

Climate Risk and Sustainable Finance*

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Abstract

The paper reviews the links between climate change and sustainable finance, set within the wider context of the triple planetary crisis of climate change, biodiversity loss and pollution. Treating these challenges as interdependent, it first defines sustainable finance via the environmental, social and governance (ESG) framework used by the European Commission and the OECD. It then compares current financial flows against estimated needs. Globally, at least \$6.3 trillion in annual climate finance is required to 2030, against roughly \$1.9 trillion currently mobilised — 93% of it for mitigation and only about 3% for adaptation. Adaptation finance, however, shows the largest relative shortfall, at ten to twelve times estimated needs, while biodiversity finance stands at \$77–87 billion against a \$200 billion target. Pollution prevention lacks any integrated global tracking framework at all. Combining the three areas, financing needs amount to 6.6% of global GDP and the gap to 4.8%, with the shortfall falling disproportionately on the private sector. The review examines instruments for closing these gaps: biodiversity-premium carbon credits, REDD+, GSSS bonds, debt-for-climate and debt-for-nature swaps, blended finance, dual-purpose mitigation—adaptation investments, and climate-related prudential policy for central banks, where stress tests and disclosure requirements show the strongest evidence of effect. A more detailed assessment of the financing gap for each area the planetary crises has been carried out for the EU, where more data are available. As for the global data it shows the largest gap for climate finance but also identifies a significant gap in pollution prevention.

It concludes by identifying gaps in understanding — notably the weak tracking of pollution finance and the insufficient identification of synergies and trade-offs across the three objectives — and the research needed to address them.

Keywords: sustainable finance, climate change, biodiversity, pollution, public, private.

1. INTRODUCTION

The topics in the title of this paper cover a vast literature. What is provided in this review is very much in the nature of an overview of the issues involved in the links between climate change and sustainable finance. These links are explored in the wider context of the planetary crisis in which climate is looked at in conjunction with the challenges of biodiversity loss and pollution because these things are not independent and dealing with one and not taking account of the interactions with the others will result in an incomplete assessment of the problem.

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We begin by defining sustainable finance and follow that by reviewing the current flows of finance for climate change and related planetary challenges. These are compared with the amounts of finance needed to address climate risk and these related challenges. Given the gap in financing, we explore ways in which more finance can be mobilized and actions that can be taken in financial institutions to make the use of such finance more effective and more sustainable.

Since climate risk is related to the other problems of biodiversity loss and pollution, we look at the synergies and trade-offs between measures that address each of these components.

Finally, the review notes areas where there are gaps in understanding the problem and where further research is needed.

2. WHAT IS SUSTAINABLE FINANCE?

The European Commission¹ views such finance as a process of taking *environmental, social and governance (ESG) considerations* into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects. *Environmental considerations* include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity, pollution prevention and the circular economy. *Social considerations* could refer to issues of inequality, inclusiveness, labour relations, investment in people and their skills and communities, as well as human rights issues. The *governance* of public and private institutions — including management structures, employee relations and executive remuneration — plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process. The OECD² takes a similar approach stating that sustainable finance integrates environmental, social and governance (ESG) information into the decision-making process of companies and financial institutions.

We work within this framework for sustainable finance, especially the links between climate change and other areas. In this context, it is useful to know the magnitude of flows for mitigating climate impacts as well as for adapting to climate change compared to estimates of needs. It is also relevant to track the finance for limiting biodiversity loss relative to the amount needed to reduce such loss. The same applies to finance for actions to reduce pollution.

There are significant links, synergies and trade-offs between finances allocated to each of these objectives. Allocating finance to reducing GHGs will in most cases also result in a decrease

1 https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en

2 <https://www.oecd.org/en/topics/sub-issues/sustainable-finance.html>

in local air pollutants from fossil fuel combustion and the health benefits of the reduction in those can often significantly lower the overall costs of making the transition away from fossil fuels (Markandya et al., 2018; Vandyck et al., 2018)).

In terms of biodiversity, climate change could overtake land use change as the leading cause of biodiversity loss by 2070 (Newbold, 2018). Wildfires are increasing as a cause of loss of forests and climate change is affecting and will continue to affect all forests, especially tropical forests.³ A key indicator of biodiversity is mean species abundance, and this is declining with temperature rise (Dasgupta, 2021). The use of wood for energy is still an important source of deforestation in some hot spots (Bailis et al., 2015). And the change in climate is altering marine biomes including systems such as coral reefs (Hoegh-Guldberg et al., 2007).

Biodiversity also has huge implications for climate change. Enormous amounts of carbon are locked within animal life and vegetation. The Amazon contains carbon equivalent to a decade of global human emissions.⁴ Biodiversity loss reduces significantly the capacity of the biosphere to absorb waste (WWF, 2022).

Regarding pollution and its links to climate change and biodiversity, the discharge of pollutants contributes to the degradation of the biosphere. As the pollution damages forests, lakes, rivers, estuaries and coastal waters, coastal waters suffer from eutrophication when subjected to overload of nutrients (Akinawo, 2023), with consequences for recreation, fisheries etc. One issue which sometimes goes the other way is emissions of sulphur, a pollutant which can reduce the impacts of greenhouse gases and temperature and if it is reduced, may actually increase the temperature.

The OECD projections to 2050 indicate that, under current policies, all three elements of the planetary crises will worsen over that period. Global temperatures will rise from around 1.2°C in 2020 to 2.1°C by 2050. Historical data confirm that Europe is warming faster than any other continent, with temperature increases running about 1°C higher than the global average.⁵ The effects of these increases are already being felt. The Summer of 2026 has been marked by extraordinary and record-breaking heat, led by Western Europe recording its hottest June on record at 3.06°C above the recent 1991–2020 average, according to the [Copernicus Climate Change Service](https://climate.copernicus.eu/). Wildfires have raised mass evacuations and national emergencies in France and Spain.

Biodiversity will continue to decline, with mean species abundance (MSA) falling from 59.7 in 2020 to 56.5 in 2050. This reduction may appear modest but is equivalent to the

3 <https://gfr.wri.org/latest-analysis-deforestation-trends>

4 <https://www.worldwildlife.org/places/amazon/>

5 <https://www.eea.europa.eu/en/topics/at-a-glance/climate>

conversion of several million km² of pristine habitat into areas where all the original species have been lost.

With respect to pollution, plastic leakage into the environment is expected to increase by 64% between 2020 and 2050, undermining efforts to meet the global ambition to end plastic pollution. The nitrogen surplus indicator shows a smaller but still notable increase, reaching a 32% rise over the same period. A more positive development is the projected global decline of 21% in population weighted PM_{2.5} concentrations by 2050 relative to 2020 (OECD, 2024).

3. FINANCE FOR CLIMATE CHANGE

Finance for climate change is separated into that for mitigation (i.e., reducing GHGs) and adaptation (i.e., adapting to a changing climate). Global Estimates by the CPI (Climate Policy Initiative, 2025) indicate that at least \$6.3 trillion in annual climate finance will be needed from 2024 to 2030 to avoid the worst impacts of climate change. Current finance for mitigation and adaptation by CPI is estimated around \$1.9 trillion a year, made up 93% for mitigation and about 3% for adaptation. The rest is a mixture of the two.

Mitigation Finance

So, there is a major gap to fill. Climate mitigation finance reached \$1.9 trillion in 2023, but it has risen quite sharply — about 134% since 2018. This includes investment in various mitigation programmes involving: energy, transport, buildings, and infrastructure. As noted, most of the total finance has been for mitigation and of that, about one-third has been public and about two-thirds private. Hence for climate mitigation we are seeing a significant amount of expenditure coming from private sources. But mitigation amounts are still far short of needs: the gap is between \$4.4 and \$8 trillion a year, which equals to between 8 and 18% of all direct investment positions globally.

It is clear that a massive scaling up is needed if the climate finance targets are to be achieved. How can this be done within the framework of sustainable finance? These issues are discussed across the papers in this volume in some detail, but the following key points can be noted here. First, amounts of finance going to fossil fuel production and distribution are still large: they were about \$1.2 trillion in 2024. At present, low carbon energy supply accounts for only 4% of global listed equity, compared to 10% for fossil fuel supply. Banks continue to finance fossil fuel supply heavily, with an estimated \$1 trillion allocated in 2022, although that is much less than the \$7.7 trillion of finance for low-carbon energy (IEA, 2025).

Second, fiscal incentives for switching to low carbon in the form of carbon pricing are still low and regulations for net zero are facing significant pushback. At present, only about 3.2% of emissions are priced at or above the recommended level and only 28% of emissions globally are covered by any pricing.⁶

Third, there are some positive trends as well. Costs of key clean technologies continue to fall rapidly, making them more competitive. The IEA's clean energy equipment price index hit a record low in early 2024, a 60% fall compared to 10 years ago. Solar panels and wind turbine prices have gone down 60% and 50% since 2022 and much more if you go back another decade (IEA, 2025).

A trend against that is the costs of grid materials, which have doubled in the last five years as a result of the demand for cables and transformers, raising infrastructure costs. Intermittency with renewables is an issue, but costs of battery storage are declining fast and declined 93% since 2010. And intermittency can be addressed through better connected grids and through variable electricity pricing. And these tools still have much greater potential than has been realized.

A key role in promoting changes that increase mitigation finance in a sustainable way lies with the central banks, who need to adopt climate-related prudential policies for risk management supervision. The integration of climate change-related risks into prudential policies covers: (a) capital (broadly covering minimum capital requirements); (b) risk management and supervision; (c) market discipline and (d) policies relating to liquidity and large exposures (OECD, 2024). On minimum capital requirements, this can be done through adjusting capital adequacy ratios with so-called green supporting or brown penalising factors, adjusting capital requirements for specific sectors highly exposed to climate-related risks or ones that can benefit from the climate transition, and adjusting counter-cyclical and systemic risk buffers. On risk management and supervision, climate-related measures involve integrating climate risks in stress tests, adjusting requirements for the quality and level of capital, or specifying lending limits. On market discipline integration mainly refers to climate-related disclosure policies for banks. Finally, liquidity requirements can be adjusted to better reflect climate related risks to banks' operations. Policymakers could restrict the share of banks' portfolios that are exposed to particularly high climate-related risks to limit their vulnerability to shocks. Similar exposure restrictions already exist for other risks (OECD, 2024).

In terms of implementation, prudential policies have mostly been implemented for capital-related policies. By 2023, 41 countries and the EU had developed some climate-related capital-related policies. Within climate-related and capital-related prudential policies, climate-related risk management and supervision policies are most common, often combined with

⁶ [Home Page | Carbon Pricing Dashboard](#)

related disclosure policies for financial institutions. Climate stress tests have been, to date, the most common climate-related risk management and supervision policies adopted or piloted.

An evaluation of the different measures is limited by a lack of data. Where attempts have been made, they have often relied on assessments based on theoretical models. Empirical data have been examined, however, for climate-related stress tests and climate-related disclosure requirements. According to the OECD, these two requirements (especially stress tests) are found to have a positive effect on reducing climate-related risks and increasing climate-related finance. Other measures studied through modelling approaches find mixed effects for restrictions on level and quality of capital, but generally positive effects of liquidity and exposure requirements (OECD, 2024).

Adaptation Finance

The amounts available for adaptation are much smaller than mitigation. About \$123 billion globally was the figure compared to \$1.7- \$1.8 trillion for mitigation. The flows for adaptation in developing countries are around \$26 billion. Compared to estimated needs, there may be a 10 to 12 times shortfall, according to the UNEP Adaptation Gap Report (UNEP, 2025).

In Western Europe, total investment for adaptation was about €13 billion in 2023 (Climate Policy Initiative, 2025). A European Commission study estimates the needs of the EU (which is not the same as Western Europe, but the difference is small) at around €70 billion a year to 2050.⁷ So even in this region there is quite a big gap which needs to be filled.

For adaptation generally, the private sector accounts for very little of the total. It is about 5% in high income countries, while in developing countries adaptation finance is predominantly obtained through public international sources. In 2022, the public share of such finance was almost 100% for least developing countries and for the emerging market economies it was 97%. Furthermore, international public finance has declined since 2022 and further declines are expected, so there will be even bigger gaps to fill.

How can adaptation finance be increased? More private sector investment has been identified as being possible, especially in the areas of agriculture, water use and infrastructure. According to UNEP about 15 or 20 % of adaptation can be met in this way. In developing countries, the public sector's role of de-risking the investment and providing leverage is very important although there is potential for increasing it. The average leverage ratios for adaptation finance are 2:1, considerably lower than mitigation (3.6:1) (UNEP, 2025).

⁷ [EU needs to invest €70 billion per year in climate adaptation up to 2050 - Climate Action](#)

Further, there is need to find more ways of linking finance (i.e., where the funds come) to funding (i.e., who pays for the investments). Without clear and reliable sources of revenue private finance will not be forthcoming. The link could be done by mobilizing the funding sources through measures such as charging for land value enhancement or for the creation of increased resilience to the beneficiaries. Such measures may face opposition on grounds of equity or affordability but there is still some potential for them. At present, a lot of the adaptation finance is funded after the event from public sources.

Lastly, adaptation finance can be increased by supporting dual purpose investments that combine mitigation and adaptation. This is especially in areas of agriculture, forest and land use. Forest, water and waste are key sectors where complementarity exists and where it is playing an increasing role (Climate Policy Initiative, 2025).

4. FINANCE FOR BIODIVERSITY

The second area where sustainable finance to address climate risk needs to engage is biodiversity loss. Here the global biodiversity framework is a central guide.⁸ The framework has many targets, but one of the key ones is to halt and reverse biodiversity loss by 2030 and restore 30% of degraded areas. The finance target is to increase finance for biodiversity actions and strategies to about \$200 billion by 2030. The OECD estimates current finance from all sources about \$77 to \$87 billion (OECD, 2020). So again, there is quite a significant gap here.

Biodiversity, like climate change and to some extent pollution, is hard to finance because it is a public good. Hence it is under provided by the market. Furthermore, there is a global subsidy involved because biodiversity rich countries (a large amount of the biodiversity is in the global south) provide conservation benefits to the financially rich in the global north.

Instruments for raising finance for biodiversity conservation that also contribute to reducing climate risk include: (a) carbon credits with a biodiversity premium; (b) public-private sector bonds and public debt conversion and (c) private sector biodiversity markets.

Carbon Credits and Biodiversity

Carbon credits are certificates representing the removal of an amount of CO₂ from the atmosphere. They are purchased by parties on the voluntary carbon market (VCM) who wish to contribute to such reductions for a variety of reasons. Biodiversity-positive carbon credits are carbon credits that include additional and specific management actions linked to the enhancement, conservation, and or restoration of biodiversity. As a result of these

⁸ <https://www.cbd.int/gbf>

additional nature benefits, the credits can be sold at a premium, thus providing some finance for biodiversity protection. The VCM has a market valuation approaching US\$2 billion (GEF, 2023) and about 10-15% of these have a biodiversity premium status⁹.

In addition to the biodiversity-linked credits, there is also the REDD+ framework to bundle carbon reductions, human wellbeing and nature enhancement. Around 50 countries have REDD+ programs at various development phases, and over 350 REDD+ projects have been initiated to date. Project-based REDD+ credits are supplied both to the voluntary carbon market (VCM) and to compliance markets. The annual amount of REDD+ approval, however, in the five years to 2023 was only about \$362 million.¹⁰ Problems with the mechanism include: issues around additionality, leakage and permanence and actual and perceived integrity of the credits (GEF, 2023).

Despite the recent growth in biodiversity-linked carbon credits, the supply of such credits from both these sources remains small.

Sustainability Bonds and Debt Relief

A second source of sustainable finance is through sustainable bonds and through the repurposing of sovereign debt relief for environmental purposes. Instruments involving public and some private sources also support nature and climate objectives. One of these is Green, Social, Sustainability and Sustainability-linked (GSSS) bonds, which represent a new asset class across developed markets. GSSS bonds, which grew by \$600 billion in 2021 alone, are borrowing instruments where the financial and structured characteristics are based on meeting pre-agreed sustainability criteria measured through key performance indicators (KPIs) (GEF, 2023). For example, nature performance bonds are tied to measurable targets for restoring wetlands, protecting forests, and reducing threats to wildlife and plant species, while still allowing for general use of proceeds (Nature Finance, 2021).

While having considerable potential, GSSS bonds still make up just a fraction of the bond market. The size of this market remains particularly limited in developing countries: Africa, for instance, accounted for only 0.077% of the global green bond market in 2021 (GEF, 2023). The market for GSSS bonds is hampered by several barriers in developing countries, especially least developed countries and small island developing states. Adequate market infrastructure is needed to provide the foundation for capital market depth and liquidity (Markandya, 2025). The share of the funds raised that are used for environmental purposes can also be quite small.

⁹ <https://www.msci.com/research-and-insights/blog-post/the-carbon-credit-market-could-help-solve-the-biodiversity-funding-challenge>

¹⁰ <https://climatefundsupdate.org/wp-content/uploads/2024/04/CFF5-2024-ENG-REDD-DIGITAL.pdf>

Debt conversions, often known as “debt for-climate” and “debt-for-nature swaps” are transactions where countries restructure, reprofile, and reduce their debt obligations in exchange for committing some portion of the freed-up financing toward domestic climate and nature projects (IMF, 2022). Debt for climate and nature swaps rely on blended finance, in the form of insurance policies or guarantees to provide below market borrowing rates for the borrower country. Examples include the GEF-supported Seychelles’ 2016 debt conversion, which resulted in \$22 million of investment in marine conservation (Convergence, 2017). Belize’s 2021 debt conversion enabled the issuance of \$364 million worth of blue bonds linked to national marine conservation activities (TNC, 2022) (Markandya, 2025). Recently, Portugal agreed to provide debt relief to Cabo Verde on condition the funds are used for climate and nature (Expresso Das Ilhas, 2023).

5. FINANCE FOR POLLUTION PREVENTION

The pollution crisis is the result of the release of various substances into the environment across several media (air, water, and soil). Its impact on both human health and wildlife is significant, with pollution being responsible for an estimated 9 million deaths annually, equivalent to one in six deaths worldwide (Fuller et al., 2022). The main forms of pollution that make up the crisis are particulate matter and ground-level ozone (air pollution), nutrients, chemicals and plastics (OECD, 2025).

As noted earlier, links between air pollutants and the drivers of climate change are strong. The links between pollution and biodiversity loss are also important. OECD (2024) notes that among species at risk of extinction, 18.2% are affected by pollution and that pollution ranks as the third most significant driver of biodiversity loss, up from fourth according to IPBES (IPBES, 2019).

Indicators that track pollution include population-weighted $PM_{2.5}$ concentration for air pollution; leakage of plastic waste into the environment for plastic pollution; area of surface water exceeding critical phosphorus concentration thresholds, and nitrogen surplus from agriculture for nutrient pollution (OECD, 2025).

In the case of pollution prevention, unlike for climate change and biodiversity, there is no integrated planning and reporting framework and no overall estimate of finance. National pollution control and management policy is made up of disparate policies and plans developed in response to different priorities and multilateral environmental agreements. These target various environmental problems such as air and water pollutants and hazardous chemicals, across different life cycle stages.

The OECD has recommended quite recently developing national plans to tackle pollution comparable to those available for climate change and biodiversity (OECD, 2025). This may be conducive to the identification of policy gaps as well as opportunities for synergies and risks of trade-off.

While there are also no global figures for financing pollution like those for climate and biodiversity, some data are available for the EU. Before looking at those, a summary of the known finance gaps at the global level are given. This recaps the discussion and figures presented earlier. It is followed by a more complete set of estimates of the financing gaps for pollution, climate change mitigation and adaptation, and biodiversity conservation for the EU. Through these we see the financing gaps that need to be filled for these three areas across this region.

6. GLOBAL SUSTAINABLE FINANCING GAPS EXCLUDING POLLUTION

Table 1 brings together the information available on finance needs and current expenditures at the global level for climate change and biodiversity. As noted, comparable data are not available for pollution. The finance needs as well as current expenditures are greatest for climate mitigation, followed by climate adaptation. The amounts for biodiversity by comparison are

Table 1

Global finance needs and levels for climate and biodiversity

	USD Billion Unless Otherwise Stated				
	Needs	Current	Gap	Public gap	Private gap
Mitigation	6,200	1,767	4,433	1,478	2,955
Adaptation	1,353	123	1,230	N.A.	N.A.
Pollution Prevention	N.A.	N.A.	N.A.	N.A.	N.A.
Biodiversity	200	82	118	N.A.	N.A.
Total	7,753	1,972	5,663		
As % of:					
Global GDP in 2024	6.6%	1.7%	4.8%		
Global Investment in 2024	27.1%	6.9%	19.8%		

N.A.: Not available

Notes:

1. Public and private gaps for mitigation assume needs are in the same proportion as current public and private finances.
2. In the case of adaptation about 5% of expenditures in high income countries are private and the rest public. In all other countries, virtually all expenditures are public.
3. In the case of biodiversity, a very high percent is currently public although new instruments involving the private sector are being developed.
4. Global GDP in 2025 is estimated at \$117.2 trillion. <https://statisticetimes.com/economy/world-gdp.php>
5. Global fixed capital formation figure for 2024 was \$28.6 trillion. (World Bank Data).

Sources: See Text.

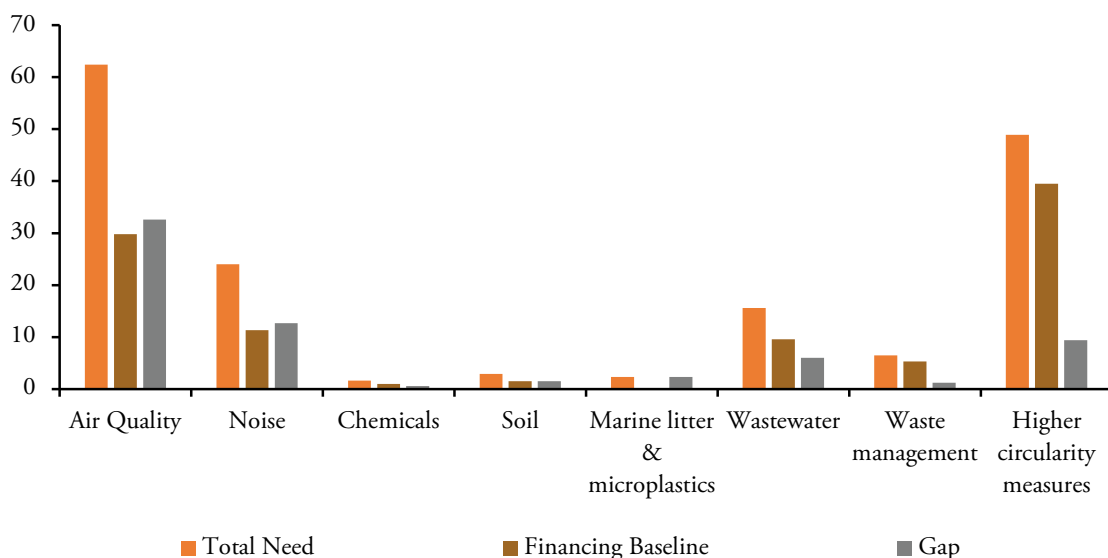
much smaller. The gap for mitigation finance is currently around \$4.4 trillion.¹¹ Based on the current private and public expenditures this would amount to about \$1.5 trillion for the public gap and nearly \$3 trillion for the private gap. We note in the text, however, there are several initiatives to increase the role of the private sector. Looking at the total (which is incomplete as pollution is not included), financing needs are about 6.6% of global GDP and 27.1% of global fixed capital formation. The corresponding gap is 4.8% of GDP and 19.8% of gross fixed capital formation. These are large amounts to raise between now and 2030.

7. FINANCING GAPS FOR THE EU INCLUDING POLLUTION

The European Environment Agency (EEA) has estimated the levels of finance needed to meet its 2050 zero pollution goals — i.e., to levels of pollution that are considered no longer harmful to the environment and human health.¹² To achieve this goal by 2050, it has set important milestones along the road. By 2030, it will require around €76 billion in EU investments. The significant current investment gap of approximately €40 billion is expected to be filled largely by private investments and additional measures through national energy and climate plans. Figure 1 shows the gap by area of pollution prevention. The biggest needs and gaps are for air

Figure 1

Pollution prevention finance in the EU 2030



Sources: Zero pollution: financing the investment gaps (Signal) | Indicators and signals | European zero pollution dashboards (EEA).

¹¹ Figures are averages over a range.

¹² <https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/zero-pollution-financing-the-investment-gaps-signal>

quality improvement, noise prevention, managing wastewater and circularity measures. The last of these consist of measures to prevent pollution and waste before it arises. They consist of designing and manufacturing goods to eliminate waste creation from the start; creating systems like refill stations or deposit-return programs to keep items in use; inspecting, cleaning, or repairing used products so they can be used again without remanufacturing and removing hazardous chemicals and dangerous materials from products during the design phase.¹³

The data show that around 47% of investment needs for pollution prevention are being met. Private funds are expected to account for a significant share of investments going forward, along with increased efforts by EU member states, partly through in-country resources and partly through EU funding, such as through the National Energy and Climate Plans. The European Commission says general government plus non-profit institutions serving households accounted for 28% of total national expenditure on environmental protection in 2022 (European Commission, 2026). In this context, easily understandable disclosures, well-introduced green bond standards, and incorporation for environmental, social, and governance elements into the ratings of corporations will help increase private finance. Also, reductions of fossil fuel subsidies will act as a means of reducing pollution as well as greenhouse gases.

A review similar to that for pollution was carried out by the European Commission for the finance gaps related to biodiversity conservation. Overall expenditure supporting biodiversity — including the EU budget, Member States' national budgets, and private expenditure — was reported at around €29 billion in 2021.¹⁴ The estimated annual needs across the EU by 2030 are estimated at €48 billion.¹⁵ We do not have an estimate of actual current expenditures but it is unlikely to very different from that in 2021. The current EU budget for biodiversity for example is fixed for the period 2021-2027 at €113 billion, or €16 billion per year.¹⁶ Taking these figures, the financing gap in 2030 for the EU region is likely to be around €19 billion, a figure also calculated by the Institute of European Environment Policy.¹⁷ In the case of biodiversity approximately 80% of biodiversity conservation funding in the EU comes from public sources, while the private sector contributes the remaining 20%.¹⁸

13 See: <https://rethinkplasticalliance.eu/news/the-new-circular-economy-action-plan/>; <https://watereurope.eu/european-parliament-adopts-resolution-on-the-new-circular-economy-action-plan/>; <https://ecostandard.org/wp-content/uploads/2019/12/The-Next-Circular-Economy-Action-Plan-Priority-Measures-For-The-European-Commission.pdf>

14 https://knowledge4policy.ec.europa.eu/biodiversity/eu-action-biodiversity-financing_en

15 https://wwfeu.awsassets.panda.org/downloads/invest-in-nature-for-people-and-planets-wellbeing_1.pdf

16 https://commission.europa.eu/strategy-and-policy/eu-budget/performance-and-reporting/horizontal-priorities/green-budgeting/biodiversity-mainstreaming_en

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18 <https://www.sciencespo.fr/chair-sustainable-development/files/Unlocking-Private-Finance-for-Nature-.pdf>

As far as finance for climate mitigation and adaptation is concerned, estimates for 2030 have been made by the Climate Policy Initiative (CPI) for individual member states. They indicate that, based on latest figures, about €13 billion is spent on adaptation and €325 billion on mitigation. The needs by 2030, however, are estimated at €83 billion for adaptation and €718 billion for mitigation, implying financing gaps of €70 billion and €393 billion respectively.

All these figures are collated in Table 2, along with statistics on the share of 2025 GDP and of EU investment they represent. In the case of the public sector financing gap, it is also reported as a percent of EU public expenditures as a whole in 2025.

The table shows that there are significant financing gaps for all areas of sustainable finance, with the largest gap in absolute terms being from climate mitigation, followed by climate adaptation and pollution prevention. Relative to current levels of expenditure, the gap is largest for adaptation, with mitigation and pollution prevention being similar.

The breakdown of the gap between public and private finance indicates that more needs to be raised from private sources (€313 billion) than from public ones (€210 billion). As a percent of total investment by each of these sectors, however, the public gap amounts to around 31%, whereas the private one is much less — at around 8%. Hence, there is a strong need to shift financing further to the private sector. As we have discussed, there are several options for doing this for all three areas, but it needs a major effort and a significant upscaling of the measures currently being implemented.

Table 2

Financing needs and expenditures in the EU

	Euros Billion Unless Otherwise Stated				
	Needs	Current	Gap	Public gap	Private gap
Mitigation	718	325	393	118	275
Adaptation	83	13	70	67	4
Pollution Prevention	76	36	40	9	31
Biodiversity	48	29	19	16	3
Total	925	403	522	210	313
As % of:					
EU GDP	4.7%	2.1%	2.7%	1.1%	1.6%
EU Investment	21.1%	9.2%	11.9%	30.7%	8.4%
EU Public Expenditure				2.2%	

Sources: See Text.

8. CONCLUSIONS

The financing needs for meeting climate change, biodiversity and pollution prevention are significant across all countries. Although amounts being mobilized are rising fast, the gaps that need to be filled are very large. Climate change mitigation has the largest requirements and needs to go up at least threefold. The good news here is that private investment in low carbon is increasing fast. Incentives to reflect risks for fossil fuel investment and support renewables can speed up this process. In this regard, the banking sector has an important role to play. A number of instruments have been introduced recently, and evidence shows that climate-related stress tests and climate-related disclosure requirements (especially stress tests) have a positive effect on reducing climate-related risks and increasing climate-related finance. Increased adoption of these is therefore recommended.

Adaptation to climate change has lower finance requirements but depends significantly on the public sector and the relative gap is greater than for the mitigation, especially in developing countries. Increasing the private sector's role is possible to a limited extent but needs concerted action through blended finance, leveraging scarce public funds to attract private sources and the use of dual-purpose programs.

The needs for biodiversity conservation are more than double the actual flows. The expenditures are needed most in biodiversity rich countries, which are mostly in the global south. Most finance will have to continue to come from public sources, but there is a potential for the private sector through various instruments such as carbon credits with a biodiversity premium, public-private sector bonds and public debt conversion that targets some of the funds realised for biodiversity conservation and private sector biodiversity markets. At present the extent of finance from these sources, however, is small.

Pollution prevention is not tracked globally in an integrated manner, and this gap needs to be addressed. Finance for such prevention is from a mixture of public and private sources, with the adoption of the polluter pays principle (PPP) determining to some extent, who finances the measures to reduce pollution. However, PPP is not universally adopted, partly on distributional grounds, so the public sector bears some of the burden. A more detailed review for the EU revealed that general government plus non-profit institutions serving households account for around 28% of national expenditure on environmental protection. Increasing the role of the non-public sector would involve the use of pollution disclosure requirements, green bonds with strong links to pollution reduction, and the incorporation for environmental, social, and governance elements into the ratings of corporations. Further, as noted, reductions of fossil fuel subsidies will act as a means of reducing pollution as well as greenhouse gases.

There is also a gap in identifying synergies and trade-offs when designing programs. This is also an area where action is needed.

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