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I4CE INSTITUTE FOR CLIMATE ECONOMICS
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Unlocking Capital for Climate Adaptation: how financing costs exacerbate needs, and ways to address them in EMDEs

Key insights and comparative analysis from adaptation project case studies

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EXECUTIVE SUMMARY

Adaptation needs in emerging markets and developing economies (EMDEs) are rising rapidly, yet current financing assessments systematically underestimate the scale of the challenge. **The cost of capital is a critical, but largely invisible, driver of adaptation outcomes in EMDEs**. It shapes which projects are implemented, at what pace, and at what ultimate cost – especially for capital-intensive infrastructure projects. While international assessments focus on investment needs, they rarely account for financing costs, even though high debt and equity costs can more than double total project costs and prevent technically sound, socially essential adaptation projects from reaching financial close.

Grants, concessional loans and risk-mitigation instruments significantly reduce financing costs by lowering interest rates, limiting reliance on expensive equity, and de-risking projects for private investors. Based on an analysis of **12 adaptation projects across six EMDEs**, we highlight how heavily these projects rely on concessional finance to be financially viable. On average, public and concessional sources account for nearly 90% of project financing, above the levels observed for mitigation. In practice, concessional finance can reduce lifetime financing costs by several hundred million dollars for large infrastructure projects. However, this model faces hard limits: international concessional resources are declining, while domestic public budgets in EMDEs are increasingly constrained by debt and fiscal pressures.

Against this backdrop, **scaling up adaptation finance cannot rely on concessional finance alone**. It requires improving project fundamentals by strengthening and diversifying revenue models, which in practice, comes with several challenges. Adaptation generates substantial economic and social value, often far exceeding its costs, but these benefits are rarely translated into predictable cash flows. The report highlights **cost recovery models** including public funding, user-based revenues, and public capture of private value as key tools to align who pays with who benefits, improve bankability, reduce the cost of capital, and mobilise private finance where appropriate. Nevertheless, the capacity of households and firms to absorb higher charges, which are still poorly quantified, also raises important concerns regarding affordability and social acceptability, all the more in least developed countries.

Overall, this paper calls for a shift from headline finance targets towards **strategies that fully integrate cost of capital considerations**, combining concessional finance, revenue mobilisation, and structural reforms to unlock durable and scalable investment in climate adaptation in EMDEs.

1. THE COST OF CAPITAL IS A MAJOR STUMBLING BLOCK OF ADAPTATION IN EMDES, YET IT IS ABSENT FROM REFERENCE NEEDS ASSESSMENTS

Emerging markets and developing economies (EMDEs) are on the frontline of climate disruption. They face significantly higher physical exposure and economic fragility than wealthier nations, particularly as extreme weather and slow-onset shifts devastate agriculture, infrastructure, and livelihoods. This intersection of vulnerability and exposure puts billions of people and substantial portions of national GDP at risk (IPCC, 2023). In Latin America alone, climate-related economic losses could reach 23% of GDP by 2050 (CEPAL, 2023).

As climate impacts intensify across ecosystems and infrastructure, adaptation has become a critical investment priority. The Adaptation Gap Report 2025 projects that developing countries will require US$310–$365 billion annually by 2035. However, constrained fiscal space and mounting debt burdens mean EMDEs will struggle to meet these needs through domestic resources only. Only about 5% of adaptation financing needs reported by developing countries are "unconditional", i.e. expected to be met through domestic resources, though noting that sources of finance are specified for only half of total needs reported (UNEP, 2025). Current international public finance covers a mere 5–10% of investment requirements, leaving a staggering shortfall. Furthermore, private capital mobilisation remains stalled at just 10% of its projected annual potential of US$50 billion, according to the Adaptation Gap Report.

Adaptation investments are often concentrated in public infrastructure sectors, such as water management, transport systems, and urban resilience. These projects are typically capital-intensive, requiring substantial upfront expenditures. As a result, adaptation financing faces challenges comparable to those of large-scale infrastructure projects more broadly, including high initial risks, long payback periods, and complex project structuring.

Adaptation is not all about high upfront investment costs!

Although this paper focuses on how to finance capital-intensive adaptation-related investments, adaptation is not limited to costly public infrastructure projects. It encompasses a wide range of project types, from complex engineered infrastructure and nature-based solutions to capacity-building and prevention measures, the latter often being less capital-intensive.

Moreover, it is worth noting that a substantial share of adaptation is low-cost, cost-neutral, or cost-saving (I4CE, 2025b):

- Many adaptation actions do not require additional spending when climate risk is **integrated into investments that would occur anyway**, for example designing new schools with passive cooling rather than adding air conditioning later. Comparing such options should also take into account timing and discounting issues.
- A large share of adaptation relies on **planning, information and prevention**, such as conducting local vulnerability assessments to inform land-use decisions.
- Early adaptation can be **cost-neutral or marginally costly while avoiding future damages**, for instance reinforcing infrastructure during scheduled maintenance instead of repairing it after repeated heat or flood damage.
- Numerous measures are **"no-regret" actions**, which make sense today and becomes even more valuable under climate stress – *e.g.* reducing water leaks in distribution networks.

Adaptation investment needs in capital-intensive infrastructure projects are further amplified by high costs of capital, which shape the scale, pace, and geographic distribution of adaptation in EMDEs. Together, debt and equity costs can more than double project costs (**Figure 2**). Consequently, technically sound and socially vital interventions often fail to reach financial close due to unstable revenue models, fragmented financing, and a lack of risk-mitigation instruments (OECD, 2025c). Exhaustive surveys for adaptation-specific capital costs are scarce, but renewable energy data provides a clear benchmark: the **IEA Cost of Capital**

Observatory (2023) reports that the Weighted Average Cost of Capital (WACC) for utility-scale renewables typically ranges from 10-15% in EMDEs, compared to just 4-6% in advanced economies.

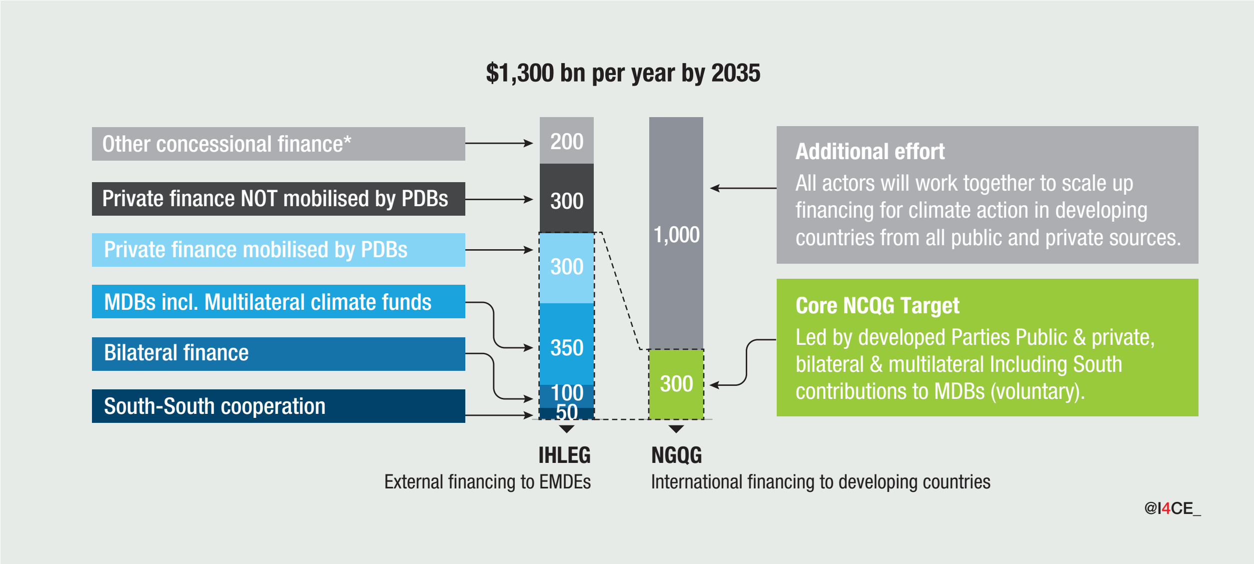
Reference assessments for EMDEs frequently leave capital costs out. For instance, UNEP's *Adaptation Gap Reports* (2024; 2025) explicitly do not include the cost of capital. On the other hand, the IHLEG's[1] landmark report on financing needs primarily details "investment" figures rather than total financing requirements (I4CE, 2025c). Their current reported adaptation needs blend the two distinct metrics from the Adaptation Gap Report: (i) modelled adaptation costs, reflecting base investment costs, and (ii) country-based estimates, sourced from national plans, which include planning and implementation costs. These needs are then presented as "financing needs" and matched against financing sources – ranging from grants to equity – without further consideration for the associated financing costs and related constraints (*see* Bhattacharya *et al.*, 2024 Figures 2.1 and 2.2). This conflation is widespread, and for example the CPI *Global Landscape of Climate Finance* (2024) interchangeably labels commitments as "finance" or "investment".

Assessing a project's cost of capital is technically complex, as highlighted by the IEA's work on clean energy finance in EMDEs (IEA, 2024). These costs fluctuate wildly based on geography, project type, and finance source, imposing vastly different constraints on seemingly identical needs. Without a common framework to aggregate project-level capital costs, current estimates lack the granularity required for a realistic understanding of EMDE adaptation needs (I4CE, 2025c).

Still, failing to include the cost of capital has major consequences. First, it minimises the true financial burden that climate action imposes on EMDEs. Much of the debate on adaptation finance focuses on the sources of finance – that is, where the money comes from – while giving less attention to who ultimately pays for adaptation and through which mechanisms. Over the lifetime of a project, this includes not only upfront investment expenditures but also financing costs. This distinction between adaptation financing and adaptation funding (UNEP, 2025) has important implications for EMDEs, as from countries' perspective, the real cost of adaptation corresponds to the total cost of funding.

Second, it results in 'source-blind' strategies that fail to mobilise specific financial actors. This disconnect is illustrated in **Figure 1**, where similar headline estimates for climate finance hide in fact visions that are poles apart regarding the sources that should bridge the financing gap[2]. The IHLEG scenario relies heavily on international public finance (including private finance catalysed by public development finance institutions), with a minor role played by international private finance and/or innovative sources. In contrast, the NCQG agreement (which provides much less detail) places the bulk of the burden on yet-to-be-defined mechanisms for scaling up finance for developing countries, other than through existing public development banks or multilateral development banks (MDBs). Recent COP30 negotiations carved US$120 billion for adaptation out of the US$ 300 billion total NCQG, but did not further specify the required mobilisation scenarios. The feasibility of these targets must still be stress-tested against the reality of cost-of-capital constraints (*see e.g.* Larsen *et al.*, 2025).

FIGURE 1. IHLEG VS. NCQG: ONE FIGURE, TWO INTERPRETATIONS. SOURCE (I4CE, 2025C)



*Other concessional finance in the IHLEG estimate includes voluntary carbon markets, SDRs, solidarity levies, debt swaps, private philantropy.

1 International High Level Expert Group on Climate Finance. See https://www.lse.ac.uk/granthaminstitute/ihleg/
2 The US$1,300 bn per year target covers five key areas of climate action: clean energy transition, adaptation and resilience, loss and damage, natural capital and just transition. The IHLEG and NCQG agreement do not detail financing sources specifically for climate adaptation.

High costs of capital also constrain the volume of finance available for adaptation in EMDEs. Lenders and investors arbitrage between adaptation projects in EMDEs and alternative, lower-risk opportunities in the Global North, generating a crowding-out effect that affects a broad range of finance providers in developed countries – and, in some cases, domestic financiers as well. As a result, unlocking durable investment in adaptation requires improving both the quantity and the quality of available finance. To put it in WRI's words, "the challenge now is how to get finance flowing in the right direction, at scale" (Larsen, Alayza et Caldwell, 2025).

This paper aims to shed light on **how financing costs shape the ability of EMDEs to mobilise capital for adaptation projects**.

- First, drawing on concrete cases, we expose the mix of financing sources for 12 adaptation projects that have been implemented and highlight how public financial instruments enhance their financial viability.
- Second, moving beyond concessional finance, we explore **how adaptation can "pay for itself"** by leveraging projects' benefits and beneficiaries through cost-recovery mechanisms, with the dual objective of lowering the cost of capital and increasing the volume of private finance mobilised.

2. CONCESSIONAL FINANCE TO REDUCE THE COST OF CAPITAL: INSTRUMENTS, CASES OF USE, AND LIMITATIONS

2.1. What is the cost of capital made of and how to reduce it?

The cost of capital of a project can be disaggregated into the cost of debt (lenders' interest rate) plus the cost of equity (investors' expected return). These elements are commonly summarised through the weighted average cost of capital (WACC), which represents the average rate of return required across all sources of financing, weighted by their respective shares in the project's capital structure. Formally, the WACC combines the after-tax cost of debt and the cost of equity, adjusted for leverage:

$$WACC = \frac{D}{D+E} K_d (1-t) + \frac{E}{D+E} K_e$$

where D and E are debt and equity, K_d and K_e are their respective costs, and t is the corporate tax rate.

- **The cost of debt K_d and the cost of equity K_e** reflect both global financial conditions and project-specific risks. In EMDEs, borrowing costs are typically high due to higher perceived risks and macroeconomic factors such as inflation volatility, currency risk, limited domestic capital markets, and sovereign credit risk. Equity investors, meanwhile, often require high risk premium to compensate for political uncertainty, regulatory instability, the company's financial situation, and limited exit options[3]. For adaptation projects – many of which generate indirect, long-term benefits – these challenges are compounded by uncertain revenue streams and difficulties in quantifying climate resilience outcomes (this point is further developed in the **Section 3** of this paper). These various risks are commonly grouped into four categories: country risks, macroeconomic risks, sector-specific risks and project-specific risks.

Schematically, two key levers can be used to reduce the cost of capital:

- **First, the use of financial instruments can isolate parts of the financing structure from overall risks**. Instruments such as concessional loans, guarantees, insurance products, and blended finance mechanisms help redistribute risk among stakeholders and lower the overall risk profile of projects. Such financial instruments can target several of the four categories of risks described above and reduce perceived risks across the investment structure. This lever is discussed in **Section 2**.
- **Second, improving project characteristics can directly address project-level risks and enhance financial attractiveness**. For example, strengthening revenue models can increase predictability and cash-flow stability, improve expected returns and bankability, and make projects more attractive to private investors. This lever is discussed in **Section 3**.

2.2. Financing mixes: Analysing 12 case studies from 6 countries

We analyse the financing structures of 12 adaptation-related projects across six developing countries and illustrate how the financing mix influences a project's cost of capital (*see* **Table 1**). We focus on capital-intensive projects, requiring high upfront investment, and choose to focus on urban infrastructure projects. The selected cases reflect geographical and economic diversity across EMDEs. Most projects are implemented by national or local governments, and a minority of them are implemented by public companies or private developers through public-private partnerships. It is important to note that these projects are not all designed

3 More details on WACC calculation methods and sources used in this paper can be found in the Annex file, or here: https://www.iea.org/articles/the-cost-of-capital-in-clean-energy-transitions

primarily as "adaptation projects", but they all explicitly contribute to climate adaptation and increase resilience. These projects rely on distinct financing sources, risk allocation, and cost recovery models. Each project case is described in detail in Annex below.

This sample is not intended to represent the full diversity of urban adaptation projects and their associated financing costs. Rather, it serves as an illustrative sample, based on publicly available data, to highlight how specific financial levers can affect the cost of capital for adaptation projects.

TABLE 1. OVERVIEW OF PROJECT CASE STUDIES

Project	Country	Dates	Investment cost (USD million)	Financing mix
1. Wastewater reuse plant expansion	Jordan	2012 - 2015	223	• 46% non-concessional loan • 42% grant – international finance • 9% grant – domestic co-financing • 4% equity
2. Desalination and conveyance	Jordan	2026 - 2029	3,070	• 52% non-concessional loan • 29% grant – international finance • 19% concessional loan
3. Stormwater management and climate change adaptation	Senegal	2012 - 2021	121	• 75% concessional loan • 13% grant – domestic co-financing • 12% grant – international finance
4. Stormwater management and climate change adaptation 2	Senegal	2021 - 2026	171	• 91% concessional loan • 4% grant – international finance • 5% grant – domestic co-financing
5. Resilient infrastructure for adaptation and vulnerability reduction	Bangladesh	2024 - 2028	506	• 99% concessional loan • 1% grant – domestic co-financing
6. Water supply and sanitation	Bangladesh	2009 - 2016	72	• 99% concessional loan • 1% grant – domestic co-financing
7. Urban development	Rwanda	2016 - 2021	95	• 95% concessional loan • 5% grant – domestic co-financing
8. Urban development 2	Rwanda	2020 - 2025	175	• 47% grant – international finance • 45% concessional loan • 9% grant – domestic co-financing
9. Flood protection and drainage improvement	Cambodia	2002 - 2021	30	• 100% grant – international finance
10. Enhancing adaptive capacity of vulnerable communities	Cambodia	2024 - 2028	10	• 100% grant – international finance
11. Metro line (intended to improve urban resilience)	Ecuador	2012 - 2023	2,131	• 83% concessional loans • 17% grant – domestic co-financing
12. Environmental sanitation programme	Ecuador	2003 - 2015	163	• 68% concessional loan • 32% grant – domestic co-financing

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2.3. Public finance instruments address a wide range of financing gaps

"Concessional finance" refers to a range of instruments designed to facilitate access to capital on more favourable terms than those available on the market. It typically includes:

- Grants, which represent the purest form of concessionality, as they carry no repayment obligation;
- Concessional loans, characterised by lower interest rates, longer maturities, grace periods, or enhanced repayment flexibility. In some cases, this category may also include below-market equity investments, although the notion of a "market rate" for equity is inherently less well defined;
- Risk-mitigation instruments, such as guarantees or first-loss tranches, which reduce downside risk for private investors.

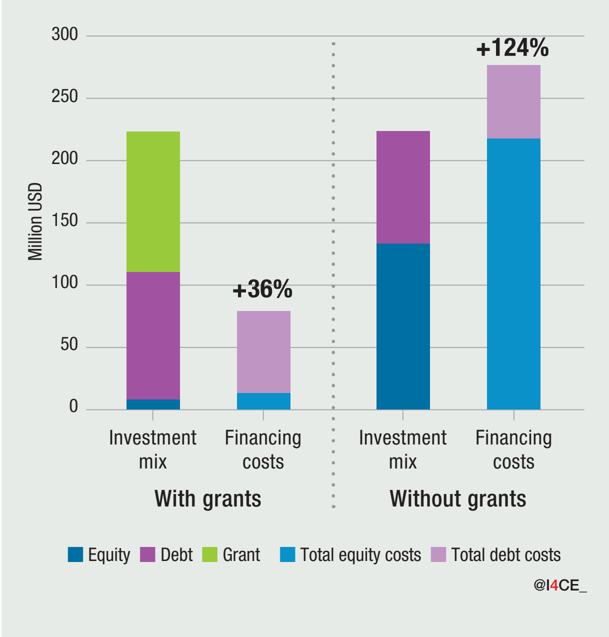
The identified case studies rely heavily on concessional finance. The share of concessional finance ranges from 42% to 100% in all projects, with an 84% average. The concessional loans are most often issued by MDBs to governments, grants are extended by vertical funds such as the GEF, or through bilateral support by development partner countries. Domestic public co-financing, which is equivalent to grants, contributes 8% on average to the projects, ranging from 0% to 32%. Among the 12 projects analysed, those with clear revenue streams tend to rely less on concessional finance, as would be expected (*see* **Section 3**).

Together, domestic and international public finance for these projects thus reaches 92% on average, consistent with the share of public spending in overall adaptation finance according to CPI's Global Landscape of Climate Finance 2025 (90%). By contrast, mitigation finance in EMDEs as tracked by CPI is 'only' relying on a 78% public participation, reflecting the high degree of dependence on public support for adaptation projects.

The composition of concessional finance varies widely across projects. Concessional loans may represent only a limited share of total financing – such as 19% in **Project 2** – or account for nearly the entire financing structure, as in **Project 5**. Grant financing shows a similar dispersion, ranging from 4% in **Project 4** to full grant coverage in **Project 10**. In practice, the composition of concessional finance depends largely on country lending policies and rates applied by MDBs and other development partners.

The share and composition of concessional finance can have a substantial impact on a project's overall financing costs. For example, in the case of **Project 1**, the financing structure consists of 51% grants (both international finance and government co-financing), 46% debt at an interest rate of approximately 8%, and 4% equity. Over the lifetime of the loan, total financing costs (including both debt interests and equity returns) amount to US$80 million with grants, compared to US$276 million in the absence of any concessional support[4] (**Figure 2**).

FIGURE 2. INVESTMENT MIX AND CORRESPONDING FINANCING COSTS OVER LOAN DURATION FOR PROJECT 1 (WITHOUT DISCOUNTING)



4 In the scenario without concessional finance, grants and part of the debt are replaced by equity. A debt ratio of approximately 40% is assumed, based on a comparable analysis building on data in EMDEs from Damodaran: http://www.damodaran.com. The cost of debt is kept around 8% and the cost of equity is calculated separately. See the Annex file for details on calculations.

Estimations of projects' WACC are limited by data gaps on concessional finance

To assess the role of concessional finance in reducing financing costs, this study sought to estimate the WACC and associated financing costs of the selected case studies.

Using the formula presented **Section 2.1**, calculations built on (*see* the Annex file for more details):

- Debt-to-equity ratios of each project;
- Cost of equity estimates based on the Capital Asset Pricing Model, using data from Damodaran;
- Cost of debt data derived from project documentation where available.

For example, **Project 1** combines grant financing, non-concessional debt at an interest rate of approximately 8%, and equity with an estimated cost of around 14%. This results in a WACC of about 4%, compared to 11% without grants. These estimates illustrate how grants can significantly lower the cost of capital and associated total financing costs (*see* **Figure 2**).

For case studies relying primarily on concessional loans, WACC estimation were constrained by limited data on the level of concessionality and lending terms. In most cases, information on projects' effective interest rates and repayment schedules was not available, making it impossible to accurately assess the cost of debt. For example, in **Project 5**, which is financed almost entirely through a concessional loan, the project's WACC depends largely on the conditions attached to this financing. This limitation prevented the calculation of reliable WACC estimates for most of the case studies.

In practice, concessional finance affects a project's financing costs through three main channels.

- First, it directly lowers the cost of debt on the portion of financing it covers by offering below-market interest rates, longer maturities, or grace periods.
- Second, when provided as a grant or concessional loan (assuming project risk remains unchanged), it can reduce the need for more expensive equity in the capital structure.
- Third, risk mitigation instruments – such as guarantees or first-loss investments – lower the perceived risk for other financiers, enabling lower-cost debt and equity participation and thereby improving the project's overall financial attractiveness.

Risk mitigation instruments are an active field of effort by development finance institutions, but the data limitations of this work (presenting only public data in our 12 case studies) does not allow to discuss it. We direct the interested reader to *e.g.* ODI's publication on 'Insights on DFI blended concessional finance practice' (Attridge, Dahan et Getzel, 2025), Convergence's 'State of blended finance 2024 – Climate Edition' (Convergence Blended Finance, 2024) or the G20/OECD 'Report on blended finance derisking measures' (OECD, 2025b) on this topic.

Concessional finance is thus an obvious and powerful tool to reduce a project's WACC and financing costs, by lowering the share of market-rate debt and equity necessary to finance the project, but also the risk (and thus return rates) of the remaining financing needs.

Table 2 provides an overview of public financing instruments found across climate projects in EMDEs, mapped to their effects on project costs and risks.

TABLE 2. SELECTED PUBLIC FINANCING INSTRUMENTS AND THEIR EFFECTS ON PROJECT COSTS AND RISKS, BASED ON LITERATURE REVIEW AND CASE STUDIES DISCUSSED IN THIS PAPER

Source of Finance	Instrument Type	Role / Mechanism	Effects on project costs and risks
Public – International (MDBs, bilateral)	Grants	Non-repayable capital for early-stage or non-bankable projects	Reduces upfront cost; increases viability
	Concessional loans	Below-market rate loans, or loans with longer maturities or grace period	Lowers financing costs directly
	Debt-for-climate swaps	Liability restructuring tied to climate investments	Reduces sovereign debt risk and frees fiscal space
Public – Domestic	Budget allocations and fiscal transfers, often labelled "co-financing" and equivalent to grants	Public finance allocated to adaptation projects	Direct public cost-coverage
	Tax incentives / subsidies	Lowers cost for private actors to invest	Indirect cost reduction
Blended Finance	Guarantees (credit/political)	Public support to unlock private participation, bringing new financers	Reduces risks for private investors
	First-loss capital	Publicly funded first tranche	Reduces WACC for de-risked tranche
	Public-private PPPs	Shared financing responsibilities	Aligns incentives and spreads risk

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2.4. The decline in concessional resources calls for new financing models

Concessional finance plays a major role in adaptation financing, but the resources are scarce – and becoming even scarcer. Downward trends in Official Development Assistance (ODA) are likely to compound the relative scarcity of concessional resources. After a 5-year period of consecutive growth which brought ODA a third higher in 2023 than in 2019, net ODA from DAC countries fell 8.3% (constant USD) in 2024[5]. On a grant-equivalent basis, this amounted to a 10.9% drop in contributions to multilateral organisations and a 5.8% drop in bilateral aid. Survey-based estimations by the OECD anticipate a further 9 to 17% drop in 2025, with least developed countries likely to be most affected by this scaling back of ODA (OECD, 2025a). A companion paper to this work discusses how to improve the use of climate-focused ODA in the face of the current and announced restrictions, from a donor perspective (I4CE, forthcoming).

Increased reliance on domestic resources is one option to make up for reduced international concessional finance. Domestic public co-financing covers its own broad share of instruments and interventions, some of which can effectively replace international concessional finance with very similar outcomes. However, the amount of available domestic public co-financing is also severely constrained in EMDEs, many of which face some degree of debt crisis that highly limit their fiscal space and borrowing options. Stagnant tax revenues and persistent inefficiencies in public spending contribute in addition to keeping domestic resource mobilisation off track (IHLEG et SYSTEMIQ, 2024).

5 https://www.oecd.org/en/data/insights/data-explainers/2025/12/final-oecd-statistics-on-oda-and-other-development-finance-flows-in-2024-key-figures-and-trends.html

Identifying new revenue streams and funding models seems therefore necessary to improve project characteristics and access to private capital. Given that many adaptation investments take the form of public infrastructure projects, building on established infrastructure financing models offers a promising pathway to scale up adaptation finance. In practice, infrastructure projects that deliver public benefits are most often funded through a combination of local taxes and public service tariffs, enabling cost recovery from direct beneficiaries and supporting access to private financing. Systematically identifying project beneficiaries is therefore key to leverage their contributions within financing models and to design cost recovery mechanisms. These considerations are developed in the next section.

Country Platforms to streamline the provision of finance

Many countries face a fragmented financing landscape on climate action: multiple MDBs, bilateral development partners, philanthropies, private investors, and technical partners engage simultaneously, often with differing priorities, timelines, and information requirements. This fragmentation increases transaction costs, slows implementation, can lead to overlaps and inefficiencies, and makes it difficult for governments to align external finance with national adaptation priorities.

Country Platforms (CPs) offer a practical institutional solution to this challenge (see *e.g.* Kelsall, Colenbrander et Simpson, 2024; Latortue et Goodman, 2025; Robinson et Larsen, 2025). As a structured forum for organising and coordinating the actions of multiple financing partners, CPs give countries a space to articulate their strategic priorities, outline investment pipelines, and sequence the mix of public, concessional, blended, and commercial finance required to deliver them. Their goal is to help ensure that international partners act in a coordinated manner and align with national planning processes, climate goals, and sectoral strategies.

From a cost of capital perspective, the interest of CPs is twofold:

- **Focus and coordinate efforts on strategic priorities**, ensuring that scarce concessional resources are deployed where and when they have the highest value – typically for high-risk, low-revenue adaptation measures. When a country provides a clear investment framework and an organised platform for engagement, development partners can align more effectively and mobilise larger, more predictable financing packages.
- **Provide clarity to investors**, reducing the uncertainty on sectoral risks by promoting a shared vision on role-sharing and expected transformations. This also clarifies the potential need for, and role of, risk-mitigation instruments and can prevent situations where private capital is either crowded out or expected to engage even as public funding is more appropriate.

However, more than coordination is needed to bring costs of capital down and investment volumes up for adaptation in EMDEs, including policy, regulatory, and institutional reforms. Effective financing plans also require attention to system-wide bottlenecks, such as grid or water infrastructure, that shape whether private capital can engage at all. CPs can support this process, but they cannot substitute for the strategic choices and reforms that underpin durable, investable adaptation pathways.

3. BEYOND CONCESSIONAL FINANCE: SECURING REVENUES FOR ADAPTATION

3.1. Scaling up private finance: turning adaptation benefits into investable value

As adaptation needs rise and concessional resources decline, the need to scale up private finance for adaptation becomes increasingly urgent. As noted above, the Adaptation Gap Report estimates that current private finance flows account for only about 10% of the US$50 billion that could be met by the private sector to help reach the US$310-365 billion annual needs in developing countries[6]. However, such levels of private participation will not materialise automatically.

Adaptation investments reduce both expected climate losses and their variability, creating high socio-economic value. Early warning systems save lives, drought-resilient agriculture protects economic activity, and coastal protection infrastructure shields entire cities and safeguards private assets. As a result, the socio-economic benefits of adaptation projects for society as a whole often far exceed their costs.

However, adaptation projects in EMDEs often lack reliable revenue mechanisms, which remains a major barrier to private sector participation (Global Centre on Adaptation, 2022). One common limitation is that the substantial socio-economic benefits are driven by non-market benefits, while financial returns are lower, or sometimes even close to zero. Many benefits accrue at the macro or systemic level – such as reduced fiscal shocks, stabilised supply chains, or stronger local economies – but the financial burden is supported by a limited number of actors. Moreover, many resilience investments deliver benefits that are uncertain, long-term, and contingent on the occurrence of future climate events, whereas their costs are immediate and concentrated. Time preference is critical, and comparing investments costs and benefits should take into account timing and discounting issues. For these reasons, many expected benefits are difficult to quantify and attribute and are therefore rarely reflected in projected financial returns.

Nevertheless, adaptation investments often yield benefits that extend beyond adaptation objectives. While some projects are specifically designed to reduce climate-related damages, many – such as infrastructure projects – primarily aim to deliver socio-economic benefits, while integrating adaptation goals. For example, stormwater management projects in Senegal (**Projects 3 and 4**) not only reduce flood-related damages but also provide significant public health gains by lowering the incidence of waterborne diseases. Similarly, the Quito metro line (**Project 11**) enhances urban mobility, easing road congestion, improving air quality, and boosting productivity by cutting travel time – all while increasing infrastructure resilience and lowering exposure to landslides. In some cases, adaptation investments also generate mitigation benefits: projects that restore degraded forests or improve land management can enhance carbon sequestration. WRI analysed 320 adaptation investments and estimated that nearly half of them yielded mitigation benefits (Brandon *et al.*, 2025).

One way to scale up private finance for adaptation could be by shifting the focus from "who pays?" to "who benefits?", through which channels, and to what extent. Improving the identification, valuation, and allocation of benefits makes it possible to develop funding models that better capture the value generated by adaptation-related projects, thereby enhancing bankability, lowering the cost of capital, and increasing the volume of finance that can be mobilised. This is developed in the following section.

3.2. Matching adaptation projects with cost recovery models

Cost recovery models (CRMs) refer to the instruments or arrangements used to generate revenue streams that cover an investment's cost, including upfront capital expenditure, operations and maintenance, and financing costs (The World Bank Group et Global Facility for Disaster Reduction and Recovery, 2025). CRMs define who ultimately pays for adaptation, i.e. the funding of adaptation projects. Designing a CRM begins with identifying value creation or value protection: what benefits does the project generate, for whom, and over what timeframe? The next step is determining which of these benefits can be monetised and which must

6 These figures exclude adaptation actions financed by the private sector for its own needs, such as cooling in commercial and industry sectors, and which are estimated at around US$250 billion per year (UNEP, 2025).

be publicly funded. Public intervention can then take the form of direct funding of adaptation investments or of adjustments to the regulatory, fiscal, or institutional framework to ensure that project outcomes are effectively reflected in the financing structure.

The ability to identify and integrate benefits into project financing varies considerably across project types, requiring differentiated approaches to cost recovery. The main CRM approaches include (The World Bank Group et Global Facility for Disaster Reduction and Recovery, 2025):

- **Public funding**, whereby project costs are covered through general government revenues, including proceeds from existing or newly introduced taxes;
- **User-based funding**, under which service providers recover costs directly from beneficiaries through tariffs, fees, or service charges;
- **Public capture of private value**, whereby governments mobilise a share of the private gains – such as increased asset values from avoided losses – that result from public investment and government action.

Each approach is further developed below.

Public funding – Some adaptation benefits are only achieved through public expenditure. Every public spending in connexion with the fundamental pillars of resilience in any society – social safety nets, civil protection, healthcare system – plays a critical role in supporting climate change adaptation by strengthening the capacity of communities and institutions to anticipate, absorb, and recover from climate shocks. Society as a whole stands to gain from these investments and expenditure, and they are typically funded through established sectoral or public expenditure channels.

User-based funding – Some adaptation investments can generate predictable revenue streams through user fees or tariffs. For example, **Project 11** (the Quito Metro Line) can recover an important share of its costs through transport fares, while **Projects 1** and **2** (the wastewater reuse and desalination plants) rely on water tariffs for cost recovery. Such projects are embedded within broader service provider systems and benefit from established revenue mechanisms, making their value easier to monetise and their financing more attractive to private investors. Nevertheless, while user-based funding has the advantage of being transparent, the capacity of households and firms to absorb higher charges, which are still poorly quantified, raises important concerns regarding affordability and social acceptability (I4CE, 2025b), all the more so for least developed countries.

Public capture of private value – Some publicly-supported adaptation projects generate clear financial gains for private beneficiaries, that can be leveraged in financing models. For instance, climate-resilient upgrades to water, energy, and sanitation systems can reduce operating and maintenance costs for utilities, improving their financial performance. Similarly, flood protection measures and urban cooling interventions can increase land and property values, benefiting property owners. Public capture of a share of these gains – through instruments such as property taxes or fees charged to developers for real estate permits – can generate revenue and support financing models. While this approach is appealing in theory, successful implementation remains challenging. It requires strong institutional capacity and a supportive regulatory environment, particularly with respect to property rights (The World Bank Group et Global Facility for Disaster Reduction and Recovery, 2025).

Finally, some adaptation projects are not suited to revenue-generating mechanisms, or don't have a high enough revenue potential to deliver adaptation at higher cost of capital, and require alternative financing approaches. CRMs must then balance commercial logic with public-good considerations. This is illustrated by **Project 8**, the Rwanda Urban Development Project (RUDP II), a multi-component programme combining flood-risk public infrastructure upgrades, wetlands restoration, and support for civil works in secondary cities. These activities deliver substantial resilience and social benefits but do not generate revenue streams. Consequently, project financing relies heavily on public support, with approximately 95% provided through a concessional loan from the World Bank's International Development Association and the remaining 5% through a government grant. For such projects, public intervention will remain essential. Where direct public financing is constrained, governments can play a critical role by reshaping policy and regulatory frameworks to create conditions conducive to private sector participation. For instance, public authorities can develop standards that clarify adaptation options and require the private sector to integrate adaptation considerations. In addition, they can foster local collaboration initiatives involving public and private stakeholders, to explore alternative business and financing models at the community level, that respond to locally specific challenges (I4CE, 2025a).

Explicitly identifying and allocating adaptation benefits helps clarify who stands to gain from resilience-building measures, whether through reduced damage, or improved economic and social conditions. This, in turn, enables the design of financing models that better align cost-sharing arrangements with benefit flows, broaden the pool of potential contributors, and reduce reliance on scarce public and concessional resources. In practice, some challenges still remain. The translation of reduced climate risk into financial signals – such as lower insurance premiums or improved credit conditions – currently remains weak or inconsistent, even where adaptation investments are undertaken (I4CE, 2025a).

CONCLUSION

Climate adaptation in EMDEs currently relies heavily on concessional finance, but resources are declining, while adaptation investment needs are rising. The share and composition of concessional finance can significantly reduce project financing costs, by lowering reliance on market-rate debt and equity and by mitigating project risks. Concessional finance is therefore a powerful tool for improving project financial viability, but scaling up adaptation finance cannot depend on concessional support alone and requires the development of new financing models to unlock additional capital.

Improving the identification, valuation, and allocation of benefits can help develop financing models that better capture the value generated by adaptation-related projects. Adaptation investments generate high socio-economic value by reducing both expected climate losses and their variability. Moreover, they often yield benefits that extend beyond adaptation objectives, and many projects primarily aim to deliver socio-economic benefits. Shifting the focus from "who pays?" to "who benefits?", through which channels, and to what extent, can thus help identify new revenue streams and clarify project funding.

Cost recovery models are key tools for aligning who pays with who benefits, improving project characteristics, enhancing bankability, and increasing the volume of finance that can be mobilised. CRMs include public funding, user-based revenues, and public capture of private value, and determine who ultimately pays for adaptation. However, they can raise important concerns regarding affordability and social acceptability, particularly in least developed countries, relating to who implements, who finances, and who ultimately funds adaptation investments. In addition, many adaptation projects are not suited to revenue-generating mechanisms and will require alternative financing approaches. Against this backdrop, governments will retain a central role. Where direct public financing is constrained, they can reshape policy and regulatory frameworks to create conditions conducive to private sector participation, for example by developing standards requiring the private sector to integrate adaptation considerations, or by fostering local collaboration initiatives between public and private stakeholders to explore financing models that respond to locally specific challenges.

ANNEX. ADAPTATION PROJECTS CASE STUDIES

We selected 12 adaptation-related projects across six developing countries. We focus on capital-intensive projects, requiring high upfront investment, to illustrate the impact of the cost of capital on the projects' total costs and on their financing structures. The selected cases reflect geographical and economic diversity across EMDEs, and we chose to focus on urban infrastructure projects. It is important to note that these projects are not all designed primarily as "adaptation projects", but they all explicitly contribute to climate adaptation and increase resilience.

This sample is not intended to represent the full diversity of urban adaptation projects and their associated financing mix and costs. Moreover, by design, it includes only projects that were financed. Rather, it serves as an illustrative sample, based on publicly available data, to highlight how financing costs shape the ability of EMDEs to mobilise capital for adaptation projects.

Across the projects financing mixes, the same colours are employed for similar types of finance sources. The following legend can be used to interpret cases. A legend with more specific details is provided along each chart.

Legend: Financing Mixes

- Equity investment
- Non-concessional loan
- Concessional loan
- Grant
- Government co-financing - grant

Amman, Jordan: Adaptation Projects Case Profile

CITY OVERVIEW

City population: 2,273,240

Country risk premium: 4.66%

Climate risk context: Amman faces severe aridity and water scarcity (Jordan is the second most water scarced country globally) making it very sensitive to climate change. This is compounded by climate-related hazards: extreme temperatures, droughts, flash floods.

Adaptation priorities: Water resource management, improved resilience of water utilities and treatment, waste management, climate resilient agriculture and urban planning.

KEY INSIGHTS

Project 1 and 2 can recoup part of the costs from water tariffs and benefit from grants and concessional loans lowering their financing costs, which improves their financial viability. Both projects are implemented by private developers under Build-Operate-Transfer contracts, and mobilise a high share of non-concessional financing compared to the other projects analysed.

PROJECT 1. AS-SAMRA WASTEWATER REUSE PLANT EXPANSION

Details: Water treatment facilities expansion, enabling reuse and improving water resource allocation (redirection of freshwater supply from agriculture to domestic).

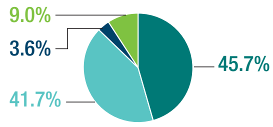
Cost: $223 million USD.

Implementing entity: Private developer – recruited through a Build-Operate-Transfer contract.

Stage: Operational/completed in 2015.

Co-benefits: Mitigation – waste to energy, and development – access to clean water.

PROJECT FINANCING MIX



- Non-concessional loan - syndicate of banks arranged by the Arab Bank
- Grant - Millennium Challenge Corporation
- Equity investment (private)
- Domestic co-financing - Government of Jordan

PROJECT 2. AQABA-AMMAN DESALINATION AND CONVEYANCE

Details: Expansion of desalination capacity for drinking water and conveyance infrastructure to store, pump and transport water from Aqaba region to Amman.

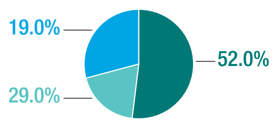
Cost: $3.07 billion USD.

Implementing entity: Public-private partnership through a Build-Operate-Transfer contract with National Water and Electricity Unit.

Stage: Committed financing (construction due in 2026).

Co-benefits: Mitigation – energy efficiency, and development – access to clean water.

PROJECT FINANCING MIX



- Non-concessional loan - mix of development financers
- Grants - bilateral country grants
- Concessional loans - mix of bilateral country lenders and MDBs

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Dakar, Senegal: Adaptation Projects Case Profile

CITY OVERVIEW

City population: 3,659,000

Country risk premium: 9.71%

Climate risk context: Dakar's rapid urbanisation, low-lying terrain, and inadequate drainage make it highly vulnerable to climate risks. These vulnerabilities are intensified by climate-driven hazards including heavy rainfall, recurrent flooding, coastal erosion, and rising sea levels.

Adaptation priorities: flooding prevention and draining system enhancements.

KEY INSIGHTS

Projects 3 and 4 provide substantial public benefits by improving stormwater drainage and flood prevention. However, they don't generate monetizable revenue and rely heavily on concessional loans and grants.

PROJECT 3. STORMWATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION: PROGEP I

Details: A four-stage project consisting of (1) integrating flood risk into urban planning; (2) construction and management of draining works and prevention of coastal erosion; (3) community engagement in urban flood risk reduction and climate change adaptation; (4) project coordination, management and monitoring evaluation.

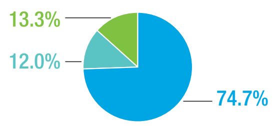
Cost: $121.3 million USD.

Implementing entity: National Government Agency – Municipal Development Agency (***Agence de Développement Municipal*** - ADM).

Stage: Operational/completed in 2021.

Co-benefits: Development benefits, particularly in increased sanitation through waste system overhaul and provision of safe drinking water sanitation.

PROJECT FINANCING MIX



- Concessional loan - International Development Association (IDA), World Bank Group
- Grants - mix Nordic Development Fund (NDF) and Global Environment Facility (GEF)
- Domestic co-financing - Government of Senegal

PROJECT 4. STORMWATER MANAGEMENT AND CLIMATE CHANGE ADAPTATION: PROGEP II

Details: Building on PROGEP I, the project aims to reduce flood risks in peri-urban Dakar and strengthen national and local capacity for integrated, climate-resilient urban flood risk management through improved planning, innovative nature-based solutions, climate-resilient sanitation, and gender-responsive approaches.

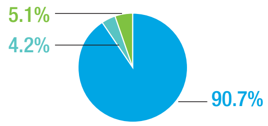
Cost: $171 million USD.

Implementing entity: National Government Agency – Municipal Development Agency (***Agence de Développement Municipal*** - ADM).

Stage: Implementation (2021-2026).

Co-benefits: Furthering of the health and sanitation development benefits developed through PROGEP I.

PROJECT FINANCING MIX



- Concessional loan - IDA, World Bank Group
- Grant - NDF
- Domestic co-financing - Government of Senegal

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Dhaka, Bangladesh: Adaptation Projects Case Profile

CITY OVERVIEW

City population: 24,652,900

Country risk premium: 7.12%

Climate risk context: Dhaka faces extreme climate vulnerability due to its low-lying delta location, rapid urbanization and population density making it highly sensitive to climate change. Key hazards include severe flooding from monsoon rains and river overflow, heat stress, poor air quality, and increased cyclone risk. These challenges are compounded by popu-lation density and climate-driven migration, straining infrastructure and resources.

Adaptation priorities: addressing fluvial and storm-water flooding risk.

KEY INSIGHTS

Both projects rely quasi exclusively on concessional loans from IDA.
Project 5 increases urban resilience but doesn't generate monetizable revenues.
Project 6 could recover part of the costs through water tariffs from the expansion of sanitation services, which could help leverage private finance. Nevertheless, the concessional loan helps lower financing costs and guarantees the project financial viability.

PROJECT 5. RESILIENT INFRASTRUCTURE FOR ADAPTATION AND VULNERABILITY REDUCTION

Details: Integrated drainage infrastructure upgrades and canal restoration to reduce flooding, improve stormwater flow, and enhance urban water management.

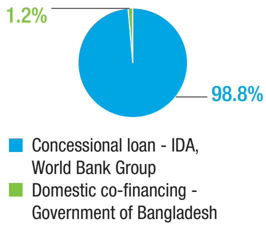
Cost: $506.2 million USD.

Implementing entity: National Government Agency: Local Government Engineering Department under the Ministry of Local Government, Rural Development and Co-operatives.

Stage: Implementation (2024-2028).

Co-benefits: Social – public health gains by reducing waterborne disease risk, reduced urban heat island effect.

PROJECT FINANCING MIX



PROJECT 6. DHAKA WATER SUPPLY AND SANITATION

Details: Rehabilitating stormwater drainage systems and sewer networks, upgrading wastewater treatment plant, and expanding sanitation services to low-income communities.

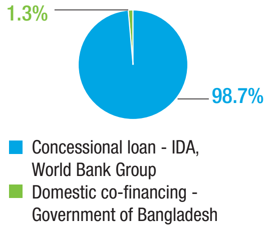
Cost: $71.8 million USD.

Implementing entity: National Government Agency – Dhaka Water Supply and Sewerage Authority.

Stage: Operational/completed in 2016.

Co-benefits: Mitigation benefits and social health benefits through access to clean water.

PROJECT FINANCING MIX



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Kigali, Rwanda: Adaptation Projects Case Profile

CITY OVERVIEW

City population: 1,745,555

Country risk premium: 7.12%

Climate risk context: Kigali's rapid expansion across steep hillsides and wetland valleys increases exposure to intense rainfall, flash floods, and landslides. More erratic rains, heavier storms, and rising temperatures drive heat stress and seasonal water shortages, while limited drainage and informal settlements heighten the impacts on infrastructure and vulnerable communities.

Adaptation priorities: addressing flooding risk, resilience building for vulnerable communities.

KEY INSIGHTS

Both projects deliver strong socioeconomic value through enhanced resilience and strengthened urban planning, but don't generate monetizable revenue streams. They rely heavily on concessional loans and grants.

PROJECT 7. RWANDA URBAN DEVELOPMENT (RUDP I)

Details: Comprehensive urban infrastructure and flooding infrastructure upgrades across Kigali and six secondary cities including the upgrading of 111 hectares of informal urban settlement area; 89.32 km of asphalt roads; 29.94 km of standalone drainage systems, 19.1 km of walkways, 7.4km of stormwater drains constructed addition of new streetlights.

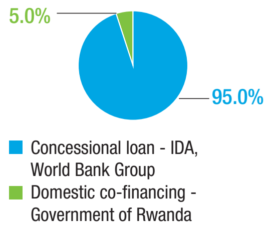
Cost: $ 95.4 million USD.

Implementing entity: National Government – Ministry of Infrastructure.

Stage: Operational/completed in 2021.

Co-benefits: Enhanced resilience in low-income areas, institutional strengthening for sustainable urban growth.

PROJECT FINANCING MIX



PROJECT 8. SECOND RWANDA URBAN DEVELOPMENT PROJECT RUDP II

Details: Multi-component project including urban upgrading of flood-hotspot infrastructure, development of a Stormwater Management Master Plan for Kigali, wetlands restoration, support for civil sector works in secondary cities beyond Kigali, institutional capacity development and project management.

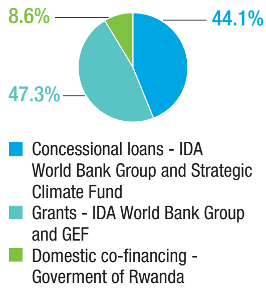
Cost: $175.5 million USD.

Implementing entity: Ministry of Infrastructure overseas collaboration between the City of Kigali, Rwanda Environment Management Authority and Local Administrative Entities Development Agency.

Stage: Implementation (2020-2025).

Co-benefits: Wetlands restoration brings carbon sequestration along with flood control, institutional capacity building and community benefits through increased green space, and improved health outcomes.

PROJECT FINANCING MIX



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Phnom Penh & Kampot-Koh Kong Provinces, Cambodia: Adaptation Projects Case Profile

CITY OVERVIEW

City population (Phnom Penh): 2,425,800

Country risk premium: 7.12%

Climate risk context: Phnom Penh is experiencing rapid urbanisation alongside inadequate infrastructure and land subsidence, increasing its vulnerability to monsoon flooding, river-flood risks driven by upstream changes, heat stress, and worsening air quality. Shifting rainfall patterns and more intense storms have resulted in frequent flooding and occasional droughts, disrupting livelihoods and causing significant damage to infrastructure.

Adaptation priorities: addressing flooding risk, capacity building.

KEY INSIGHTS

Projects 9 and 10 are financed exclusively through grants from international donors. They provide substantial socioeconomic benefits through increased climate resilience, but lack monetizable returns.

PROJECT 9. PHNOM PENH FLOOD PROTECTION & DRAINAGE IMPROVEMENT

Details: Four phase project spanning two decades, each project funded by Japanese Official Development Assistance provided in Yen, designed to protect Cambodia's capital from worsening flood risks caused by rapid urbanisation, inadequate drainage, and climate-driven increases in rainfall.

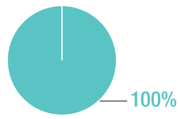
Cost (Phase IV): $30 million USD.

Implementing entity: Department of Public Works and Transport of Phnom Penh Capital City.

Stage: Operational/completed in 2021.

Co-benefits: Reduced risk of waterborne diseases, protection of vulnerable communities living in informal settlements, enhanced ecosystem conditions.

PROJECT FINANCING MIX



PROJECT 10. INCREASING CLIMATE RESILIENCE AND ENHANCING ADAPTIVE CAPACITY OF VULNERABLE COMMUNITIES IN KAMPOT AND KOH KONG PROVINCES

Details: Three-dimension project seeking to increase coping capacity by promoting climate-resilient small-scale infrastructure; adapt to current impacts of climate change through the recovery of coastal ecosystems and livelihood improvement and diversification; build capacity and knowledge sharing to reduce vulnerability to climate change.

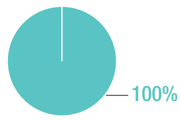
Cost: $10 million USD.

Implementing entity: International Organisation – United Nations Human Settlements Programme (UN-Habitat).

Stage: Implementation (2024-2028).

Co-benefits: Protection of livelihoods (agriculture, tourism), capacity building brings job creation.

PROJECT FINANCING MIX



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Quito, Ecuador: Adaptation Projects Case Profile

CITY OVERVIEW

City population: 2,017,260

Country risk premium: 12.95%

Climate risk context: Quito is experiencing more variable precipitation, rising temperatures, and glacial retreat. These trends are increasing water stress and erosion risks. Rapid urban expansion and inadequate drainage systems are worsening impacts on infrastructure, particularly in vulnerable hillside communities.

Adaptation priorities: building resilience to flooding and land erosion/land slide risk.

KEY INSIGHTS

Project 11 and 12 both include a large share of concessional debt, complemented by domestic grants, which contribute to reducing projects' financing costs. Moreover, they can recover part of the costs through user tariffs: transport fares for Project 11 and water tariffs for Project 12.

PROJECT 11. QUITO METRO LINE 1

Details: This is Quito's first underground rail system, running North-South across the entire narrow metropolitan area. Quito is highly exposed to landslides, flooding and road washouts, and to volcanic ash degrading air quality. This transport infrastructure project reduces exposure to climate hazards by shifting mobility underground and strengthens urban resilience.

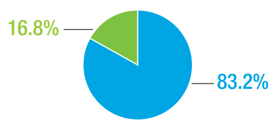
Cost: $2.13 billion USD.

Implementing entity: The city of Quito and Empresa Pública Municipal Metro de Quito, a state owned operating company.

Stage: Operational/completed in 2023.

Co-benefits: Job creation (5 000 direct and 15,000 indirect jobs created during construction), benefits for private and public actors through increased productivity via reduced traffic congestion, health benefits from improved air quality.

PROJECT FINANCING MIX



PROJECT 12. ENVIRONMENTAL SANITATION PROGRAM - PHASE I & II

Details: This project expands and upgrades Quito's water supply, wastewater collection and treatment, and stormwater drainage systems to improve public health and reduce environmental contamination. Together, the phases finance new sanitation infrastructure, network extensions, and institutional strengthening to increase service coverage and climate-resilient urban water management.

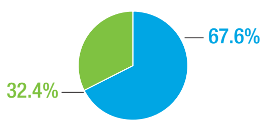
Cost: $162.8 million USD.

Implementing entity: Local Government Agency – Empresa Pública Metropolitana de Agua Potable y Saneamiento de Quito.

Stage: Operational/completed in 2015.

Co-benefits: Improved public health outcomes and reduced methane and nitrous oxide emissions through improved wastewater management.

PROJECT FINANCING MIX



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ACRONYMS

CAF	Corporación Andina de Fomento
CP	Country Platform
CPI	Climate Policy Initiative
CRM	Cost recovery models
DAC	Development Assistance Committee
EIB	European Investment Bank
EMDEs	Emerging markets and developing economies
FIEM	Fondo para la Internacionalización de la Empresa
GDP	Gross Domestic Product
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IDB	Inter-American Development Bank
IEA	International Energy Agency
IHLEG	Independent High Level Expert Group on Climate Finance
GEF	Global Environment Facility
MDBs	Multilateral Development Banks
NCQG	New Collective Quantified Goal on Climate Finance
NDF	Nordic Development Fund
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
UNEP	United Nations Environment Programme
WACC	Weighted average cost of capital
WRI	World Resources Institute

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