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KIRIBATI

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June 18, 2025

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Asia and Pacific Department

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CONTENTS

STRENGTHENING RESILIENCE IN KIRIBATI WITH PUBLIC INVESTMENT

Kiribati, a collection of remote archipelagos of mostly low-lying atolls, faces significant risks from natural hazards and an existential risk from rising sea levels. This paper explores the critical needs for public investment in climate-resilient infrastructure to safeguard the nation's long-term prosperity and assesses the macroeconomic implications of such investments. To build moderate resilience, carefully designed fiscal policies and enhanced public investment efficiency are needed to alleviate the fiscal burden, maximize output gains from better infrastructure, and crowd in private investment, while maintaining debt sustainability.

A. Introduction

1. **Kiribati mostly consists of low-lying atolls and is exposed to natural hazards.** The Republic of Kiribati is a collection of archipelagos made of 32 atolls and one island that occupy a vast area of the central Pacific Ocean. Most of the land is less than two meters above sea level and tends to have narrow long shapes. The most densely populated area in South Tarawa is approximately 500 m wide. High exposure and sensitivity to the oceanic environment make Kiribati susceptible to storm surges, overwash, and, over the long run, risks of inundation due to sea-level rise. Freshwater lenses, an important water supply source for Kiribati, are vulnerable to saltwater intrusion that can occur with storm and king tide. Overwash on the low-lying atolls can significantly undermine the soil's fertility and jeopardize food security.[1]

2. **Kiribati's remoteness, weak capacity, and limited economic base compound the country's vulnerability to natural hazards.** Kiribati is the sixth most remote country in the world. The country spans 3,441,810 km^2 of ocean (an area as large as one third of the United States) but total land area is equal to only 811 km^2 (similar to Singapore). Approximately half of the total population of 130,000 lives in the atoll of South Tarawa, where the capital Tarawa is located. Kiritimati Island, the largest coral atoll, is located approximately 3,000 kilometers east of Tarawa, a distance that takes about one week to cover with cargo ships. Geographical remoteness and dispersion compound the difficulties in timely delivery of disaster responses. The densely populated atolls are vulnerable to public health challenges posed by natural disasters, including sanitation and vector-borne diseases. Kiribati has limited productive capacity and is highly dependent on imports of food and other goods and services, adding to its vulnerability to exogenous events.

3. **Kiribati has made progress on climate adaptation, through cooperation with development partners and passage of relevant legislations.** With support from development partners, significant investment is underway to strengthen the climate resilience of transport

[1] Overwash is the inundation of land due to strong waves and storm surges. King tides are exceptionally high tides due to alignment of the gravitational pull between sun, moon, and Earth. A freshwater lens is a layer of freshwater floating on top of the denser saltwater beneath the islands.

infrastructure and to upgrade water and sanitation infrastructure.[2] The Kiribati Disaster Risk Management and Climate Change Act (2019) sets out the legal framework and establishes the Kiribati National Expert Group (KNEG) on Climate Change and Disaster Risk Management as a principal technical oversight entity. The Kiribati Joint Implementation Plan (KJIP 2019-2028) outlines strategic targets for adaptation. The revised Building Act and a new building code are expected to take effect in 2025, setting out provisions to promote climate resilience in buildings.

4. High-quality public spending to invest in the climate resilient infrastructure will be critical for Kiribati's long-term prosperity. Despite public development expenditure averaging 47 percent of GDP per year during 2013-2019, Kiribati is still in need of substantially more public investment to build climate resilience. Much of the investment would have to be conducted by the public sector, given the limited private sector development and remoteness from other markets. Investment needed to build protection against rising sea levels by 2100 is estimated to be over 25 percent of GDP annually, which could jeopardize fiscal sustainability.[3] This paper shows how a carefully designed fiscal framework and enhanced public investment efficiency can alleviate the fiscal burden, maximize the output gains from better infrastructure, and crowd in private investment.

5. This paper analyzes the macroeconomic impacts of stepping up public investment in climate resilience. Box 1 reviews climate risks in Kiribati. The paper uses the IMF's DIGNAD (Debt-Investment-Growth and Natural Disasters) toolkit[4], to show that while the adaptation investment needed is large, moderate resilience to disasters that are related to extreme precipitation, flooding, and sea-level rise can be achieved without substantially worsening debt dynamics with appropriate fiscal policies. The policies include a measured consolidation through both revenue and current expenditure measures, and further improvements in public financial management to make public investment more efficient. However, building high resilience to sea-level rise, if financed through borrowing in the absence of substantially more grants, carries significant risks to debt sustainability. Specific policy recommendations are discussed in the last section.

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[2] Key projects include the South Tarawa Water & Sanitation Project and the Kiribati Outer Island Transport Infrastructure Investment Project.

[3] See Box 1 for discussions of the range and the uncertainty regarding the adaptation needs for sea-level rise in Kiribati. The cost estimate corresponds to the estimated existing public investment on coastal protection and adaptation and the required physical adaptation up to 0.5m under RPC4.5 (World Bank (2024)).

[4] Aligishiev, Ruane and Sultanov (2023).

Box 1. Kiribati: Climate Risks in Kiribati[1]

Kiribati has a tropical rainforest climate characterized by warm temperatures all year round and large variability in precipitation. Annual average temperatures are mostly stable around 27.5°C, and extreme heat is never observed.[2] Years with low rainfall jeopardize water security and pose large risks due to limited freshwater and groundwater sources. There is, however, little confidence in any long-term temperature change and changes of risks associated with droughts due to limited observational data in Kiribati.[3]

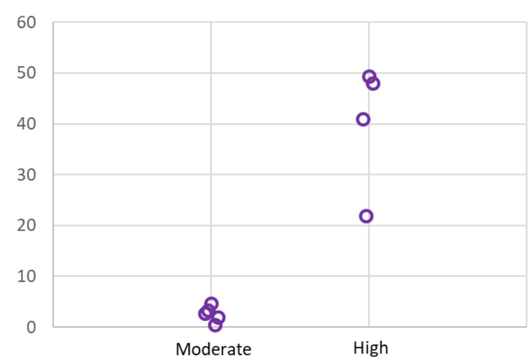
Climate models project with high confidence that temperature, precipitation, and intense precipitation will increase in Kiribati, while dry periods may become shorter.[4] Mean annual temperature is expected to increase between 1.2 and 2.6 °C at the end of the century, depending on the emissions scenario.[5] There are no indications that extreme temperature thresholds will be crossed even in these warmer scenarios. Precipitation is projected to increase, mostly during high-intensity events. The number of consecutive dry days is projected to decline in most scenarios, but a modest increase cannot be excluded. These projections are in line with broad regional trends in the Central Pacific and do not indicate significant changes to present drought risks. More intense precipitation events may increase risks from localized floods and land erosion.

Sea level is rising and will continue to rise well beyond the end of the century, creating existential risks for Kiribati. End-of-century projections indicate that sea levels will increase from 0.51 to 0.97 m, depending on the emissions scenario and the speed of ice melting in Greenland and Antarctica.[6] Higher sea levels cannot be excluded in the event of low-likelihood, catastrophic melting of the West Antarctic Ice Sheet.

Adaptation to sea level rise calls for costly long-term investment and complex transformations. Estimates of investment needs to protect and fortify coastal areas are very uncertain. However, all studies concur in projecting very large costs in Kiribati, ranging from US$3 billion in a moderate scenario with +0.5 m sea level rise to US$45 billion with sea level rise of +1.5 m and above (Figure on the right). This is equivalent to 10 times and 150 times present GDP, respectively. Costs will be distributed over the century, but the annual burden will still be very large. Incentivizing migration from small atolls to a few fortified areas can substantially reduce investment needs, but it implies permanent land loss and societal costs. With limited fiscal space and uncertain international aid, trade-offs and synergies between different adaptation strategies and between adaptation and social spending should be carefully addressed (Bellon and Massetti, 2022).

Cumulative cost of adaptation to sea level rise until 2100

(USD Billions)



Source: IMF staff estimate based on Diaz (2016), Hinkel et al. (2018), and World Bank (2024).

Notes: Moderate scenario: approximately +0.5m with respect to 2020. High scenario: +1.3 to 2.0m with respect to 2020. Cumulative costs from 2020 to 2100, undiscounted. For the moderate scenario studies use a mix of protection and planned retreat (World Bank, 2024) or only planned retreat (Diaz, 2016; Hinkel et al., 2018). For the High scenario, only protection is assumed to be a viable adaptation (Diaz, 2016; World Bank, 2024).

Additional macrocritical risks may arise from the negative impacts of higher temperature and ocean acidification on the health of marine ecosystems and coastal livelihoods. Acidification will reduce the health of corals while higher average temperature and more frequent marine heat waves will expose them to higher stress (CSIRO, 2014). As a result, episodes of coral bleaching are likely to become more frequent, jeopardizing the long-term viability of coral reefs and the surrounding marine ecosystems. Coastal livelihoods could be negatively affected. Warming of the Pacific Ocean as well as changes in currents and nutrients availability will likely affect the size of valuable fisheries in the Exclusive Economic Zone, generating uncertainty in a key source of government revenue.

[1]Prepared by Emanuele Massetti (FAD).

[2] Days with maximum daily temperature above 35 °C are considered as extreme heat.

[3] CSIRO (2014) and FADCP Climate Dataset (Massetti and Tagklis, 2024), using CRU data (Harris et al., 2020).

[4] FADCP Climate Dataset (Massetti and Tagklis, 2024), using CRU data (Harris et al., 2020), ERA5 reanalysis data (Hersbach et al. 2023), and CMIP6 data (Copernicus Climate Change Service, Climate Data Store, 2021: CMIP6 climate projections).

[5] The lowest temperature change is projected using the SSP1-2.6 scenario, in line with the Paris goal to keep global mean temperature increase below 2ºC with respect to pre-industrial times. The highest temperature change is projected using the high emission SSP3-7.0 scenario.

[6] IPCC AR6 data (Fox-Kemper et al., 2021) in proximity of Betio, Tarawa accessed using the IPCC/NASA Sea Level Projection Tool Sea Level Projection Tool – NASA Sea Level Change Portal (Garner et al., 2021).

B. The Macroeconomic Implications of Resilience-Building Investment

6. The DIGNAD (Debt-Investment-Growth and Natural Disasters) model[5] is used to analyze the macroeconomic trade-offs related to building resilience to natural-disasters in Kiribati. The DIGNAD model incorporates the macroeconomic impacts of natural disasters and public investments in both standard and climate-resilient infrastructure. As a general equilibrium model, DIGNAD assesses the macroeconomic consequences of investments in these two types of infrastructure, including their effects on debt sustainability over time. Investing in climate-resilient infrastructure mitigates output losses and physical damages due to natural disasters and requires lower maintenance for everyday exposure to weather and costal erosion. Because climate-resilient infrastructure delivers a larger return than standard infrastructure, it also encourages private investment. While climate-resilient infrastructure has clear benefits, it is more expensive, because it requires specialized skills, and more imported components to build. This introduces a difficult tradeoff for governments. Using the calibrated model, we simulate the paths of the economy under different resilience-building scenarios. Compared with the baseline, the resilience-building scenarios incorporate the staff-recommended fiscal consolidation of 3.5 percent of GDP, achieved by enhancing revenue from VAT and excise taxes, and a slight increase in fishing revenues, and rationalizing subsidies (IMF, 2025).

7. Three scenarios for infrastructure investment are considered:

- **The baseline scenario.** The baseline scenario is consistent with the staff's macroeconomic projections presented in the main body of the 2025 Article IV Staff Report and Debt Sustainability Assessment. For each year in the baseline scenario, public adaptation investment is at 12 percent of GDP and conventional public investment is at 29 percent of GDP, supported by international grants, concessional loan issuances, and withdrawals from the Revenue Equalization Reserve Fund (RERF), the sovereign wealth fund.

[5] Marto, Papageorgiou, and Klyuev (2018).

- **The moderate resilience scenario.** This scenario assumes a step-up in public adaptation investment from 12 to 25 percent of GDP, with which the economy can build moderate resilience to withstand increased flooding risk that may be associated with approximately 0.5m of sea-level rise by 2100.[6] The increase in adaptation investment from the baseline is assumed to be financed by an additional annual withdrawal of 5.5 percent of GDP from the RERF, a fiscal consolidation resulting in annual savings of 3.5 percent of GDP, and additional concessional loan issuances of around 4 percent of GDP per year.[7]

- **The high resilience scenario.** This scenario assumes a further increase in adaptation investment to 45 percent of GDP to build higher resilience to withstand increased flooding risk that may be associated with approximately 2m of sea level rise by 2200.[8] It should be noted that the level of adaptation investment still falls short of the lower-end estimate of the investment needs to adapt to a 1.3m sea-level rise by 2100. To illustrate the burden of the additional investment needed for building high resilience, we assume no additional RERF withdrawal compared with the moderate resilience scenario. Therefore, concessional loans are assumed to bridge the gap in investment financing relative to the moderate resilience scenario.

8. Results indicate that the moderate adaptation investment dampens the negative impact of natural disasters on GDP, with a manageable debt-to-GDP increase. To illustrate the impacts of adaptation investment, we compare the real GDP projections in the event of a natural disaster in 2040 (Figure 1).[9] While in all three scenarios real output drops in the immediate aftermath, the recovery is faster when there is more climate-resilient infrastructure. However, with the extremely quick ramp-up in public investment in the high resilience scenario, debt would rise fast to several times of GDP. Nonetheless, the modest increase of debt-to-GDP ratio in the moderate resilience scenario relative to the baseline suggests that with prudent fiscal policy and appropriate use of RERF resources, the fiscal burden of moderate resilience-building can be manageable. Higher output on the back of more public investment in the two resilience-building scenarios also helps

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[6] There is substantial uncertainty regarding the adaptation needs for sea-level rise in Kiribati and potential for associated flooding. The cost estimate corresponds to the estimated existing public investment on coastal protection and adaptation and the required physical adaptation up to 0.5m under RPC4.5 (World Bank, 2024). NASA 2024 finds that future sea level rise will cause a large increase in the frequency and severity of episodic flooding in Kiribati within the 21st century. Under the assumption of no additional protections, NASA 2024 finds that all island chains in Kiribati will likely experience more than 100 days of flooding every year by the end of the century.

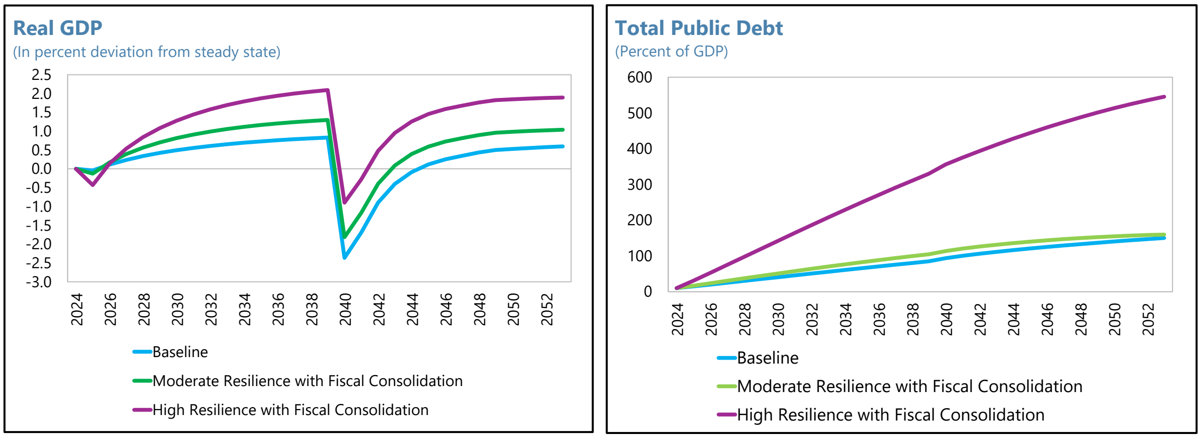
[7] Main sources of climate finance for Kiribati have been MDBs such as the World Bank and ADB, and bilateral partners such as Australia and New Zealand. Securing direct access to climate funds has been very challenging for Kiribati and other low-income Pacific Islands and would require substantial improvements to public investment institutions (Fouad et al, 2021). But Kiribati can continue to access global climate funds through engagement with development partners.

[8] The cost estimate corresponds to the required physical adaptation up to 2m under RPC4.5, assuming decreased building density over the long run (World Bank, 2024).

[9] The magnitude of the natural disaster in terms of its macroeconomic impact is consistent with the estimate based on the most extreme historical disaster in Kiribati (Lee et al, 2018). The shock entails a 4.6 percent loss in output, a 12 percent decrease in exports, and a 10 percent increase in fiscal outlay.

contain the rise in debt-to-GDP ratio. This is more salient in the long run, when the benefits of higher output growth further dampen the debt-to-GDP increase in the moderate resilience scenario.

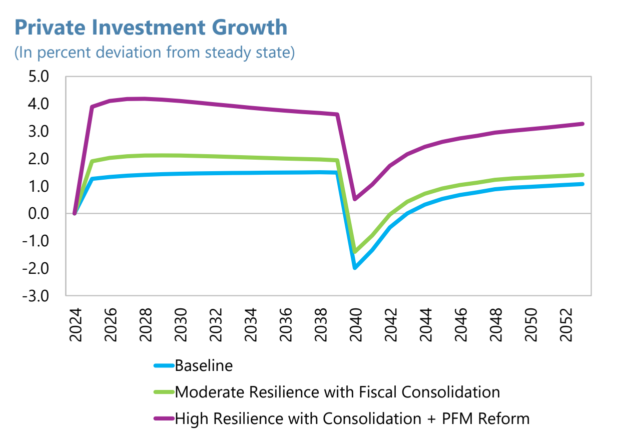
Figure 1. Kiribati: GDP and Debt Projections by Scenario



Source: IMF staff simulations using the DIGNAD toolkit. A natural disaster is assumed to occur in 2040.

9. Public investment in adaptation infrastructure crowds in private investment because of improved risk-return profile in a more climate-resilient economy. Adaptation infrastructure, a public good, enhances the overall resilience of the economy and complements the productivity of private firms thus increasing returns to private investment. In addition, adaptation infrastructure mitigates the output loss and the damages to both public and private capital stocks from natural disasters, reducing the exposure of all investment to such risks. It is important to note that even though the government reconstructs public infrastructure post-disaster, the private sector requires time to rebuild its capital stock due to adjustment costs, which introduces some scarring from natural disasters. Nevertheless, with a larger climate-resilient capital stock, private investment will still be higher than in the baseline.

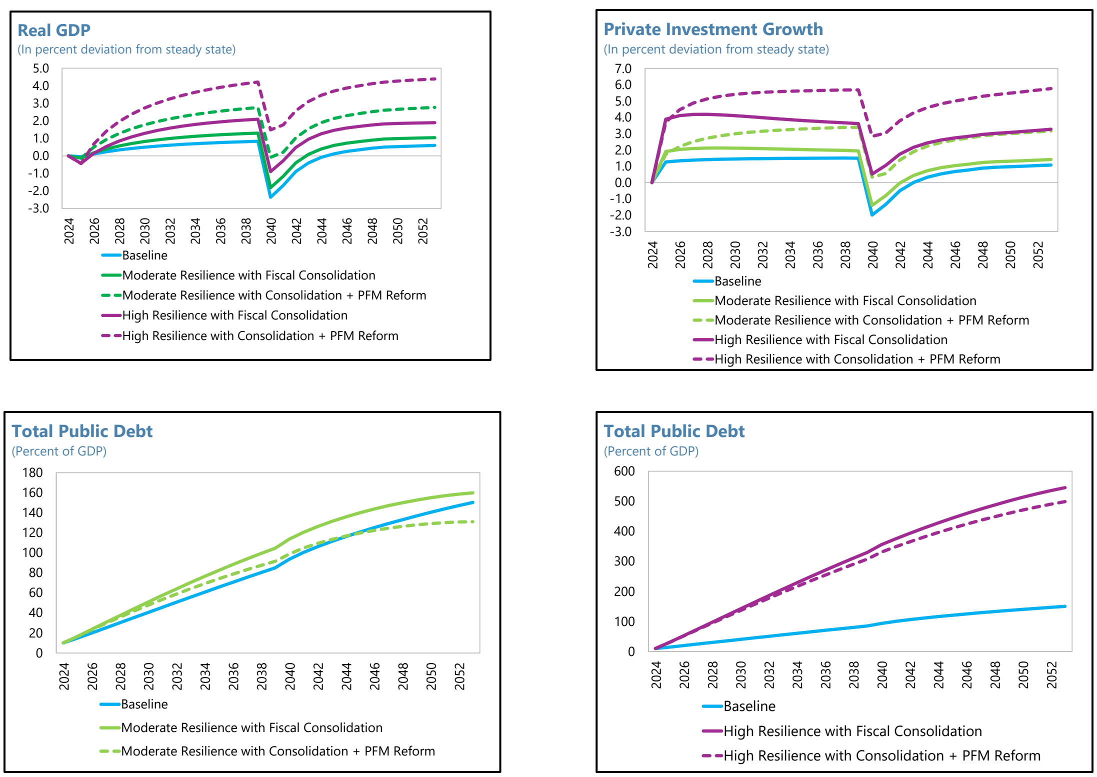
Figure 2. Kiribati: Private Investment by Scenario



Source: IMF staff simulations using the DIGNAD toolkit. A natural disaster is assumed to occur in 2040.

10. The efficiency of public investment matters.[10] For illustration purposes, additional simulations assume that deep reforms decrease the public investment efficiency gap from 80 to about 50 percent for Kiribati. The efficiency gap measures how much the capital stock falls short compared to the best performing LIDC peer given the same level of public investment. Increased efficiency stemming from PFM and investment management reforms leads to higher output and private investment, given the same public investment as in the resilience-building scenarios without efficiency reforms (Figure 3). The economy is also more resilient against natural disaster shocks, exhibiting faster post-disaster recovery. The increase in debt-to-GDP ratio is lower with efficiency-inducing PFM reforms than without, due to higher GDP growth. In the moderate resilience scenario, debt-to-GDP ratio even drops below the baseline level around 2045. In the long-run, debt stabilizes in the moderate resilience scenario with PFM reforms.

Figure 3. Kiribati: Comparison of Scenarios with and without Efficiency-Inducing PFM Reforms



Source: IMF staff simulations using the DIGNAD toolkit. A natural disaster is assumed to occur in 2040.

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[10] Public investment efficiency measures how much infrastructure output results from a given level of public investment. In the absence of such a measure for Kiribati, we approximate it with the left-tail estimate of the cross-country analysis of Kapsoli et al. (2023), i.e. an efficiency gap of about 80 percent to best-performing LIDC peers. The approximation is based on the IMF public investment management assessment (PIMA) in 2018 that Kiribati's PFM institution had notable weaknesses compared with the average LIDC, especially in planning, selection, procurement, and asset monitoring. Kiribati is taking steps to strengthen its PFM institutions, having published a national infrastructure investment plan and working on a three-year PFM roadmap.

C. Policy Discussions

11. Continued mainstreaming of resilience-building in budgeting and establishment of a medium-term fiscal framework can ensure stable public capital expenditure. With pre-COVID public development expenditure averaging 47 percent of GDP per year, Kiribati has been undertaking substantial public investment, a large share of which is financed by donors. Kiribati could benefit from better planning of public investment and management of fiscal surprises, especially volatility in fishing revenue, grants, and RERF returns that sometimes constrain development and adaptation spending.[11] Against this backdrop, the establishment of a medium-term fiscal framework supported by an appropriate RERF withdrawal rule can ensure that resilience investment remains stable, consistent with multi-year planning. IMF 2025 Article IV Staff Report shows that, with a withdrawal rule that sets the limit at 5 percent of the RERF balance, Kiribati can help safeguard high priority investment from potential revenue volatility.

12. Public investment efficiency can be improved with concrete steps towards better planning, procurement, and infrastructure governance.

- **Develop a centralized database of all ongoing and planned projects, including donor-funded ones.** The authorities do not have a centralized system to track spending on individual public investment projects. Projects solely funded by donors often do not report their spending to the Ministry of Finance. The Ministry of Infrastructure and Sustainable Energy is working on a tracking system for the projects under their purview. Such efforts should be broadened to include projects led by other line ministries, SOEs, and development partners, and include details on expenditures.

- **Continue to mainstream operational and maintenance costs in project budgeting.** Geographical dispersion, remoteness, and limited domestic labor market add to the challenges of keeping infrastructure in a good shape. Kiribati has made progress in recent years by establishing a maintenance fund designated for certain infrastructure projects. But the country still faces many difficulties in keeping up the operation and maintenance of infrastructure. It is therefore important to set aside funds and plan for staffing for operation and maintenance when budgeting for new projects. When it is difficult to secure local staff, arrangements such as the pooling of regional experts can be explored in coordination with other countries.

- **Establish comprehensive public asset registries, including SOEs, for better public infrastructure management and governance.** Accurate asset data will facilitate the identification of under-utilization, underperformance, and maintenance needs of public infrastructure, leading to better management of the resources. Asset registries will also improve transparency and accountability, thereby enhancing infrastructure governance. IMF (2018) finds

[11] Kiribati has a return-based rule for maximum RERF withdrawals—excess above a 2 percent nominal return in the previous year sets the upper bound for total withdrawal for the current year.

that revenue gains from better public asset management can be as high as 3 percent of GDP annually.

- **Regularly review utility tariffs and align them with market prices, to maintain the SOEs' financial health and their ability to undertake public investment.** In 2025, Kiribati revised its electricity tariff for the first time since 2009, while water tariff remains nil. Sanitation charges are low and face low collection. Tariff reviews should continue on a regular basis and be broadened to include utilities other than electricity, with a view to align the prices with supply-demand dynamics over time. Having correct price signals is important for the financial viability of SOEs such as the Public Utility Board and allows them more autonomy to make much-needed investment in utilities infrastructure, alongside donor-driven investment.

- **Continue to strengthen the public procurement framework.** Kiribati amended the Procurement Act in 2021 to broaden its coverage to SOEs. Further enhancements to the procurement framework should support a more transparent procurement process, which includes the disclosure of beneficiary ownership of the awarded companies and details of the bids, and allows sufficient public notification and time for bidding. While traditional development partners have rigorous procurement procedures that complement domestic institutions, as Kiribati expands its network of development partners, it is important that domestic institutions for procurement act as a backstop.

13. Efforts should continue to strengthen local capacity for project execution and infrastructure management. Limited domestic capacity for project execution and lack of skilled personnel to maintain infrastructure have contributed to delays in project implementation and inadequate infrastructure governance. Kiribati has also experienced difficulties in retaining staff from donor-financed projects. Efforts are underway to address the skill shortage, including career awareness programs targeting secondary schools, scholarships for engineering degrees abroad, and training workshops by the Ministry of Infrastructure and Sustainable Energy. Given that Kiribati spends a relatively large share of its government expenditure on education (16 percent in 2023, the fourth highest among PICs), it is important to target high-priority areas such as vocational training to support infrastructure. Kiribati can also continue to tap into the expertise offered by development partners through knowledge transfer and technical assistance.

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