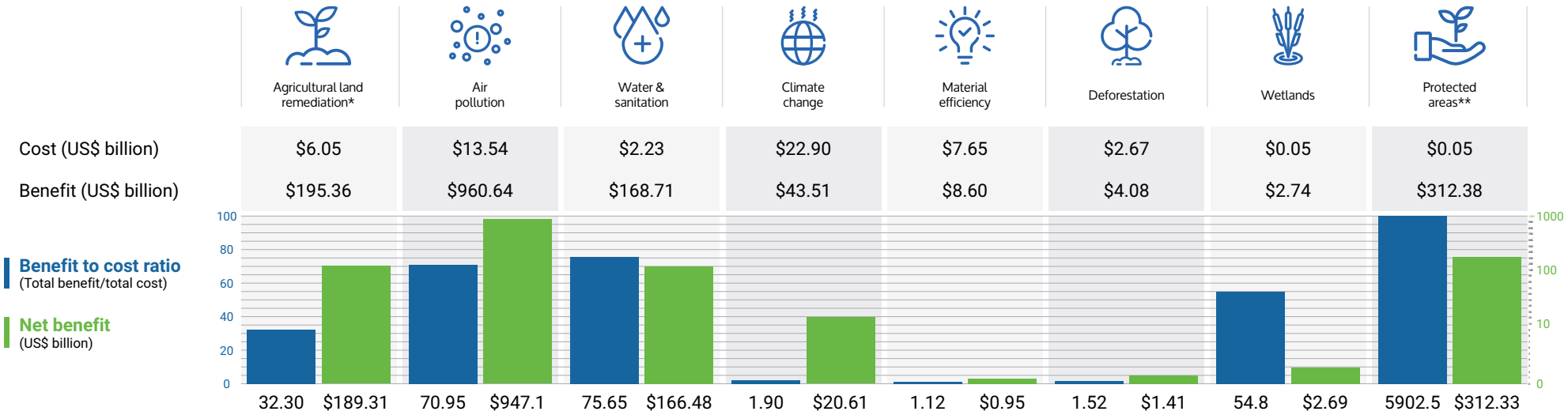
	Agricultural land remediation	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation	Wetlands	Protected areas*
Cost (US$ billion)	$7.25	$10.65	$16.87	$4.79	$0.96	$29.10	$0.65	$0.05
Benefit (US$ billion)	$79.93	$61.13	$95.68	$9.11	$1.08	$37.29	$45.63	$299.33



* The net benefit of increasing protected areas in Tanzania is comparatively large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Tanzania is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Tanzania is 8.95, meaning that, on average, every $1 invested in closing the natural capital gap will bring $8.95 in benefits. The total potential net benefit for Tanzania is $558.85 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investment in meeting protected area targets by 2030 results in an estimated BCR of 5686.5, through the value of ecosystem services provided by marine protected areas. This represents a net benefit of $299.28 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 69.9. This represents an estimated net benefit of $44.98 billion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 11 and would yield a net benefit of $72.67 billion.

THAILAND



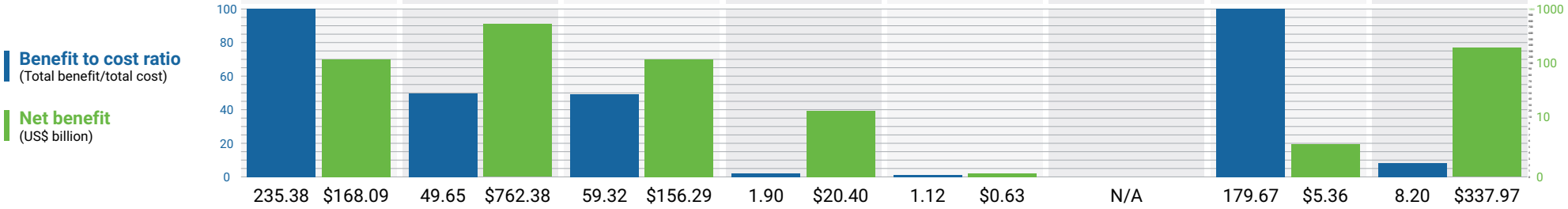
* Thailand currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** The net benefit of increasing protected areas in Thailand is comparatively large as the cost per hectare of increasing marine protected area coverage is estimated to be low while the benefits (based on global data) are high and meeting the SDGs in Thailand is associated with a large increase in marine protected areas.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Thailand is 30.76, meaning that, on average, every $1 invested in closing the natural capital gap will bring $33.1 in benefits. The total potential net benefit for Thailand is $1.64 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **protected areas** (SDG15). Investments in meeting protected area targets by 2030 result in an estimated BCR of 5,902.5, through the value of ecosystem services provided by marine protected areas. This represents a net benefit of $312.33 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 70.9. This represents an estimated net benefit of $947.1 billion.
- Investment in **improving water quality and sanitation** (SDG 3 and SDG11) has a BCR of 75.7 and would yield a net benefit of $166.48 billion.

TÜRKIYE

	Agricultural land remediation*	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation**	Wetlands	Protected areas
Cost (US$ billion)	$0.72	$15.67	$2.68	$22.66	$5.05	-	$0.03	$46.89
Benefit (US$ billion)	$168.81	$778.05	$158.97	$43.06	$5.68	-	$5.39	$384.85

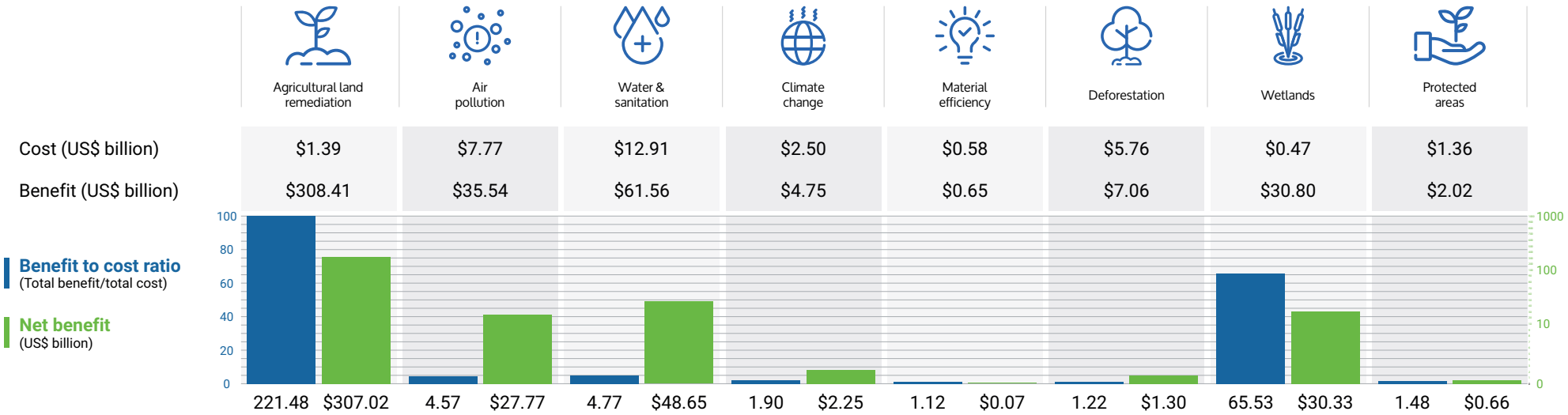


* Türkiye currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

** No net deforestation was reported in Türkiye from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Türkiye is 16.5, meaning that, on average, every $1 invested in closing the natural capital gap will bring $16.5 in benefits. The total potential net benefit for Türkiye is $1.45 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **restoring degraded agricultural land** (SDG2). Investments in restoration result in an estimated BCR of 235.4, through the value of ecosystem services provided. This represents a net benefit of $168.09 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 187.2. Meeting this target by 2030 results in an estimated net benefit of $5.36 billion.
- Investment in **improving water quality and sanitation** (SDG3 and SDG11) has a BCR of 58.5 and would yield a net benefit of $154.16 billion.

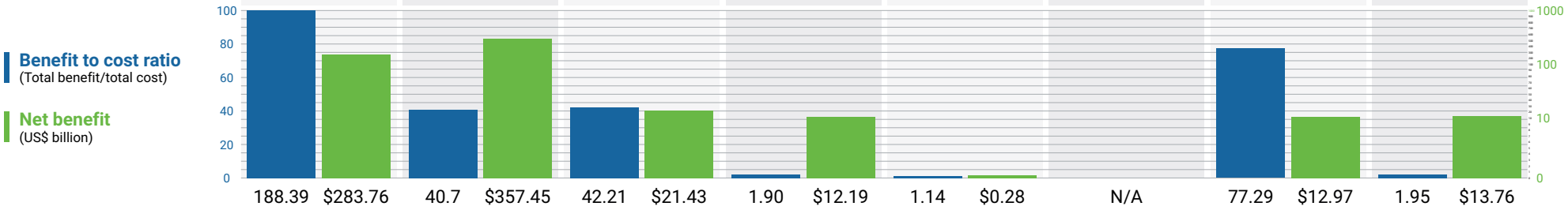
UGANDA



- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Uganda is 13.8, meaning that, on average, every $1 invested in closing the natural capital gap will bring $13.8 in benefits. The total potential net benefit for Uganda is $418.04 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **agricultural land remediation** (SDG2). Investment in restoring degraded agricultural land results in an estimated BCR of 221.5, through the value of ecosystem services provided. This represents a net benefit of $307.02 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 65. This represents an estimated net benefit of $30.32 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 4.6 and would yield a net benefit of $27.77 billion.

UKRAINE

	Agricultural land remediation**	Air pollution	Water & sanitation	Climate change	Material efficiency	Deforestation***	Wetlands	Protected areas
Cost (US$ billion)	$1.51	$9.00	$0.52	$13.54	$2.25	-	$0.17	$14.41
Benefit (US$ billion)	$285.27	$366.45	$21.95	$25.73	$2.53	-	$13.14	$28.17



* The analysis presented in this report was conducted prior to the Russian Federation invasion of Ukraine, as such the conclusions drawn within this report may not reflect the current geopolitical landscape and do not capture any implications arising from the conflict.

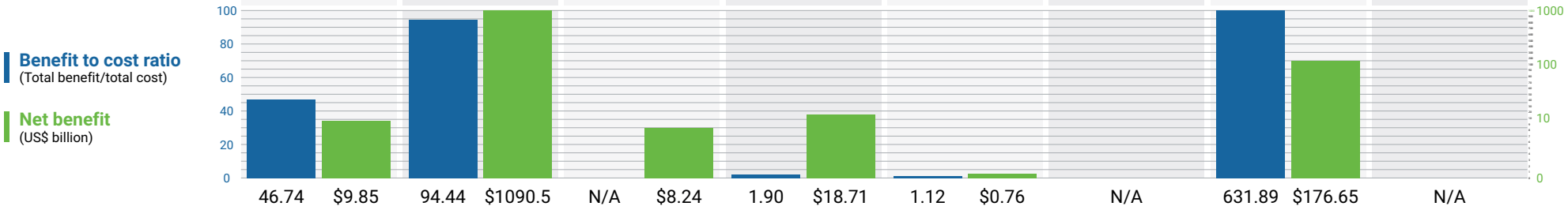
** Ukraine currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

*** No net deforestation was reported in Ukraine from 2000 to 2015 (World Bank 2017).

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in Ukraine is 17.95, meaning that, on average, every $1 invested in closing the natural capital gap will bring $17.95 in benefits. The total potential net benefit for Ukraine is $701.83 billion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **restoring degraded agricultural land** (SDG2). Investments to meet these targets result in an estimated BCR of 188.4, through the value of ecosystem services provided. This represents a net benefit of $283.76 billion.
- Investment in **halving the rate of wetland loss** (SDG15) has a BCR of 79.1. This represents an estimated net benefit of $12.97 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 40.7 and would yield a net benefit of $357.45 billion.

UNITED KINGDOM

	Agricultural land remediation*	Air pollution	Water & sanitation**	Climate change	Material efficiency	Deforestation***	Wetlands	Protected areas †
Cost (US$ billion)	$0.22	$11.67	$0.00	$20.79	$6.12	-	$0.28	-
Benefit (US$ billion)	$10.06	$1102.20	$8.24	$39.50	$6.88	-	$176.93	-



* The United Kingdom currently does not have a Bonn Challenge target for land restoration. The costs and benefits shown are calculated as share of the global Bonn Challenge target proportionate to the degraded land area estimated by Bai et al.

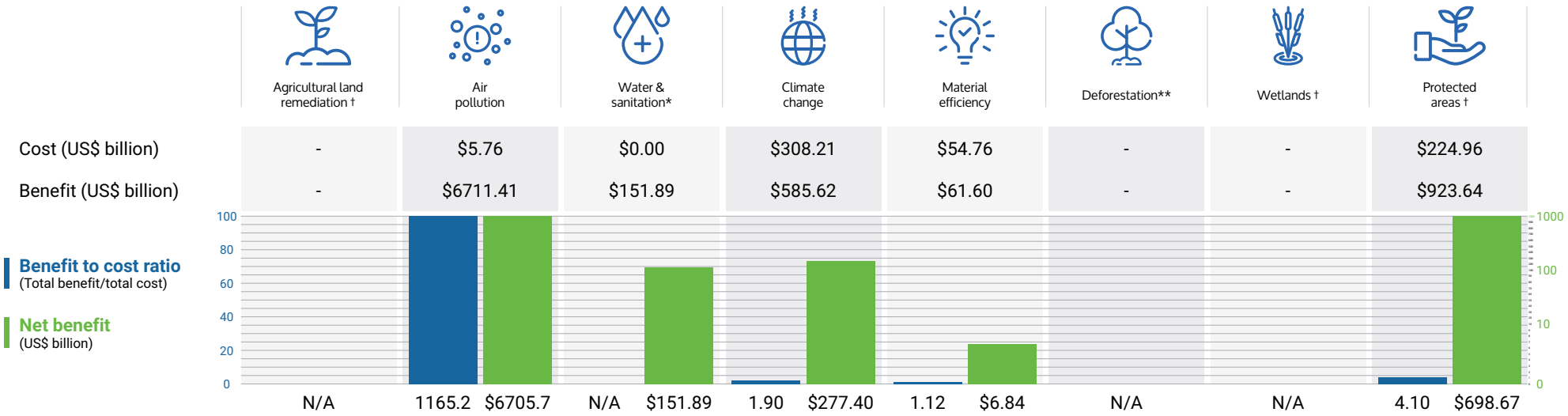
** Where there are benefits of closing the natural capital gap, but with no cost attributed. This reflects that the relevant SDG target is technically satisfied, but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

*** No net deforestation was reported in the United Kingdom from 2000 to 2015 (World Bank 2017).

† Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in the United Kingdom is 34.4, meaning that, on average, every $1 invested in closing the natural capital gap will bring $34.4 in benefits. The total potential net benefit for the United Kingdom is $1.3 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **wetlands** (SDG15). Investments in halving the rate wetland loss result in an estimated BCR of 632, through the value of ecosystem services provided. This represents a net benefit of $176.65 billion.
- Investment in **improving air quality** (SDG3 and SDG11) has a BCR of 94.5 and would yield a net benefit of $1.09 trillion.
- Investment in **restoring degraded agricultural land** (SDG2) has a BCR of 46.7. Meeting these targets by 2030 result in an estimated net benefit of $9.85 billion.

UNITED STATES



* Where there are benefits of closing the natural capital gap, but with no cost attributed. This reflects that the relevant SDG target is technically satisfied but that there remain benefits which are expected to be delivered from improvements in outcomes beyond those required by the SDG target.

** No net deforestation was reported in the United States from 2000 to 2015 (World Bank 2017).

† Relevant target already met.

- The benefit-to-cost ratio (BCR) of closing the natural capital gap to meet the nature-related SDG targets in the United States is 14.2, meaning that, on average, every $1 invested in closing the natural capital gap will bring $14.2 in benefits. The total potential net benefit for the United States is $7.84 trillion over the period 2021 to 2030.
- The highest returns relative to investment are observed for **improving air quality** (SDG3 and SDG11). Meeting air quality targets results in an estimated BCR of 1,165.2, this represents a net benefit of $6.71 trillion.
- Investment in **climate change mitigation** (SDG9 and SGD13) has a BCR of 1.9 and would yield a net benefit of $277.4 billion.
- Investment in **meeting protected area targets** (SDG15) has a BCR of 4.1 and would yield a net benefit of $698.67 billion.

ADDENDUM ON THE TREATMENT OF CLIMATE CHANGE IN THE UNDERLYING ANALYSIS

Climate change mitigation is integrated into the analysis of the natural capital gap that underpins this report. It is analysed as a global problem, with a share of the global costs and benefits of tackling climate change attributed to countries based on levels of greenhouse gas emissions production.

This means that the benefit-to-cost ratio of addressing climate change appears constant across all 40 countries, and both the costs and benefits of addressing climate change are concentrated in three countries – China, the US and India. Within the 40-country analysis, these top three greenhouse gas emission producers are collectively attributed to around two-thirds of both the costs and benefits of meeting a 2˚C emissions target.[9]

As such, although the costs of climate mitigation make up approximately 30% of the investment needed to close the overall global natural capital gap, it does not stand out in comparison to other natural capital gaps when looking at, for example, regional priorities.

Compared to China, the US and India, many countries are relatively low emitters and hence other issues dominate. Despite this, closing the natural capital gap with respect to climate change is in the top three priority gaps (by the net benefit of closing the gap) for both the US and China, as well as for other high-income countries such as Germany, Japan and the United Kingdom.

Using a global average social cost of carbon to calculate the damages avoided by closing the natural capital gap with respect to greenhouse gas emissions also assumes damage is evenly spread, whereas some countries in reality are more vulnerable to climate damage than others and so may benefit more from national and global action than this analysis suggests.

Addressing climate change remains a global priority with large benefits for society as a whole. More detailed analysis at a country level may reveal a different pattern of costs and benefits.

9 The costs and benefits of meeting both a 1.5˚C and 2˚C emissions scenario are included in the underpinning analysis; however, as the 2˚C was used in the aggregate analysis, this scenario is also used in this paper for consistency.

Annex 1:
METHODOLOGY

This annex summarizes the approach to measuring natural capital gaps at a country level developed and applied by Professor Anil Markandya, Basque Centre for Climate Change, and his colleagues in the publications below:

- *Natural Capital and the Sustainable Development Goals*
- *Assessing Countries' Financial Needs to Meet the SDGs Through Natural Capital Investment*
- *The Natural Capital Gap and the SDGs: Costs and Benefits of Meeting the Targets in Twenty Countries*
- *The Natural Capital Gap and the SDGs: Costs and Benefits of Meeting the Targets in Forty Countries*

Collectively, this annex refers to these as the GGKP Natural Capital Gap Reports, which are available at: www.greengrowthknowledge.org/working-group/natural-capital.

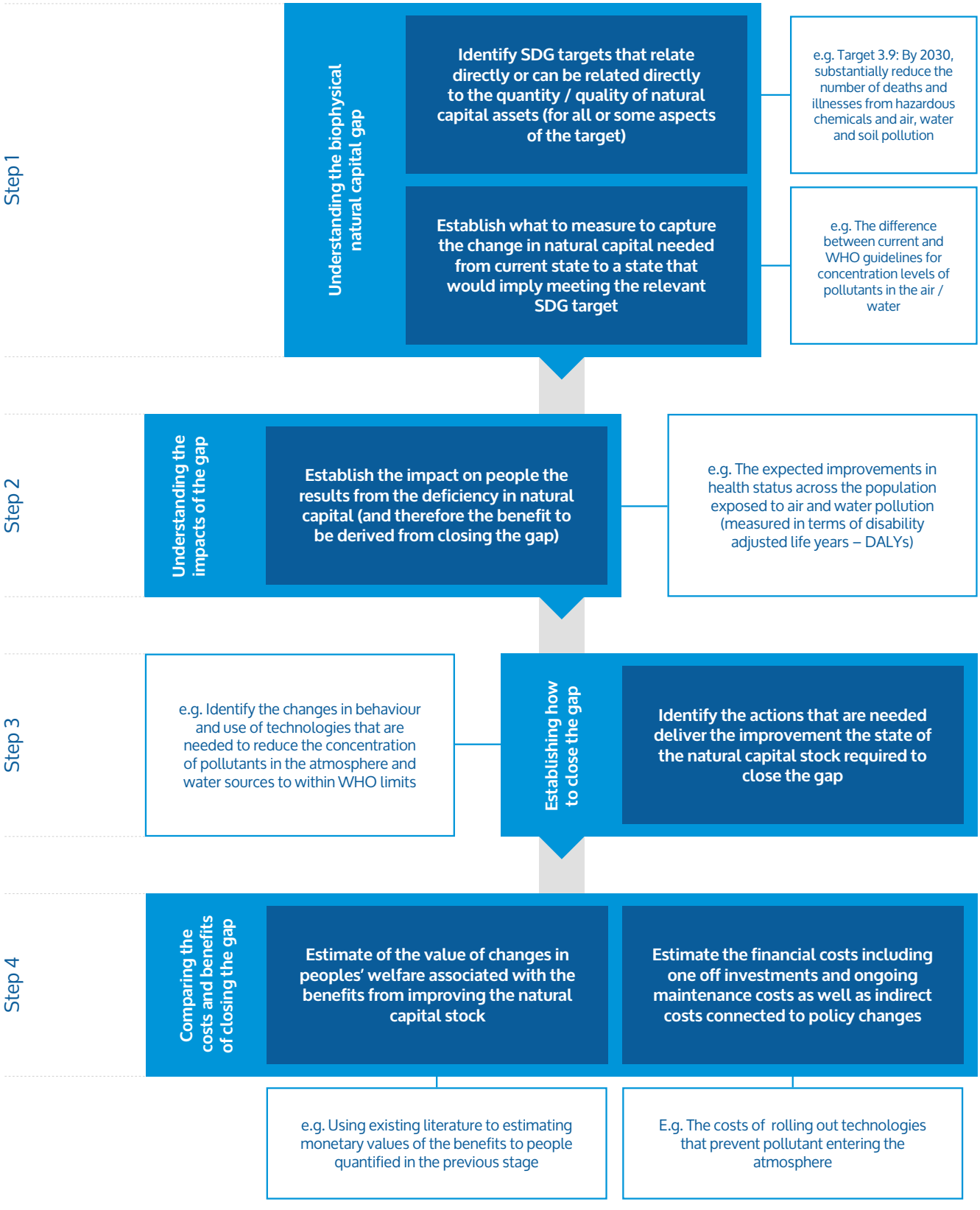
More details on the process of understanding and practically measuring the natural capital gaps, as well as the financial needs to close them, are provided in these documents. This annex does not provide detailed guidelines to replicate the results in the GGKP Natural Capital Gap Reports and extend this to other countries. Rather, it provides an overview of the types of data which need to be collated to carry out a national-level natural capital assessment inspired by the GGKP Natural Capital Gaps Report, and highlights where it may be possible to extend from what was feasible based on globally available information if more or more refined data may be available at the country level.

In carrying out any country-level natural gap assessment, however, there is likely to be value in cross referencing the original GGKP Natural Capital Gap Report to compare and contrast approaches and findings.

Figure 1A below gives an overview of the process involved in carrying out a natural capital gap assessment of this type, from SDG target selection to assessing the costs and benefits of closing the natural capital gap. Subsequent sections of the annex explore each of the steps of this process in turn.

9 The costs and benefits of meeting both a 1.5˚C and 2˚C emissions scenario are included in the underpinning analysis; however, as the 2˚C was used in the aggregate analysis, this scenario is also used in this paper for consistency.

BROAD METHODOLOGICAL APPROACH: STEPS TO ESTABLISHING THE BENEFITS AND COSTS OF CLOSING THE NATURAL CAPITAL GAP TO MEET THE SDGS



Step 1:

UNDERSTANDING THE BIOPHYSICAL NATURAL CAPITAL GAP

The goal of this step is to appreciate the change in the state of natural capital that is required to meet specific components of the Sustainable Development Goals (SDGs), whose delivery is dependent upon the state of the natural capital stock.

The SDGs are made up of 17 goals and 169 targets. Details on the goals and targets can be found at https://sdgs.un.org.

Natural capital is often described as the world's stocks of natural assets, which include geology, soil, air, water and all living things.

Capital assets are defined by their nature as being durable (long-lasting) and producing a flow of goods and/or services over time. In this context – and in relation to identifying relevant SDG targets – natural capital should be understood to include all aspects of the biosphere which produce benefits over time, whether that is a forest for its role in regulating water flows or preventing soil erosion, or the atmosphere in regulating the global climate/dispersing pollutants.

The ability of natural capital assets to continue to produce a flow of goods and/or services over time can be influenced by both the condition (quality) and extent (size) of natural capital assets as well as their spatial configuration (where they are). For example, the size, breadth and position of mangrove forests relative to human settlement influence their role in protecting human settlements from storm surges. Likewise, if assets are damaged/lost they may no longer be able to supply services; for example, current concentrations of greenhouse gases in the atmosphere mean it can no longer support a stable climate.

Identify SDG targets that relate directly or can be related directly to the quantity/quality of natural capital assets (for all or some aspects of the target)

The state of natural capital will directly impact the delivery of many of the SDGs. For example, Wood et al (2018)[10] assessed that 44 of 169 SDG targets focus directly on improving the environment and human well-being, and that individual ecosystem services (that flow from the ecosystem as natural capital assets) make important contributions to 41 SDG targets.

The GGKP Natural Capital Gap Reports focused on nine SDG targets where there was a clear connection between the target and natural capital (i.e. agricultural land, air, water, atmosphere, forests, wetlands, protected areas) and data was available internationally. The reports had to exclude some targets related to natural capital, including some of those related to marine and terrestrial ecosystems, and indoor air quality where data availability was limited. This may not be the case at a country level and therefore it may be possible to capture a more detailed understanding of a country's natural capital gap at a more local level.

Selecting a target for inclusion first requires being able to relate the achievement of the target to the quantity/quality of natural capital. This is not necessarily as simple as it may seem. The SDGs and the targets that sit under them can be very broad. For example, SDG target 15.1 seeks to "ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements."

This relates to ecosystems as elements of the natural capital stock, but it also covers many different ecosystems and goals/aspirations for these, which are likely to be challenging to measure holistically. If it could be measured, however, closing the natural capital gap would entirely contribute to meeting this target.

In other targets this may not be the case, but there may be important contributions from natural capital that can be measured. For example, target 2.4 seeks to "ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity

10 Wood et al (2018) Distilling the role of ecosystem services in the Sustainable Development Goals, https://doi.org/10.1016/j.ecoser.2017.10.010.

for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality."

Some of these targets may rely upon how agricultural land is used (i.e. how labour and human-made inputs are deployed on the land), but there are also large elements of the goal that relate to the condition of agricultural land. Here, the task is to segregate the natural capital aspects of the target and recognize the change in the status of natural capital that is needed within the target for it to be met.

In establishing what to measure and how to measure it, there will be an element of pragmatism.

Building on the two examples above in the GGKP Natural Capital Gap Reports, the decision on what to measure in terms of the gap for SDG target 15.1 prioritized measuring ecosystems, which are known to deliver benefits to people, and those for which data was readily available. As such, measurement of the natural capital gap for goal 15.1 focused on forests, wetlands and protected areas, but other ecosystems may also be deemed relevant at a national level.

Assessing the baseline (i.e. the current state of assets) is a data issue. For example, for SDG target 15.1., is data on the extent/area the ecosystems covered available? And is data on the condition of those ecosystems available? The GGKP Natural Capital Gap Reports focused on the extent of ecosystems, again as a pragmatic choice given the reliance on internationally available data. At the national level, considering the condition as well as the extent of ecosystems may be useful to understand the current and future flows of benefits that may be derived from those ecosystems more thoroughly (rather than inherently assuming benefits will continue at the same level, which may not be the case if ecosystems become more degraded).

Identifying the target state of forests, wetlands and protected areas was more complex, largely because the SDG targets referred back to international agreements; particularly relevant are the CBD Aichi Biodiversity targets, which should have been met in 2020. As this was not the case, and at the time of writing the GGKP Natural Gap Report, the post-2020 global biodiversity framework was not yet agreed upon; it was assumed that the target should be interpreted as meeting the related aims expressed in the relevant Aichi targets by 2030. This problem aside, the aspects of the Aichi targets used were reasonably well defined in terms of extending cover of protected areas and halving the rate of loss of other habitats.

SDG target 2.4. required a little more interpretation. The indicator used for target 2.4 is the "proportion of agricultural area under productive and sustainable agriculture". However, no target proportion is given. In terms of the need for improvements in natural capital, the GGKP Natural Capital Gap Reports interpreted this to require the remediation of degraded agricultural land. However, as degraded land is not universally and consistently measured a comparable international baseline could not be identified. Measurement of the gap to be closed therefore relied on declared international restoration targets (under the Bonn Challenge) and estimating potential restoration needs where countries did not have their own specific targets.

As this highlights, identifying and measuring natural capital gaps requires both pragmatism and interpretation.

It is useful to start from the SDG targets and indicators (a full list of which can be found at https://unstats.un.org/sdgs). However, further work will be required to establish what is appropriate and possible to measure for the baseline, and for the target outcome if this is not well defined.

It is important to be clear from the outset how natural capital can contribute to the meeting of the target concerned as this will also drive what needs to be measured. Country-level data and knowledge of national goals will likely enhance the measurement and understanding of the natural capital gap at a nation-state level.

Where countries collate environmental accounts, these may contain useful information for understanding the baseline condition of some natural capital assets. This has been explored by the United Nations Statistical Division in the following two publications:

- Using the SEEA EA for Calculating Selected SDG Indicators
- Using the SEEA EA for Calculating Selected SDG Indicators - Project country testing experiences

9 The costs and benefits of meeting both a 1.5˚C and 2˚C emissions scenario are included in the underpinning analysis; however, as the 2˚C was used in the aggregate analysis, this scenario is also used in this paper for consistency.

Step 2:

UNDERSTANDING THE IMPACTS OF THE GAP

While step 1 is focused on the biophysical condition of natural capital and understanding how this needs to change to deliver on the SDGs, step 2 is focused on the analysis of monetary costs and benefits of closing the natural capital gap. It aims to capture the ramifications of closing the natural for people to help establish the benefits that can be attributed to meeting the SDG targets selected in step 1.

Establish the impact on people from the deficiency in natural capital/the benefit to be derived from closing the gap

This is an important step in establishing (and valuing) the change in welfare or well-being that is likely as a result of closing the natural capital gap, as it identifies the "transmission mechanism" through which people benefit.

In many cases, the impact of the natural capital gap will be connected to the inability to derive benefits associated with the provision of ecosystem services[11] where the natural capital assets concerned are the ecosystems themselves; for example, the various benefits that are derived from standing forests in the context of deforestation. Where deforestation is avoided, such benefits are preserved.

Where the natural capital gap relates to having too little of a given ecosystem in a good condition (e.g. relating to protected areas), it is important to appreciate the difference in benefits that would be derived from ecosystems in the baseline condition versus the condition it could achieve if restored/allowed to regenerate. In the GGKP Natural Capital Gap Reports, it was assumed that without protection, an area's ability to deliver benefits would diminish over time, while with protection the same area's ability to produce benefits would gradually increase and then be maintained at a high level. Both terrestrial and marine protected areas were considered in the same way.

The GGKP Natural Capital Gap Reports also look at the biosphere and how this is used as a receptor for waste, or pollution. Here, the reports looked at the direct impacts of air and water pollution on human health across a range of SDG targets. The benefits to people here are estimated in terms of disability-adjusted life years (DALYs); a commonly used metric to allow the different health impacts and interventions to be compared on a similar basis, or values of lives lost as a result of the pollution.

Avoiding double counting benefits

An important point flagged in the GGKP Natural Capital Gap Reports is the potential interaction between efforts to meet different SDG targets. For example, delivering greenhouse gas emissions savings sufficient to be on track to limit global temperature increases to 1.5˚C will also reduce concentrations of other air pollutants – in effect leaving a smaller natural gap to close to meet other air pollution targets assuming that climate goals are met. This interaction is important to measure the gaps, and the benefit of closing gaps properly.

At the country level, an advancement on the work of the GGKP Natural Capital Gap Reports could be to use more geographically specific data to look at who (within the country's population) is impacted by current deficiencies in natural capital, and who might gain from improvements in natural capital. This would help understand whether investments in natural capital also have co-benefits that would help efforts to reduce inequalities, for example, under SDG10.

11 A detailed description of the connections between natural capital, ecosystem services, benefits to people and their economic values can be found in Bateman, I. J., & Mace, G. M. (2020), The natural capital framework for sustainably efficient and equitable decision making, https://doi.org/10.1038/s41893-020-0552-3.

The key focus of step 2 is to identify variables that can be connected to changes in human welfare, which are also directly associated with the measure of the change in natural capital stock established in step 1, and – if the benefit is to be estimated in monetary terms in step 4 – can be connected to estimated welfare benefits.

It is important to point out that in some cases this intermediate step may not be required as, for example, with greenhouse gas emissions where the benefit of closing the natural capital gap (measured in terms of CO2 equivalent emissions) can be connected directly with changes in social welfare through estimates of the Social Cost of Carbon. Similarly, for the natural capital gaps associated with specific ecosystems, the GGKP Natural Capital Gap Reports have focused on measuring the area of different ecosystems and valuing the benefits from these based on meta-analyses of the bundles of benefits derived from different ecosystem types. This may or may not be preferable at a country level, where specific benefits for specific places, e.g. water benefits for cities connected to forests upstream may warrant a more detailed, granular examination.

Step 3:
ESTABLISHING HOW TO CLOSE THE GAP

Step 3 is aimed to help understand the cost side of closing the identified natural capital gaps. It seeks to understand "what needs to be done" in order to change the status of the natural capital stock to that required to meet the relevant SDG target.

Identify the actions that are needed to deliver the improve the state of the natural capital stock required to close the gap

This step focuses on how to deliver the change in the state of natural capital assets that are the focus of the different SDG targets examined. What technologies could be deployed or what behaviours could be changed to deliver the change needed in natural capital and the benefits identified in step 2?

In the GGKP Natural Capital Gap Reports, the options examined were necessarily quite broad and built from packages of measures assessed in the literature. For example, in relation to efforts to remediate land (connected to SDG target 2.4), the GGKP Natural Capital Gap Reports looked at different bundles of potential actions from lower costs actions such as capacity building and planting of grass and trees, to higher cost actions such as introducing physical infrastructure to prevent erosion. The reports looked at ranges depending on the options deployed across different countries in the absence of detailed knowledge. Therefore, a country-level gap analysis should be able to provide more precise forecasts of actions needed to be built from local knowledge.

The important part of this step is to understand the types of actions that are needed, and whether they are one-off investments or ongoing actions, so that the cost of delivering these can be estimated in step 4. It is also important to understand who is impacted by these actions, so that the ramifications of any investment beyond the financial costs of delivering the actions required to improve the status of natural capital are captured.

Considering actions with multiple benefits

It is important to reflect that some actions (such as investments in nature-based solutions) may deliver across multiple SDGs targets, therefore helping to close more than one identified natural capital gap. This should be taken into account where possible to ensure that overall natural capital gaps are closed in the most cost-effective ways.

Step 4:

COMPARING THE COSTS AND BENEFITS OF CLOSING THE GAP

The GGKP Natural Capital Gap Reports show that the benefits of closing natural capital gaps across the SDG targets examined tend to significantly outweigh the costs. Being able to compare the costs and benefits of closing the natural capital gap, therefore, may help prioritize investments in natural capital, when compared to other potential investments elsewhere in the economy.

The two key metrics used to compare costs and benefits in the GGKP Natural Capital Gap Reports are:

- **Net present value.**

  Here, net represents the difference between the benefits and costs of meeting the specific SDG targets, and present value indicates that it captures the flows of costs and benefits over time, but represents them as a present-day equivalent. A positive net present value indicates that the benefits of the investment outweigh the costs. Across a range of SDG targets, the largest net present value figure would be associated with the gap which – if closed – would deliver the greatest overall increase in benefits to society.

- **Benefit-to-cost ratio.**

  The benefit-to-cost ratio (BCR) is calculated by dividing the present value of the benefits by the present value of the costs. It estimates the number of $s worth of benefit delivered for each $ of investment (or cost to society). If the BCR is greater than 1, the investment yields benefits which exceed the costs. Across a range of SDG targets, the largest BCR would be associated with the gap that – if closed – would deliver the greatest benefit per $ invested. This will not necessarily be the same as the SDG target associated with the highest net present value, as the gap to be closed where the BCR is very high may not be large, in comparison to other gaps.

In both cases, there are bound to be uncertainties. **Therefore, it is important to provide some measure of that by reporting ranges for the benefits and costs.**

Estimate of the value of changes in peoples' welfare associated with the benefits from improving the natural capital stock

The GGKP Natural Capital Gap Reports highlight the importance of focusing on welfare values rather than market prices and ensuring that benefits that fall outside markets are captured and properly valued. This means values that reflect the benefits that people receive as a result of closing the natural capital gap. This is particularly important for natural capital given the frequently observed pattern whereby the expansion of economic activity is associated with a decline in natural capital, which may generate growth in GDP, but neglects the values that natural capital generates, and therefore may not be beneficial to society overall.

Using welfare values largely means focusing on values generated through research and connecting these with the benefits generated by closing the natural capital gap articulated in step 2.

In the absence of further country-level data, the GGKP Natural Capital Gap Reports detail the sources used, as well as how the values were used and applied, and this approach will be readily transferable to other country contexts.

The following elements of the process are noted to support analysis of the natural capital gap, which is more bespoke at a country level.

- Unit values associated with the benefits of closing the natural capital gap were sought from the literature, where possible reflecting any variation in values between countries. At a country level, more specific research may be available and applied as the global work relied more on meta-analyses (the results of which could be applied across countries).

- Unit values were applied across the extent of the natural capital gap measured. However, it is important to reflect that where the benefits are unlikely to be delivered instantly, assumptions must be made about how benefits would accrue, for example increasing over time as the condition of the natural capital stock improves.

- A profile also had to be assumed for the rate at which the natural capital stock would be filled over the period to 2030, as it is unlikely that the gaps would be filled in their entirety in any given year. Also, decisions will need to be made about how long-lived the benefits from the actions to close the natural capital gap will be – i.e. can they be assumed to be permanent, or would they only last as long as operating or maintenance costs are covered?
- The focus of this work was to look at the change in the natural capital stock, and therefore annual benefits over time needed to be "capitalized" to provide a value of that flow of benefits as a single present-day value.
  - For example, if classifying an area as a protected area improves the provision of ecosystem services from that area, the value of the stock should capture this associated increase in flow of benefits over time.
  - This was done by discounting and summing the value of the change in flow of benefits.
  - A discount rate was applied to reflect various factors, which means that people tend to value benefits in the nearer term more highly than benefits that are delivered a long time in the future – these include time preferences, expectations that living standards may increase over time, and to reflect the possibility of disasters in the future, which may mean benefits are not realized. The GGKP Natural Capital Gap Reports used a discount rate of 4% per year. This was applied both over the period to 2030, and beyond where investments in the natural capital stock were expected to have long-lived benefits (for example over 50 years for protected areas). A lower discount rate weights future generations more highly.

Some accessible guidelines on transferring welfare values from primary research to different contexts can be found at: https://www.gov.uk/government/publications/valuing-environmental-impacts-guidelines-for-the-use-of-value-transfer

A useful introduction to discounting can be found here: https://www.rff.org/publications/explainers/discounting-101

Estimate the financial costs, including one-off investments and ongoing maintenance costs as well as indirect costs connected to policy changes

Having established the benefits of closing the natural capital gaps to meet the various SDG targets assessed, it is useful also to look at the costs of closing the gaps to understand the economic case for investment.

A range of different types of costs may be relevant. These include:

- The costs of the actions identified in step 3, including the direct costs such as any equipment, installation of technology and labour, as well as training and associated policy costs such as monitoring and enforcement.
- Opportunity costs – effectively the benefits foregone or benefits that are lost if a previous/alternative use of a resource (such as an area of land or sea) is no longer possible if the natural capital gap is to be closed. For example, if a forest can no longer be converted to agriculture, or a grassland is protected to reduce grazing pressure.

Both one-off and ongoing costs should be included.

Costs may not necessarily fall on the seeking to fund efforts to close the natural capital gap. Opportunity costs may be borne by actors whose options are limited by, for example, policies that prevent the conversion of wetlands if they are not paid compensation. To understand the economic case, or the costs and benefits to society as a whole, these costs should still be included in the calculation.

Understanding where within society the costs and benefits of options to close natural capital gaps fall will help to apply measures in a way that ensures they support wider SDG objectives around poverty alleviation and reducing inequalities.

As with the benefits, the profile of costs (which would deliver these benefits) over time will need to be evaluated, and subsequently discounted and summed up to give the present value of the costs, which can then be used in the calculation of metrics such as net present values and benefit-to-cost ratios.

Adjusting for inflation

As estimates of the costs and benefits of closing natural capital gaps are likely to draw from a range of sources of information, it is unlikely that they will all have been generated at the same time. To aid comparability of data, it is important to adjust for inflation. This would allow a cost estimate from 2017 to be compared with a benefit estimate from 2021, if the costs were adjusted to 2021 prices.

The World Bank publishes a global GDP deflator data series that can be used for this purpose (available at https://data.worldbank.org/indicator/NY.GDP.DEFL.ZS). A GDP deflator is an index that reflects how prices have changed. For example, if the index was 80 in 2017 and 100 in 2021, to adjust 2017 costs to 2021 prices, the 2017 costs would need to be multiplied by 100/80 – the extent to which the price index has risen (as 100/80 = 1.25, this is effectively saying that prices in this example have on average risen by 25% between the two years).

Annex 2:

NET BENEFITS PER COUNTRY

Country	Agricultural land remediation	Improving air quality	Water and sanitation	Climate change	Materials efficiency	Terrestrial ecosystems and all protected areas	Net benefits of all selected SDG targets ($bn)
Algeria	$65.60	$166.95	$50.73	$8.84	$0.46	$313.54	$606.12
Angola	$67.15	-	-	$3.64	$0.27	$957.74	$1,028.80
Argentina	$33.42	-	-	$11.81	$0.44	$335.69	$381.36
Australia	$478.96	$50.05	$10.69	$25.15	$1.27	$47.66	$613.78
Brazil	$103.38	$1,290.71	$405.41	$34.24	$2.17	$1,146.86	$2,982.76
Cameroon	$422.02	$35.62	$161.92	$3.69	$0.08	$24.02	$647.34
Canada	$321.32	$619.75	$17.78	$28.78	$0.96	$5,200.86	$6,189.45
China	$403.57	$27,118.17	$699.03	$824.91	$27.97	$2,359.18	$31,432.84
Colombia	$28.09	$210.44	$44.12	$5.71	$0.15	$27.29	$315.80
Democratic Republic of the Congo (DRC)	$84.05	$8.40	$23.81	$2.49	$0.09	$205.16	$324.00
Egypt	$1.90	$462.35	$358.66	$13.37	$0.80	$139.13	$976.21
Ethiopia	$727.85	$48.56	$124.09	$7.12	$0.16	$12.77	$920.55
France	$28.89	$1,119.99	$12.72	$17.54	$0.64	$212.86	$1,392.64
Germany	$10.55	$2,503.78	$19.35	$33.78	$0.90	$14.57	$2,582.93
India	$1,642.60	$8,097.98	$5,040.64	$240.90	$8.37	$3,274.27	$18,304.77
Indonesia	$487.65	$2,078.81	$1,108.34	$45.51	$3.05	$6,614.61	$10,337.96
Iran (Islamic Republic of)	$54.91	$621.80	$124.05	$34.01	$0.62	$239.17	$1,074.56
Japan	$32.42	$3,774.93	$38.02	$50.12	$1.35	$20.45	$3,917.28
Kenya	$209.28	$27.16	$94.96	$3.20	$0.17	$208.61	$543.38
Madagascar	$221.48	$17.74	$68.81	$1.24	$0.03	$1,553.32	$1,862.61
Malaysia	$69.31	$274.60	$62.90	$5.46	$0.72	$357.64	$770.62
Mexico	$241.87	$547.83	$183.19	$21.80	$0.93	$337.70	$1,333.32
Morocco	$68.31	$55.24	$51.37	$3.89	$0.31	$503.56	$682.69
Nigeria	$824.78	$556.96	$3,860.82	$12.16	$1.29	$384.07	$5,640.07
Pakistan	$4.85	$748.32	$1,066.74	$20.68	$0.06	$254.43	$2,095.07
Papua New Guinea	$36.18	$11.15	$20.62	$1.14	$0.00	$6,804.68	$6,873.78
Peru	$151.15	$133.23	$60.86	$3.09	$0.10	$2,088.51	$2,436.94
Philippines	$117.51	$400.74	$162.98	$11.27	$0.71	$2,562.75	$3,255.96

Country	Agricultural land remediation	Improving air quality	Water and sanitation	Climate change	Materials efficiency	Terrestrial ecosystems and all protected areas	Net benefits of all selected SDG targets ($bn)
Russian Federation	$2,295.83	$3,891.62	$314.71	$115.12	$1.36	$11,003.09	$17,621.73
Saudi Arabia	$1.92	$579.20	$119.46	$27.39	$0.95	$472.94	$1,201.85
Senegal	$295.65	$12.76	$38.28	$1.24	$0.04	$240.22	$588.19
South Africa	$183.68	$313.02	$441.39	$21.48	$0.44	$132.73	$1,092.74
Spain	$112.28	$701.85	$8.49	$13.48	$0.63	$33.98	$870.71
Tanzania	$72.67	$50.48	$78.82	$4.31	$0.12	$352.44	$558.85
Thailand	$189.31	$947.10	$166.48	$20.61	$0.96	$316.42	$1,640.88
Türkiye	$168.09	$762.38	$154.16	$20.40	$0.63	$343.32	$1,448.98
Uganda	$307.02	$27.77	$48.65	$2.25	$0.07	$32.27	$418.04
Ukraine	$283.76	$357.45	$21.43	$12.19	$0.28	$26.73	$701.83
United Kingdom	$9.85	$1,090.53	$8.24	$18.71	$0.76	$176.65	$1,304.75
United States	$0.00	$6,705.65	$151.89	$277.40	$6.84	$698.67	$7,840.46

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