NET ZERO+
Building Climate
and Economic Resilience

Scaling up finance and investment for climate change adaptation

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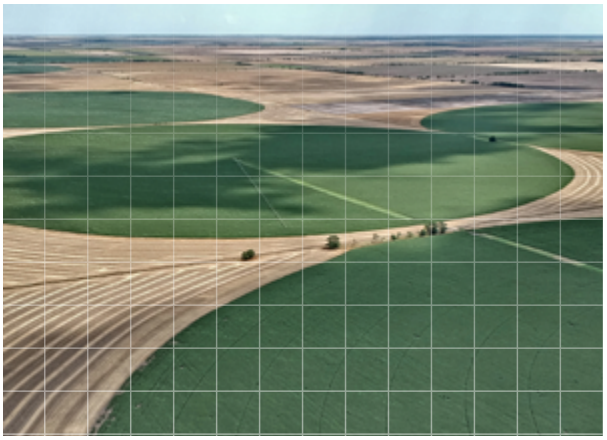

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Abstract

Global finance for adaptation remains well below what is needed to address the impacts of climate change. This paper presents recent evidence on the finance and investment gap and provides an overview of key policies to align investment flows with climate adaptation goals. Developing detailed funding strategies for National Adaptation Plans, mainstreaming adaptation considerations into public budgeting, and improving policy coherence are integral to creating an enabling environment for investment. Enhancing transparency in financial disclosures, aligning private and public incentives, and expanding risk transfer mechanisms are essential to promote sustainable financial markets. Scaling up adaptation finance in developing countries, which are especially vulnerable to climate change, requires better strategic use of international public finance. Key actions that can help to this end are: assessing the consistency of international providers' spending plans with climate finance goals; supporting countries' efforts to strengthen their enabling environments; improving development practices and systems; leveraging public and blended finance to mobilise private investment; and exploring innovative financing sources.

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The paper builds on the work of several OECD committees, including (in alphabetical order): the Development Assistance Committee, Environmental Policy Committee, Insurance and Private Pensions Committee, Investment Committee, Public Governance Committee and Committee of Senior Budget Officials.

The Net Zero+ project

The OECD's Horizontal Project *Net Zero+: Building Climate and Economic Resilience* harnesses the multidisciplinary reach of the OECD to support governments in driving the swift transformational change needed to tackle climate change. The project provides analysis and insights for governments to accelerate and scale up climate action: driving a rapid and resilient transition to net-zero while building economic and societal resilience to impacts of climate change.

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Executive summary

Climate adaptation efforts, such as constructing resilient infrastructure or developing early warning systems, are vital to address the diverse impacts of climate change. However, policy misalignments, capacity challenges, and fiscal constraints are holding back the finance and investment flows required to support climate adaptation.

This paper presents recent evidence on the adaptation finance and investment gap and provides an overview of key policies to align investment flows with adaptation objectives. Specific attention is paid to the actions of multilateral development banks and bilateral and other international providers to contribute to scaling up finance for adaptation in developing countries.

Key messages

- Climate adaptation is crucial to reduce the risks and costs of climate impacts. Yet, while global adaptation investments have increased, they remain far below what is needed, especially for developing countries.
- Addressing the adaptation finance gap requires scaling up public and private sector finance by aligning investment frameworks with climate resilience goals. This requires action across multiple policy areas, including establishing effective regulations and an enabling environment for adaptation investments.
- National adaptation plans (NAP) should include clear and detailed funding strategies that aim to match financing needs with appropriate public and private sources, ensuring co-ordinated efforts to address financing gaps.
- Green budgeting frameworks and updated project appraisal tools to account for uncertainties and non-market benefits of adaptation help to mainstream climate adaptation into public spending. Targeted financial support may be needed to align public and private incentives and mobilise private sector investment.
- Increased transparency and standardisation of disclosures can help align financial markets with climate resilience objectives. Governments play a key role in setting disclosure requirements, improving data access, and, in some jurisdictions, supporting the development of credible taxonomies for identifying adaptation investments.
- Insurance and risk transfer mechanisms can contribute to managing physical climate risks by encouraging risk reduction through risk-based pricing and financial protection. Significant coverage gaps remain, however, particularly in high-risk areas. Targeted programmes may be needed to ensure the accessibility and affordability of insurance where there are significant financial protection gaps.
- Developing countries, which are highly vulnerable to climate impacts due to their geographic location and limited investment capacity, face multiple barriers to accessing adaptation finance. International climate finance providers can scale up funding for climate change adaptation for developing countries by: 1) assessing the consistency of their spending plans with climate finance

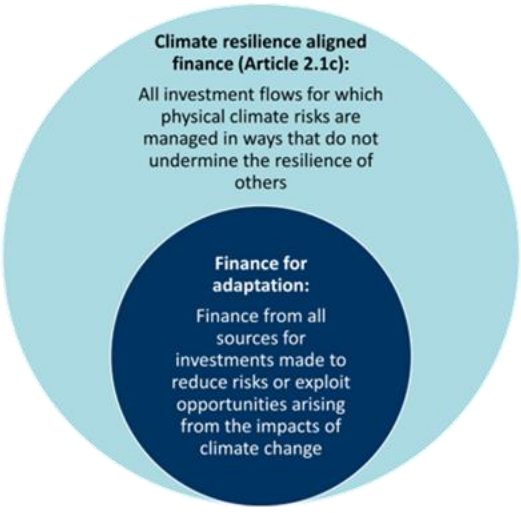
goals; 2) supporting developing countries' efforts to strengthen their domestic enabling environments; 3) improving development practices and systems for efficient adaptation finance delivery; 4) leveraging public and blended finance to mobilise private investment; and 5) exploring innovative financing sources (e.g. carbon markets).

1 The adaptation finance and investment gap

Strengthening climate adaptation[1] is essential to protect communities, economies, and ecosystems from increasing risks posed by climate impacts. Effective adaptation efforts can enhance resilience[2], better equipping systems to handle future disturbances (OECD, 2023[1]). Investment in climate adaptation can help key sectors such as agriculture, water and flood management, infrastructure, and business and industry better withstand climate disruptions, which in turn can help to lower costs, prevent losses, and support sustainable growth even as climate challenges intensify (OECD, 2024[2]).

There is a need to align all finance flows with climate resilience objectives, as stipulated in Article 2.1c of the Paris Agreement, which calls for "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (Figure 1, outer circle) (UNFCCC, 2015[3]). This means increasing finance to activities that contribute to climate objectives, such as solutions and transition efforts, while diverting finance from those that hinder climate mitigation and resilience (OECD, 2024[4]). Assessing the climate alignment of finance flows entails evaluating whether financial flows and stocks, including transactions related to goods, services, and assets, contribute to climate resilience, and requires credible, transparent, and comparable metrics to inform decisions and prevent greenwashing (Noels et al., 2024[5]).

Figure 1. Finance flows for climate adaptation



Source: Authors based on (OECD, 2023[1]).

Global investment needs for climate adaptation are likely to be in the hundreds of billions of dollars annually (Figure 1, inner circle) (OECD, 2024[2]) (UNEP, 2023[6]) – USD 215 billion and USD 387 billion per year this decade (UNEP, 2023[6]). Overall investment needs will depend on progress on climate change

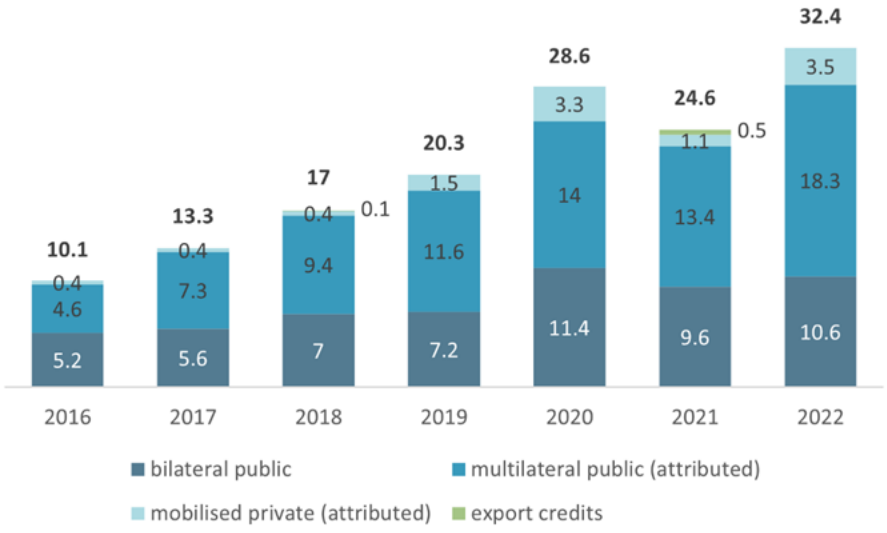
mitigation, with costs rising significantly under more pessimistic global warming scenarios. For example, estimated annual investment needed for climate adaptation in the European Union and United Kingdom ranges from EUR 40 billion per year if global temperature rise is limited to 1.5°C to EUR 175-200 billion per year if temperatures rise by 3-4°C compared to pre-industrial levels (European Environmental Agency, 2023[7]).

Estimated adaptation investment flows are well below estimated needs. Some estimates of global adaptation finance identified worldwide flows of USD 76 billion in 2022, albeit with significant coverage gaps (CPI, 2024[8]).[3] Climate finance mobilised by developed countries for adaptation in developing countries reached USD 32.4 billion in 2022, suggesting that efforts are on track to reach USD 40 billion by 2025, in line with the call made by the Glasgow Climate Pact (2021) to at least double the collective provision of climate finance for adaptation from 2019 levels by 2025 (Figure 2). Still, even allowing for underreporting of adaptation-relevant finance from some sources, overall levels remain significantly below what is needed (OECD, 2024[2])[4].

Globally, adaptation finance is largely dominated by public actors, while private sector contributions remain fragmented and underreported. OECD data shows that, in 2022, almost 90% of adaptation finance provided and mobilised for developing countries came from bilateral and multilateral public sources.[5] (OECD, 2024[9]). While adaptation finance from the private-sector more than doubled between 2019 and 2022 (from USD 1.5 billion to USD 3.5 billion) it is important to note that the substantial increases in private adaptation finance mobilised in 2020 and 2022 were driven by a few large-scale projects in developing countries (OECD, 2024[9]).

Figure 2. Adaptation finance for developing countries provided and mobilised in 2016-2022 per component

USD billion



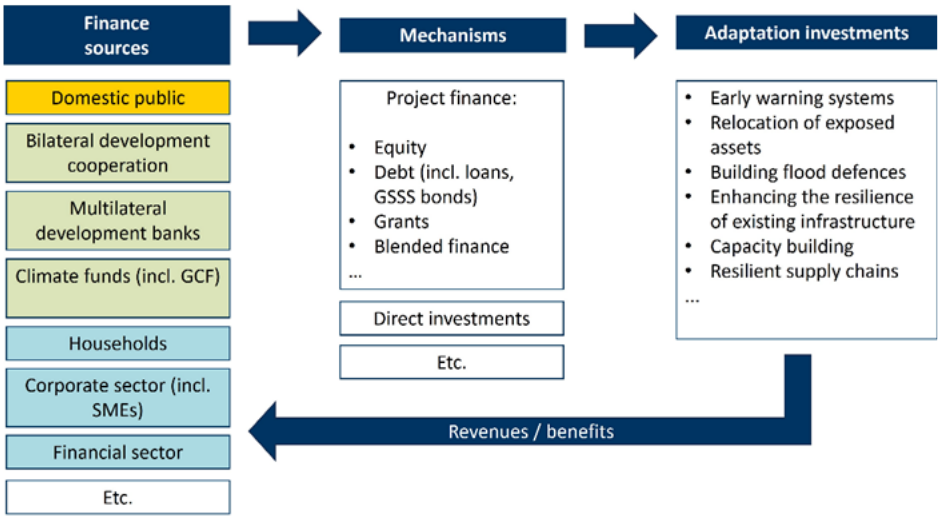
Note: The sum of components may not equal totals due to rounding.
Source: (OECD, 2024[9]).

2 Creating an enabling environment for adaptation investments

Several challenges limit the scale of climate adaptation investment. Behavioural barriers such as short-termism mean that the benefits of adaptation investments, which are often visible only during extreme climate events or over longer time periods, hinder action. Distributional issues also play a role, as communities with the highest adaptation needs often have limited resources, necessitating public finance to support action in low-income and developing regions. Furthermore, adaptation projects often require co-ordinated efforts across interconnected systems, complicating individual investments. Adaptation projects may create both positive and negative externalities, requiring effective regulation to manage negative impacts while monetising positive effects (OECD, 2024[2]).

Creating an enabling environment for climate adaptation investments entails aligning policy actions across a number of policy areas to ensure that funding from all sources is mobilised, including public, corporate and financial sectors, climate funds and development co-operation (Figure 3) (OECD, 2024[2]).

Figure 3. Finance sources, mechanisms and adaptation investments



Note: Colours designate domestic public (yellow), international public (green) and private (blue) sources of finance.
Source: (OECD, 2024[2]).

Building on the OECD Climate Adaptation Investment Framework (CAIF) (Box 1), this section provides an overview of key policy actions to align investment flows with adaptation objectives (OECD, 2024[2]).

Box 1. The OECD Climate Adaptation Investment Framework

The OECD Climate Adaptation Investment Framework highlights six policy areas and best practices that support climate adaptation investment:

- **Strategic planning and policy coherence** involve setting clear adaptation objectives, engaging key ministries including environment, finance or economy, assessing the economic impacts of climate change, translating priorities into financing strategies, ensuring reliable climate data, and tracking progress in mobilising investment.
- **Regulatory alignment** should be ensured through strengthening sector-specific frameworks, providing incentives for climate resilience, reforming distorting subsidies, updating technical standards, and ensuring economic regulation supports investment in adaptation.
- **Insurance and risk transfer** frameworks should promote investment in risk reduction, support resilient recovery after extreme events, and encourage the adoption of climate-related insurance, including innovative approaches like parametric insurance.
- **Public finance and investment** strategies should integrate climate resilience benefits (e.g. saving lives, benefits for health and well-being) into budgeting, procurement, and project appraisals, manage climate risks in public-private partnerships, and address the financial consequences of climate extremes for the public sector.
- **Sustainable finance** should promote the use of financial instruments for adaptation (e.g. ESG funds, green, social, and sustainability (GSS) bonds, and sustainability-linked bonds (SLBs), support credible standards and taxonomies for identifying adaptation investments, and ensure climate risks are considered in financial regulation and supervision.
- **Support and incentives for private investment** should include targeted measures such as tax credits, project development support, fostering innovation, and removing barriers in the intellectual property framework.

Source: (OECD, 2024[2]).

Ensuring that national adaptation plans have clear and fair funding strategies

National adaptation plans (NAP) and strategies (NAS) should include detailed funding plans (OECD, 2024[2]). A dedicated financing strategy needs to be in place for the entire NAP process, from development to implementation. By identifying potential financing sources and the necessary steps to access them, such as building capacity and fostering relationships with key actors (e.g. climate finance providers, private sector representatives), NAP financing strategies play a crucial role in translating adaptation plans into action (International Institute for Sustainable Development, 2017[10]). Countries can fund their NAP process through a combination of domestic and international public and private sources (OECD, 2023[1]), but effectively combining these sources to meet financing needs requires careful planning, co-ordination, and alignment with national circumstances.

To ensure fair and equitable financing of resilient adaptation measures, costs should be distributed among relevant parties according to their ability to contribute. Different actors have different roles and responsibilities in climate adaptation. National governments should support subnational entities, disincentivise investments in high-risk areas, and may need to cross-subsidise entities unable to finance their full share, particularly in vulnerable communities. Local governments are better placed to respond to specific resilience needs within their communities, while beneficiaries such as property or private infrastructure owners should share the financial burden and risk when locating themselves in at-risk areas.

Clear principles on liability and compensation, risk allocation and cost-sharing mechanisms between the public and private sectors can help to ensure equitable financial contributions (OECD, 2024[11]).

Mainstreaming adaptation in public budgeting and improving policy coherence

Green budgeting can help incorporate adaptation into government budget processes. The OECD defines green budgeting as "integrating climate and environmental considerations into the government's budgetary and fiscal frameworks, policies and practices" (OECD, 2024[12]). The 2022 OECD Survey on Green Budgeting shows progress across these areas, with countries enhancing institutional frameworks, expanding tools such as environmental impact assessments, and improving transparency. However, persistent challenges such as insufficient resources and technical expertise and limited climate impact data hinder effective integration of adaptation into budgeting (OECD, 2024[12]).

Green budgeting helps to facilitate the integration of adaptation into budgetary processes by incorporating climate considerations into medium-term expenditure frameworks, specifying requirements in the budget preparation phase, and enhancing reporting practices. For example, the European Union's 2021-2027 budget and NextGeneration EU initiative aim to mainstream climate action with 30% of total expenditure committed to climate mitigation and adaptation alongside a "do no harm" principle to align spending with climate goals, supported by budget tagging, annual reports, and guidance tools (OECD, 2024[2]).

Reviewing sectoral policies can help to avoid misalignment with adaptation objectives. In the building sector, updates to land use and energy efficiency codes can support retrofitting efforts, and infrastructure regulations may need to be reviewed to ensure effective risk management. Governments should also review regulations for business and industry to encourage climate change adaptation by ensuring they address climate risks, promote resilience-enhancing investments, and prevent actions that undermine climate resilience (Box 2). In the water sector, regulations should manage water demand based on ecological limits and future projections (OECD, 2024[2]). In the agriculture sector, subsidies that hinder shift in production that may help to adapt to new climatic conditions and are economically inefficient, such as producer support tied to the production of specific commodities, should be reformed (OECD, 2023[13]).

Box 2. OECD Guidelines for Multinational Enterprises on Responsible Business Conduct: Amplifying synergies for comprehensive climate action

Businesses play a key role in climate adaptation efforts, but to date, many have not been active in this area. In 2022, only one in five companies had a physical risk adaptation plan in place. Where businesses are active on adaptation, they are primary concerned with managing their own exposure to risk from the perspective of business continuity and managing financial impacts. An approach focused solely on reducing exposure to climate risk can be at odds with adaptation goals or end up redistributing climate impacts onto others (e.g. by capturing or diverting resources and land, disengaging, or discontinuing supply of goods and services in high-risk areas).

The OECD Guidelines for Multinational Enterprises on Responsible Business Conduct (OECD Guidelines) are recommendations by governments to businesses, including in the areas of climate change. The OECD Guidelines call on businesses to act both on mitigation and adaptation and ask companies to "avoid activities which undermine climate adaptation for, and resilience of, communities, workers, and ecosystems." They also call on companies to undertake risk-based due diligence with respect to climate and other environmental impacts and "to assess and address social impacts in the context of their environmental management and due diligence activities and to take action to prevent

and mitigate such adverse impacts both in their transition away from environmentally harmful practices, as well as towards greener industries or practices, such as the use of renewable energy."

Adhered to by 52 governments, the OECD Guidelines are increasingly reflected in national regulations and global standards related to sustainability disclosure, supply chain due diligence or sustainable finance. They are supported by the National Contact Points for RBC (NCPs), which promote the OECD Guidelines and function as a non-judicial grievance mechanism for non-observance, including those related to financial institutions' responsibility to address climate change.

Source: (OECD, 2024[14]) (OECD, 2023[15]).

Specific attention should be paid to the regulatory frameworks of regulated monopolies, which can also be misaligned. In many OECD countries, infrastructure networks such as electricity transmission, railways, and water supply are managed as regulated natural monopolies, with a single provider per area due to the impracticality of competition (OECD, 2024[2]) (Box 3). Regulatory frameworks in these sectors can significantly impact firms' ability and willingness to invest in climate change adaptation and may not provide the right incentives for monopolists to invest in adaptation. Regulatory elements influencing such investments include permitting expenditures on resilience improvements, performance standards, minimum share of reinvestment, allowed costs, and requirements such as stress tests and adaptation plan disclosures. By incorporating climate resilience into regulatory frameworks, governments can drive utilities to adopt robust infrastructure investments while balancing the need for affordability and reliability, thus ensuring long-term resilience against climate-related challenges (OECD, 2024[11]).

Box 3. Finance for climate-resilient infrastructure

While investing in climate-resilient infrastructure is expected to be cost-effective by protecting returns, extending asset lifespans, and supporting economic growth, attracting financing for it can be challenging due to complex project cycles, poorly designed regulations, and the long-term nature of investments. As a result, finance flows for climate-resilient infrastructure are currently far below the levels required to meet global climate and development needs. Trillions of dollars in additional investment are needed annually to replace and retrofit aging infrastructure, expand access to services in developing countries, and support the transition to net-zero emissions.

The OECD estimates that an average of USD 6.9 trillion per year is required between 2016 and 2030 for infrastructure investment, with USD 4.5 trillion annually needed for clean energy alone by the early 2030s. Recent analysis found that only USD 31 billion was directed toward climate-resilient projects in 2019-20, highlighting a significant gap. The costs of mainstreaming climate resilience could increase infrastructure project costs by 3%, translating to an additional USD 207 billion per year. Further, substantial investments are needed for disaster-related infrastructure, such as flood defences, with significant expenses expected, as in London's projected USD 20 billion flood protection upgrades.

Investing in climate-resilient infrastructure offers significant long-term financial benefits, often referred to "dividends", including more reliable future cash flows due to reduced chances of unexpected disruptions and minimised economic losses. Moreover, the perception of increased reliability and lower risks can lead to higher revenues, as users are more likely to engage with and use dependable infrastructure. Over the infrastructure asset's life cycle, lower financing and insurance costs further enhance financial stability. While the initial capital expenditure (CAPEX) for climate resilience may be

higher, these long-term benefits can offset the upfront costs, making it a financially sound investment, particularly in emerging and developing markets where such challenges are more pronounced.

Source: (OECD, 2024[16]), (OECD, 2024[11]).

Public procurement and investment appraisal

Mainstreaming adaptation considerations in public procurement plays a key role in aligning public spending with adaptation objectives. Incorporating climate factors into project selection and appraisal tools can help to avoid locking in carbon-intensive and climate-vulnerable infrastructure and support long-term sustainable development (OECD, 2017[17]). Ensuring that climate risks are explicitly identified, managed, and considered in public expenditure decisions is particularly important, including in public-private partnerships (PPP) (OECD, 2024[2]). Furthermore, public procurement can drive sustainable and climate-resilient innovations by creating lead markets for new products.

Project and programme appraisal tools must be adapted to account for the uncertainties and non-market benefits associated with climate change. Traditional appraisal methods such as cost-benefit and cost-effectiveness analyses may require adjustments to capture the non-market benefits of adaptation, including for health and well-being. Real options approaches can be used to take into consideration the uncertainty of climate change impacts, while life-cycle costing can be used to ensure that both (higher) upfront costs and (higher) long-term benefits of climate resilient projects are considered (OECD, 2024[2]).

Incentives to support private sector action

Ensuring investor certainty is crucial to encourage private sector participation in climate resilience projects. Stable and long-term policy frameworks are needed to unlock private investment in climate adaptation, both in physical infrastructure and skills (OECD, 2024[11]).

Targeted financial support may be needed to align private and public incentives. The private sector often fails to fully account for the positive spillovers of adaptation. Targeted government support through financial (e.g. tax breaks, grants) and non-financial incentives (e.g. regulatory incentives, technical and business support) and de-risking instruments (e.g. guarantees, concessional finance, equity stakes) can help to overcome these barriers. Incentives for adaptation investments must be targeted, cost-effective, and complement a robust policy framework rather than compensate for weak regulations. Financial incentives, for example prepaying a portion of a company's income taxes in the form of public works on climate-resilient infrastructure, can boost adaptation investments by improving after-tax profits or reducing costs (OECD, 2024[2]). Cost-based tax incentives (e.g. accelerated depreciation allowances which lower the cost of capital) linked to specific expenses are generally more effective than profit-based ones, and should be time-limited, well-targeted, and regularly reviewed for uptake and cost-effectiveness (OECD, 2022[18]). The OECD is currently developing a comprehensive checklist to help governments design, implement, manage, and evaluate investment incentives, aiming to ensure these incentives effectively promote sustainable development objectives (including adaptation) while addressing related costs (OECD, 2024[2]).

Support for development of innovative technologies for climate adaptation may be needed. Innovative technologies can reduce cost and/or increase effectiveness of adaptation, thus enhancing long-term sustainability and reducing vulnerability to climate risks. However, traditional innovation barriers, along with barriers hindering investment in adaptation, are likely to result in underinvestment. Governments can bridge these gaps through public research and development (R&D) funding, subsidies, and support for incubators and accelerators, as well as by updating regulations and standards to address climate

change impacts, as outdated requirements can impede the adoption of innovative technologies. Public sector efforts to share knowledge and good practices, along with international climate finance programs such as the Global Environment Facility's Challenge Program, help stimulate innovation and display effective adaptation solutions. Additionally, international technology transfer mechanisms, such as the UNFCCC's Technology Mechanism, have been established to facilitate technology diffusion, thus ensuring that innovations benefit a wider range of countries (OECD, 2024[2]).

Taxation policies can also be used to enhance incentives for climate adaptation. Revenue-side policy options include establishing a framework for implementing taxes or fees on adaptation-related externalities, such as Philadelphia's stormwater fee, based on impermeable surface area, which incentivises replacing paved areas with green spaces (OECD, 2024[2]). By financially rewarding sustainable land-use practices, such policies can foster community engagement in climate adaptation efforts while generating the revenue necessary to support adaptation measures.

Promoting sustainable finance and insurance markets

Increased transparency and disclosure of climate risks in financial markets support better capital allocation and risk management, as they enable investors and stakeholders to make informed decisions, help manage financial risks, and drive capital towards sustainable, climate-resilient investments. Governments play a crucial role by setting and implementing disclosure requirements and providing accurate climate data, raising awareness, and improving the visibility of climate risks in financial markets. Furthermore, new tools such as AI can help standardise diverse corporate disclosures on adaptation investments, as suggested by the Bank for International Settlement's pilot project to create harmonised indicators of climate risk. Despite progress, gaps remain in standardised metrics and data, necessitating further efforts to ensure consistency and effectiveness in risk assessment (OECD, 2024[2]).

Several public- and private-led initiatives are emerging to improve transparency, but coherence needs to be ensured. By 2023, 70 countries (including 30 OECD member countries) had established climate-related finance guidelines, including taxonomies, which often incorporate adaptation considerations (OECD, 2024[4]). The EU Taxonomy for Sustainable Activities sets process-based criteria for identifying investments contributing to climate adaptation, emphasising the "do no significant harm" (DNSH) principle and encouraging Nature-based Solutions (NbS) (OECD, 2024[2]) (OECD, 2024[16]) Panama's recently introduced Sustainable Finance Taxonomy provides criteria to identify economic activities supporting a sustainable, resilient, and inclusive economy (UNEP FI, 2024[19]). Additionally, private-led initiatives such as the Climate Bonds Resilience Taxonomy and tools from organisations such as the Global Adaptation and Resilience Investment Group and Standard Chartered are emerging to define adaptation-related investments and propose relevant key performance indicators (KPIs) for adaptation. Meanwhile, methodologies like the Physical Climate Risk Assessment Methodology help integrate climate resilience into infrastructure finance by translating risks and measures into key performance indicators (OECD, 2024[11]). Such standards and guidelines make it easier to identify financial instruments that support environmental and social goals, such as green, social, sustainability and sustainability-linked (GSSS) bonds (Box 4). Ensuring coherence and interoperability between frameworks can reduce transaction costs and market fragmentation, streamline regulatory compliance, and foster more efficient resource allocation. This, in turn, enhances investment tracking and improves the overall flow of capital towards climate adaptation projects by creating a more consistent and transparent investment environment.

Box 4. Green, social, sustainability and sustainability-linked (GSSS) bonds for adaptation

Demand is increasing for financial instruments that support environmental and social goals, such as environmental, social and governance (ESG) funds, and green, social, sustainability, and sustainability-linked (GSSS) bonds. Two subtypes of GSSS bonds that differ in their underlying mechanisms are green, social, and sustainability (GSS) bonds, and sustainability-linked bonds (SLB).

GSS bonds, which are tied to underlying assets or projects, offer transparency for investors and low-cost funding for issuers while providing stable returns, funding a range of projects from climate change mitigation to biodiversity conservation. However, adaptation and resilience projects are less frequently financed, with only 19% of GSS bonds in 2022 supporting these activities, with challenges including limited capacity to assess climate risks, difficulty in identifying eligible projects, and issues with bond issuance size and currency preferences. Expanding the use of GSS bonds requires developing relevant performance standards, addressing knowledge gaps, and ensuring proper market conditions. Private sector standards, such as those from the International Capital Market Association and Climate Bonds Initiative, provide frameworks for defining and managing GSS bonds, including for adaptation and resilience activities. Despite some variability in definitions, establishing standardised principles and taxonomies is vital for project clarity, investor comparability, and effective fund allocation, allowing sustainable infrastructure projects to significantly benefit from these standardised approaches.

Meanwhile, SLB are flexible financial instruments where issuers commit to sustainability targets, with bond structural or financial characteristics changing based on whether these goals are met. Unlike traditional bonds, SLBs are not tied to specific projects, making them well-suited for adaptation finance as they allow flexibility in addressing evolving climate impacts. SLBs can be tied to existing sustainability pledges, like NDCs or NAP, enhancing the credibility of these commitments and increasing accountability for public sector issuers. In the context of adaptation, SLBs offer flexibility as climate change impacts evolve and new adaptation solutions emerge. It is crucial to monitor their potential in this regard and adjust them as needed to better serve this purpose, but challenges remain in assessing the ambitiousness of SLBs' objectives and addressing data gaps, especially in developing countries.

Source: (OECD, 2024[2]), (OECD, 2024[16]), (OECD, 2023[1]), (OECD, forthcoming[20]), (OECD, 2024[21]).

Insurance and risk transfer

Insurance and risk transfer mechanisms can play a critical role in managing the financial impacts of physical climate risks and can contribute to raising awareness and promoting risk reduction. The insurance sector not only provides critical funds for recovery but also plays a key role in assessing risks and encouraging adaptation through risk-based premium pricing. By providing financial protection, it helps communities, businesses, and governments recover more quickly from climate-related disasters. Insurance and risk transfer mechanisms can also raise awareness of climate risks and encourage policyholders to adopt preventative measures such as resilient building practices and flood defences. In doing so, they can promote risk reduction, aligning financial incentives with climate adaptation goals and fostering a culture of preparedness and resilience (OECD, 2024[2]).

Significant gaps in insurance coverage persist in many countries. Extreme weather events driven by climate change are making insurance increasingly unaffordable or unavailable in many high-risk areas, as they challenge the ability of insurers to cover risks. For example, 15% of Australian households could be considered "affordability stressed" in terms of their ability to pay for home insurance coverage – up from 12% in 2022-2023 (Actuaries Institute, 2024[22]), while in the United States, many insurance companies have stopped offering home insurance in high-risk areas such as California, Texas, or Florida due to rising

claims, higher repair costs, increased catastrophe exposure and other factors. As a result, homeowners face skyrocketing premiums or are left without coverage, "and the US becoming increasingly uninsurable means economically disadvantaged people will bear the burden" (Sherriff, 2024[23]).

Insurance programmes' coverage of climate risks can be designed with the aim of achieving different objectives, such as providing broad coverage by making insurance accessible and affordable to a wide population, leveraging existing insurance market capacity, limiting overall fiscal exposure to climate loss and/or encouraging risk reduction and adaptation. Different design features can help achieve these objectives, for example by linking premiums to risk reduction efforts to incentivise prevention measures, and by transferring risk to reinsurance and capital markets (such as through catastrophe bonds (see Chapter 3) to limit fiscal exposure (OECD, forthcoming[24]). For instance, gaps in flood insurance coverage have led to the establishment of targeted flood risk insurance programmes in countries where insurance is limited or unaffordable due to high flood risk, insufficient market capacity and/or limited demand for coverage (Box 5).

Box 5. Insuring water-related climate risks

Water-related risks, including physical, transition, and liability risks, can impact corporates, households, sovereigns, and financial institutions, leading to credit defaults, asset devaluation, and increased insurance costs. The insurance sector is increasingly aware of growing water-related risks, particularly as flooding becomes more frequent and severe. The economic damages from water-related events are substantial, with flooding alone causing over USD 1 trillion in losses since 1980. Flood-related losses, particularly in emerging markets, are largely uninsured, with only USD 56 billion of the USD 320 billion in global flood losses over the past five years being covered by insurance, placing a significant burden on businesses and governments. With significant gaps in coverage and high uncertainty of water-related risks, the insurance industry is adopting innovative solutions like parametric policies and partnerships to improve affordability and encourage risk reduction. For example, Flood Re, a joint re-insurance scheme between the UK government and the insurance industry, helps make flood insurance more affordable by allowing insurers to transfer flood risk to a central scheme, cross-subsidising high-risk policyholders and reimbursing claims, keeping premiums lower for customers.

Source: (Davies and Martini, 2023[25]), (OECD, 2023[15]), (Munich RE, n.d.[26]), (Flood Re, n.d.[27]).

3 Mobilising finance for developing countries

Developing countries are particularly vulnerable to the threats of climate change, due to their geographic location at low latitudes and physical characteristics, as well as fiscal constraints and generally lower levels of development and economic diversification, limiting their ability to invest in adaptation measures and provide aid when shocks occur (OECD, 2021[28]). Development, climate adaptation and resilience are intrinsically linked: economic development improves climate resilience by increasing income levels, strengthening institutions, and improving healthcare, which subsequently boosts the capacity to mobilise resources for adaptation. For instance, better-funded social protection schemes can help strengthen adaptive capacities by supporting recovery after climate shocks (Box 6) (ILO, 2024[29]). At the same time, integrating adaptation measures into broader developmental policies can yield significant co-benefits and justify necessary investments. For example, adapting infrastructure, such as all-weather roads, to anticipated climate impacts is crucial to ensuring its continued functionality and supporting local economic development (OECD, 2023[1]).

Box 6. Enhancing resilience through social protection systems

Social protection plays a vital role in climate adaptation by addressing the root causes of vulnerability, such as poverty and inequality, while building resilience to climate-related shocks. Through income support, healthcare access, and fostering adaptive capacities, social protection strengthens people's ability to withstand climate impacts. It also promotes sustainable livelihoods and forward planning, particularly benefitting vulnerable communities. Furthermore, social protection systems can support effective climate action by compensating for adverse policy impacts and facilitating transitions to greener jobs. For maximum impact on adaptation, social protection must be integrated with broader policies to address climate-related risks in an increasingly interlinked risk environment. Social protection systems are particularly important for the labour market, as developing countries, where informal employment is widespread, face high vulnerability levels among workers. Expanding social protection systems and formalising the workforce in sectors such as agriculture or forestry are critical, especially as green-driven jobs grow. Financing options for expanding social protections include reallocating funds from carbon pricing, issuing bonds, and optimising public expenditure[6].

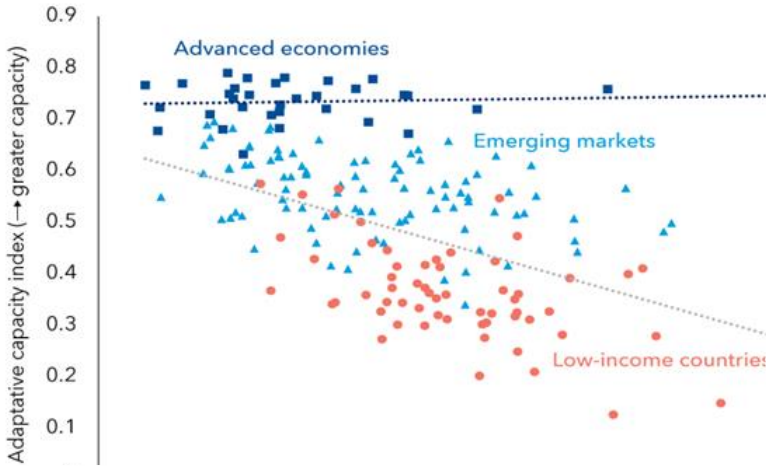
Source: (ILO, 2024[29]), (OECD, 2022[30]), (OECD, 2024[31]).

Developing countries are constrained in their financial capacity to invest in essential adaptation measures, such as building climate-resilient infrastructure or implementing effective disaster response systems (Figure 4). This lack of finance heightens their vulnerability and underscores the urgent need for international support and innovative financial solutions (e.g. debt-for-nature swaps, carbon markets or

insurance schemes that incentivise conservation) to help these nations better prepare for and respond to the impacts of climate change (OECD, 2023[32]).

Figure 4. Unequal costs of climate change

Poorer countries face greater risks from climate change and are less able to adapt to them



Note: Adaptive capacity and exposure indexes, points out of 1. Dotted lines show estimated linear relationships for advanced economies, and for emerging market and low-income countries combined, respectively.
Source: (IMF, 2022[33]).

Developing country governments face economic, technical and institutional barriers to accessing international public finance and attracting private investment for adaptation. The absence of dedicated policies and regulatory frameworks in many developing countries hinders the internalisation of adaptation benefits, making it difficult for businesses to value adaptation and incorporate climate risks into their strategies. Developing countries also face significant challenges in accessing accurate, granular, and up-to-date climate data, which is crucial for assessing climate risks, conducting vulnerability assessments, linking climate impacts to adaptation projects, and building a case for adaptation projects that are worth financing. Furthermore, they often lack the capacity and expertise to develop detailed adaptation strategies and project pipelines, which limits their ability to secure adaptation financing, as multilateral development banks (MBDs) and climate funds require country ownership and project proposals to be linked to national strategies. Importantly, private investment in resilience requires backing from public finance, but developing countries often lack the resources to do this themselves and must instead rely on Official Development Assistance (ODA) funds. Nevertheless, institutional and governance challenges, including fragmented climate finance architecture, complex accreditation processes, and diverse processes and criteria to access finance, complicate access to these funds, including for most vulnerable actors like Small Island Developing States (SIDS) (Box 7) and Least Developed Countries (LDCs) (OECD, 2023[1]). Notably, in 2021-22, 33% of bilateral ODA targeted climate objectives, with 34% of these activities focused on adaptation and 29% addressing both adaptation and mitigation objectives (OECD, 2024[34]).

Box 7. Capacity development for climate change in Small Island Developing States

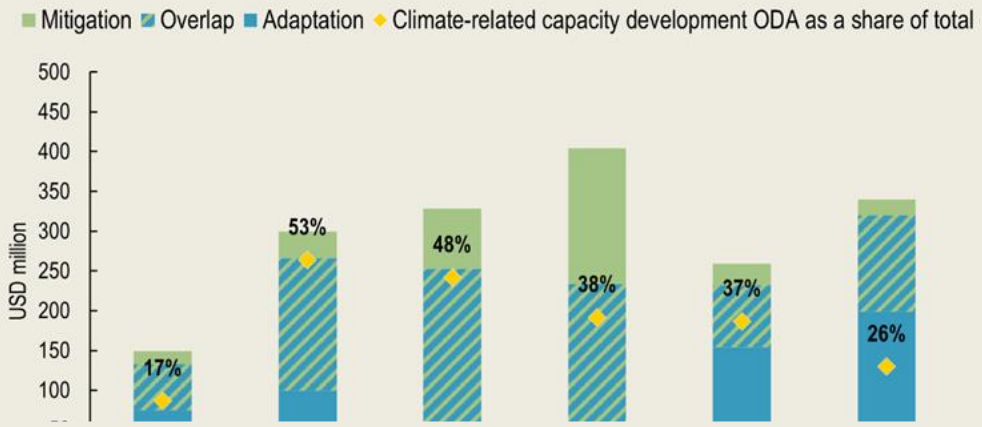
Small Island Developing States (SIDS), despite being among the least responsible for climate change, face severe impacts and urgent needs for capacity development support to meet their climate and development goals, necessitating accelerated efforts and substantial financial resources to address the climate crisis effectively. SIDS face significant climate-related capacity development bottlenecks due to limited financial resources, inadequate climate data, insufficient human capacity, and governance challenges, which hinder their ability to effectively manage climate risks and integrate climate adaptation into national development plans. Cost-effective ex ante investments in climate adaptation in SIDS are crucial, especially in the context of the risk of debt distress, which is rooted strongly in their exposure to climate risks.

Between 2015 and 2021, OECD Development Assistance Committee members allocated an average of USD 323 million annually in bilateral climate-related capacity development ODA for SIDS. This accounted for 35% of total bilateral climate-related ODA to these nations, mirroring the shares allocated to non-SIDS. Climate-related capacity development ODA surged by 222% during this period, a stark increase compared to the 57% rise in all climate-related ODA to SIDS. This significant increase underscores the growing importance of climate-related capacity development in donor agendas.

To enhance the effectiveness and sustainability of these efforts, the OECD recommends several strategies for donors: improving access to finance, advancing climate services and data, fostering partnerships with non-governmental stakeholders, leveraging regional and triangular co-operation, and adhering to broader effectiveness principles.

Figure 5. Total climate-related capacity development trends in SIDS; 2015-21

Commitments, USD millions, 2021 constant prices



Source: (OECD, 2023[35]).

Source: (OECD, 2023[35]), (OECD, 2023[32]).

New initiatives are being launched to support countries in developing the investment components of their adaptation plans and strategies. The Asian Development Bank's Climate Adaptation Investment Planning process, the Green Climate Fund's (GCF) and NDC Partnership's joint Climate Investment Planning and Mobilization Framework, and the UN's Adaptation Pipeline Accelerator are designed to translate NAP into actionable investment strategies, integrating them into economic frameworks and fostering high-level

collaborations to develop bankable projects. Importantly, **a strategic approach to adaptation investments should align with disaster risk financing strategies where they exist,** as investments in climate adaptation and disaster risk management are closely linked (OECD, 2024[2]).

OECD analysis identifies five key action areas for bilateral providers, MDBs, and other international providers to contribute to the scaling up of finance for adaptation:

First, **international providers should assess the consistency of their spending plans with the call of the Glasgow Climate Pact to collectively double climate finance for adaptation by 2025 from 2019 levels**. This action is crucial for meeting the goals set out in the Paris Agreement, particularly the balance between adaptation and mitigation efforts. Increased international public finance, especially concessional finance, is needed to accelerate adaptation and unlock further funding sources. Providers are encouraged to review and enhance their adaptation investments, recognising the varied circumstances of each donor, to effectively scale up climate finance and support developing countries in building resilience to climate change (OECD, 2023[1]).

Second, **support is needed to strengthen sectoral capacities, integrate adaptation into planning, and enhance national ownership of climate initiatives**. Enabling local governments and communities to directly access adaptation finance could improve the effectiveness of adaptation measures through better use of local knowledge and ensure long-term sustainability. Building capacity in project identification, proposal writing, and finance management could be instrumental to this end (OECD, 2023[1]). For example, the United Nations' UN4NAPs initiative provides technical assistance to LDCs and SIDS by scaling up support for the formulation and implementation of NAP and addressing technical requests from countries in this process (Casado Asensio, Blaquier and Sedemund, 2022[36]), while the Green Climate Fund's Readiness and Preparatory Support Programme helps countries build their institutional capacities to access and manage GCF resources (OECD, 2023[1]). Finally, facilitating private sector capacity to access finance for adaptation is essential for scaling climate change efforts, as businesses need financial resources and information to invest in resilience measures and adaptation technologies.

Third, **international development and climate finance providers should strengthen their development practices and systems to ensure efficient delivery of adaptation finance**. Setting internal quantitative targets for adaptation finance allows providers to strategically direct resources, integrate adaptation into broader development projects, and make informed decisions, though it necessitates flexibility and alignment with institutional frameworks to ensure impactful outcomes. Establishing geographical targets or minimum funding levels for the most vulnerable countries ensures that adaptation finance reaches those in greatest need, requiring careful balancing of needs and capacities. Transitioning from project-based to programmatic approaches, which consolidate multiple projects into long-term, multi-year programs, fosters reliable funding and co-ordinated planning. Increasing the use of policy-based finance can further enhance effectiveness by combining technical assistance, investment, and policy reforms, though it must be tailored to recipient conditions and often integrated into broader funding initiatives. Streamlining finance access processes by standardising applications, promoting direct access, and bolstering capacity development can reduce transaction costs and improve the efficiency of adaptation funding (OECD, 2023[1]).

Fourth, public and blended finance instruments should be better leveraged to mobilise private finance. Blended finance, defined by the OECD as "the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries" (OECD, 2018[37]), is mostly provided by development actors and can take the form of either structures or instruments. By enhancing the risk-return profile of investments or mitigating risks for private investors through tools like government guarantees, equity stakes, and concessional debt finance, blended finance can attract additional private investment into adaptation projects that are not yet commercially viable. International providers play a crucial role in this process by integrating private finance mobilisation objectives into adaptation projects, programmes, and transactions, tailoring financial instruments to meet

the specific needs of adaptation activities, and creating supportive environments for investment. International initiatives like the Private Infrastructure Development Group could further facilitate the mobilisation of private capital by linking it directly to donor funding, particularly for climate-resilient projects (OECD, 2024[11]). The OECD Blended Finance Guidance for Climate Change Adaptation (OECD, forthcoming[20]) provides insights for scaling up blended finance for adaptation in developing countries, aimed primarily at ODA providers, but also relevant to private finance stakeholders (Box 8).

Fifth, **exploring and utilising alternative financing sources and innovative instruments can help bridge financing gaps for adaptation by improving liquidity and potentially enhancing the lending capacity of MDBs**. International carbon markets offer a funding opportunity for climate adaptation projects through proceeds from carbon transactions directed into the Adaptation Fund. The potential of carbon markets as a financing source is highlighted by the recent adoption of new standards for international carbon market at COP29 under Article 6.4 of the Paris Agreement (UNFCCC, 2024[38]), (COP29, 2024[39]). Additionally, integrating adaptation and resilience into emerging sustainable finance tools, such as sustainability-linked bonds (SLBs) (Box 4) and tax securitisation, could be explored though challenges such as setting ambitious targets and managing complex structures must be addressed. For instance, debt-for-nature swaps, which provide debt relief in exchange for investment in climate-resilient projects, also hold promise for mobilising adaptation finance while tackling multiple crises, though their impact is constrained by their complexity, scale, and the need for effective governance and alignment with national priorities (OECD, 2023[1]). Insurance mechanisms incentivising coastal protection through coral reef restoration, which reduces flood risk and lowers insurance premiums can particularly benefit SIDS and are already being explored in countries such as Samoa (OECD, 2023[32]). Catastrophe (CAT) bonds can be a useful financing tool for absorbing the impact of natural catastrophes in both developing (Box 9), as well as developed countries, where they are typically issued by the insurance sector (OECD, 2024[40]). Lastly, Special Drawing Rights (SDRs) offer a means to improve liquidity and support adaptation by enhancing the lending capacities of MDBs and IMF-administered trust funds, but their role in financing adaptation needs to be clarified (OECD, 2023[1]).

Box 8. The OECD Blended Finance Guidance for Climate Change Adaptation

The forthcoming OECD Blended Finance Guidance for Climate Change Adaptation provides concrete recommendations for development finance providers to better design blended finance interventions and mobilise private finance towards key adaptation needs and priorities. Building on the OECD Blended Finance Guidance and Principles, it focuses on additional considerations for the specificity of blended finance for adaptation. The Guidance outlines a step-by-step approach for development finance providers to determine the scope and form of blended finance approaches:

1) **Select climate-resilient themes and sub-themes**: Blended finance approaches should be tailored to the adaptation specificities of each climate resilient theme and sub-theme. The Guidance focuses specifically on framing the role of blended finance for adaptation in seven climate resilient themes and sub-themes which hold particularly strong adaptation needs: resilient societies, resilient cities, resilient health systems, resilient industry and commerce, resilient infrastructure, resilient agrifood systems, and resilient nature and biodiversity.
2) **Determine the adaptation context:** The adaptation context is delineated by the development and the specific sector contexts. This step is key to establish a sound enabling environment for private investments to flow into adaptation.
3) **Define the scope and shape for blended finance, based on practical determinants:** The Guidance outlines three practical determinants that shape and determine the scope of blended

finance approaches: the investment type, finance providers and instruments, and the enabling environment and investment barriers for adaptation investments.

4) **Apply adaptation checks to mainstream adaptation considerations**: The Guidance outlines five adaptation checks to include adaptation aspects into blended finance operations, namely i) design blended finance for adaptation objectives based on a development rationale, ii) consider the risk of development foregone or reversed in the absence of adaptation when assessing additionality, iii) focus on opportunities to use blended finance for the integration of adaptation into the domestic financial sector, iv) pursue blended finance for adaptation with a focus on scale, standardisation and systemic solutions, and v) use and support high-quality adaptation data in a dynamic climate change process.

Finally, the Guidance illustrates how to identify appropriate blended finance approaches to unlock private finance, in the context of the seven climate resilience themes previously mentioned.

Source: (OECD, forthcoming[20]).

Box 9. Catastrophe bonds in Asia and the Pacific

Catastrophe (CAT) bonds are financial instruments are a useful financial tool to manage the impacts of disasters by securitising disaster risk into tradable assets. CAT bonds provide flexible, fully collateralised, multi-year financing, often with quick payouts through parametric triggers, offering effective disaster risk transfer for low-frequency, high-severity events, making them a valuable tool in comprehensive risk management strategies.

The CAT bond market remains underdeveloped in Asia and the Pacific, with a limited presence in developing countries and advanced economies dominating issuance. Singapore has emerged as the primary market in The Association of Southeast Asian Nations (ASEAN) for CAT bonds, supported by the ILS Grant Scheme launched by the Monetary Authority of Singapore to lower issuance costs. Meanwhile, Hong Kong, China is gaining traction as an international risk management hub, offering incentives such as issuance grants and hosting significant transactions like the World Bank's CAT bond for Chile. The growing importance of these markets highlights opportunities for further expansion in the region, including potential development in Central Asia and South Asia, where climate change poses significant economic risks.

Pacific Island countries could also benefit from CAT bonds as they enhance their disaster preparedness and engage with international financial institutions. CAT bonds may not always be the appropriate tool to manage risks to public finances, however, as there can be challenges including basis risk from parametric triggers, high CAT bond spread costs, limited investor interest due to market illiquidity, and underdeveloped legal and regulatory frameworks.

The case of the Philippines

The Philippines, ranked as the most disaster-prone country globally, faces frequent disasters including typhoons, earthquakes, and floods. To manage these risks, the country has used CAT bonds, notably through the World Bank's issuance of USD 225 million in bonds in 2019 to cover earthquake and cyclone risks. This was facilitated by the Philippines' Parametric Catastrophe Risk Insurance Program, piloted from 2017 to 2019 with World Bank support, which provided technical expertise and valuable lessons learned from its implementation and paved the way for the subsequent issuance of CAT bonds. The Philippines' experience underscores both the potential and challenges of using CAT bonds and

parametric insurance to strengthen disaster preparedness, with a strong legal and institutional framework being essential for the success of such risk transfer mechanisms. The country has established a robust regulatory and institutional framework for disaster risk financing, based on the Disaster Risk Reduction and Management Act of 2010 and the updated National Disaster Risk Reduction and Management Plan 2020-30, which emphasise risk transfer mechanisms like CAT bonds, promote public-private partnerships, and aim to enhance financial resilience through comprehensive disaster risk financing strategies.

Source: (OECD, 2024[40]), (OECD, 2022[41]).

4 Summary and conclusion

Global investment needs for climate adaptation are estimated at hundreds of billions of dollars annually. Developing countries alone may require USD 215-387 billion per year by the end of this decade. Yet current adaptation finance levels are significantly lower than needed, with estimates showing just USD 76 billion in annual flows in 2022, which is vastly insufficient compared to mitigation finance and projected needs under current global warming scenarios.

The gap in adaptation finance is exacerbated by an overwhelming reliance on public funding, with private sector contributions remaining fragmented. Adaptation finance is unevenly distributed across sectors, with agriculture, forestry, and other land-use sectors receiving inadequate support despite their vulnerability to climate risks. Although progress has been made, particularly with developed countries increasing adaptation finance to developing nations, much remains to be done to meet global adaptation goals.

To address this gap, there is a pressing need to align finance flows with climate resilience goals and incentivise private sector investment in adaptation. Governments should create enabling environments through robust policy frameworks, regulatory reforms, and innovative financial instruments to attract private investment. Increasing transparency, standardising climate risk assessments, managing risks in public-private partnerships, and improving insurance mechanisms also play a crucial role.

Developing countries are highly susceptible to the impacts of climate change due to their geographic locations and limited financial resources to invest in adaptation measures. These nations struggle to finance necessary climate adaptation efforts such as disaster response systems and climate-resilient infrastructure, highlighting the critical need for international financial support and innovative solutions to close the funding gap. The links between climate adaptation, resilience, and economic development are important to consider: economic growth enhances resilience by improving infrastructure, healthcare, and institutions, all of which bolster a country's ability to respond to climate challenges.

International providers and development banks play a pivotal role in scaling up adaptation finance through five key areas: assessing the consistency of their spending plans with the call to collectively double climate finance for adaptation by 2025, supporting the improvement of the enabling environment in developing nations, strengthening development practices and systems, leveraging blended finance, and exploring alternative financial instruments. These efforts can provide developing countries with tools to improve their climate resilience while advancing sustainable development goals.

Notes

1 The OECD defines *climate adaptation* as “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” and resilience as the capacity of human systems or societies to prepare for, respond to and recover from the impacts of external shocks while minimising damages (OECD, 2023[1]).

2 The OECD defines *resilience* as “the capacity of human systems or societies to prepare for, respond to and recover from the impacts of external shocks while minimising damages” (OECD, 2023[1]).

3 This figure is likely to underestimate all finance flows contributing to reducing impacts of climate change as it includes only deployment of climate-specific capital, while finance mobilised to address other outcomes which may still be aligned with building climate resilience is not included (Figure 1). Likewise, financing through instruments like insurance, guarantees, tax credits, and subsidies is excluded from this figure.

4 At COP29 in 2024, countries noted the gap between climate finance flows and needs, particularly for adaptation in developing countries, and agreed to triple climate finance for developing countries to USD 300 billion annually by 2035 under the New Collective Quantified Goal on Climate Finance (NCQG) (UNFCCC, 2024[43]), (UNFCCC, 2024[44]).

5 Data limitations hinder comprehensive tracking of domestic adaptation finance, but evidence shows that domestic governments are the largest source of adaptation funding in many developing countries, despite the lack of consistent climate budget tagging and the challenges in tracking this funding globally (CPI, 2024[8]).

6 Social protection systems and labour market adaptation are further explored in a forthcoming Net Zero+ policy paper on Just transition (OECD, forthcoming[47]).

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Scaling up finance and investment for climate change adaptation

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Global finance for adaptation remains well below what is needed to address the impacts of climate change. This paper presents recent evidence on the finance and investment gap and provides an overview of key policies to align investment flows with climate adaptation goals. Developing detailed funding strategies for National Adaptation Plans, mainstreaming adaptation considerations into public budgeting, and improving policy coherence are integral to creating an enabling environment for investment. Enhancing transparency in financial disclosures, aligning private and public incentives, and expanding risk transfer mechanisms are essential to promote sustainable financial markets.

Scaling up adaptation finance in developing countries, which are especially vulnerable to climate change, requires better strategic use of international public finance. Key actions to help scale up adaptation finance include: assessing the consistency of international providers' spending plans with climate finance goals; supporting countries' efforts to strengthen their enabling environments; improving development practices and systems; leveraging public and blended finance to mobilise private investment; and exploring innovative financing sources.

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