

CLIMATE RESILIENT FISCAL PLANNING IN ARMENIA

Michael Alan Schur, Davit Manukyan, and Vardan Melikyan

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Notes:

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CONTENTS

TABLES, FIGURES, AND BOXES	iv
ACKNOWLEDGMENTS	v
ABBREVIATIONS	vi
EXECUTIVE SUMMARY	vii
1 Introduction	1
Framework for Climate Resilient Fiscal Planning	2
2 Climate Fiscal Risk Assessment	4
Identifying Climate-Related Risks in Armenia	4
Fiscal Impacts of Identified Climate Risks	9
Recommendations for Improving Climate Fiscal Risk Assessment in Armenia	14
3 Climate Fiscal Risk Management	16
Introduction	16
Institutional Arrangements for Managing Climate-Related Risks in Armenia	16
Assigning Key Climate Change Risks	18
Risk Transfer, Risk Retention, and Risk Reduction Strategy and Actions	20
Reducing and Managing Government-Retained Risk	21
Recommendations for Improving Fiscal Risk Management in Armenia	23
4 Climate Finance Optimization to Fund and Finance Investment in Adaptation	25
Introduction	25
Creating Fiscal Space for Climate Change Adaptation in Armenia	26
Private Sector Financing	35
Recommendations to Improve Fiscal Capacity to Invest in Adaptation	36
5 Conclusions	38
Function 1. Climate Fiscal Risk Assessment	38
Function 2. Climate Fiscal Risk Management	39
Function 3. Climate Finance Optimization to Fund and Finance Adaptation	39
Key Recommendations	40
REFERENCES	44

TABLES, FIGURES, AND BOXES

TABLES

2.1	Projected Changes in Wheat, Potato, and Grape Yield, by Region (2030–2070)	7
2.2	Sectoral Risk Transferring to Fiscal Risks in Armenia	12
3.1	Adaptation Cost Estimates of SAPs (\$, Thousands)	22
4.1	Types of Private Sector Adaptation Investor and Their Return Expectations	26
5.1	Key Recommendations for Improving Armenia’s Fiscal Capacity to Invest in Adaptation	41

FIGURES

1.1	Framework for Climate Resilient Fiscal Planning	3
2.1	Average Annual Temperature Deviation against the Baseline Average for 1961–1990	5
2.2	Average Annual Precipitation Deviation from the Baseline Average for 1961–1990	5
2.3	Cumulative Number of Hazardous Hydrometeorological Phenomena Cases in Armenia, 1975–2016	6
2.4	Average Annual Temperature (°C) Distribution, Based on the METRAS Model and RCP8.5 Scenario	6
2.5	Effects of Climate Change on Fiscal Projections (2012–2072)	10
3.1	Institutional and Policy Structure for Climate Change Adaptation in Armenia	17
3.2	Subnational Government Share of Revenue and Spending	19
4.1	Dynamics of Armenian GDP	27
4.2	Fiscal Rules and Rule Targets	27
4.3	Fiscal Rule Target vs. Actual Debt-to-GDP Levels	28
4.4	Assessment of Design of PIM Institutions	29
4.5	The Public Investment Management Process	30
4.6	Average Tax Revenue in Selected Asian Economies: 2010–2014 vs. 2017–2021	32
4.7	State Expenditure vs. GDP Growth	33
4.8	Government Spending, by Direction of Financing	34
4.9	Armenia’s Health Expenditure, Compared to Peers	34
4.10	Government Spending, by Expense Type	35

BOXES

1.1	The Need for Climate Resilient Fiscal Planning	2
2.1	Undertaking a Climate Risk Assessment for the Agriculture Sector	13

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ABBREVIATIONS

ADB	Asian Development Bank
Armstat	Statistical Committee of Armenia
CBA	Central Bank of Armenia
EIRR	economic internal rate of return
FRS	Fiscal Risk Statement
GDP	gross domestic product
GoA	Government of Armenia
IMF	International Monetary Fund
MoF	Ministry of Finance
MTEF	medium-term expenditure framework
NAP	National Adaptation Plan
NDC	Nationally Determined Contributions
OECD	Organisation for Economic Co-operation and Development
PIM	public investment management
PPP	public-private partnership
SAP	sector adaptation plan
SNG	subnational government
SOE	state-owned enterprise
TA	technical assistance
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Armenia will require significant and sustained investment to adapt to current and projected climate change impacts. Funding these investments will require scaled-up climate finance that is programmed to ensure adaptation investment is sustained across systems and is not short-term, projectized, or fragmented.

Central finance and planning agencies—which include ministries and central banks—can play a catalytic role in scaling up and aligning finance with investment in adaptation. By integrating climate action into economic investments, fiscal policies, and budget management, finance ministries can help ensure economy-wide investment in adaptation. They can also deploy policy and regulation to leverage private investment in adaptation.

This report outlines a framework for climate resilient fiscal planning—based on three functions—to help decision-makers scale up and align finance with investment in adaptation and resilience. The first function is to assess climate-related fiscal risks to identify, model, and disclose the impact of climate-induced physical risks on fiscal sustainability. The second is in managing climate-related fiscal risks to guide risk assignment and risk reduction, transfer, and retention strategies. And the third function is to optimize resources to mobilize and manage public and private sources of finance for investment in adaptation.

The report assesses Armenia’s progress toward climate fiscal risk assessment, management, and resource optimization. It finds that the country has made good progress to date in strengthening climate resilient fiscal planning.

Armenia has passed an important milestone to project the impact of acute and chronic climate change risks on the macroeconomy and government fiscal position by modeling three global climate scenarios that reveal the risks may be substantial and push public debt to unsustainable levels. More granular assessments, focused on the short to medium term effects of climate risk, are now needed to guide more immediate investment prioritization, building on sector adaptation plans that are already being developed and complement the national adaptation program. A Fiscal Risk Statement has identified climate-related risks, while specific institutional arrangements to coordinate climate responses include the Inter-Agency Coordinating Council on Climate Change and recognition of the need to establish a Fiscal Risk Council and an Investment Committee. Armenia has also updated its Public Investment Management decree to guide prioritization of the adaptation investment pipeline and is developing a green taxonomy as a policy instrument to guide private and public activities.

Building on this progress, the report recommends the following actions for Armenia to close remaining gaps. These actions may also be pertinent for other developing member countries that the Asian Development Bank is assisting with climate resilient fiscal planning.

Function 1. Climate fiscal risks assessment: Armenia should develop a sector-by-sector understanding of climate risk that can inform risk management, including improving resilience in existing investment and operations, adaptation plans, and investment planning. Sharpening the assessment of climate fiscal risks includes actions to improve data collection and processing systems. Expansion and technology upgrades to the hydrometeorological observation network are critical, as is strengthening data collection institutions.

Function 2. Climate fiscal risk management: Despite progress with climate risk policies and institutional arrangements, Armenia should now undertake rigorous sector risk analysis, to develop a risk management strategy that includes all prioritized investments, and to integrate this with the budget process and medium-term expenditure framework to ensure fiscal sustainability. Proper institutional arrangements for fiscal risk management include an

urgent need to establish the proposed Fiscal Risk Council to guide prioritization of adaptation investments and build a climate risk assignment framework to quantify risks and help the government take a balanced approach to risk-layering in its budget.

Function 3. Finance optimization to fund and finance investment in adaptation: While Armenia has made excellent progress in fiscal management over past decades, it is now a priority to create fiscal space for funding investment in climate adaptation initiatives. This, in turn, will help increase access to the financing required to support sustainable investment in adaptation. The Government of Armenia will also need to consider how best to harness private sector adaptability, ingenuity, and financing for priority adaptation investment. Among other things, this requires finalizing the green taxonomy and strengthening communication to make it clear what climate risks the private sector is expected to manage, and which risks government agencies intend to handle. A long-term fiscal sustainability analysis is recommended to optimize funding of adaptation investments. This should account for fiscal priorities and pressures beyond climate adaptation, such as health care, education, and Armenia's debt position. This evaluation can help build a climate action framework to protect the country's most vulnerable households from climate impacts while mobilizing private investment in adaptation and facilitating access to climate finance.

1 INTRODUCTION

Armenia faces comparatively higher climate change exposure and vulnerability than the global average. Climate change has resulted in an increase in temperature by 1.23°C above preindustrial levels for 1929–2016, a 9% decrease in rainfall, and more frequent, higher magnitude extreme weather events (Republic of Armenia 2020). The temperature rise is higher than the global average increase in 2017, which was approximately 1.0°C (Allen et al. 2018). Climate projections indicate that temperatures across Armenia may rise by 4.7°C by 2100, combined with an 8.3% decline in average annual precipitation, and that the country is expected to face significant risk, given its geographic location, extreme weather, fragile ecosystems, and economic and social structures (Republic of Armenia 2020).

Climate-related socioeconomic impacts are already evident. Climate change has already impacted the economy and livelihoods that rely on climate-sensitive sectors, such as agriculture and tourism. Between 1994 and 2014, Armenia lost an estimated \$1.5 billion annually due to natural hazards like floods, drought, hail, spring frosts and mudflows.¹ In the agriculture sector, weather-related cropland losses between 1995 and 2013 are estimated at over \$690 million (World Bank Group 2018a). Climate change will continue to impact Armenia's poor first, including the 26.5% that lives under the national poverty line in 2021.² These negative impacts are already creating fiscal pressure related to compensation provided to households and firms suffering losses, as well as increased costs for the rehabilitation of assets and infrastructure.

Central finance and planning agencies can be catalytic in scaling up and aligning finance with investment in adaptation to build resilience and ensure fiscal sustainability in the context of climate change. By integrating climate action into economic investments, fiscal policies, and budget management, finance ministries can help ensure that investment in adaptation reaches all parts of the economy. They can also deploy policy and regulation to leverage private investment in adaptation.

This report outlines a three-function framework to help decision-makers scale up and align finance with investment in adaptation and resilience (Section 2). The report assesses Armenia's progress toward climate fiscal risk assessment, management, and resource optimization (Section 3). And provides recommendations to strengthen climate resilient fiscal planning (Section 4).

To date, no major comprehensive and systematic assessment of Armenia's legal, institutional, or fiscal framework for climate-related planning and budgeting has been conducted. Findings of this and subsequent reports will help develop an understanding of the institutional and regulatory gaps that need to be closed while responding to climate change issues, providing a gateway to climate financing in development policy, planning, and budgeting.

Box 1.1 presents the rationale for climate-related fiscal planning.

The report has been produced under the knowledge and support technical assistance (TA)—TA-6629 REG: Improved Fiscal Decision-Making for Climate Resilient Development in Asia and the Pacific. This TA supports selected Asian Development Bank (ADB) members (Armenia, Indonesia, and Mongolia) to strengthen both their systems for, and knowledge of, climate risk-informed decision-making.

¹ <https://www.irtek.am/views/act.aspx?aid=89460>.

² <https://www.adb.org/where-we-work/armenia/poverty>.

Box 1.1: The Need for Climate Resilient Fiscal Planning

A **fiscal risk** is defined as the exposure of public finances to unexpected developments that may lead to fiscal outcomes deviating from expectations as set out in the budget or other forecasts. When these deviations are large or unanticipated, they can have significant adverse socioeconomic consequences.

Climate fiscal risks arise in several ways. On the revenue side, climate change can lead to overall tax revenues falling due to declining economic activity, reduced royalties and dividends from state-owned enterprises (SOEs) because of disrupted economic activity, or to lower tax collection as administration operations are disrupted and/or suspended. On the expenditure side, climate change impacts can result in immediate relief payments to the affected population, increased costs associated with reconstruction of damaged infrastructure, higher social transfers to affected households, stimulus spending to maintain economic activity in general, contingent liabilities and guarantees—e.g., of public–private partnership (PPP) revenue or SOE debt—being triggered and paid out, or in transfers to local government to finance their disaster-related activities.

Lower revenues and higher expenditures arising from climate change impacts can lead to larger deficits and therefore higher debt. This can reduce governments' fiscal capacity, and therefore their ability to adapt effectively to climate change and fund other important social and economic priorities. The impacts of climate change on the wider community—including, for example, lower growth from disruption to the economic base and exchange rate pressure from lower exports and higher/same demand for imports—can create a feedback loop, further reducing governments' fiscal capacity.

Climate resilient fiscal planning is becoming increasingly important to ensure governments are well positioned to adapt to climate change and preserve fiscal space for other important social and economic policy priorities.

Source: ADB.

The TA will help countries to scale up and improve climate finance programming to implement adaptation investment plans that enable transformation and system transition to address near and long-term climate risks. It will help financial institutions scale up investment in adaptation, by supporting the country's Ministry of Finance (MoF).

Framework for Climate Resilient Fiscal Planning

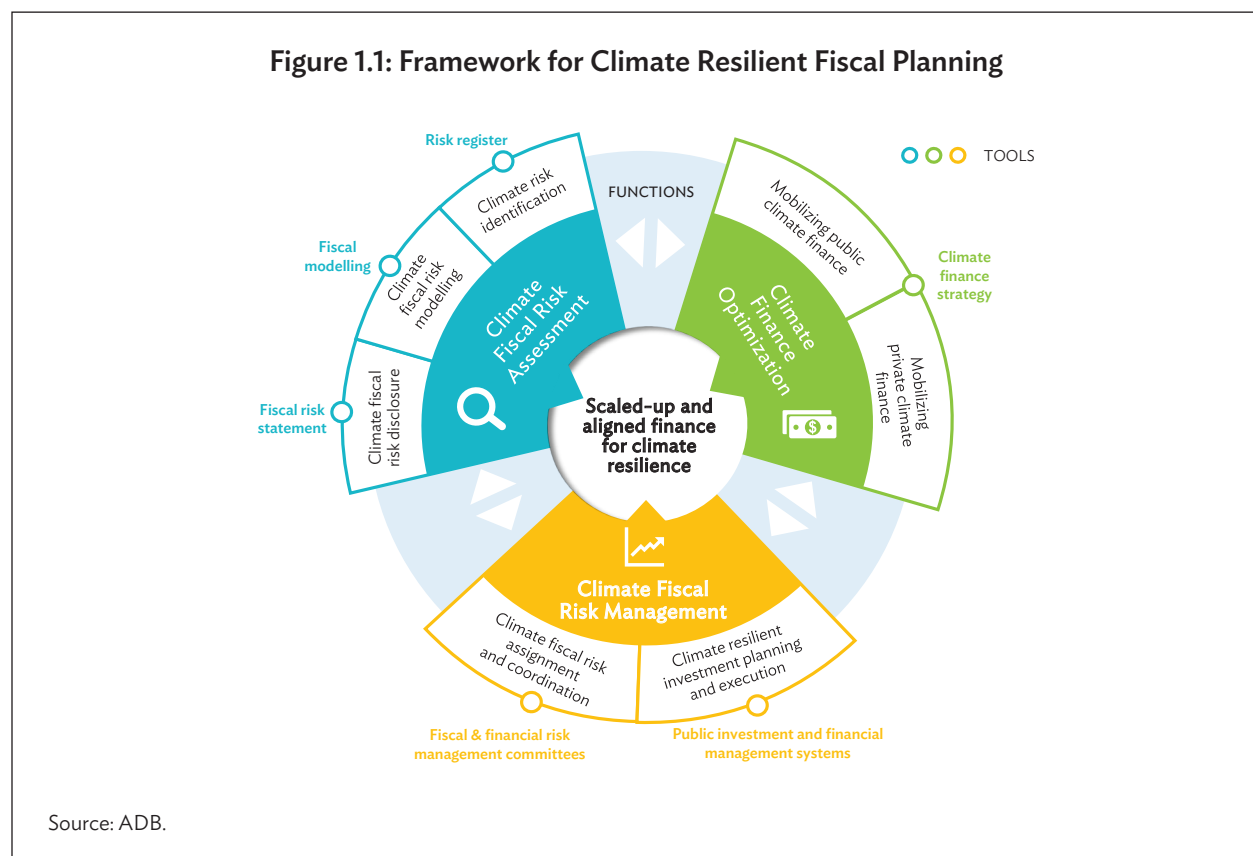
This document applies the good practice climate risk-informed decision-making framework developed under this TA to assess Armenia's institutional and regulatory gaps, and includes recommendations for how to tackle them. The framework has three functions (Figure 1.1).

Function 1. Climate fiscal risk assessment to identify, model, and disclose the impact of climate-induced physical risks on fiscal sustainability. Within overall fiscal risk, countries must assess climate-related fiscal risk, starting with their exposure and vulnerability to climate change. Climate change affects each country differently, in terms of both physical impacts (exposure) and the consequential impacts on human settlement and prosperity (vulnerability). From this analysis, countries can develop a list of key climate change and sector impacts. This will

allow them to assess the fiscal implications of climate risks, by first developing a baseline of their current fiscal position, and then identifying how the key sector impacts will affect both the current and projected fiscal positions. By understanding the impacts of climate change, countries can allocate risks throughout society, and define and manage the risk borne by the government.

Function 2. Climate fiscal risk management to assign risks and investments in risk reduction, transfer, and retention strategies. Countries can then determine how to assign climate risks (particularly sector impacts), including across national and subnational governments (SNGs), businesses, and households. By developing a risk assignment matrix, countries can scope the key risks borne by central government and identify where further work is required to help other entities bear or transfer risk (for example, through information for households and businesses). Once the government-borne risks are known, countries can develop a fiscal risk management strategy using a mix of adaptation investments, financial instruments—such as classical insurance, parametric instruments, and contingent credit—and provisioning. They can also develop a strategy for catalyzing private investment in adaptation for projects that will provide adequate returns to private investors.

Function 3. Climate finance optimization to mobilize public and private finance for investment in adaptation. In parallel, countries can improve their fiscal capacity by integrating climate risks into their overall fiscal risks management framework, thereby developing a more climate-informed fiscal framework that optimizes revenue collection, controls expenditure, and improves the efficiency of public investments through climate-informed and disaster risk-informed public investment management (PIM) standards. Countries can also develop a climate finance framework that identifies the right mix of public and private financing to use, including considering market developments in climate finance. They can then implement climate fiscal and finance frameworks in parallel with the fiscal risk management strategy.



2 CLIMATE FISCAL RISK ASSESSMENT

Identifying Climate-Related Risks in Armenia

As a landlocked mountainous country, 90% of which is located more than 1,000 meters above sea level, Armenia is among the most vulnerable countries to climate change. The high frequency of intensive hydrometeorological hazards, resulting in droughts, landslides, mudflows, wildfires, and so on, means that climate change adaptation is a priority for the country.

Armenia's economy largely depends on agriculture, and around one-third of the population is rural. Its high levels of poverty and unequal gender distribution of the poverty, drought, soil erosion, and other natural hazards makes its poor rural population especially vulnerable to climate change.

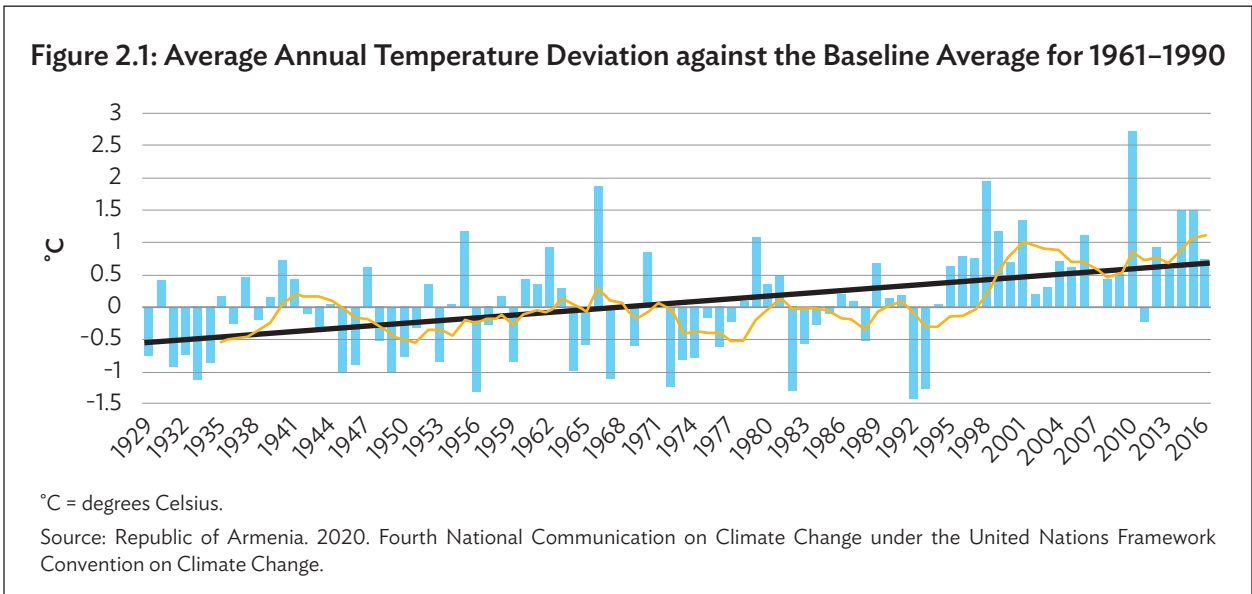
Key climate risks

The Ministry of Environment's Hydrometeorology and Monitoring Center is responsible for researching, assessing, and forecasting spatiotemporal climate and climate change patterns, and developing recommendations around the vulnerability of different sectors of the economy to climate change.

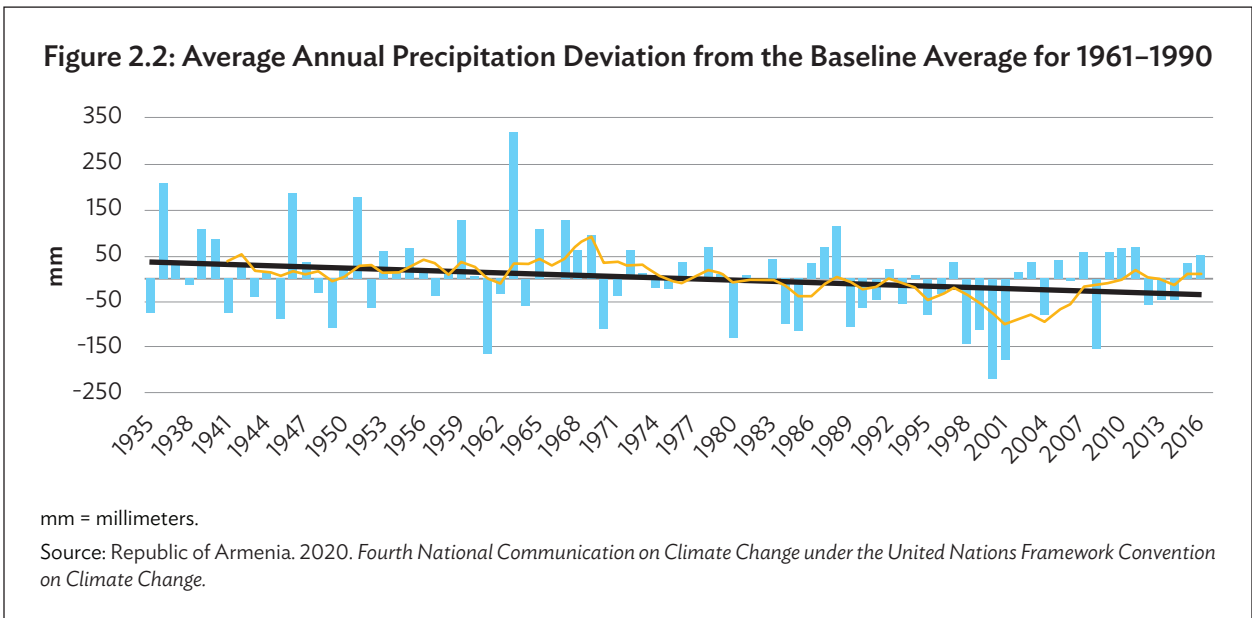
The center has received significant support from international development partners over recent years, particularly for technical capacity building, including modernizing the network of meteorological stations, largely informed by a roadmap developed by the World Bank (World Bank Group 2018b). But to reach the targets set in this roadmap—developing a modernized weather and climate services center that will provide timely and relevant data to key constituents—more investments are needed to develop climate services, including modeling and more accurate forecasting. This will also help improve the assessment of climate risks and provide information to sector policy makers. Armenia is particularly vulnerable to climate change, with its climate already characterized by high-frequency, high-magnitude hydrometeorological phenomena. Between 1994 and 2014, the country bore estimated annual losses of more than \$1.5 billion due to floods, droughts, hail, early spring frost, and mudflows. Damage assessment conducted in accordance with Decree N 1582-N of 10 November 2011,³ shows that in 2020, the total damage caused by disasters triggered by natural hazards, including hail, strong winds, frost, and mudslides, amounted to AMD3.8 billion, decreasing to AMD3.1 billion in 2021, and AMD727 million in 2022.⁴

³ <https://www.arlis.am/DocumentView.aspx?DocID=72227>.

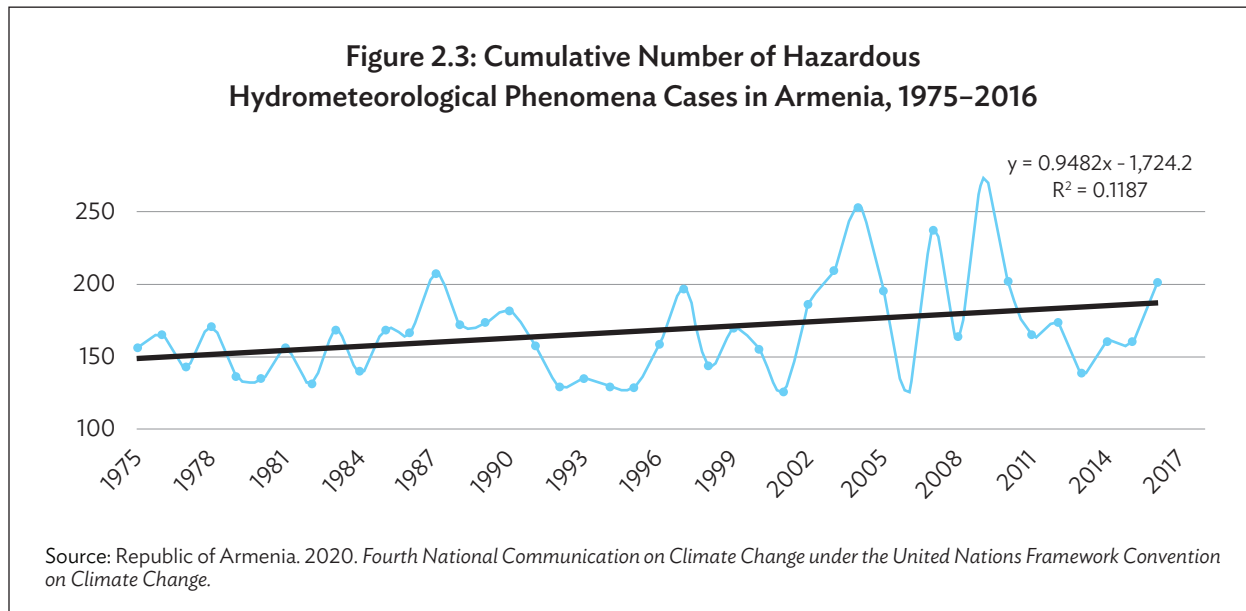
⁴ Figures received from the MoF.



Armenia’s climate is already changing, with an increase in temperature (Figure 2.1) and a fall in precipitation (Figure 2.2). Its Fourth National Communication on Climate Change states that the ambient air temperature in the country increased by 0.4°C during 1929–1996, by 0.85°C during 1929–2007, by 1.03°C during 1929–2012, and by 1.23°C during 1929–2016 (Republic of Armenia 2020). In parallel, precipitation has fallen, with average annual precipitation decreasing by 6% during 1935–1996, and by around 9% during 1935–2016.

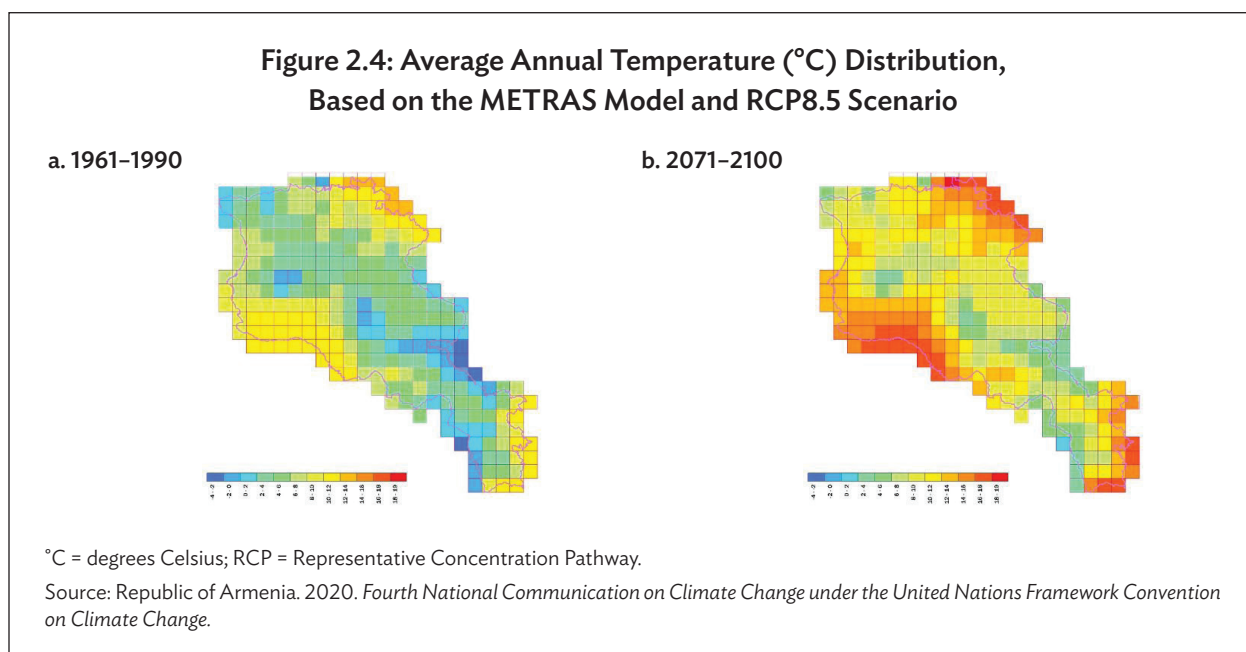


Another disturbing development is the increasing frequency and intensity of hydrometeorological hazardous phenomena, caused by climate change. An analysis of trends related to hazardous phenomena observed in Armenia (Figure 2.3) shows that the number of observed cumulative cases of such phenomena increased by around 40 during 1975–2016, against the baseline average of 168 cases for 1961–1990. This is 23.5% of the multiannual average value.



Climate change projections, based on the results of the CCSM4 global climate model, as well as high-resolution (12x12 kilometer) METRAS⁵ regional climate model, show that by 2100, the temperature in Armenia may rise by 4.7°C against the 1961–1990 baseline annual average of 5.5°C, while precipitation may decrease by 8.3%, and hydro meteorological hazards become more frequent.

According to the METRAS model, used to develop Armenia’s Fourth National Communication on Change, the average annual temperature is going to increase further (Figure 2.4). This is particularly so in the Ararat Valley and the valleys of Tavush and Syunik region, Armenia’s main agricultural zones, where average temperatures will reach 16–18°C in 2071–2100, compared to 10–14°C in 1961–1990.



⁵ The METRAS regional model enabled dynamical downscaling of the results of these global models for Armenia, reducing the errors due to the rough model resolution, given the country’s complex mountainous terrain. Using the METRAS model, we conducted projections of average air temperature and atmospheric precipitation in Armenia based on different altitude zones, deriving from the pessimistic RCP8.5 scenario.

Key sector risks

Water resources: The vulnerability of Armenia’s water resources—which include rivers, lakes, and reservoirs—differs from basin to basin, due to several factors, including existing climate conditions. The results of water resource vulnerability analysis conducted using different methods, particularly models and emission scenarios for 2040, 2070, and 2100, show that river flow may decrease by 8%–13% by 2040, by about 13%–27% by 2070, and around 20%–39% by 2100.

Similar analysis conducted for Lake Sevan indicates the likelihood of negative developments in terms of river flow, precipitations, and evaporation contributing to Lake Sevan water balance. During 1961–1990, the average annual river flow was 783.8 million cubic meters (m³), average annual precipitation was 503.9 million m³, and average annual evaporation was 1,074.5 million m³. By 2100, these may be 519.0–646.4 million m³, 463.6–524.0 million m³, and 1,316.9–1,467.1 million m³, respectively (Republic of Armenia 2020).

Agriculture: Climate change is expected to increase pressure on the agriculture sector, decreasing soil moisture levels and soil moisture provision to various crops by 30% and up to 13%, respectively, with irrigation water shortage increasing the soil water deficit by up to 30%, irrigated land productivity reducing by 24%, land and natural pastures degrading, and crop yield declining by up to 14% by 2030. Table 2.1 shows projected yield changes to several crops, based on a statistical model using the values of main climatic parameters and the data of METRAS model.

Table 2.1: Projected Changes in Wheat, Potato, and Grape Yield, by Region (2030–2070)

Region	2030	2040	2050	2060	2070
Wheat crop					
Ararat	-4.5	-8.4	-12.2	-16.1	-19.9
Kotayk	-5.0	-10.4	-15.7	-17.0	-19.3
Vayots Dzor	8.3	7.4	6.5	5.5	4.6
Shirak	-5.6	-9.9	-10.2	-12.4	-18.7
Gegharkunik	-6.0	-11.8	-14.5	-13.3	-19.9
Lori	3.2	5.3	5.5	7.5	7.5
Syunik	10.5	12.3	10.0	8.1	7.3
Potato crop					
Gegharkunik	-3.9	-7.0	-10.0	-12.2	-14.2
Kotayk	-4.7	-6.6	-9.5	-12.4	-15.3
Shirak	-7.6	-10.2	-13.4	-16.2	-20.7
Lori	-3.2	-7.3	-9.1	-11.6	-14.0
Syunik	-4.1	-8.4	-10.4	-13.2	-17.7
Grape crop					
Armavir	-5	-9.3	-12.5	-19.7	-
Vayots Dzor	5.3	9.1	10	11.8	-
Ararat	-3.7	-5.6	-10.4	-14.8	-

Note: Wheat yield assumes no agrotechnical measures. Grape data not available for 2070.

Source: Republic of Armenia. 2020. *Fourth National Communication on Climate Change under the United Nations Framework Convention on Climate Change*.

Major factors contribute to these negative changes, including hailstorms, frost, heatwaves, and drought. Their combined annual impact during recent years is estimated at around AMD15 billion–30 billion. Hailstorms have the largest impact and will become more frequent during spring and summer due to climate change.

Settlement and infrastructure: Mudflows, landslides, rockfalls, floods, and avalanches cause major devastation throughout Armenia, damaging settlements, roads, and other infrastructure, and causing human casualties.

Mountainous terrain, heavy rainfall, and hail are the main reasons for mudflows, while snow melt plays a smaller role. Around 80% of heavy rainfalls, which eventually lead to mudflows, happen in May and June. While heavy rainfalls were particularly abundant in 2007, there was a downward trend in this regard during 2012–2018.

While most of Armenia's territory is prone to landslides of some degree, most take place in Dilijan, Ijevan, Kapan and Vanadzor, and other settlements in the Debed, Aghstev, Vedi, Getik, and Vorotan river basins. Landslides are generally more common in mountainous and foothill areas, where heavy precipitation and abundance of humidity cause heavy rockslides (Republic of Armenia 2020).

Human health: Rising temperatures, changing precipitation patterns, and increasing frequency of hazardous hydrometeorological phenomena, resulting from climate change, may increase risks related to human health, particularly the incidence of cardiovascular and respiratory diseases, when coupled with increased air pollution.

Another health risk related to climate change is the spread of infectious, waterborne diseases, particularly in areas where water quality, sanitation, and personal hygiene standards need improvement. Other diseases that require increasingly more attention due to climate change include leishmaniasis, brucellosis, and intestinal and airborne infections.

There are also risks related to working outdoors, where the effects of extreme weather conditions are more acute. While cardiovascular and respiratory diseases create more health-related risks for the urban population, the rural population and people frequently contacting natural landscapes or products are more susceptible to natural focal infections. Low water quality and poor sanitary facilities and personal hygiene can increase the risk of gastrointestinal infections (Republic of Armenia 2020).

Ecosystems: Armenia's main natural ecosystems are projected to shift vertically over the next century, with mountain landscapes shifting upwards by up to 300 meters. Parts of some climate zones are already moving upwards, and forest ecosystems are expected to shift upwards across vertical zones, while the frequency of wildfires, pest and disease outbreaks are also projected to increase.

The incidence of wildfire has increased since the early 2000s. While mostly caused by humans, these are increasingly due to higher temperatures, more frequent heatwaves, and reduced precipitation. Wildfires are significantly more frequent and intense in years with extremely hot summers. Forest diseases and pests are also becoming more common due to climate change, which creates favorable conditions, particularly warmer winters. Since 2000, an increase has been observed in the surface area affected by forest diseases.

Climate change will also affect biodiversity, altering the phenological and bioecological features of the species and their prevalence, potentially resulting in the extinction of local endemic, rare plant and animal species. Invasive species can become a serious threat for Armenia's natural ecosystems and rich biodiversity. For example, *Ambrosia artemisiifolia* has significant spreading potential and can create hazardous consequences for natural ecosystems, biodiversity, agriculture, and human health.

Decreasing levels of Lake Sevan during the second half of the 20th century due to human interventions and the changing of the thermal water regime have had adverse effects on the lake's ecosystem. As the water temperature continues to increase and blue-green algae continue to develop at an increasingly higher rate during summer and fall, changes in the lake's ecosystem can become even more significant (Republic of Armenia 2020).

Fiscal Impacts of Identified Climate Risks

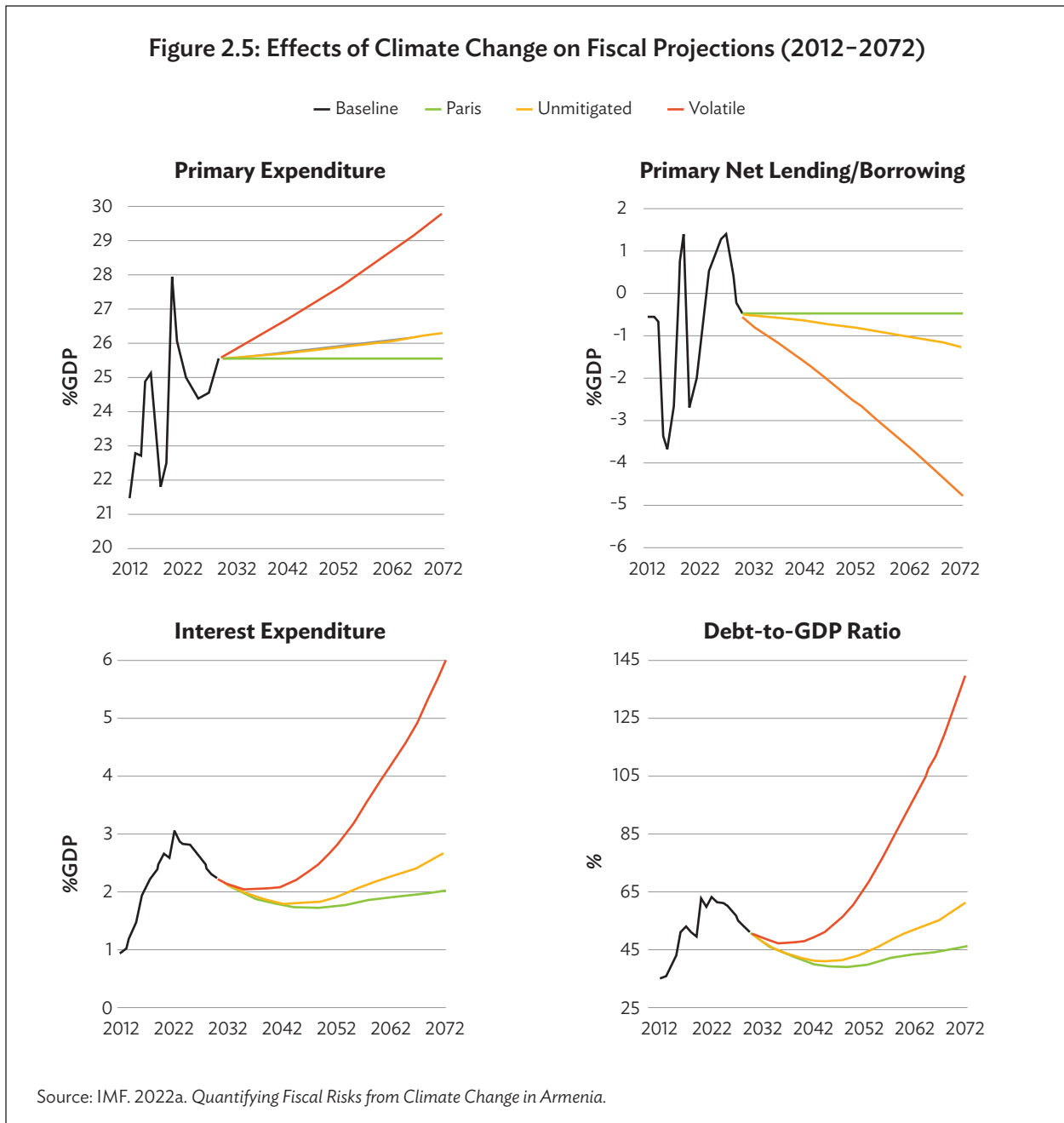
Macrofiscal impact

In 2022, the MoF started including disaster and climate risk into its FRS. After identifying acute and chronic risks and providing a qualitative analysis of their impact on the macrofiscal environment, the MoF worked with the IMF to quantify the risks, using an econometric model to reflect simulations in an analytical framework that links estimates of changing climate patterns on the real economy and with long-term fiscal projections. This analysis considered: the impact of higher temperatures on the economy, based on an empirical analysis of the effect of past temperature changes on growth; how slower economic growth flows through to fiscal projections to identify building fiscal pressures; and discrete climate change-related fiscal risks—including those transferred through SOEs and PPPs—to identify the state's direct exposures to climate risks. To assess fiscal pressure, the study focused on fiscal health and economic growth indicators, such as GDP, public expenditure, net borrowing, and debt-to-GDP ratio (IMF 2022a).

This modeling is applied to three key scenarios relative to baseline projections, which project how the long-term fiscal situation may evolve based on current policies in the absence of climate change. The baseline scenario demonstrates how the long-term fiscal situation may evolve, based on current policies in the absence of climate change. The three climate scenarios are:

- **Paris Agreement scenario**, where international commitments from the Paris Agreement are met (RCP2.6)
- **Unmitigated scenario**, where global greenhouse gas emissions continue to increase throughout the century, leading to a temperature increase of around 5.5°C above the average 1990s level by 2090–2100
- **Volatile scenario**, which takes the unmitigated scenario and adds higher weather volatility and increased numbers of extreme weather events that may arise from climate change.

The potential impacts are outlined in Figure 2.5.



Under the Paris Agreement scenario, the modeling results project that GDP remains unchanged from the baseline, and public debt is 46% of GDP by 2072. Under the volatile scenario, climate change impacts could reduce GDP per capita by 18% relative to baseline by 2072, and in the absence of any fiscal policy response, public debt levels could reach an unsustainable 140% of GDP (IMF 2022a).

Interestingly, the modeling also demonstrates that investing in adaptation can reduce the fiscal impact. Even in the unmitigated scenario, reducing the time it takes for the economy to adapt to higher temperatures could reduce the impact on GDP by 1.7 percentage points, and lower public debt from 62% to 54% of GDP by 2072. Theoretically, the Government of Armenia (GoA) could also reduce expenditure in line with economic growth. But this translates into a very challenging 14% reduction in real primary spending per capita relative to the baseline in 2072.

The IMF modeling is an important milestone in Armenia’s development of a good-practice climate risk-informed decision-making framework because it quantifies the impact of both acute and chronic climate change risks on the macroeconomy and the GoA’s fiscal position under a range of possible climate scenarios.

But it does not assess climate impacts and adaptation expenditure at sector level. And, while it makes long-term projections, it does not provide enough direction on short-term priorities. Sector-level and short-term impact analysis are critical to translate physical and macro understanding of climate risk into a sector-by-sector understanding that can inform risk management, including through adaptation plans and investment planning. Doing so will give the GoA a stronger evidence base on how, where, and how much to respond, balancing the many competing demands on GoA’s limited fiscal space. This requires more robust data collection on climate-related sector risks, increased data processing capacity, and the use of sector modeling approaches.

Key sector risks and transfer mechanisms

The state of sector-level analysis in Armenia’s NAP, based on its Nationally Determined Contributions (NDC), identifies seven sectors that are vulnerable to climate change: agriculture, water, energy, settlements and infrastructure,⁶ human health, tourism, and natural ecosystem.

There is a complex interplay between the impact of acute and chronic climate risks on various sectors of the Armenian economy and the GoA’s fiscal position. Indicative examples of transmission mechanisms are described in Table 2.2.

⁶ As part of infrastructure, the transport sector will have its own SAP.

Table 2.2: Sectoral Risk Transferring to Fiscal Risks in Armenia

Climate risk	Vulnerable sectors	Impacts	Financial and economic costs	Fiscal impacts
<p>Acute risk (immediate and growing frequency of extreme events): Increase in intensity and frequency of climate hazards and associated natural hazards, including: heatwaves, droughts, intensive hail, frost (early spring, late fall), heavy rainfall, strong winds, severe cold, landslides, mudflows, seasonal floodings, forest fires, rockfall, and avalanches</p>	<p>Agriculture: annual output 13% of GDP (2021)</p> <p>Settlements and infrastructure: e.g., transport infrastructure assets: 9% of GDP</p> <p>Human health: annual public expenditure: 2.2% of GDP</p> <p>Water</p> <p>Energy</p> <p>Tourism</p> <p>Natural ecosystems</p>	<p>Agriculture: Crop failure: direct losses at farm level</p> <p>Settlements and infrastructure: Damage of social and economic infrastructure, including water and energy sector, inhabitable settlements, and loss of communities</p> <p>Human health: Impact on health; loss of life</p> <p>Tourism: Damage of tourism and transport infrastructure and touristic assets; loss of tourist season</p> <p>Natural ecosystem: Loss of natural capital</p>	<p>Income loss by private sector due to direct impact (e.g., average annual climate hazard losses of agriculture is about 2.2% of total output)</p> <p>Economic losses of private sector due to unavailable infrastructure services (e.g., damage suffered by businesses due to landslides on the roads)</p> <p>Reconstruction costs of addressing damage to private and public sector assets</p> <p>Finance sector portfolio losses (e.g., agriculture portfolio is 6% of total banking portfolio)</p> <p>Insurance payments</p> <p>Impact on finance sector through credit and insurance markets and pricing of financial products</p> <p>Loss of labor input in the economy</p>	<p>Decreased tax revenues</p> <p>Increased public sector expenses for:</p> <ul style="list-style-type: none"> • Infrastructure repair • Emergency response • Health care and social security <p>GoA contingent liability risk to:</p> <ul style="list-style-type: none"> • Private sectors businesses • Finance sector • Restore natural capital
<p>Chronic risks (slow-onset and long-term costs): Temperature increase Change of precipitation patterns</p>		<p>Change of crop and animal yields</p> <p>Change in outdoor labor productivity</p> <p>Degradation of natural capital (water availability, land quality, loss of farmland, biodiversity loss, etc.)</p> <p>Increased demand for energy for cooling and heating</p> <p>Increased demand for water</p> <p>Decreased water availability</p> <p>Change of infrastructure and building construction design, standards, and maintenance and capital repair requirements</p> <p>Increase in poverty and food insecurity</p>	<p>Sector output losses</p> <p>Sector asset losses</p> <p>Impact on energy and water markets and prices (social cost)</p> <p>Pension funds losses</p> <p>Deterioration of ecosystem services</p>	<p>Decreased tax revenues</p> <p>Increased public sector expenses for:</p> <ul style="list-style-type: none"> • Health care and social security • New infrastructure and maintenance costs <p>GoA pension fund liability guarantees</p>

GDP = gross domestic product; GoA = Government of Armenia.

Notes: Transport assets shown at historical costs; replacement cost may be much higher. It is important to note that there has been no attempt to precisely model the impacts of climate change on various sectors of the Armenian economy, notwithstanding the recognition given to these priority sectors. This will be crucial to properly direct investment planning and prioritization. While the NAP and SAPs have identified broad categories of investments, adaptation investment planning will require a more detailed understanding of fiscal risks and costs at sector level, to properly assess impacts.

Sources: ADB calculations, based on data from the Statistical Committee of Armenia (Armstat) and CBA.

Armenia will need to undertake sector-specific climate risk assessments to inform and develop sector adaptation investment plans and sequence and prioritize investments. Box 2.1 illustrates the application of a sector approach to agriculture through three activities with related objectives and outlines next steps.

Box 2.1: Undertaking a Climate Risk Assessment for the Agriculture Sector

Activity 1: Initial agriculture sector climate diagnostic

An initial climate risk assessment diagnostic for the agriculture sector notes that Armenia already experiences weather-related extreme events, including flooding, droughts, landslides, hailstorms and heatwaves, and there is some evidence that these are increasing. These extremes already reduce agriculture productivity.

Production of some crops has decreased quite significantly in recent years. Future climate change will lead to higher temperatures, though the level of warming will depend on global GHG mitigation. There will be some positives from warming temperatures, with a longer growing season. There will also be changes to existing agroclimatic zones, with greater challenges in the lowlands but some opportunities at higher elevations with warming. These climatic changes will also affect the range and potential outbreaks of pests and disease.

The climate models indicate a higher rate of temperature warming in Armenia, compared to most other countries. This is projected to lead to increased heatwaves and a significant increase in the number of very hot days (>35°C). Higher temperatures will increase evaporation, evapotranspiration, and thus crop water and irrigation demand.

Rainfall (precipitation) projections from the models are much more uncertain, with differences between some models on whether average rainfall will increase or decrease. But there seems to be an indication that monthly average precipitation from June to September could reduce. There are also very large potential increases in drought risk projected from climate change, particularly toward mid-century and beyond, with this finding seeming robust across models.

The combination of rising temperature and increasing drought indicate a major risk pathway for agriculture. Planning for this now is a priority, including consideration of water use and irrigation, noting that expanding irrigation could risk locking in future exposure to these risks. Some studies indicate that increasing aridity could be a factor in desertification. This is also a long-term risk that might be worth some early planning. The lowlands look particularly vulnerable to climate change impacts. Potential increases in heavy precipitation are also projected, which could increase flood intensity and potential landslide risks.

Activity 2: Climate risk and vulnerability of sector strategy and plans

The strategy for economic development in the agriculture sector for 2020–2030 has a number of key sector targets, some of which are climate sensitive. For example, labor productivity will reduce with higher heat, and this may affect the target related to improved farmer productivity. Similarly, when diversifying agricultural products, checking that new promoted crops are resilient to future climate conditions, not just based on the past climate, will be vital. There are ambitious targets for increasing irrigation, which would have significant impacts on water use and should therefore be considered under projections of water supply impacted by climate change. While short-term irrigation efficiency is likely to be no-regret, increasing the area of irrigation may lock in future risks.

The 2020–2030 plan includes some consideration of climate risks, with actions for insurance and hail, and plans to increase insurance for agriculture. This could help address losses, but weather-related losses are likely to increase, and insurance will need to take this into account (affordability of premiums).

continued on next page

Box 2.1 *continued*

Activity 3: Analysis of current investment plans

The first few years of the strategy have an associated investment plan, and the main adaptation options in the published documents are in the NAP. Some early no-regret actions are already planned—such as hail warning systems—but there is potential to further reduce current weather-related losses, which could have large economic benefits. Investments to reduce leakage and losses in irrigation systems would likely also have large economic benefits, though the (private) financial benefits will depend on water-charging regimes. Water conservation and management will be key, given rising temperatures and increased drought risk. But increasing irrigation share will increase future risks, and integrated water resource management–climate change analysis will be needed to check future pathways.

The next steps would be developing the current set of options, with a few additions for key omitted risks, and considering the urgency and sequencing of adaptation options.

°C = degrees celsius; GHG = greenhouse gas; NAP = National Adaptation Plan.

Source: ADB.

Recommendations for Improving Climate Fiscal Risk Assessment in Armenia

Undertaking the following initiatives could help the GoA improve fiscal risk assessment in the country.

1. **Risk data and data processing:** Prioritizing the finalization and public funding of implementation of activities aimed at strengthening of its hydrometeorological observation network can improve Armenia’s climate data collection. Increasing the number of stations and automating them, as outlined in World Bank Group (2018b), and investing in the continuous upgrading of the network, based on the best available technology principle, will improve Armenia’s evidence base on climate change and provide other economic benefits across agriculture, energy, transport, and water resource management. The World Bank estimates the cost at \$19 million.
2. **Risk assessment:** Developing national climate forecasting and socioeconomic impact assessment models will allow Armenia to develop evidence-based economic and financial assessments and forecast future scenarios. Climate change forecasting is key to understanding future risks and integrating these into the country’s investment planning and long-term risk management framework. As discussed in its Fourth National Communication on Climate Change (Republic of Armenia 2020), assessing economic loss and damage will require systematic data collection and mapping of damage in the vulnerable sectors caused by hazardous hydrometeorological phenomena, based on well-developed standard data collection and damage assessment methodology that reflects Armenia’s national circumstances.

Together with introducing physical and statistical models for long-term climate change impact assessment, this will enable the country to develop evidence-based assessments and forecast future scenarios. Some of the potential approaches to fiscal risk quantification that can be adapted for Armenia include: costs of earlier disaster events from the economic literature, real-world fiscal impact of past events, scenario modeling, and IMF’s QCRAFT tool for estimating long-term losses from climate change. When selecting fiscal risk quantification methodologies, one of the key considerations should be the availability of information on the past fiscal cost of disasters triggered by natural hazards, which is often a challenge.

Undertaking detailed sector risk assessments will help Armenia translate physical and macro understanding of climate risk into a sector-by-sector understanding that can inform risk management including making

climate resilient adaptation plans for all investments and investment planning. This is particularly important for sectors identified in Armenia's NDC as the most vulnerable, including natural ecosystems, human health, water resource management, agriculture (including fishery and forests), energy, human settlements and infrastructures, and tourism.

- 3. Risk information communication and public disclosure:** Institutionalizing risk information public disclosure cycles and methods can help Armenia achieve overall readiness and resilience. The benefits of and processes for doing so are analogous to disclosing other sources of fiscal risk. The MoF already has a climate and disaster risk subsection in its FTS, which has identified climate-related risks and impact channel discussions, describes explicit and implicit contingent of SoE and PPP contracts, and discusses macrofiscal implications of some climate-related risks. The next step could be to extend the scope of the risks by including more risk sources and impact channels in the assessment to improve the quantification of risks and modeling approaches. The FRS could include quantitative information on climate-related risks, their magnitude, and their implications. The GoA can use the FRS to disclose and communicate planned actions for responding to identified risks, and the MoF can use the Fiscal Risk Council and Inter-Agency Coordinating Council on Climate Change to share climate fiscal risk information, collect feedback on potential improvements, and coordinate to integrate models between different stakeholders and risk information into policy decision-making.

3 CLIMATE FISCAL RISK MANAGEMENT

Introduction

The outcomes of a climate impact assessment, described in Section 2, can inform the approaches the GoA takes to manage climate fiscal risks and promote a more resilient economy. The objective of fiscal risk management and strategy is to balance short-term funding needs and macroeconomic stability with long-term fiscal sustainability. An effective fiscal risk management strategy includes a set of actions to reduce the likelihood or impact of unplanned shocks to government revenue streams, disruptions to the economy, or unsustainable debt (IMF 2020).

Approaches and actions the MoF can take to manage risks based on climate-related risk information include: managing exposures by defining risk ownership and clarifying government liabilities; strategically managing fiscal risks by reducing, retaining, and transferring them; and choosing cost-effective risk financing instruments.

Institutional Arrangements for Managing Climate-Related Risks in Armenia

Armenia has undertaken significant steps to develop its institutional arrangements and policies to respond to climate change related risks. This includes establishing the Inter-Agency Coordinating Council on Climate Change as a cross-functional body to coordinate its response to climate change. The council's objectives include:

- Regularly discussing the report of the United Nations Framework Convention on Climate Change (UNFCCC) and acting as the Paris Agreement focal point; making recommendations and consulting on implementation measures related to the GoA's obligations under the UNFCCC and Paris Agreement, including developing innovative climate change-related financial mechanisms
- Assessing progress toward and results of implementing GoA obligations under the UNFCCC and Paris Agreement
- Coordinating and overseeing national processes related to climate change mitigation and adaptation, as outlined in the country's NDC
- Making recommendations on the implementation of GoA obligations under the UNFCCC and Paris Agreement to state and local self-governance entities, academia, nongovernment organizations, and legal entities.

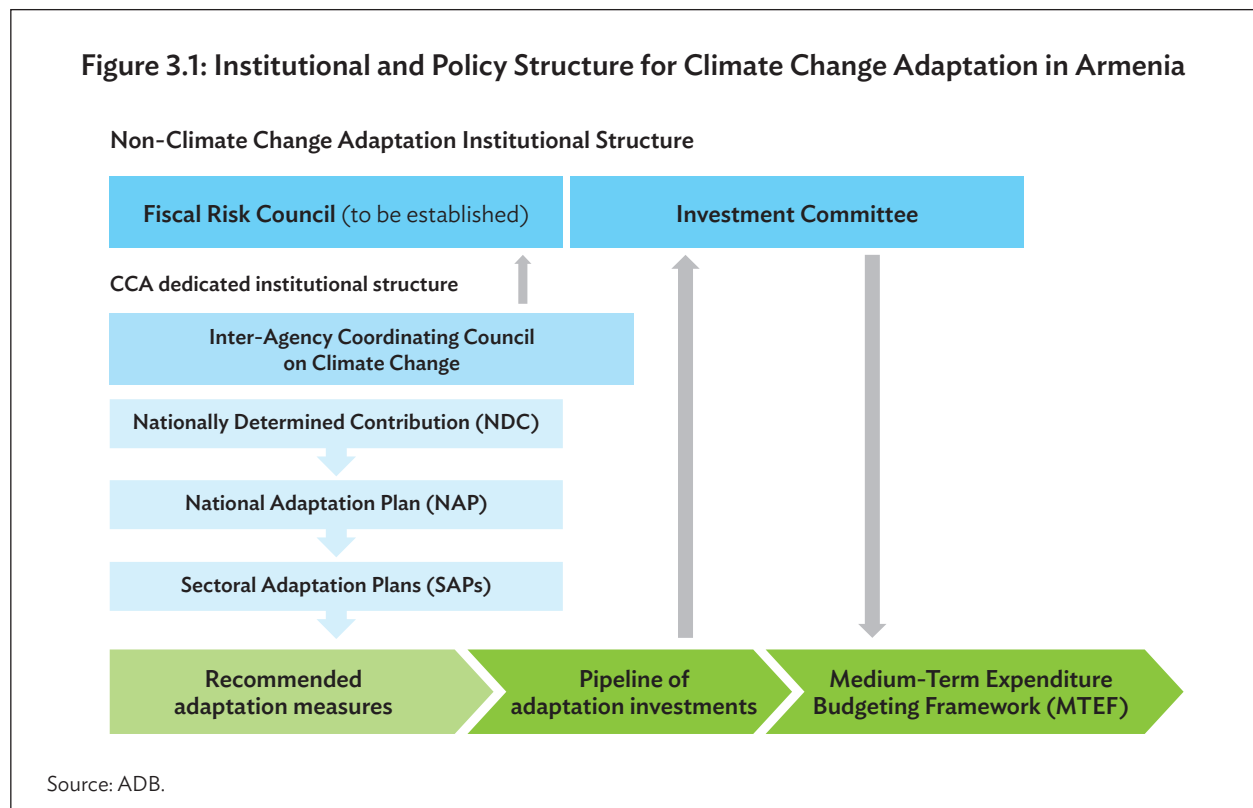
Chaired by the deputy prime minister, the council has representation from government departments and the nongovernment sector, including:

- Minister of environment (deputy chair of the council)
- Deputy ministers of labor and social affairs; health; justice; internal affairs; foreign affairs; high-tech industry; education, science, culture, and sport; finance; economy; and territorial administration and infrastructure (responsible for energy and territorial administration)
- Chairperson of the Tourism Committee of the Ministry of Economy
- Deputy head of the Cadastre Committee
- Member of the Statistical Committee

- Deputy Chair of the Urban Development Committee
- Representative of Public Service Regulatory Commission (by consent)
- UNFCCC focal point (by consent)
- Resident representative of the United Nations Development Programme in Armenia (by consent).

While the council has wide representation, it does not include a representative of the CBA, which is a member of the Network for Greening the Financial Sector and prioritizes climate change challenges in fulfilling its role as a central bank. This limits the council's ability to coordinate Armenia's climate change response with its financial stability risk management strategy.

Figure 3.1 illustrates the leading role played by the Inter-Agency Coordinating Council on Climate Change within Armenia's wider climate institutional arrangements. Other institutions that are central to managing climate-related risks include the Investment Committee and the yet-to-be established Fiscal Risk Council. The Investment Committee reviews and approves investment projects under Armenia's PIM decree, playing a crucial role in approving public financing for large and medium-sized capital projects, including climate adaptation projects. Adaptation plans and projects that are developed within SAPs need to pass through the PIM process for inclusion in the MTEF.⁷ The committee's members include the prime minister, deputy prime ministers, chief of staff of the prime minister, and the ministers of the economy and finance. The Ministry of Economy evaluates investment projects, and the MoF reviews the evaluations. The Fiscal Risk Council will reinforce Armenia's fiscal risk management functions currently performed by the MoF, fostering interagency cooperation in identifying, assessing, and communicating climate fiscal risks and other fiscal risks to which Armenia is exposed.



⁷ This process is applicable for projects with a cost estimate of at least AMD1 billion. For smaller projects, the general budgeting framework is applied, which does not require multicriteria project appraisal, and financing is approved based on the budget request from the relevant government agency and included in the MTEF and annual budget. For the 2024 budget, the PIM applicable threshold is AMD3 billion.

Assigning Key Climate Change Risks

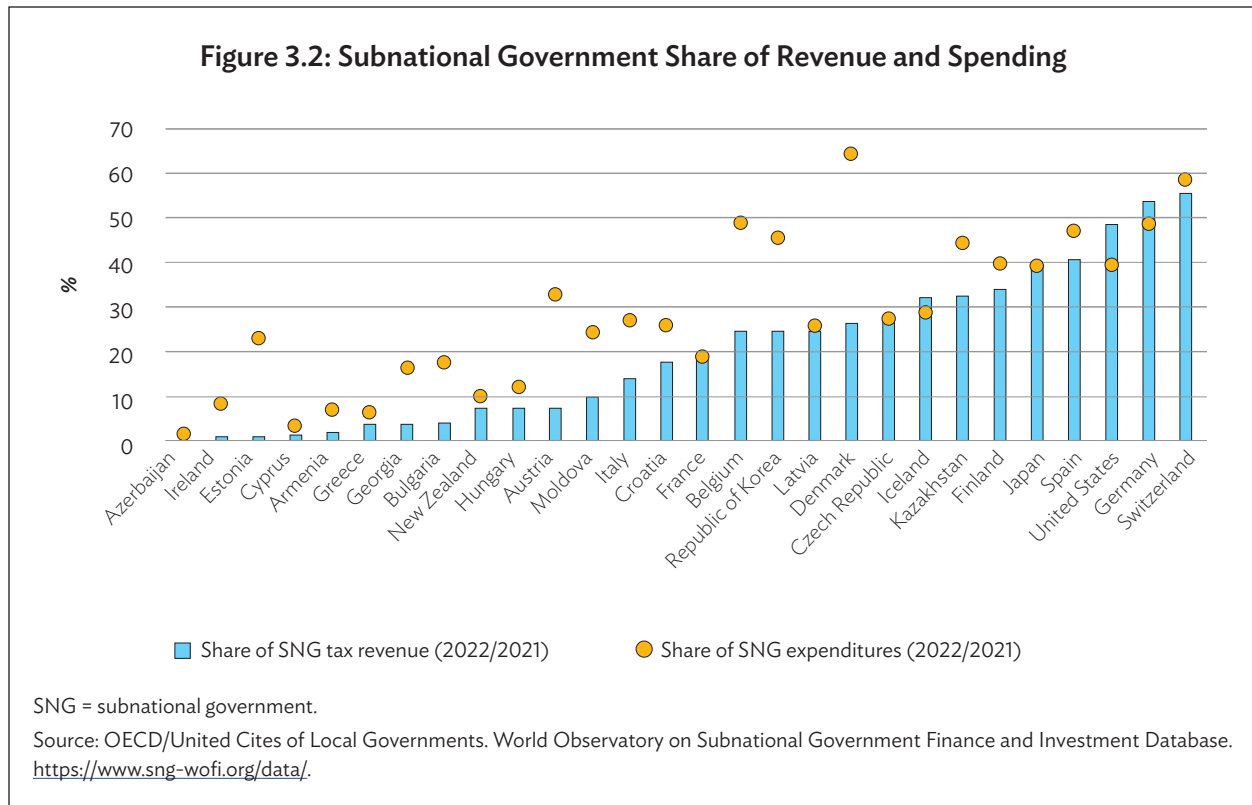
Assigning risk is a process of either affirming that risks borne by default (the ‘default primary incidence’) are appropriate or developing policy mechanisms that will wholly or partially shift the burden of those risks to other potential risk owners. Risk assignment can provide clarity on the scale of a government’s contingent liabilities and create incentives for efficient risk management.

Assigning risks to public sector entities

One avenue to explore is whether SOEs and SNGs can support central government in bearing some of the fiscal response to climate change. Even as the Armenian economy is not SOE-dominated, large companies operate in climate-sensitive public infrastructure sectors such as energy, water, and transport, and can be source of material climate-related fiscal risks. Through its ownership role, the GoA can ensure these institutions comply with government climate objectives and participate in improving the overall resilience of public infrastructure.

But to assign risk to SOEs and achieve the fiscal benefit of getting a portion of the risk off the national government balance sheet, SOEs must operate independently and on a commercial basis. Otherwise, the national government will have to guarantee their borrowing, undermining this objective. More than 60% of SOE assets (equivalent to around AMD473 billion or 7% of GDP) are concentrated in the energy sector (which also includes transmission and distribution networks that are vulnerable to climate-related risks, as well as a few private operators under power-purchase agreements that likely transfer many physical risks to the public sector), which can be vulnerable to acute and slow-onset event risks. The liabilities of energy sector SOEs, at about AMD400 billion (5.7% of GDP), are a significant consideration. Another 12% of assets are in the water sector, and 2% in the transportation sector. Considering the current level of SOE independence and commercial viability, and the level of potential impact, including and analyzing climate-related and other SOE risks in the government balance sheet is highly recommended.

Armenia’s SNGs are vulnerable to climate change-related risks and in many cases are the default risk owner. The GoA can introduce incentives to ensure SNGs deliver their share of the climate adaptation strategy, without undermining their financial autonomy. Fiscal transfers to SNGs are often tied to certain national government policy priorities, an approach that can be extended to adaptation investments or climate resilience policies. But for SNGs to carry a reasonable share of the risk and required funding, they need to have the fiscal capacity to do so. As in many other countries, Armenia’s SNGs have a gap between their expenditure obligations and revenue sources, suggesting that any contribution they make to adaptation investments may require an equivalent increase in fiscal transfers from the state budget (Figure 3.2). They also often lack the knowledge and management capacity to effectively mitigate climate-related risks. So, while it may be efficient to allocate certain adaptation investment responsibilities to SNGs, there is no guarantee that this will free up fiscal space. The exception is Yerevan, which has more capacity and resources and based on property tax reform may have more financial means in future to invest in adaptation. SNGs can also play a greater role in reinforcing resilience to climate risk in their ordinary investments, with the help of appropriate PIM guidelines.



Assigning risks to private firms and households

The private sector plays a significant role in Armenia's economy, accounts for over 70% of GDP,⁸ and employs much of the labor force. The private sector is diverse and includes a mix of small and medium-sized enterprises and large corporations. The services sector—which includes telecommunications and IT, banking, tourism, and hospitality—is a significant contributor to the economy, as is the industry sector, particularly mining, metallurgy, and diamond processing. Agriculture also is a significant share of the economy.

The private sector has a crucial role in climate adaptation, in three key areas (Lu 2022) as:

- **Adaptors**, to protect their own commercial interests in a changing climate
- **Solution providers**, by supplying the technologies, services, and products required to respond and adapt the physical climate risks that will impact communities, economies, and the environment
- **Financiers**, to bridge the considerable gap in financing requirements for investment in adaptation.

Globally, there are many examples of potential private sector participation in adaptation actions (Tall et al. 2021). In the agriculture sector, private lenders are financing small and larger producers to develop more climate-resilient crops. In health care, private technology is helping develop early warning and monitoring systems that both predict and track the spread of diseases linked to climate change. In the infrastructure sector, private contractors are designing and constructing more climate-resilient buildings and retrofitting old ones. And in the water sector, privately developed technology is providing more climate-smart irrigation systems and early warning systems for extreme weather and precipitation variability, and investing in the design and implementation of desalination plants.

⁸ Based on Armstat data for 2021, structure of expenditure of GDP by main consumption elements by SNA 2008.

Private financiers are increasingly issuing green bonds on behalf of municipalities looking to strengthen city resilience and continued municipal service delivery during climate-related disruptions, such as floods, storms, and droughts. Private investors are also participating in PPP transactions to make infrastructure investments more resilient.

Armenia has already undertaken several initiatives to create and strengthen the enabling environment to mobilize private sector investment in climate adaptation. For example, the CBA and Ministries of Environment and Economy are developing a green taxonomy to guide private investment in climate action, and the CBA is undertaking an analysis of climate risk assessment facing the banking sector.

These are important initial steps, but experience from elsewhere (Lu 2022) suggests that Armenia will need to do more to facilitate comprehensive private sector participation in climate adaptation investment, as adaptors, solution providers, and financiers. There are three main areas of focus:

- **Data and information:** The private sector requires access to usable data, information, and tools to make more informed adaptation and investment decisions. Individual firms are not well incentivized to collect such data but require reliable data for decision-making.
- **Institutional arrangements:** The private sector responds best when government intentions are clear. As such, developing sector adaptation investment plans with clear targets, pathways, finance needs, and guidance on where private participation will be needed—that is, who is best placed to do what and when—is crucial.
- **Rules and incentives:** Businesses and households will need support and guidance to manage or reduce climate-related risks. Policies can include market-based incentives, regulation, and information dissemination such as:
 - » Mandating insurance coverage for systemic risks, including subsidizing insurance products to ensure compliance (e.g., agriculture, bushfire, or flooding insurance)
 - » Imposing capital requirements for financial institutions to cover losses in the event of an acute climate event
 - » Specifying recovery spending strategies, to dissuade the private sector’s reliance on corporate bailouts
 - » Using market instruments to incentivize behaviors (e.g., by lowering the concentration of activities in high-risk areas through support to households to move away from floodplains).

Risk Transfer, Risk Retention, and Risk Reduction Strategy and Actions

A fiscal risk management strategy involves developing an approach with an appropriate balance between risk reduction, risk retention, and risk transfer.

Risk retention actions are fiscal buffers—such as budget reallocations or contingency funds—that help the government manage the costs of climate-related liabilities. They tend to be appropriate for smaller risks, where the government has the resources to fund contingent liabilities. Although the GoA does not have specific fiscal buffers for climate-related risks, it does have a state reserve fund for unexpected expenditure, which cannot be larger than 5% of the state expenditures budget and can be used for climate-related purposes if necessary. For 2017–2022, the GoA used these funds at least twice to compensate for climate-related hazard damage in agriculture sector in 2018 and 2019.

Risk transfer actions transfer the financial cost of climate-induced risks from one party to another (e.g., through an insurance contract). These actions tend to have a premium and can be expensive to hold, so risk transfer is typically most appropriate for low-probability and very high-cost risks. The GoA has not used this type of instrument to transfer fiscal risk to third party. The instruments may include catastrophe bonds, special loan arrangements with direct foreign investors, or disaster risk insurance products. For this purpose, ADB's Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards (ADB 2019) can also be considered.

Risk reduction actions reduce a government's liabilities by directly reducing the size of a risk. For climate-related risk, this is typically through adaptation investment in infrastructure and livelihood, and/or policy to limit implicit risks. The previous section discusses risk reduction actions in detail.

Reducing and Managing Government-Retained Risk

Armenia has developed a NAP and started work on SAPs, although deeper sector impact analysis is required to strengthen the evidence base for these adaptation plans. It has adopted key policy documents it has adopted as part of its institutional response to manage climate change risks. These include its NDC for 2021–2030,⁹ and, based on this, its NAP,¹⁰ an iterative process to enable Armenia to fulfil its commitments under the UNFCCC and Paris Agreement that ensures adaptation actions are planned and implemented at all levels. The NAP process also assumes strategic investment programs for climate change adaptation at sector, regional, and local government levels.

SAPs are developed under the NAP framework, for the sectors that are most vulnerable to climate change, including water, agriculture, energy, human settlements and infrastructure, health, tourism, and transport. These plans list adaptation measures over a 5-year period and include provision for semiannual reporting on the progress toward and results of implementing measures. The water SAP was the first to be officially adopted by the GoA in 2021, and SAPs have also been developed for agriculture, energy, health care, and tourism. The transport SAP is due by the end of 2024.

SAPs are designed to complement existing planning processes and do not prescribe ways of implementing policy and planning processes at the sector and region levels. Rather, they serve as guidance on best practices to be integrated into development planning and processing. Following the water SAP, the GoA decided to integrate adaptation planning into sector development planning to avoid creating parallel planning process. This ensures that all actions are to be prioritized and go through the MTEF.

Through its SAP process, Armenia has taken its first steps to identify key climate-related risks and adaptation options, and understand the costs of adaptation. But detailed work related to estimating the costs of suggested adaptation options and selecting the most cost-effective solutions has yet to be done. With large numbers of identified adaptation solutions at pre-feasibility level, many SAPs suggest conducting feasibility studies or other types of investigation. Implementing such feasibility studies will help identify and prioritize more capital projects for adaptation, significantly increasing total adaptation costs, especially for asset-based sectors, such as energy, water, and infrastructure.

Armenia has yet to develop a portfolio of adaptation investment projects and prioritized pipeline. This should be based on the SAPs and recommended measures, with feasibility studies and detailed designs for construction, assessed within the PIM process and included in the MTEF. Soft action recommendations have not been considered under the PIM process and need to be prioritized and included in the MTEF. It is anticipated that the Inter-Agency

⁹ Approved by Decree N 610-L of 22 April 2021.

¹⁰ Approved by Decree N 749 of 13 May 2021, "on approval of the National Action Plan for Climate Change Adaptation and the list of measures for 2021–2025".

Coordinating Council on Climate Change will support cross-functional collaboration on such actions, identifying parallels and synergies, and avoiding duplication.

Table 3.1 shows that adaptation across all sectors will cost an estimated at \$217 million¹¹ over 5 years, excluding health care, as the health SAP does not provide cost estimates. Most of the actions recommended in the SAPs are institutional strengthening and capacity building, including feasibility studies for potential capital projects; policy and regulation changes; trainings and capacity building; and information campaigns. The water and agriculture sector SAPs include a few capital projects, such as investing in infrastructure and digital systems. But even the water SAP, which provides the largest volume for estimated capital investments, significantly underestimates investments needs. For example, some unofficial, yet expert, estimates suggest that a planned reservoir construction program alone could cost over \$400 million.

Table 3.1: Adaptation Cost Estimates of SAPs (\$, Thousands)

Sector	Period	Capital project costs	Soft measure costs	Total costs
Agriculture	2022–2026	10,849	76,266	87,116
Water	2022–2026	121,550	6,638	128,188
Tourism	2022–2026	0	706	706
Energy	2023–2027	0	1,843	1,843
Health	2022–2026	n/a	n/a	n/a
Total		132,399	85,453	217,852

n/a = not available; SAP = sector adaptation plan.

Source: GoA water, agriculture, tourism, energy, and health SAPs (2022).

It is also worth noting that many measures assume budget funding by the GoA, and the agriculture SAP involves the extension of insurance schemes, which require engagement with the MoF and CBA to ensure their fiscal sustainability and financial stability.

Other studies have been undertaken on Armenia’s climate-response investment needs, including an EU4Climate program study (EU4Environment 2021), which estimates costs at \$5.7 billion¹² for climate mitigation and adaptation between 2020 and 2030. This includes \$170 million for adaptation investments and \$656 million for multifocal measures that have mitigation and adaptation impacts.

Although there is no final and comprehensive estimate for adaptation investment needs for all vulnerable sectors, available estimates suggest that it could be well over \$1 billion for the period up to 2030. This represents 0.5%–1% of GDP annually. With limited potential for increasing fiscal revenue, this could increase annual expenditures by 2%, forcing the GoA to finance it through additional debt. And this estimate may be on the low side. The IMF has assessed that countries in the Asia-Pacific region will need to invest an average 3.3% of GDP annually up to 2030 to mitigate climate change and adapt to its impacts (IMF 2021).

Further work is required to quantify the short and long-term costs of adapting to climate change in Armenia. Its NAP and SAPs have not been adequately informed by comprehensive climate risk assessment (as outlined in Section 1), nor by a clear framework for assigning risks between the government, private firms, and households (as outlined in this section). Linking its NAP and SAPs to climate change risk assessments and risk assignments is crucial, as it would be imprudent and economically inefficient to commit to an adaptation investment program without a good understanding of the economic benefits of adaptation investments relative to their costs.

¹¹ Exchange rate: \$1 = AMD400.

¹² When considering the potential investments required to build of new nuclear power plant, the volume of estimated investments will reach \$8.3 billion.

Recommendations for Improving Fiscal Risk Management in Armenia

Armenia has made significant progress in developing its institutional framework for climate change, constantly improving understanding of climate-related risks and impact channels (risk assessment). But work is now needed to develop a risk management approach that balances socioeconomic development and long-term fiscal sustainability objectives. This includes clarifying risk assignment, using risk retention and transfer instruments, and ensuring robust investment planning, prioritization, and realization of risk reduction investments. To improve fiscal risk management in Armenia, the GoA could consider the following actions.

1. **Make institutional arrangements for risk management:** Armenia has established the Inter-Agency Coordinating Council on Climate Change and the Investment Committee. It must now establish the Fiscal Risk Council as an urgent priority, to create the fiscal space required, and use the Investment Committee and PIM decree to guide the prioritization of the pipeline of adaptation investments, consistent with Armenia's MTEF. These interagency coordination institutions can all play a significant role in climate-related risk management, but are not being used to their full potential. For example, the Inter-Agency Coordinating Council on Climate Change could be more active in communicating identified climate-related risks, and the government's risk management strategy and approach—including risk assignment policies and its fiscal implications—to private and public sector stakeholders. The Fiscal Risk Council is required to ensure Armenia's adaptation investment program is fully embedded in the country's fiscal framework.
2. **Assign risks and manage instrument selection:** Based on the quantification of key sector climate risks discussed in Section 2, the GoA could develop a climate risk assignment framework that identifies which risks will be borne by government, including how these will be shared between national government, SNGs, and SOEs, and which by private firms and individuals. Developing a risk-layering approach that includes balancing risk retention, risk transfer, and risk reduction actions will allow the GoA to manage instrument selection. Armenia does not have any effective risk management instrument to provide coverage for low-probability, high-impact disaster risks.

To close this gap in the fiscal risk management strategy in a cost-effective way through parametric insurance or other disaster risk-financing instruments, the GoA will need climate-related data and evidence-based analysis. ADB's Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards (ADB 2019) can help it cover this gap.

3. **Direct public funds into adaptation investments:** Developing adaptation investment plans based on SAPs that reflect the risk assignment process for all key sectors would create a pool of adaptation investment projects to be integrated into sector development strategies and plans as pipeline of adaptation projects. Starting in the agriculture sector, the GoA can create a template to develop adaptation investment plans for other sectors.
4. **Engage private sector and facilitate access to international financing:** Finalizing and adopting the green taxonomy that is under development would help the GoA engage the private sector to address the country's climate adaptation needs. Developing a comprehensive and coherent policy for engaging the private sector in comprehensive risk reduction will help the GoA use the green taxonomy as a tool for private and public market investments, ensuring operations are resilient and encouraging the private sector to invest more in adaptation. Such a policy could include direct and indirect financial regulation and supervision, to help financial institutions and insurers develop insurance against disaster risk, and ensure financial institutions analyze the resilience of their customers. Building alliances—for example, by establishing an Armenian chapter of the United Nations

Office for Disaster Risk Reduction's Private Sector Alliance for Disaster Resilient Societies (ARISE)¹³—would help the GoA access to international financing and support for private businesses.

5. **Monitoring and evaluation:** To monitor and evaluate progress, the GoA can develop and pilot a tracking methodology for planning and budgeting climate investments by national government, SNGs, and SOEs, scaling up the tested methodology across relevant SOEs and the SNG network. Monitoring and evaluating the results of investment and adaptation measures would allow it to continually improve risk assessment and management institutions and systems based on lessons learnt.

¹³ [United Nations Office for Disaster Risk Reduction's Private Sector Alliance for Disaster Resilient Societies \(ARISE\)](#).

4 CLIMATE FINANCE OPTIMIZATION TO FUND AND FINANCE INVESTMENT IN ADAPTATION

Introduction

The key starting point for improving fiscal capacity is recognizing the difference between funding and financing. *Funding* refers to how the cost of adaptation investments will be paid for over time. The investment costs, including finance costs, must be covered by payments from either taxpayers or beneficiaries, where these are easily identifiable. In other words, the present value of future investment revenues must equal the present value of the project costs, including the initial capital cost and future operating costs. An investment where this is true is said to be fully funded. *Funding* refers to the need to deal with the mismatch in timing between upfront development costs and future revenues. Finance can consist of either debt or equity. What makes finance different from funding is that it must be repaid.

If an investment project is fully funded, then it can be financed. This is because a fully funded investment generates cash flows that are enough to pay equity investors and debt providers their desired risk-adjusted returns. Conversely, if an investment project is not fully funded, it cannot be financed.

Funding sources should optimize the benefits to users, with public funding compensating for the shortfall between what a government can realistically charge users and the costs of building, operating, and maintaining the investment. These costs include payments for principal and interest—that is, servicing the debt.

The implication of this for investment in climate adaptation is that private finance does not solve fiscal space constraints if cash flows required to pay private equity investors and debt providers derive from taxpayers. So, while privately financed investments can be bankable even if cash flows derive from taxpayers, they can only *create* fiscal space—rather than *take up existing* fiscal space—if they are both privately financed and fully funded by private beneficiaries.

Even in sector examples where beneficiaries are easily identifiable, such as agriproducers, energy consumers, and irrigation farmers, there is uncertainty around whether they will be able to fully fund the necessary investment, on a temporary or longer-term basis. Support to these sectors typically involves substantial subsidies, and any taxpayer support required would occupy existing fiscal space.

Table 4.1: Types of Private Sector Adaptation Investor and Their Return Expectations

Entity Type		Returns Spectrum
Real sector (corporations, private companies of all sizes)		Market-rate returns
Commercial banks		
Institutional investors (e.g., pension funds, insurance companies, sovereign wealth funds, other asset managers)		
Bilateral, multilateral, national development banks (private sector arms)		Quasi- or blended returns
Impact Investors	Impact investors (seeking impacts and return)	
	Impact investors (not seeking market return)	
Family offices/philanthropies/NGOs		Below market returns by design
Bilateral, multilateral, national development banks (public sector arms)		
Governments		

NGO = nongovernmental organization.

Source: Tall et al. 2021. *Enabling Private Investment in Climate Adaptation and Resilience: Current Status, Barriers to Investment and Blueprint for Action*.

It is also worth noting that not all investors require market rates of return (Table 4.1). And while there is a range of investors, all finance must, ultimately, be fully funded. Even where private financing is provided below standard market rate based on a project's risk profile, cash flows must be sufficient to provide a (below market rate) return to equity, and service debt. While lower capital costs may enhance opportunities for beneficiary willingness to pay, thereby freeing up fiscal space, it may not always be possible to do so.

To effectively manage climate change risks, Armenia will need to create fiscal space to fund investment in climate adaptation initiatives. While there is some uncertainty around the level of investment required, this is likely to be higher than initial estimates, and focused primarily on supporting rather than direct investment costs. As noted in Section 1, the IMF's longer-term projections of fiscal risks will require the GoA to create the fiscal space to accommodate future shocks, including those arising from climate change, which are expected to increase in both frequency and intensity.

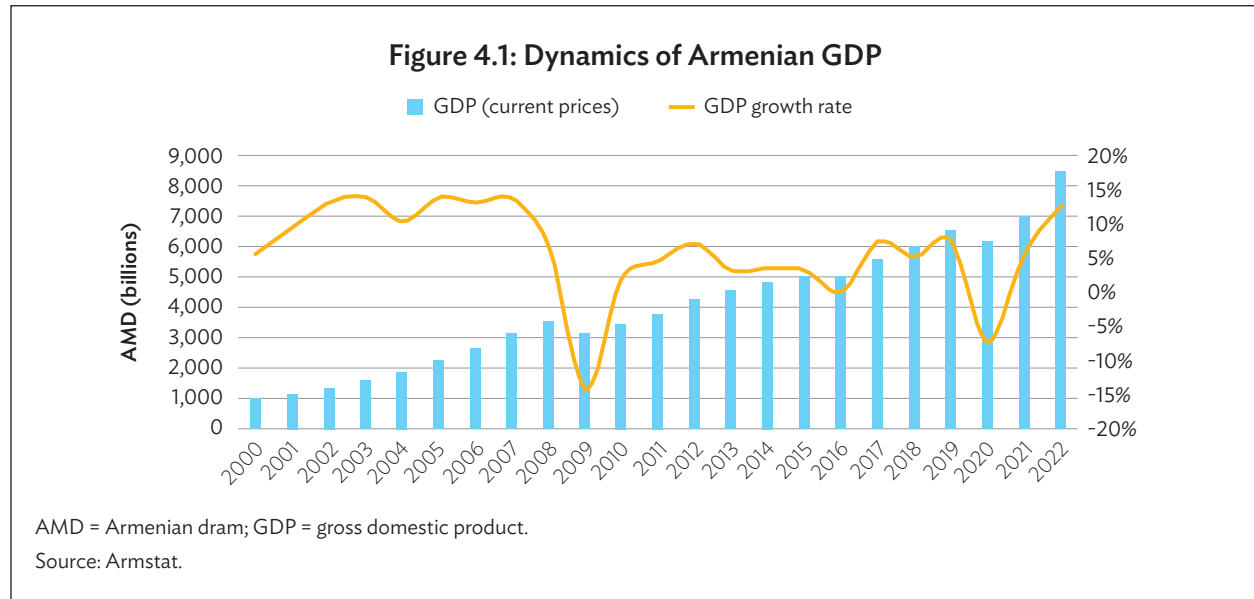
Fiscal consolidation will likely require ongoing efforts to optimize revenue and expenditure, while ensuring maximum returns from adaptation investments by strengthening PIM institutions. Improving fiscal capacity will, in turn, help increase access to the financing required to support sustainable investment in adaptation. Armenia will also need to consider how best to harness private sector adaptability, ingenuity, and financing for priority adaptation investments.

Creating Fiscal Space for Climate Change Adaptation in Armenia

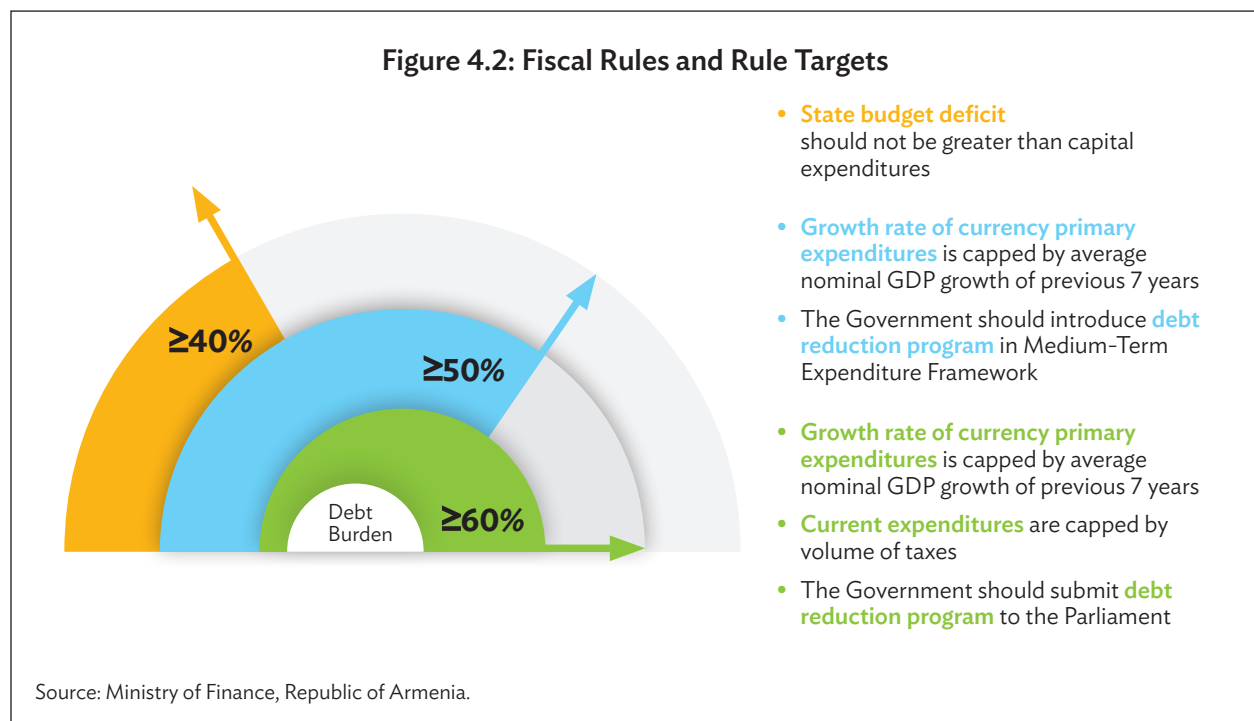
Current fiscal position

The Armenian economy has been growing at a steady pace for the past 22 years, interrupted occasionally by external shocks, including the 2008 global financial crisis and the COVID-19 pandemic. As Figure 4.1 shows,

the 2008 global financial crisis had a much stronger impact on the Armenian economy than the COVID-19 pandemic, when the country demonstrated stronger resilience. The main reasons for this stronger ability to absorb macro shocks were a change in the economic structure and improved fiscal management practices.

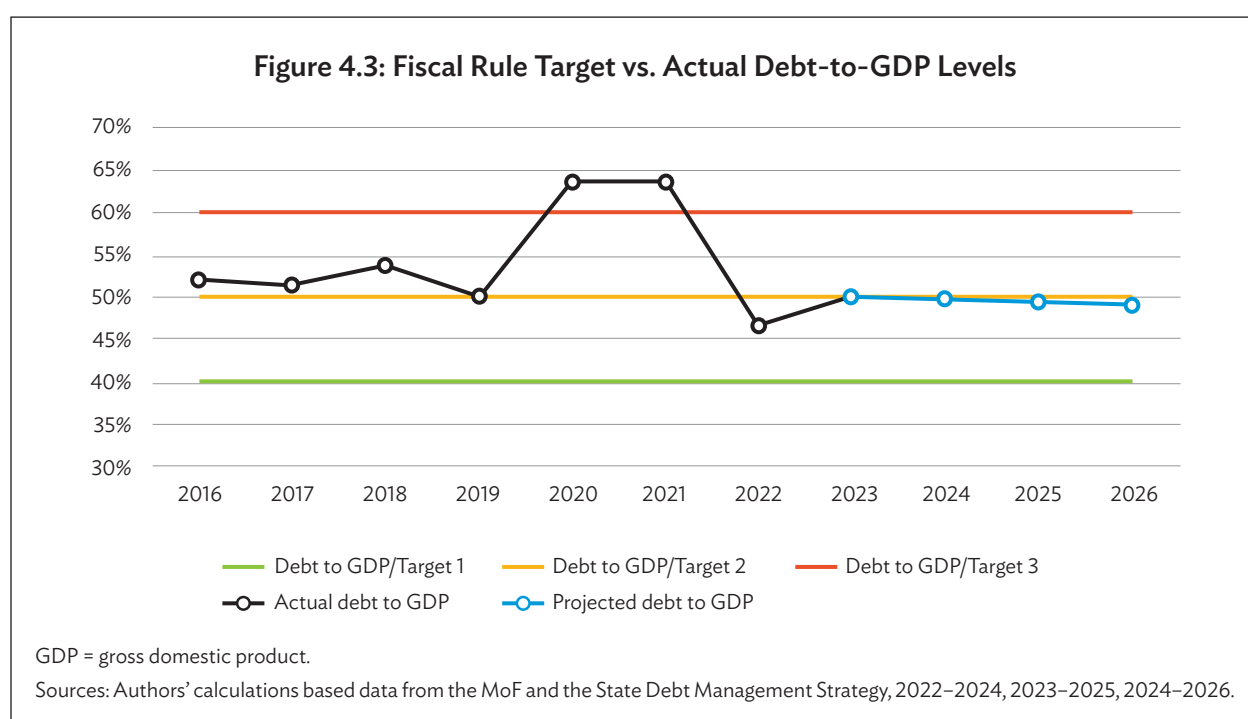


Armenia is committed to disciplined fiscal management. It has strong fiscal rules, designed to manage debt within sustainable limits, and has worked hard to adhere to them. These are designed to keep recurrent expenditure in check while encouraging the reversal of a low public capital stock relative to its peers. Fiscal responses are defined for different levels of public debt as a percentage of GDP (Figure 4.2).



Armenia is also implementing an ADB-Agence Française de Développement policy-based loan to deepen financial markets and strengthen fiscal management and sustainability. This commitment to fiscal discipline is already paying dividends. Fitch Ratings upgraded Armenia's long-term foreign-currency issuer default rating to BB- from B+ in July 2023, with a 'stable' outlook. S&P Global Ratings upgraded Armenia's sovereign credit rating to BB- from B+ and changed its outlook to 'stable' from 'positive', citing robust growth and an improved fiscal position in August 2023.

Despite its high debt-to-GDP level (the black line in Figure 4.3) relative to target 3 ($\geq 60\%$) in 2020 and 2021, given the level of budget support required in response to the COVID-19 pandemic, the GoA managed to decrease it to a more manageable level by 2022, capitalizing on relatively strong GDP growth and increased fiscal revenues as well as local currency appreciation against hard currencies. Importantly, the MoF's current projections plans target a debt level slightly below 50% of GDP until 2026.



It is worth considering the impacts of adaptation investment on the GoA's fiscal position. As an illustration, were the GoA to invest up to \$1 billion in adaptation investments to 2030, equivalent to an additional 2%–4% of annual expenditure, actual debt would increase from just under 50% to about 56% of GDP by the end of the decade, all else being equal, thereby worsening debt sustainability.

While these projections are preliminary, they point to the need to ensure that:

- Risks are properly assessed, along the lines of the approach described in Section 1.
- Risks are properly assigned and managed, along the lines of the approach described in Section 2.
- Investments designed to manage and/or reduce such risks are prioritized on the basis of highest net economic benefit, and fiscal space is created to fund priority investments, along the lines of the approach described in this section.

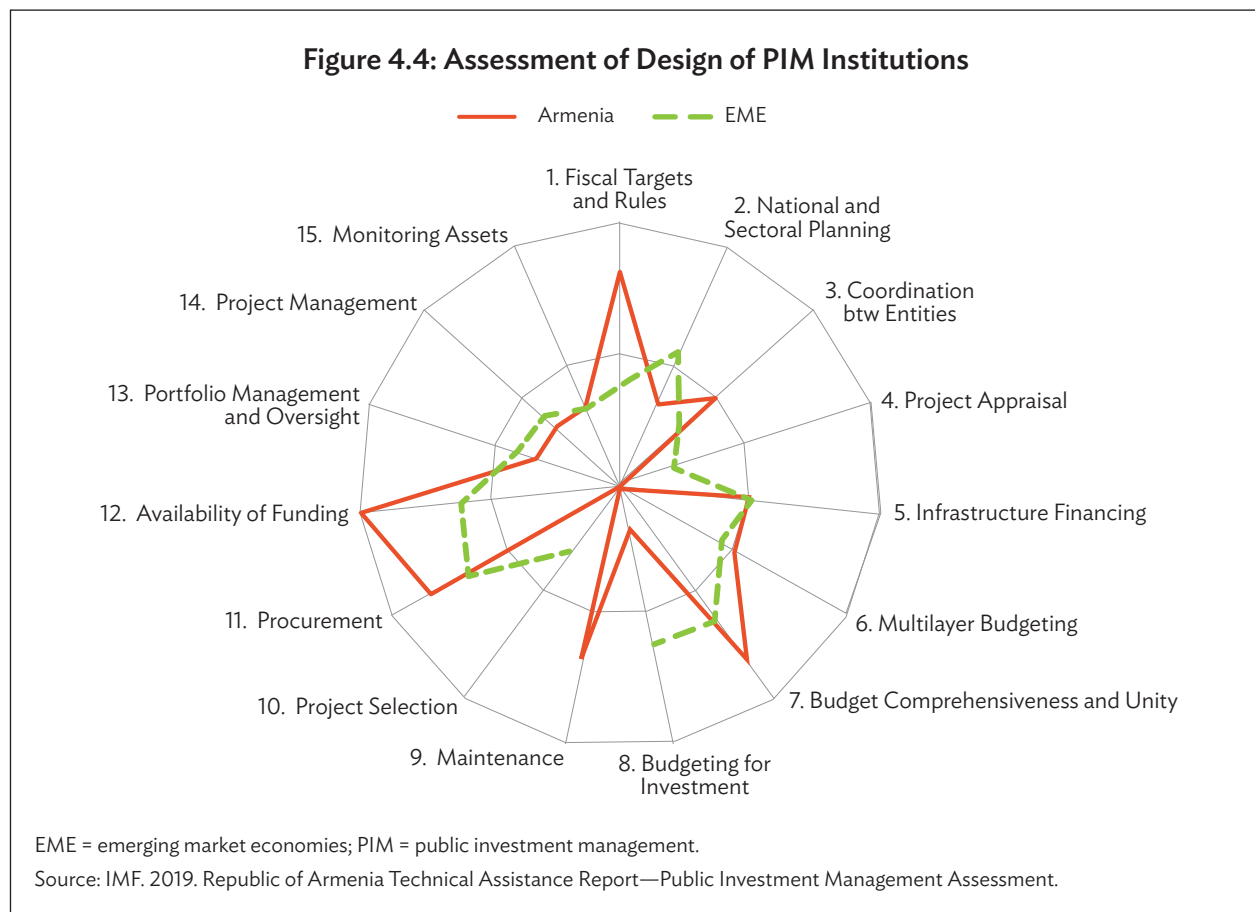
Armenia has initiated a number of structural reforms to consolidate and further strengthen its fiscal position. These include revenue-raising reforms and current spending restraint, as well as better budget costing and planning, and managing fiscal risks. Key initiatives are highlighted in the previous section.

Using existing fiscal space more effectively

The starting point for funding priority adaptation investments must be to use existing fiscal space as efficiently as possible. Appraising proposed adaptation investments can be an important part of the budgeting stage of the PFM cycle and help the GoA assess and prioritize adaptation investments.

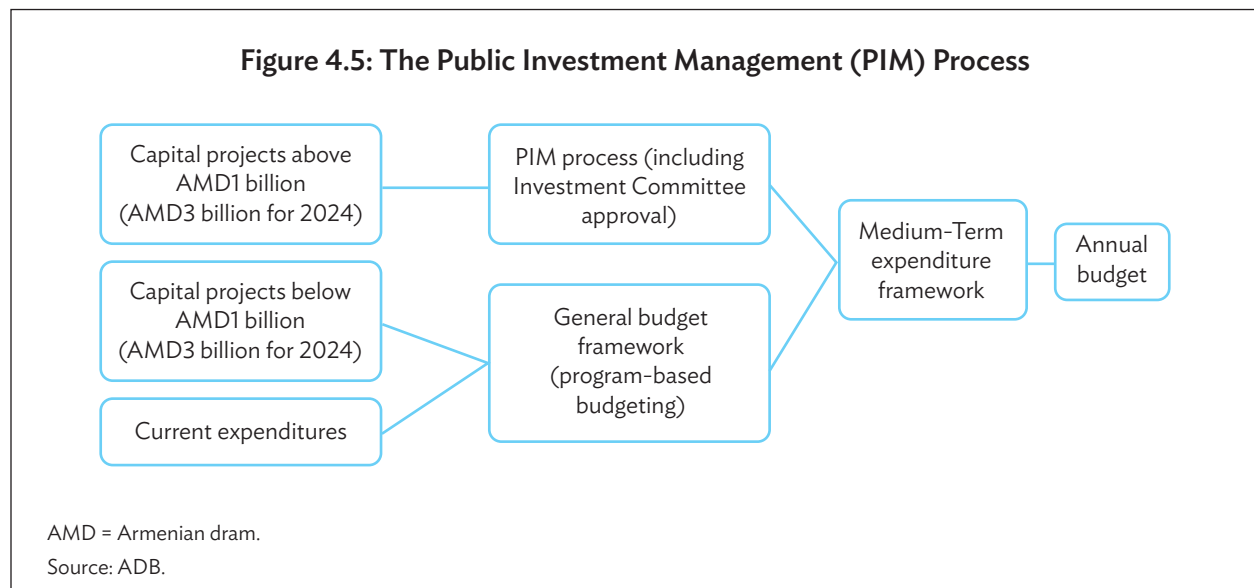
The IMF analysis has identified average global public investment efficiency losses of 30%–35%, measured as the gap between a country's public capital stock and indicators of access to and quality of infrastructure assets compared with leading comparator countries (IMF 2015).

Strong PIM institutions, policies, and processes are crucial for closing this efficiency gap. An assessment of such institutions, undertaken in 2019 with the IMF, found that while Armenia scores favorably relative to the average for the emerging market economies group, it has particular deficiencies in national and sector planning, project appraisal, budgeting for investment, project selection, and portfolio management and oversight (Figure 4.4).



While strong PIM foundational institutions, policies, and systems are required for business-as-usual public investments, these have to be strengthened and adapted to the requirements of investment planning and prioritization in the context of climate risk. This typically involves a shift in approach to investment planning away from a narrow and simplistic view of risk focused on assets toward system or user resilience. As noted in ADB (2022), infrastructure services are interconnected, and disruptions to the usability of specific assets can affect production, trade, or the delivery of essential services, leading in turn to broader economic or social impact. A systemwide approach takes these interdependencies into account and prioritizes interventions with regard to their effect on risks to people and the economy, rather than individual assets.

Armenia has adopted the PIM decree for evaluating and prioritizing large capital projects. The decree prescribes the process for using multicriteria analysis to evaluate and prioritize public investment projects with projected costs greater than AMD1 billion, raised to AMD3 billion in the first year of implementation (Figure 4.5). Lower-cost projects do not require multicriteria project appraisal and go through the general budgeting framework for approval by the relevant government agency. Regardless of the approval route, all projects are included in the MTEF and annual budget.



The PIM decree adopts a multicriteria assessment approach, that considers:

1. Impact on human capital.
2. Public importance of the infrastructure.
3. Compliance with the sector strategy.
4. Impact on climate change.
5. Project risk, including climate and disaster risks.
6. Economic internal rate of return (EIRR).

Armenia's PIM decree should support increased public investment efficiency, although capacity building and detailed guidance notes are required to operationalize it, and strengthening is required to mainstream climate considerations into Armenia's investment planning.

While the PIM criteria and overall approach are considered good practice, operationalizing them will require significant work. Clarifying their application to adaptation investments is also vital, particularly given high uncertainty about future climate scenarios, compounded by the early stage of Armenia's sector impact understanding. The next steps are developing guidelines for climate change and disaster risk impact analysis into investment assessments, and considering the financing options available for adaptation, including support from international development partners and global climate funds.

Calculating EIRR is one of the main challenges Armenia faces in operationalizing PIM for adaptation investments. A nonexhaustive list of challenges include:

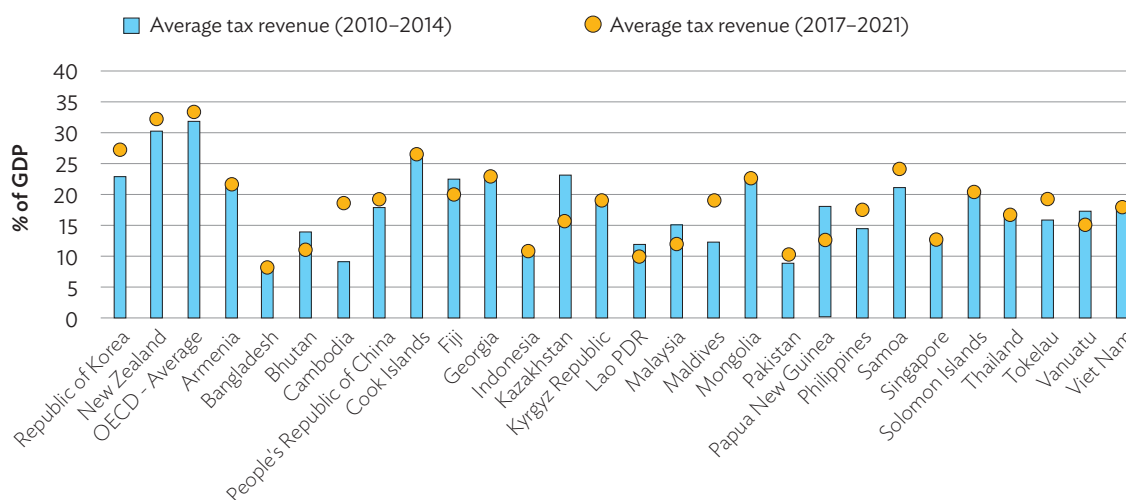
- **Data and modeling:** Adequate and reliable data for estimating the costs and benefits of climate change adaptation projects may be lacking or of varying quality. Uncertain and changing climate patterns make it challenging to accurately predict future benefits and costs over a project's entire lifespan. This also includes difficulty due to uncertainty in climate models and variations in climate change scenarios.
- **Nonmarket benefits:** Many climate change adaptation benefits, such as ecosystem services preservation, are nonmarket in nature, and valuing them accurately can be complex and subjective.
- **Avoided costs:** Most of the adaptation investments benefits are linked to avoided costs, and estimating them is itself challenging, considering issues with quantifying costs of future risks associated with climate change.
- **Multiple co-benefits and trade-offs:** Climate change adaptation projects often provide multiple co-benefits beyond climate resilience, such as improved public health, biodiversity conservation, and poverty reduction. Assessing and incorporating these co-benefits into the EIRR calculation can be complex.

Another important aspect of prioritizing adaptation investments within the PIM framework is integrating adaptation considerations into sector development strategy to meet the PIM decree's second criteria. So, if adaptation to climate change is a well-defined priority within a sector's development strategy, the adaptation investments should score higher and receive public funding.

Failure to deal with this may lead to suboptimal adaptation investment planning, with short to medium-term adaptation investments potentially being disadvantaged compared to other public investments. Ultimately, the GoA needs to make policy decisions on the complex trade-offs to support prioritization as part of climate-informed investment planning.

Revenue measures

It is tempting for governments to increase taxes to fund new investment requirements, but doing so is often not economically efficient. At the same time, cutting expenditure in other areas is rarely straightforward. But both should be part of the mix. With 23% in 2021, Armenia is well above its peer countries' average tax revenue-to-GDP ratio of 17%. This is a serious improvement since 2010 (20%) but remains below the Organisation for Economic Co-operation and Development (OECD) average of 34% (Figure 4.6). It continues to improve, however, with 24% in 2022 and its current tax policy and administration measures targeting 25% for the next 3-year period. The MoF considers its top tax capacity to be 30% of GDP.

Figure 4.6: Average Tax Revenue in Selected Asian Economies: 2010–2014 vs. 2017–2021

GDP = gross domestic product; Lao PDR = Lao People's Democratic Republic; OECD = Organisation for Economic Co-operation and Development.

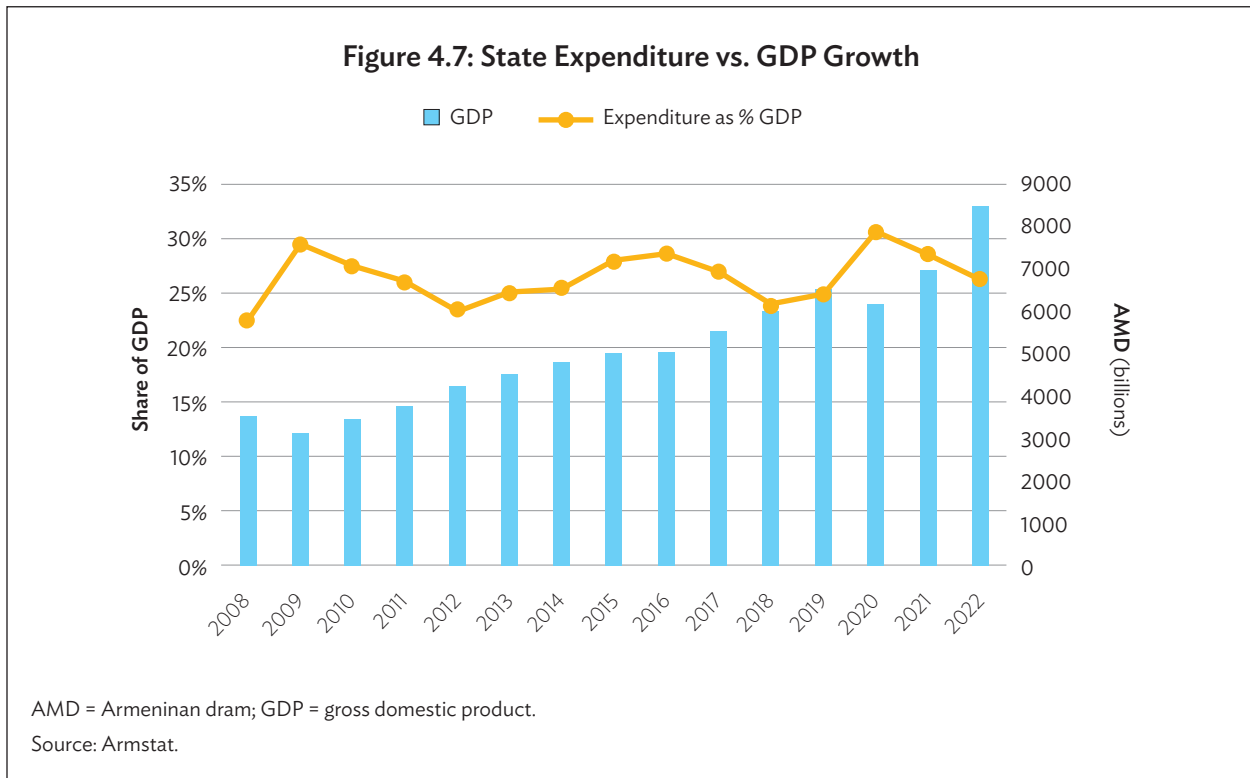
Sources: OECD Global Revenue Statistics Database.

The focus on continued implementation of planned revenue reforms is crucial for creating fiscal space and supporting consolidation. Value-added tax is the largest source of Armenia's tax and fee revenues (35%), followed by personal income tax (25%), and profit tax (11.5%). The environmental tax and natural resource use fees contribute about 5%, mainly from the mining sector. Natural resource use fees can be targeted to create adaptation incentives, especially in the water sector.

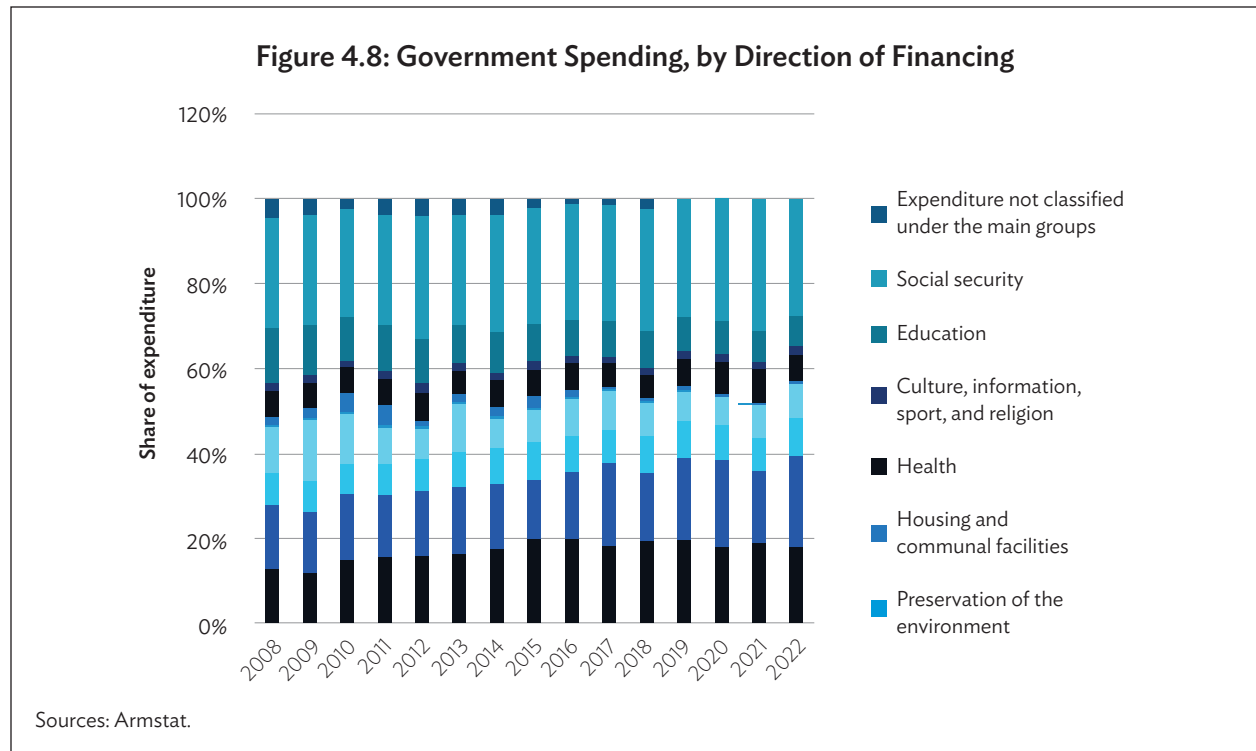
The GoA remains committed to expanding the tax base and improving tax compliance. To expand the tax base, it has recently adopted mining sector and property tax reforms. It also plans comprehensive income reporting reform. While these are important steps, comprehensive tax reform will take long to reap benefits. Reforms to tax expenditure will also be required and could yield substantial additional tax revenue (IMF 2022b). Armenia's budgeted tax expenditure of about 5% of GDP (excluding health and education) is higher than its peers'. The MoF is undertaking a detailed assessment, and will follow this up with an action plan for rationalizing them.

Expenditure measures

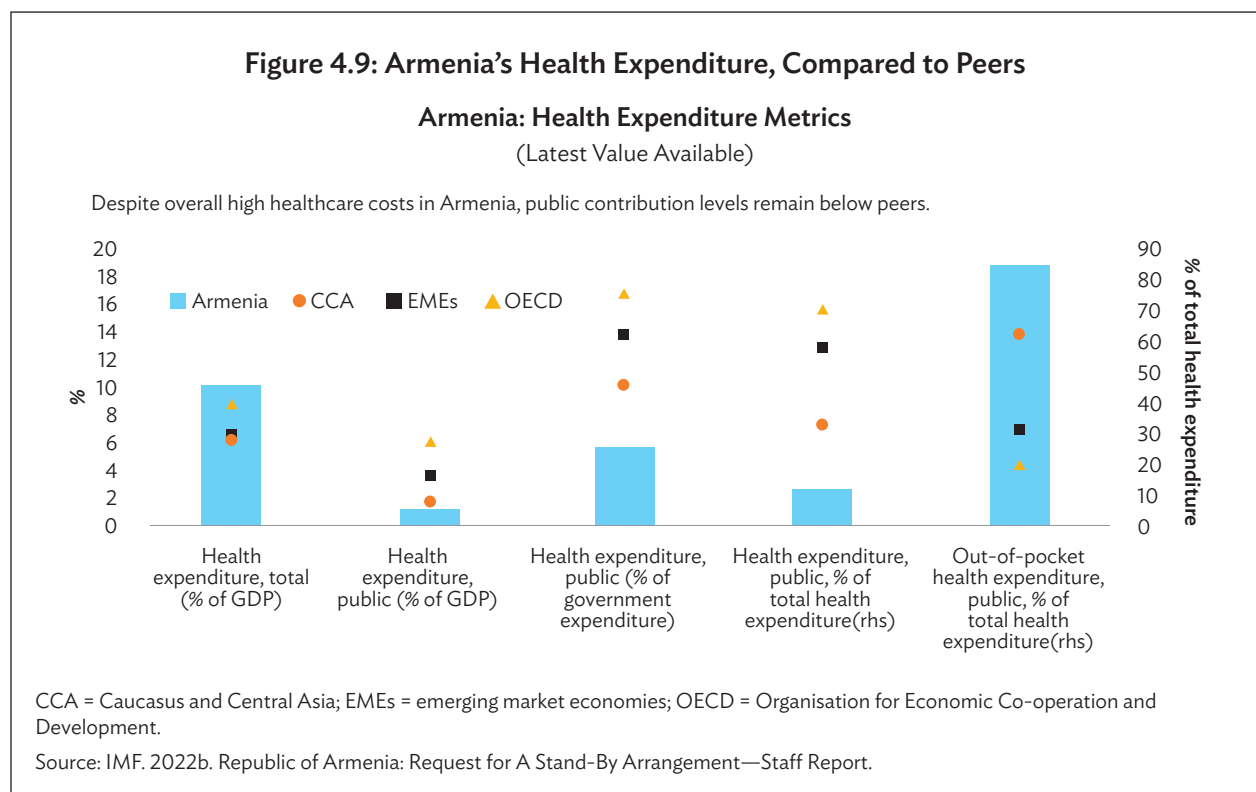
Armenia has generally been able to achieve a relatively stable relationship between expenditure and GDP, going back more than a decade (Figure 4.7). This represents a good initial platform for improving the country's fiscal capacity.



While overall expenditure has been a relatively stable proportion of GDP for many years, the structure of expenditure tells a more challenging story (Figure 4.8). Defense and national security make up a sizable proportion of government spending. Social security—primarily in the form of pension payments—also makes up a large proportion of expenditure (4.5% of GDP). Considering Armenia’s demographic structure and aging population, social security payments may have to increase in the long term, with fewer taxpayers available to support this level of expenditure. Reforms to the country’s defined contribution pension system can help navigate this risk better. Recent GoA plans to increase pensions and the minimum wage will, however, put additional pressure on the fiscal balance.

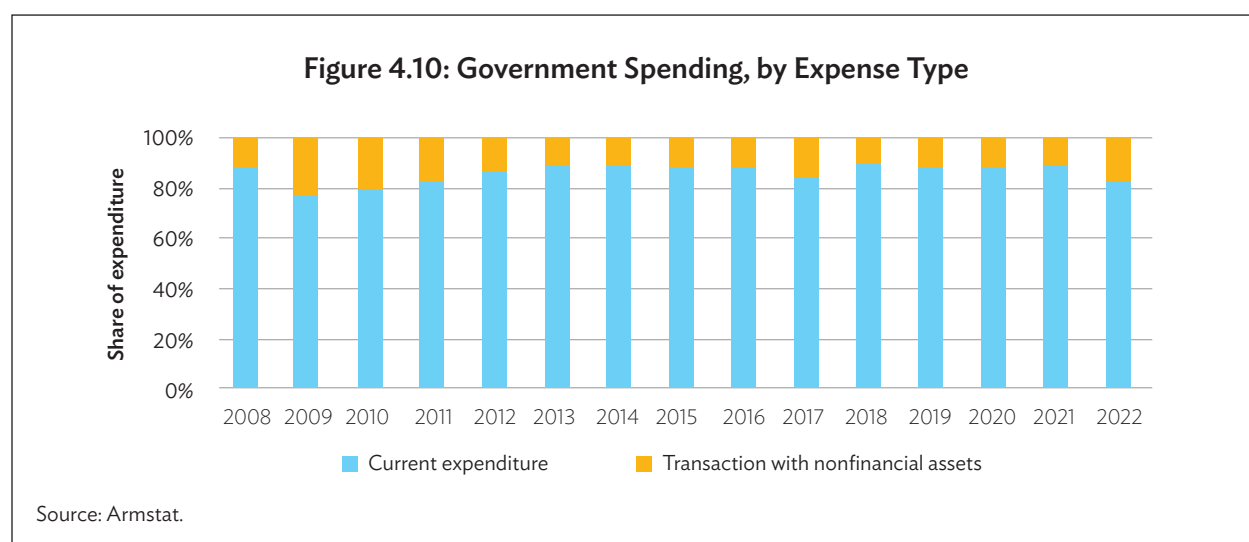


The data also suggest that Armenia underinvests in its human capital (Figure 4.9). Spending on education is roughly equivalent to 2% of GDP, against a global average of 4%. Public spending on health equates to 2.3% of GDP, against an OECD average of more than 5%. This underinvestment in human capital is not sustainable over the long term, suggesting the country faces several medium- to long-term fiscal pressures, alongside those that are likely to arise due to climate change.



Armenia's fiscal rules favor debt creation, if this is for formulating capital and recurrent expenditure is under control. So, the composition of expenditure matters, and the GoA has shown a strong bias toward recurrent expenditure. This is at the expense of capital expenditure (Figure 4.10), which is low and has declined in recent years, despite recurrent expenditure being relatively under control. Public capital stock declined from 160% of GDP in 2000 to 62% of GDP in 2017. Public investment has remained low, at approximately half of that invested by regional peers since 2012. While this is an obvious concern, it is also an opportunity, providing scope and fiscal capacity for investing in climate adaptation.

The appropriate bias in Armenia's fiscal rules toward capital formation provides further motivation for the need to consolidate fiscal space for climate adaptation. This is because in future, Armenia is likely to need more budget for increased operations and maintenance due to climate events.



Private Sector Financing

Armenia's finance sector is exposed to indirect risks, mainly through portfolio risk exposure. Banks controls 90% of total finance sector assets, and have a total loan portfolio worth about 53% of GDP [in 2021] . This portfolio has exposure to the energy (worth 3.2% of GDP), tourism (4.6%), and housing (in the form of mortgages, 17.3%) sectors. Armenia's banking sector has a healthy consolidated balance sheet, and with an institutional structure that allows the CBA to manage the risks related to financial stability. This allows the sector to manage its risk by default; but in the case of systemic risk caused by climate change-related impacts, it may need outside support, depending on the magnitude of impact.

Understanding, assessing, and provisioning climate-related risks can be the main risk management strategy to ensure stability in the sector. The CBA can play a key role in this by fostering regulations aimed at better insurance of assets, business interruption, and improving operational risk management practices. It can also play a role in facilitating green finance.

The private sector's role, as private financier, has received a lot of prominence in the climate change risk management literature, given the scale of the financing gap, globally. Given Armenia's significant fiscal constraints, it would be tempting to assume that the private sector will bridge the financing gap, financing many of the investments identified in its NAP and SAPs.

But it is important to recognize that many adaptation programs will not be self-financing, given their “public good” characteristics. So, while private capital markets are expected to provide financing for bankable investments in risk reduction, they cannot realistically finance nonviable investments, and therefore cannot create fiscal space. Conversely, it follows from this that if investments are viable—that is, self-financing—they do not take up fiscal space.

This is true for all private finance, including PPPs. These partnerships have an important role in adapting to climate change, primarily because, when properly structured—with risks allocated to the party best able to manage those risks at lowest cost—PPP transactions can provide considerable value for money to governments. They do not, however, create fiscal space. Armenia has adopted a new PPP law and is working to improve it and finalize derived regulations, to ensure that PPPs do not inadvertently create future liabilities that are not fiscally sustainable.

The GoA is exposed to around AMD256 billion in broad contingent liabilities from power purchase agreements in the energy sector and AMD87 billion in contingent liabilities from a PPP in the water sector. Transport sector PPPs are also subject to material risks—for example, contingent liabilities from South-Caucasian Railways and Armenia International Airports are 1.19% and 2.1% of GDP, respectively. Total contingent liabilities from power purchase agreements and PPPs is 6.92% of GDP. As already identified in its regular FRS, the GoA is also exposed to other sources of fiscal risk, such as SOEs, budgetary loans, legal claims, disaster risk, and environmental liabilities. Mitigating these risk are critical to avoid impairing future fiscal space. The Fiscal Risks Committee or Council can contribute to this.

The GoA may need to provide financial incentives for a fixed period to facilitate private investment in adaptation, recognizing that there is typically a mismatch between the short-term horizons of investors and the often long time frame within which physical climate risks manifest. Some form of public support—such as the agricultural insurance scheme—may therefore be required for a period to end information asymmetries and bridge gaps between short and long term horizons. But to be sustainable, these have to be temporal in nature. Other schemes involving public resources may be needed to facilitate “private” sector financing that is relevant to adaptation, including households, cooperatives and micro, small and medium-sized enterprises. These take up fiscal space and must therefore be properly assessed.

Recommendations to Improve Fiscal Capacity to Invest in Adaptation

Undertaking the following initiatives could help the GoA improve its fiscal capacity to invest in climate adaptation.

1. **Fiscal sustainability analysis:** Although Armenia has developed its NAP and is developing SAPs, it has yet to integrate these within the budget process and MTEF. At the same time, the country has other considerable medium- to longer-term fiscal pressures, alongside climate change-related ones, notably in the area of underinvestment in human capital (education and health). To develop a better understanding of how various fiscal pressures will weigh in on Armenia’s ability to adapt to climate change, the GoA should undertake a long-term (15–20-year) fiscal sustainability analysis.
2. **Develop a set of fiscal principles and policies for climate action:** Armenia needs a strategy to bridge the gap between longer-term fiscal pressures, including those likely to arise from climate change, and current and project fiscal space. This should include measures to ensure the GoA uses existing fiscal space as efficiently as possible—for example, by strengthening rules and guidance around the PIM decree, and identifying revenue-raising and expenditure-reduction measures to create additional fiscal space. It should also include an assessment of the fiscal requirements for protecting the most vulnerable households exposed to climate change risk.

3. **Better mitigate existing fiscal risks, including those related to climate change.** Fiscal risk management requires the identification, assessment, disclosure, monitoring, and management of all key sources of fiscal risk, to avoid undermining future fiscal space. This includes all sources of risk—including plans and actions aimed at reducing already identified disaster and climate risks—and should be undertaken in the short term for what is fiscally and operationally achievable.
4. **Mobilize and facilitate access to climate finance:** As government delivery agencies are expected to comply with the requirements of the PIM decree, it is vital the GoA operationalizes the decree and introduces supporting guidance to facilitate appropriate levels of investment in climate adaptation. It is also important to develop a fiscally sustainable framework and set of fiscal principles to ensure any public support required to facilitate private investment in adaptation tackles information asymmetries and bridges gaps between short and long-term horizons.

Developing a strategy for increasing the supply of climate finance is crucial. Private investor demand for thematic bonds has grown as a result of the COVID-19 pandemic, and the volume of social bonds issued in 2020 jumped to \$249 billion; that is a 10-fold increase from 2019. Green bonds for climate resilience could offer a diversified source of funding for Armenia. Private banks have already started issuing green bonds, with Ameriabank issuing the country's first green bond in 2020 (Ameriabank 2020). The GoA could undertake a scoping study to determine the benefits of diversifying climate finance sources, including international development partners, alongside an understanding of increased compliance and reporting requirements in the medium term. It could also investigate opportunities for issuing green bonds for its own financing needs. There is growing market interest in issuances focused exclusively on resilience bonds, and Armenia could assess whether they have any pricing and term advantages.

5 CONCLUSIONS

Armenia has made significant progress in climate resilient fiscal planning. The extent to which central finance and planning agencies carry out climate fiscal risk assessment, management and resource optimization is summarized below. This section concludes with recommendations to build on this progress and strengthen functions for climate resilient fiscal planning.

Function 1. Climate Fiscal Risk Assessment

Armenia has begun the process of assessing the fiscal risks it faces from climate change and quantifying the possible fiscal costs. Applying economywide International Monetary Fund (IMF) modeling to three possible global climate scenarios relative to baseline projections, it has projected how the long-term fiscal situation may evolve based on current policies in the absence of climate change action (IMF 2022a).

The analysis suggests that long-term fiscal costs and risks arising from climate change may be substantial. Under a volatile climate scenario, modeling predicts that gross domestic product (GDP) per capita could decline by 18% relative to baseline by 2072. In the absence of any fiscal policy response, this could result in public debt levels increasing at an unsustainable pace to 140% of GDP.

The IMF modeling is an important milestone in Armenia's development of a climate risk-informed decision-making framework, in that, for the first time, it estimates the impact of both acute and chronic climate change risks on the macroeconomy and the Government of Armenia's (GoA's) fiscal position under a range of possible climate scenarios. This work represents a significant improvement in Armenia's evidence base, in providing projections of fiscal costs and risks of climate change.

However, the quantification does not assess sector-level climate impacts and adaptation expenditures. Rather, it identifies macro-level impacts based on assumed relationships between GDP, GoA revenue, and taxation. This now needs to be supplemented by more granular, sector-based climate risk assessments, focused on the short to medium term, to guide more immediate investment prioritization. Sector-level analysis is crucial to translate physical and macro understanding of climate risk into a sector-by-sector understanding that can inform risk management, including adaptation plans and investment planning. Doing this will give GoA a stronger evidence base on how, where, and how much to respond, allowing it to balance the many competing demands on its limited fiscal space.

The MoF already has a climate and disaster risk subsection in its Fiscal Risk Statement (FRS). The FRS has identified climate-related risks and impact channel discussions, which include descriptions on explicit and implicit contingent liabilities of SOEs and PPP contracts, as well as the macrofiscal implications of some climate-related risks. Armenia could use the FRS more effectively to describe how it expects to manage climate-related risks. Disclosure on climate risk could also take place through the Fiscal Risk Council (to be established) and Inter-Agency Coordinating Council on Climate Change.¹⁴

¹⁴ Established by Decree N 719-A on 6 July 2021.

Function 2. Climate Fiscal Risk Management

Armenia has developed several important policy and institutional responses to the varied climate risks it faces. It has identified, at a high level, adaptation investments through its NAP, and is developing SAPs for key sectors impacted by climate change.

The country has also made specific institutional arrangements to coordinate its climate response, including the Inter-Agency Coordinating Council on Climate Change, chaired by the deputy prime minister. Importantly, it has demonstrated an understanding of the importance of embedding its climate change response in a sound fiscal framework and has identified the need to establish a Fiscal Risk Council to create the fiscal space required, and an Investment Committee. It has also adopted the PIM decree¹⁵ to guide prioritization of the pipeline of adaptation investments, consistent with its Medium-Term Expenditure Framework (MTEF) and is developing a green taxonomy as a policy instrument to guide private and public activities.

However, since it has yet to undertake a rigorous assessment of the economic impact of climate risk on key sectors, and there is limited guidance to underpin investment planning, particularly prioritization, which naturally follows from adaptation planning. Once it has identified and quantified key sector climate risks, Armenia will need to determine how best to allocate these to government, private firms, and households, and then assign those allocated to government to national government, SNGs, and SOEs. This will enable Armenia to convert its NAP and SAPs, which broadly describe investments and funding required, into sector adaptation investment plans with prioritized pipelines of projects/programs developed to a point where they are feasible, viable, and ready for implementation.

For sector risks that are proposed to be assigned to government, GoA will need to develop consider whether it will achieve best value for money by retaining or reducing certain risks. For example, Armenia has no effective risk management instrument to provide coverage for low-probability, high-impact disaster risks. The GoA will need climate-related data and evidence-based analysis to close this fiscal risk management strategy gap in a cost-effective way through parametric insurance or other disaster risk financing instruments. ADB's Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards (ADB 2019) can help with this.

Function 3. Climate Finance Optimization to Fund and Finance Adaptation

Sector-level adaptation investment plans will then need to be assessed against existing and projected fiscal space. Armenia has a well-developed fiscal framework, with clear fiscal rules, and good discipline managing within fiscal limits. It has worked hard to maintain a strong fiscal position. Its ability to withstand the recent COVID-19 pandemic and the recent shocks—are testimonies to this discipline. But its fiscal space is limited, given pressing claims for investment in health, education, and long-term pension commitments.

The proposed Fiscal Risk Council, and the Investment Committee established under the PIM decree, will play an important role in overseeing long-term fiscal sustainability analysis that includes likely impacts from climate change, and in ensuring that fiscal space is created to support necessary investments in adaptation. This will likely require ongoing efforts to optimize revenue and expenditure, while ensuring maximum returns from adaptation investments by strengthening PIM institutions. Improving fiscal capacity will, in turn, increase access to the financing required to support sustainable investment in adaptation.

¹⁵ Decree N 175 “on approving the procedure for revealing, developing, appraisal and determining priorities of public investment projects” of 9 February 2023.

On the revenue front, the GoA remains committed to expanding the tax base and improving tax compliance. To expand the tax base, it recently adopted mining sector and property tax reforms. It also plans comprehensive income reporting reform. While these are important steps, reaping the benefits of comprehensive tax reform will take a long time. Reforming tax expenditure will also be necessary and could yield substantial additional revenue (IMF 2022b). Armenia's budgeted tax expenditure of about 5% of GDP (excluding health and education) is higher than its peers'. The MoF is undertaking a detailed assessment, and will follow this up with an action plan for rationalizing them (expected June 2023 SB).

Armenia's PIM decree should help make public investment more efficient, although operationalizing it will require capacity building and detailed guidance notes, and it will need to strengthen its PIM institutions, policies, and systems to be able to mainstream climate considerations into Armenia's investment planning. While the PIM criteria and overall approach are considered good practice, operationalizing them will therefore require significant work, if they are to provide appropriate guidance for climate adaptation investments. Clarifying their application to adaptation investments is vital, particularly given the high degree of uncertainty in future climate scenarios, compounded by the early stage of Armenia's sector impact understanding.

Armenia has already undertaken several initiatives to create and strengthen the enabling environment to mobilize private sector investment in climate adaptation. The Ministry of Economy is developing a green taxonomy to guide private investment in climate action, and the Central Bank of Armenia (CBA) is undertaking an analysis of climate risks facing the banking sector. The CBA published its green finance roadmap in October 2023.

These are important initial steps, but experience from elsewhere (Lu 2022) suggests that Armenia will need to do more to facilitate comprehensive private sector participation in climate adaptation investment, as adaptors, solution providers, and financiers. There are three main areas of focus:

- Data and information, to make more informed adaptation and investment decisions
- Clarity on institutional arrangements, since the private sector responds best when government intentions are clear
- Rules and incentives, given that businesses and households will need support and guidance to manage or reduce climate-related risks.

Key Recommendations

Armenia has made important progress under each of the three functions for Climate Resilient Fiscal Planning: climate fiscal risk assessment, climate fiscal risk management, and climate finance optimization to fund and finance investment in adaptation. To bridge the gap between readiness to respond to climate-related risks and best practice, we recommend Armenia consider the following.

Function 1. Climate fiscal risks assessment: Key steps to sharpening the first function include refining risk data collection and processing systems. Expansion of the hydrometeorological observation network by increasing the number of stations, automating them, and upgrading the existing network is crucial for improving climate data collection. It needs to be anchored on the best available technology. Primary data collection institutions and analysis tools also need to be strengthened.

Function 2. Climate fiscal risk management: It is also recommended that proper institutional arrangements for the fiscal risk management function be put in place. These include establishing a Fiscal Risk Council as an urgent priority. This will not only create necessary fiscal space but guide the prioritization of adaptation investments. To remain consistent with Armenia's Medium-Term Expenditure Framework, a climate risk assignment framework following key sector climate risk quantification is critical. This will guide risk assignment across all levels of

government and for public and private firms. A balanced government approach to risk-layering is recommended to include risk retention, risk transfer, and risk reduction actions. Efforts should be made to direct public funds into adaptation investments while engaging the private sector and facilitating access to international financing.

Function 3. Finance optimization to fund and finance investment in adaptation: It is recommended to undertake a long-term fiscal sustainability analysis that considers fiscal priorities and pressures beyond climate adaptation— such as health care and education—as well as Armenia’s debt position. Such analysis will help gauge the tensions between long-term fiscal pressures, including from climate change, and the demands of the current and projected fiscal space. Based on this fiscal evaluation, a fiscally sustainable framework for climate action should be devised for protecting the most vulnerable households from climate impacts while mobilizing private investment for adaptation. Furthermore, efforts must be directed at mobilizing and facilitating access to climate finance. A strategy may include issuing green bonds, resilience bonds, equity and other derisking instruments for climate adaptation to meet NAP and SAP requirements.

The GoA will also need to consider how best to harness private sector adaptability, ingenuity, and financing for priority adaptation investments. This will necessitate developing and finalizing a green taxonomy, and strengthening communication through the Inter-Agency Coordinating Council on Climate Change, to make it clear what climate risks the GoA expects the private sector to manage, and which it intends to manage.

This report’s recommendations are summarized in Table 5.1.

Table 5.1: Key Recommendations for Improving Armenia’s Fiscal Capacity to Invest in Adaptation

Areas of intervention	Recommendations
Function 1. Climate fiscal risk assessment	<p>Risk data and data processing</p> <ol style="list-style-type: none"> Strengthen the hydrometeorological observation network to improve climate data collection, including by increasing the number of stations, automating stations, and upgrading the existing network, based on the best available technology principle. Continue to strengthen primary data collection institutions and analysis tools in compliance with the best available technology principle. <p>Risk assessment</p> <ol style="list-style-type: none"> Strengthen national institutions’ capacity to undertake climate risk assessments, so that the Fiscal Risk Council can make more informed decisions. Undertake detailed sector assessments of short and long-term climate risks, including their likely fiscal impacts. Develop national climate forecasting and socioeconomic impact assessment models. <p>Risk information communication and public disclosure</p> <ol style="list-style-type: none"> Institutionalize risk information disclosure cycle and methods. Use the FRS to communicate GoA-planned actions to respond to identified risks. Use the proposed Fiscal Risk Council and Inter-Agency Coordinating Council on Climate Change more effectively to share climate fiscal risk information, collect feedback on potential improvements, and coordinate for model integration between stakeholders and risk information integration into policy decision-making.

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Table 5.1 *continued*

Areas of intervention	Recommendations
Function 2. Climate fiscal risk management	<p>Institutional arrangements for risk management</p> <ol style="list-style-type: none"> 1. Establish the Fiscal Risk Council as an urgent priority, to create the fiscal space required, and use the Investment Committee and PIM decree to guide the prioritization of the pipeline of adaptation investments, consistent with Armenia’s MTEF. <p>Risk assignment and management instrument selection</p> <ol style="list-style-type: none"> 1. Based on the quantification of key sector climate risks under Function 1, develop a climate risk assignment framework that identifies which risks will be borne by government—and how these will be assigned to national government, SNGs, and SOEs—and which by private firms and individuals. 2. For risks assigned to government, develop a risk-layering approach that includes balancing risk retention, risk transfer, and risk reduction actions. <p>Direct public funds into adaptation investments</p> <ol style="list-style-type: none"> 1. Develop adaptation investment plans based on SAPs and reflecting the risk assignment process for all key sectors, creating a pool of adaptation investment projects to be integrated into sector development strategies and plans. <p>Engage the private sector and facilitate access to international financing</p> <ol style="list-style-type: none"> 1. Use green taxonomy for private and public market investments by developing a comprehensive and coherent policy for private sector engagement, including through direct and indirect financial regulation and supervision. 2. Build alliances—for example, by establishing an Armenian chapter of the United Nations Office for Disaster Risk Reduction’s Private Sector Alliance for Disaster Resilient Societies (ARISE). <p>Monitoring and evaluation</p> <ol style="list-style-type: none"> 1. Develop a tracking methodology for national government, SNGs and SOEs to plan and budget climate investments and pilot the tracking methodology. 2. Scale up the tested methodology across relevant SOEs and the SNG network. 3. Monitor and evaluate the results of investment and adaptation measures, and constantly improve risk assessment and management institutions and systems based on lessons learnt.

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Table 5.1 continued

Areas of intervention	Recommendations
<p>Function 3. Finance optimization to fund and finance investment in adaptation</p>	<p>Fiscal sustainability analysis</p> <ol style="list-style-type: none"> 1. Undertake a long-term fiscal sustainability analysis, considering other fiscal priorities or pressures on the budget (e.g., health, education, pensions) and Armenia’s debt position. 2. Develop a strategy for bridging the gap between longer-term fiscal pressures—including those likely to arise from climate change—and current and projected fiscal space. 3. Ensure that existing fiscal risks are better mitigated. <p>Develop a set of fiscal principles and policies for climate action</p> <ol style="list-style-type: none"> 1. Develop a fiscally sustainable framework and set of fiscal principles for protecting the most vulnerable households from climate impacts and facilitating private investment in adaptation. 2. Prioritize the development of PIM decree guidance material, including economic impact assessments, to provide an appropriate framework for investing in climate adaptation. <p>Mobilize and facilitate access to climate finance</p> <ol style="list-style-type: none"> 1. Develop a strategy for increasing the supply of climate finance. 2. Explore requirements for issuing green bonds, resilience bonds, and equity instruments, and other derisking instruments for climate adaptation. 3. Consider issuing climate adaptation bonds that meet NAP and SAP requirements.

FRS = fiscal risk statement; GoA = Government of Armenia; MTEF = Medium-Term Expenditure Framework; NAP = National Adaptation Plan; PIM = public investment management; SAP = sector adaptation plan; SNG = subnational government; SOE = state-owned enterprise.

Source: ADB.

REFERENCES

- Asian Development Bank (ADB). 2019. *Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards*. Manila. <https://www.adb.org/sites/default/files/institutional-document/518061/disaster-financing-policy-paper.pdf>.
- ADB. 2022. *Disaster-Resilient Infrastructure—Unlocking Opportunities for Asia and the Pacific*. Manila.
- ADB. 2023. *Good Practice Decision Framework*. Manila.
- M.R. Allen, O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld. 2018. Framing and Context. In: *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* [V. Masson-Delmotte et al.]. Cambridge University Press, Cambridge, UK and New York. <https://www.ipcc.ch/sr15/chapter/chapter-1/>.
- Ameriabank. 2020. *Green Bond Framework*. https://ir.ameriabank.am/docs/default-source/default-document-library/gbf_ameriabank.pdf.
- EU4Environment. 2021. *An Assessment of Investment Needs for Climate Action in Armenia up to 2030*. <https://www.eu4environment.org/app/uploads/2021/04/Report-Assessment-of-Investment-Needs-for-Climate-Action-in-Armenia-up-to-2030.pdf>.
- International Monetary Fund (IMF). 2015. *Making Public Investment More Efficient*. Washington, DC.
- IMF. 2019. *Republic of Armenia Technical Assistance Report—Public Investment Management Assessment*. IMF Country Report No. 19/33. Washington, DC. <https://infrastructuregovern.imf.org/content/dam/PIMA/Countries/Armenia/Documents/ArmeniaPIMATAR.pdf>.
- IMF. 2020. *Managing Fiscal Risks Under Fiscal Stress. Special Series on Fiscal Policies to Respond to COVID-19*. Washington, DC.
- IMF. 2021. *Fiscal Policies to Address Climate Change in Asia and the Pacific*. Washington, DC.
- IMF. 2022a. *Quantifying Fiscal Risks from Climate Change in Armenia*. Technical Report. Washington, DC.
- IMF. 2022b. *Republic of Armenia: Request for A Stand-By Arrangement—Staff Report*. Country Report No. 22/366. Washington, DC.
- Lu, X. 2022. *Accelerating Private Sector Engagement in Adaptation in Asia and the Pacific*. ADB Sustainable Development Working Paper Series 220513-2, Asian Development Bank, Manila.
- Republic of Armenia. 2020. *Fourth National Communication on Climate Change under the United Nations Framework Convention on Climate Change*. Ministry of Environment of the Republic of Armenia. https://unfccc.int/sites/default/files/resource/NC4_Armenia_.pdf.
- A. Tall, S. Lynagh, C. Blanco Vecchi, P. Bardouille, F. Montoya Pino, E. Shabahat, V. Stenek, F. Stewart, S. Power, C. Paladines, P. Neves and L. Kerr. 2021. *Enabling Private Investment in Climate Adaptation and Resilience: Current Status, Barriers to Investment and Blueprint for Action*. Washington DC: World Bank. <http://hdl.handle.net/10986/35203>.

World Bank Group. 2018a. *Disaster Risk Finance Country Note: Armenia*. Washington, DC. <http://documents.worldbank.org/curated/en/316831526641378244/Disaster-risk-finance-country-note-Armenia>.

World Bank Group. 2018b. *Modernizing Weather, Climate and Hydrological Services: A Road Map for Armenia*. Washington DC. <https://documents1.worldbank.org/curated/en/684751548347371395/pdf/134019-WP-P167315-Hydrometeorological-Report-Armenia-September2018-Final.pdf>.

Climate Resilient Fiscal Planning in Armenia

This working paper highlights Armenia’s progress and needs in scaling up finance for comprehensive adaptation investments and fiscal planning to deepen resilience to climate change. It presents a three-function framework that developing countries can use to assess and manage the risks to fiscal stability from climate change, and to optimize financial resources to promote climate action and encourage private sector investment in adaptation. The paper recommends an institutional and investment focus based on detailed sector-specific adaptation plans. Armenia’s experiences demonstrate the importance of integrating rigorous sectoral risk analysis into budget processes to manage climate-related fiscal risks, and strategic governance of the private sector to ensure financial sustainability.

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