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Republic of Congo Economic Update

Climate Change Impacts, Adaptation and Opportunities

✖

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WORLD BANK GROUP

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Abbreviations and Acronyms

BEAC	*Banque des États de l'Afrique Centrale (Bank of Central African States)*
CEMAC	Communauté économique et monétaire de l'Afrique centrale (Economic and Monetary Community of Central Africa)
CDC	Centers for Disease Control and Prevention
COVID-19	Coronavirus disease of 2019
COP26	Conference of the Parties
DARA	Development Assistance Research Associates
ECF	Extended Credit Facility
EMDEs	Emerging market and developing economies
FAO	Food and Agriculture Organization
GEP	World Bank Global Economic Prospects report
GHGs	Greenhouse gas emissions
GFDRR	Global Facility for Disaster Reduction and Recovery
ICT	Information and communications technology
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IMPACT	International Model for Policy Analysis of Agricultural Commodities and Trade
NDC	Nationally Determined Contributions
NPL	Non-performing loan
PMI	Purchasing Managers' Index
PPP	Purchasing Power Parity
ROC	Republic of Congo
SNPC	National Petroleum Company of Congo
SIVL	*Système informatique de vérification de la légalité et de la traçabilité des bois* (Information technology system for verifying the legality and traceability of timber)
SOEs	State-owned Enterprises
SSA	Sub-Saharan Africa
TIAO	*Taux d'intérêt des appels d'offres* (BEAC policy bid interest rate)
y-o-y	year-on-year
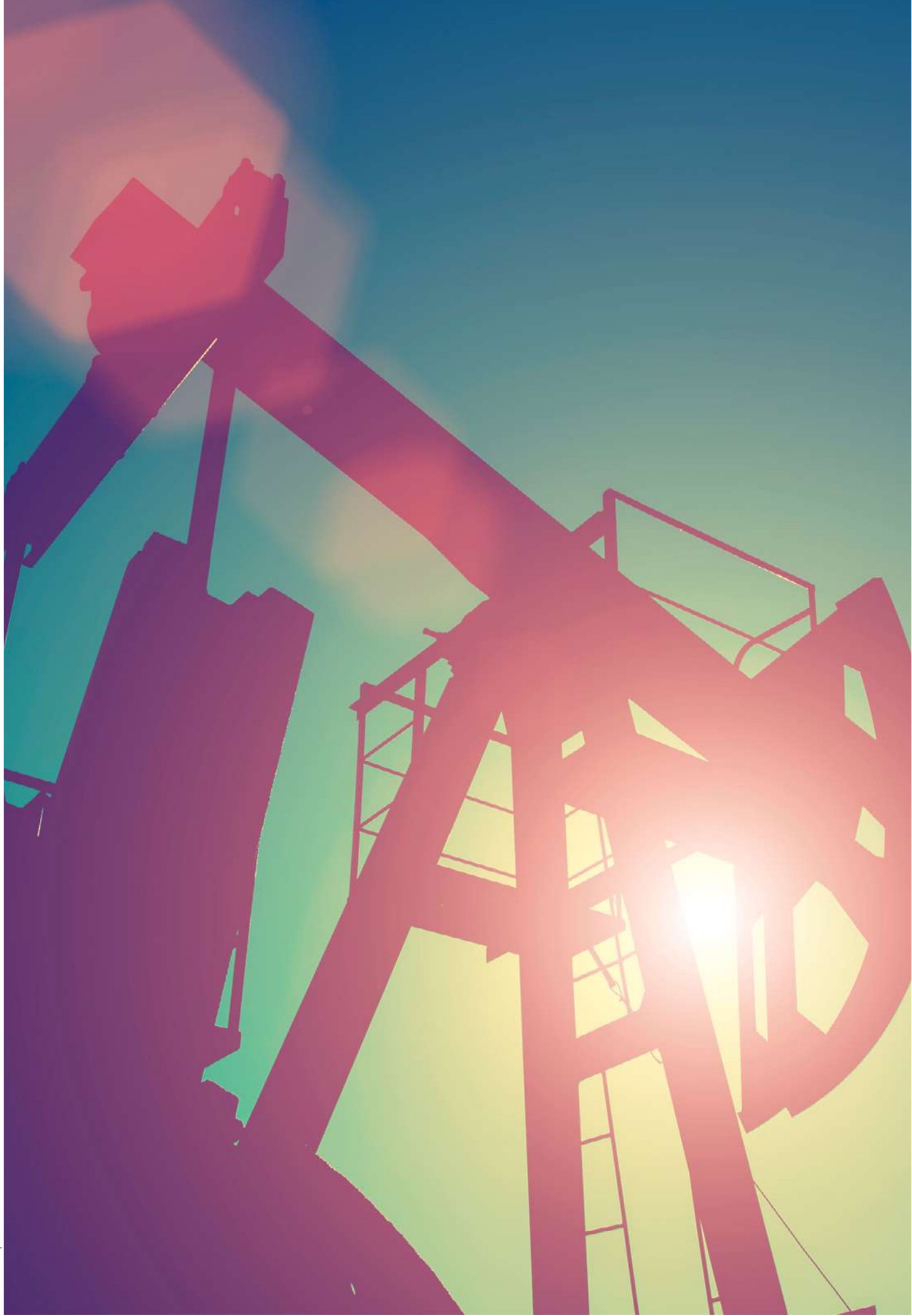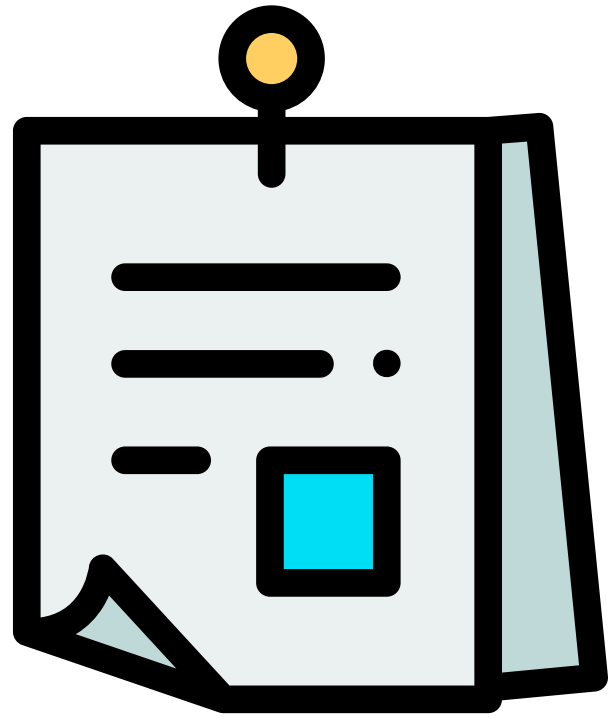
Executive Summary

This is the ninth edition of the Republic of Congo Economic Update. Each edition of this annual report presents an overview of the Republic of Congo (ROC) evolving macroeconomic position, followed by a detailed exploration of a specific topic. The first chapter of this year's update presents recent economic developments, and macroeconomic outlook and risks. It also includes policy actions that could help strengthen fiscal and debt sustainability, contain inflation, including the rise in food prices driven by war in Ukraine, and prevent the resurgence of COVID-19. The second chapter discusses the effects of climate change on the economy and people of the ROC. As Congo tries to implement a sustainable and inclusive economic recovery program, it is crucial to integrate the impact of climate change on the country's development path. According to Africa's Pulse (October 2021), despite being the lowest contributors to global carbon emissions, Sub-Saharan African countries are disproportionately affected by climate change. The social and economic disruptions of climate shocks are wide-ranging and can multiply quickly with intergenerational consequences. Congo is one of the most vulnerable countries to climate change in the world, which calls for urgent government action. This report proposes possible adaptation measures, with a focus on the agriculture sector given the sector's vulnerability to climate change, its critical role for food security and economic diversification, and its relevance in the new National Development Plan 2022-26. Furthermore, the challenges and opportunities for reducing greenhouse gas emissions are also discussed.

Recent economic developments

The impact of the war in Ukraine is improving Republic of Congo (ROC) government revenues, but rising inflation and shortages have major adverse impacts on businesses and households. As a commodity exporter, ROC is currently benefiting from higher oil prices with exports receipts increasing significantly and bolstering government revenues. However, households and businesses are being impacted by rising food prices, supply chain disruptions and fuel shortages, which prompted the Government to adopt a "resilience plan on the food crisis 2022-23" in June 2022. In addition, ROC's subsidy bill is rising, especially oil and electricity subsidies, as the Government maintains administrative controls on the prices of a wide array of consumer necessities (e.g., gasoline, electricity tariffs, cooking gas, and several food staples). Driven by these developments, in August 2022, ROC's Government revised its 2022 Budget Law, increasing revenues for the year by nearly fifty percent and expenditure by eighteen percent relative to the initial law. While the effects of the war in Ukraine are benefitting government revenues, the impacts on households and firms add to existing socio-economic challenges and pressures from the COVID-19 pandemic.

ROC's economy has yet to recover from the economic fallout of the COVID-19 pandemic, but economic activity is picking up in 2022. Following a sharp economic contraction in 2020 due to the pandemic, output in many countries rebounded in 2021, but ROC's economy is estimated to have contracted

further in 2021. The most recent wave of the COVID-19 pandemic has subsided, following a steep increase in the number of cases in 2021 Q4. This led to the removal of most of COVID-19 restrictions in early 2022, especially the curfew that was in place since the beginning of the pandemic, which is helping strengthen the recovery in the non-oil sector in 2022, especially for services (accommodation, food service activities, transportation). Despite the recent decrease in the number of COVID-19 cases, uncertainties regarding the spread and persistence of the virus remain, as new variants could emerge across the world. ROC's population could be vulnerable to a new wave of infections as vaccination progress has stalled at 11.5 percent of the population as of June 30.

In 2021, growth was held back by reduced oil production while the non-oil sector recorded its first year of positive growth since 2014. The pandemic and oil production challenges continued to affect ROC's economy in 2021. Despite higher oil prices and increased global demand, oil production declined in 2021 due to postponed investments by oil companies, maturing oil fields, and technical challenges. As a result, the oil sector contracted by 10.6 percent. By contrast, non-oil growth reached an estimated 3.1 percent in 2021, boosted by domestic demand which increased thanks to the resumption of economic activities, higher public spending on goods and services, and the partial repayment of domestic arrears. However, the decline in oil production led to a contraction of exports by 12.2 percent in real terms.

Despite the fall in oil production, fiscal and external positions improved due to higher oil prices. High export receipts resulting from higher oil prices led to a nominal increase in export revenues. The current account surplus is estimated at 10.9 percent of GDP in 2021. Similarly, government revenues in 2021 increased thanks to higher oil prices, which have compensated for reduced export volumes. Meanwhile, total expenditure declined in 2021. The increase in revenues together with a moderation in public spending led to a fiscal surplus estimated at 1.4 percent of GDP (compared to a deficit in 2020).

Due to concerns over the declining trend of foreign exchange reserves, the *Banque des États de l'Afrique Centrale* (Bank of Central African States, BEAC) tightened its monetary policy in late 2021. Despite higher oil prices and the additional Special Drawing Rights allocation (equivalent to US$1.4 billion) by the IMF in 2021 for the *Communauté économique et monétaire de l'Afrique centrale* (Economic and Monetary Community of Central Africa, CEMAC) region, by the end of 2021, BEAC's international reserves represented just over three months of imports of goods and services in the region. To respond to the risks arising from low foreign reserves, in November 2021, the BEAC increased the policy bid interest rate (*taux d'intérêt des appels d'offres*, TIAO) by 25 basis points to 3.50 percent. In March 2022, BEAC further raised the TIAO to 4.0 percent amid concerns about recent inflationary pressures due to the war in Ukraine.

ROC's debt situation improved significantly in 2021. ROC's public debt is classified as in distress, but the debt is now assessed as sustainable. Higher oil prices, improved debt management, and debt restructuring agreements with two of Congo's three largest oil traders, helped restore debt sustainability in the second half of 2021. Furthermore, public debt fell sharply from 113.2 percent of GDP in 2020 to 102.2 percent of GDP in 2021 driven by high external debt amortization payments tied to oil prices and the increase in nominal GDP.

Existing socio-economic challenges of households have been exacerbated by the economic contraction. With real GDP per capita falling by an estimated 4.6 percent in 2021, the poverty rate is estimated to have further increased, reaching 52.0 percent in 2021. Inflation remained contained in 2021, but disruptions in global supply chains and high international commodity and agricultural prices exerted inflationary pressures on domestic food prices, which increased by about 3.4 percent, particularly impacting the poor. With the war in Ukraine, food prices have risen further in 2022H1, exacerbating food insecurity.

ROC's economy is expected to rebound in 2022. The global economic recovery is set to soften considerably in 2022 because of a sharp deceleration of global activity triggered by the war in Ukraine. Following a strong 5.7 percent rebound in 2021, global economic activity is projected to moderate significantly to 3.2 percent in 2022-23. In ROC, GDP growth is projected at 1.9 percent in 2022 and an average of 4.1 percent in 2023-24 driven primarily by the resumption of investments by oil companies and the continued clearance of government arrears to domestic firms. The poverty rate will decline slightly to an average of 51.7 percent in 2022–24. The return of real GDP per capita to the pre-COVID level of US$1,800 by 2030 will require the economy to grow by 4.5 percent on average starting in 2025. Inflation is projected to remain above BEAC's 3.0 percent target over the medium term, and the war in Ukraine will exert inflationary pressures on food prices. High world oil prices and increased oil production are expected to increase oil export revenues and result in current account surpluses in 2022-2024. The fiscal balance is expected to remain positive, driven by oil revenues and improved non-oil revenue mobilization due to tax administration reforms. Expenditure moderation and significant oil revenues will help reduce the debt stock. Clearance of external arrears is an immediate priority to enable Congo to come out of debt distress. There are several downside risks to this outlook, including uncertainties related to the pandemic and oil production, a protracted war in Ukraine and sustained high food prices, tighter conditions in global and regional financial markets, and adverse weather conditions which could impact agricultural production.

Credits: Unsplash

The Social and Economic Impacts of Climate Change in the Republic of Congo

The Republic of Congo is one of the most vulnerable countries to climate change. ROC is the 169th most vulnerable country to climate change out of 182 countries on the Notre Dame GAIN Country Index. Evidence of the adverse impacts of higher temperatures and more erratic rainfall is mounting. More frequent floods, a slowdown in agricultural productivity growth, and a higher incidence of heat-related and vector-borne illnesses have already been observed.

Looking forward, projections of Congo's climate will depend on the evolution of global emissions. The projections of the changes in average temperatures and precipitation in Congo vary depending on different scenarios of global emissions. While the projected impact of the global climate scenarios on average temperature in Congo is small until 2030, it increases over time, dramatically so by 2090 under a pessimistic scenario (where no further measures are taken to stabilize temperatures beyond those already committed). The projections for average annual precipitation are less clear.

Assessments of the impact of climate change on Congo have identified the agriculture sector and flooding as the key vulnerabilities. Assessments have been undertaken as part of the government's National Communications (2001 and 2009) and Nationally Determined Contributions (NDCs) (2015 and 2021) to the United Nations Framework Convention on Climate Change. Floods are a recurring natural hazard in Congo, exacerbated by climate change. Many areas are seasonally flooded due to exceptional rainfalls that affect human settlements, agriculture, public health, and biodiversity. In recent years, increased incidence of extreme rainfall related to climate change has resulted in higher levels of damage. Observed changes in Congo's climate have already affected the country's main agricultural zone and harmed those most vulnerable. Changing patterns of precipitation make agricultural activities more difficult and less successful. As temperatures continue to rise, increased rates of evapotranspiration are expected to damage certain crops more than others. The poor are the most affected by such changes, as agriculture is their main source of income. Women are also particularly affected.

Agriculture and labor productivity account for most of the projected costs. The impacts analyzed in this report fall into four categories: agriculture, health, floods and sea level rise, and labor productivity. Costs in agriculture (including loss of labor productivity in that sector) make up about one-third of the cost (for the categories considered) in 2030 and 2050, while labor productivity losses in the rest of the economy make up close to 60 percent. Floods and sea level rise account for around five percent of the costs of the five categories in 2030 and 2050. Health costs are about four percent of the cost in 2030, rising to nine percent in 2050. With its significant impact on the agriculture sector, climate change could exacerbate hunger and malnutrition in ROC.

A more detailed investigation is made of the climate impacts on agriculture, including the loss of labor productivity, loss of yields, and changes in agricultural revenues resulting from changes in food prices. Losses in agriculture due to climate change are found to be about five percent of the quantity of agricultural output in 2030 and ten percent in 2050. The quantity of output losses will be greatest for millet, bananas, and other fruits and vegetables. Modest output declines are expected for maize, cassava, and groundnuts.

Adaptation to climate impacts should be aligned with the government's National Defined Contribution and as closely linked as possible to the development agenda of ROC. In agriculture, Congo's 2015 and 2021 NDCs identify the need to improve the management of water and to increase food production. The issue of labor productivity is not discussed in the NDCs although recent studies find that labor losses have risen sharply with temperature and have been

particularly high in the agriculture sector. For health, the government identifies activities to control malaria vectors. For extreme events, the 2021 NDC focuses on coastal regions, proposing to strengthen early warning systems. For forestry, the country aims to maintain or even increase the carbon sequestration potential of its forests through better management of the sector as well as through reforestation. The budget for adaptation in the NDC is however dependent on external funding with conditional expenditures on average 2.9 times greater than unconditional public expenditure commitments across categories.

Congo's 2021 NDC also sets goals for climate change mitigation, notably targets for greenhouse gas emissions (GHGs) through waste management and preventing deforestation, but achieving these goals will require substantial resources, both domestic and international. There are, however, potential instruments for mobilizing needed resources such as exploiting the international market for carbon sequestration, and recovering oil-associated gas, instead of flaring it into the atmosphere, which could raise revenues and reduce emissions. For carbon sequestration, ROC is well placed to play a role in reducing net global carbon emissions and to benefit financially. However, international carbon markets are currently designed in a way that does not adequately compensate Congo for its role in climate change mitigation. A further difficulty arises in the way carbon credits work in the forestry sector, with the baseline for the credits being a critical factor along with the price agreed for a credit. But while the current conditions for Congo raising substantial income from carbon sequestration in its forests are not favorable, evolving global developments could change the situation. For recovery of associated gas, it is critical that Congo updates the regulatory framework of routine gas flaring as ROC's current laws and regulations and its financial sanctions are insufficient to reduce flaring and venting.

Policy Options

Strengthening fiscal and debt sustainability, increasing COVID-19 vaccination rates, and containing inflation are among urgent actions to address in the short-term, but climate actions will also be needed for sustainable recovery. Exiting debt distress and maintaining long-term debt sustainability will require the government to continue enhancing domestic revenue mobilization, as well as debt management and transparency. As the world is facing a global food crisis, the government needs to protect the most vulnerable from the surge in food prices, while putting in place measures to gradually reduce the country's dependence on food imports. The resurgence of COVID-19 remains a significant risk for Congo's economic recovery, and increasing vaccination coverage remains critical. Finally, the sustainability of Congo's longer-term growth requires timely climate adaptation actions, especially to manage the impacts on agriculture and labor. At the same time, Congo should continue to contribute to global efforts to reduce emissions of GHGs through protection of its forests and explore opportunities to increase external financing for its adaptation and mitigation actions.

Table 1: A summary of policy priorities

1 Strengthening fiscal and debt sustainability

Domestic revenue mobilization

→ Streamline tax expenditures by identifying exemptions, quantifying their fiscal cost and evaluating their economic return (e.g., through tax expenditure analysis).
→ Improve the business environment by eliminating administrative processes and requirements that duplicate those of the Congolese Agency of Business Creation.
→ Increase revenues from the forestry sector by optimizing the use of the information technology system (SIVL) to collect taxes from forestry companies.

Debt management and transparency

→ Finalize the government's strategy for the clearance of domestic arrears and prevent the accumulation of new arrears by strengthening ex ante control of commitments and cash management.
→ Pursue negotiations for debt restructuring agreements with China (a second round) and Chinese commercial creditors.
→ Do not enter into any contractual obligations for new external public non-concessional debt.
→ Improve annual debt reports by extending their coverage of state-owned enterprise (SOE) debt beyond the ten largest SOEs.

2 Actions to mitigate the impact of the war in Ukraine

→ Use some of the oil windfall gains to provide cash transfers to help low-income households with rising food prices.
→ Ensure that the budget allocated to social sectors in the 2022 and 2023 Budget Laws is fully executed and free of delays.
→ Support farmers and the agriculture sector to reduce the country's dependence on food imports by providing training to farmers, improving farmers' access to inputs and finance for leasing or buying equipment, and securing land rights.
→ Work with the private sector to increase production and processing of local alternatives to wheat flour.

3

Increase vaccination to reduce the risk of new COVID-19 outbreaks

→ Communicate clearly and consistently about the effectiveness, safety, and availability of COVID-19 vaccines.

→ Work with health workers and community leaders to design and implement communication and outreach programs about COVID-19 vaccines.

→ Make access to vaccines easy and at minimal cost to households in terms of time and effort.

→ Offer vaccines during routine healthcare visits, supported by targeted communications.

4

Adopt key climate adaptation actions with a focus on reducing impacts on agriculture and labor

→ In agriculture: farmers will need information about the response of crop yields to changing patterns of temperature and precipitation and access to more resilient seed varieties.

→ To support labor productivity: adopt labor rules to prohibit working during extreme heat, encourage the adoption of cooling technology, and require the use of heat sensors on work sites.

→ In health: design an early warning system which is compatible with the country's communications facilities and supported by back-up services.

→ Coastal areas: prepare and implement a detailed plan for coastal protection to prepare for extreme climate events.

5

Continue to contribute to global efforts to reduce GHG emissions and explore financing opportunities

→ Carefully manage development of forests and protection of portion of the Congo peatlands to provide opportunities for international carbon credits and ensure preservation of the country's biodiversity.

→ Reduce flaring and venting of associated gases by strengthening the current regulatory framework (clarifying circumstances under which flaring, and venting are acceptable) and by introducing specific financial penalties.

6

Diversify ROC's economy to prepare for the prospect of shrinking global oil demand

→ Accelerate human capital development by adopting a legal instrument that prioritizes disbursement of funds to service delivery units in health and education.

→ Improve the coverage and quality of information and communications technology (ICT) and electricity infrastructure by strengthening competition in the fiber optic wholesale market and the international submarine cable market and by thoroughly reviewing the current electricity tariff regime to determine if an adjustment is needed.

→ Support ecotourism development by ensuring wildlife protection authorities have sufficient resources and a clear mandate to stop poaching, illegal hunting, and wildlife trafficking, and by strengthening tourism governance through fostering improved leadership and an invigorated tourism body.

1

Recent Economic Developments

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1.1   Recent Economic Developments

1.1.1   ROC has so far avoided severe COVID-19 health impacts, but its economy has yet to recover

The most recent wave of the COVID-19 pandemic has subsided, following a steep increase in the number of cases in 2021Q4. As of June 30, 2022, ROC registered a cumulative 24,128 confirmed cases of COVID-19 and 385 deaths (Figure 1). This corresponds to a mortality of 6.8 per 100,000 population (compared to about 80.2 globally). The pandemic situation in ROC has also been less severe than most countries in the CEMAC region according to official data.[1] ROC has registered a lower number of confirmed cases and deaths per million habitants compared to Equatorial Guinea, Gabon, and Cameroon. Despite the recent decrease in the number of cases, uncertainties regarding the spread and persistence of the virus remain, as new variants could emerge, putting the country's mostly unvaccinated population at risk.

Despite the government's efforts, progress in vaccination has stalled in ROC. In 2021H2, the government put in place several measures to increase the pace of vaccination, including opening several vaccination centers, increasing communications about the virus and importance of vaccines, and making vaccination mandatory for certain segments of the population. Despite these efforts, as of June 30, 2022, only 11.5 percent of the Congolese general population had been fully vaccinated. While vaccine supply constraints eased in 2021H2, most people have not sought to get vaccinated due to hesitancy, misinformation, and declining concern about contracting the virus.[2] Although ROC's vaccination rate was close to the average for CEMAC (13 percent) by June 30, 2022, it remained below the average of 19 percent for Africa and well below the best performers in the region such as Rwanda and Mauritius and some neighboring countries such as the Central African Republic and Angola (Figure 1).

Figure 1: ROC has recorded relatively low numbers of COVID-19 cases despite a low vaccination rate

COVID-19 monthly confirmed cases and deaths in Congo

Cumulative confirmed COVID-19 cases and deaths

Monthy cases   Monthly deaths (rhs)

Cumulative cases   Cumulative deaths (rhs)

Fully vaccinated share of the population (%)
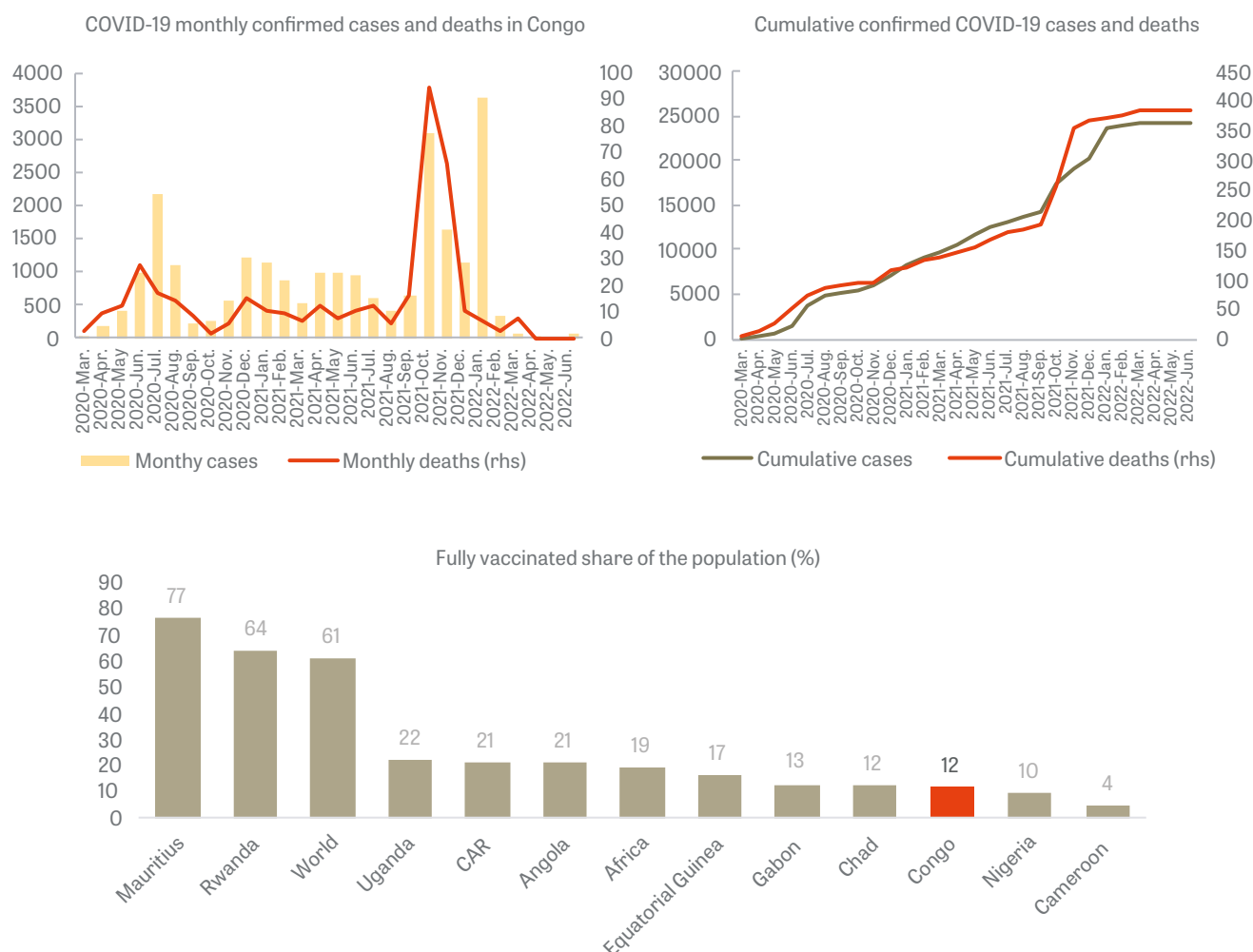
Note: Fully vaccinated share of the population as of June 30, 2022, based on latest available data on Africa CDC.
Source: Africa CDC.

Output in many countries rebounded in 2021 after a sharp decline in 2020, but for many developing countries, progress toward recovery has been hampered by multiple challenges. Global growth is estimated to have surged to 5.7 percent in 2021 (compared to -3.3 percent in 2020)—its strongest post-recession pace in 80 years, as a relaxation of pandemic-related lockdowns in many countries helped boost demand (World Bank Global Economic Prospects (GEP), June 2022). However, spillovers from the war in Ukraine are leading to a deceleration of global economic activity in 2022 (see Box 1). In SSA, economic growth is estimated at 4.2 percent in 2021 compared to -2.0 percent in 2020. However, the recovery of Sub-Saharan Africa (SSA) economies from the 2020 global recession has been disappointing, falling behind the rebound in advanced economies in 2021 and the average for emerging markets and developing economies despite high commodity prices. The scarring effects of the 2020 recession combined with limited policy responses, elevated public debt levels, supply disruptions, and rising inflation impacted the region's recovery in 2021.

In the CEMAC region, the economic recovery has been weak amid modest hydrocarbon production. The region's economic growth is estimated to have reached 0.8 percent in 2021 compared to -1.9 percent in 2020.[3] Only three CEMAC economies have recorded positive growth (Cameroon, CAR and Gabon), while others are experiencing continued recession (Chad, Congo and Equatorial Guinea) (Figure 2, left panel). As in 2020, the estimates for 2021 show that the Congolese economy registered the worst growth performance in the CEMAC region.

ROC's economy is estimated to have contracted further in 2021, but economic activity is picking up in 2022. Overall GDP is estimated to have contracted by 2.2 percent in 2021. The COVID-19 pandemic and oil production challenges continued to affect ROC's economy in 2021, following the deep economic contraction of 6.2 percent recorded in 2020.[4] ROC's growth performance in 2021 was significantly below the 3.0 percent average growth rate of other oil exporting countries in the SSA region such as Nigeria or Angola (Figure 2, right panel). However, economic activity in ROC is starting to pick up in 2022, driven by the removal of most of COVID-19 restrictions in early 2022 and the repayment of domestic arrears.

Figure 2: ROC's growth performance remains below that of peers

GDP growth in Congo and CEMAC countries, 2019-2021

GDP growth in Congo and selected peer countries, 2019-2021
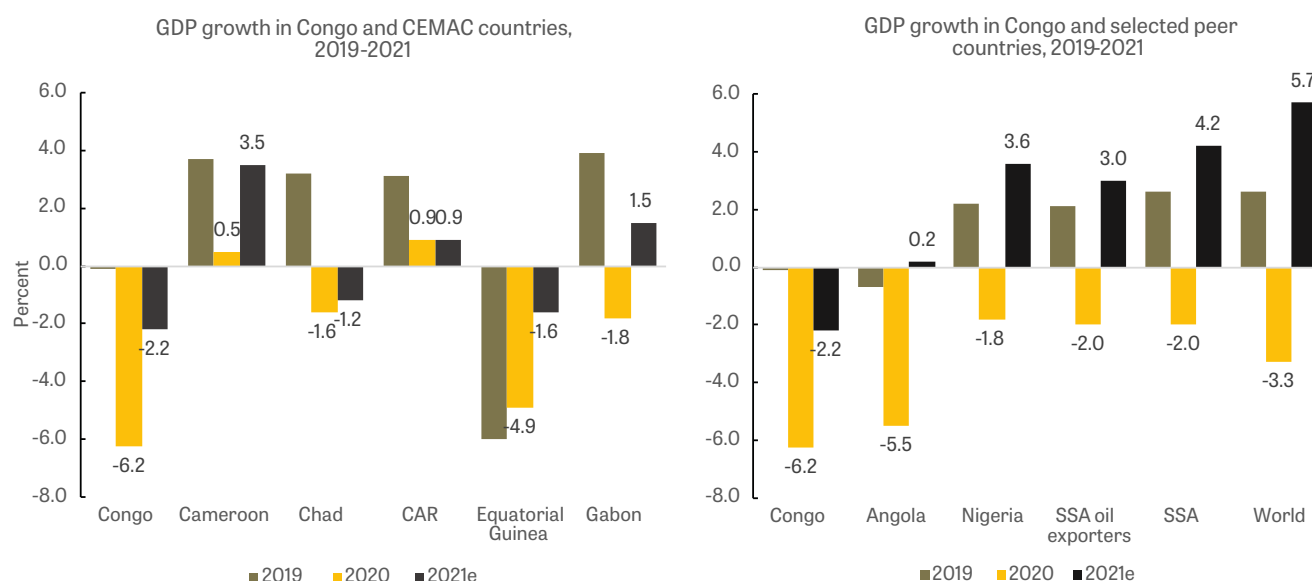
Note: SSA oil exporters include Angola, Cameroon, Chad, the Republic of Congo, Equatorial Guinea, Gabon, Ghana, Nigeria, and South Sudan.
Source: World Bank staff estimates, national authorities, GEP June 2022 edition.

Box 1: Impact of the War in Ukraine on the Global Economy, SSA and Congo[5]

1. What has been the global impact so far?

The war in Ukraine has precipitated a humanitarian catastrophe and resulted in a deep regional slowdown and substantial negative global spillovers. These spillovers are magnifying pre-existing strains from the pandemic, such as bottlenecks in global supply chains and significant increases in the price of many commodities (Figure 3). Rising food and energy prices are eroding real incomes as households in emerging market and developing economies (EMDEs) devote a larger share of spending to basic necessities (Figure 4).

Inflation has soared across the world, exacerbating the exceedingly difficult tradeoffs policy makers face between supporting growth and controlling price pressures. Global financial conditions have tightened, and borrowing costs have increased, particularly in EMDEs. This reflects reduced policy accommodation in response to inflationary pressures, spillovers from financial crises and sanctions in Russia, and heightened geopolitical risks.

Figure 3: Commodity price changes since January 2022

Crude oil — Natural gas — Wheat
Maize — Fertilizers — Nickel
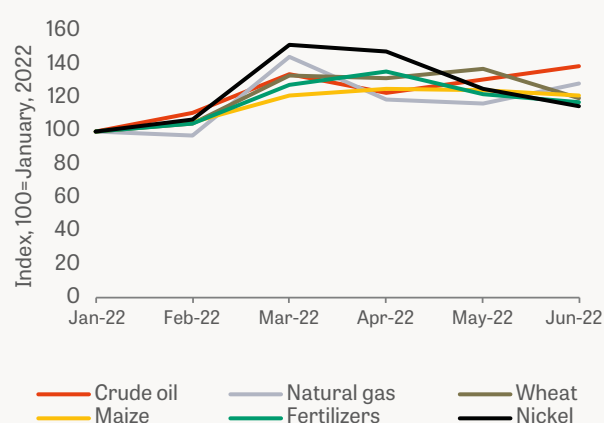
Figure 4: Food share in consumption basket and food inflation

■ Share of food in consumption basket
◆ Food inflation: Apr-22 (RHS)
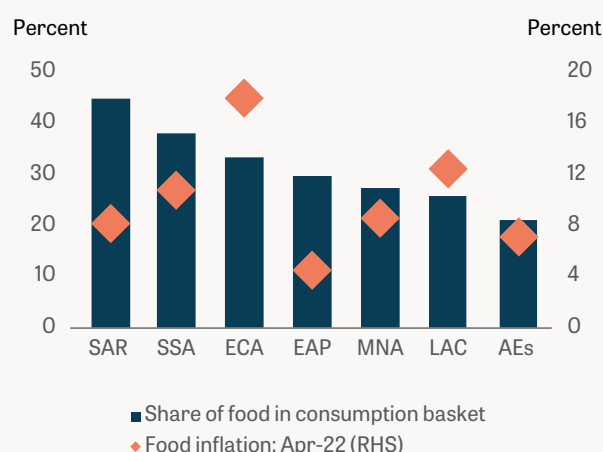
Note: AEs = advanced economies, EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MNA = Middle East and North Africa, SAR = South Asia, SSA = Sub-Saharan Africa
Source: Staff calculation based on World Bank Commodity Price Data; GEP, June 2022.

2. Forward look

The war has led to a downward revision of global growth forecasts. The effects of the war, including more acute inflationary pressures and a faster pace of monetary tightening than previously assumed, account for most of the 1.2 percentage point downward revision to the 2022 global growth forecast. Growth projections for most economies, including for the majority of commodity exporters, have been downgraded as the war significantly disrupts activity and trade in the near term, pent-up demand fades, and policy support is withdrawn amid high inflation (Figure 5).

The abrupt growth slowdown in EMDEs implies a pronounced deceleration in per capita income growth, from 5.4 percent in 2021 to 2.3 percent in 2022. EMDE catch-up with advanced-economy income levels is expected to be markedly slower over the next few years than in the pre-pandemic period, with progress reversing in EMDEs excluding China. Higher food prices are likely to lower real per capita incomes in many EMDEs reliant on

food imports and substantially worsen global food insecurity and poverty. Taken together, the lingering effects of the pandemic, the war, and the surge in food prices are expected to lead to a net increase of 75 million people in extreme poverty by the end of this year relative to pre-pandemic projections. Per capita income is expected to be lower in 2023 than its pre-pandemic level in about half of the countries in EAP, MNA, LAC and SSA, (Figure 6).

Figure 5: Forecast revisions to 2022 growth
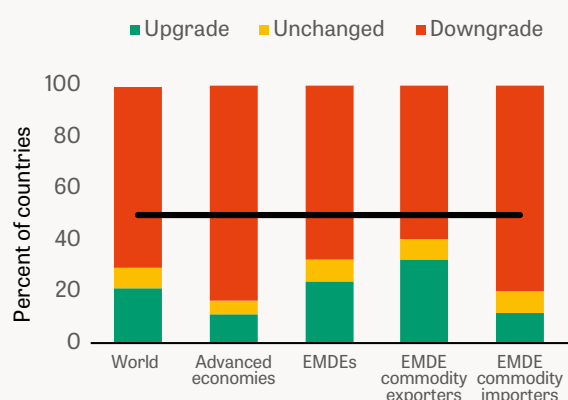
Figure 6: First year in which 2019 per capita income is surpassed
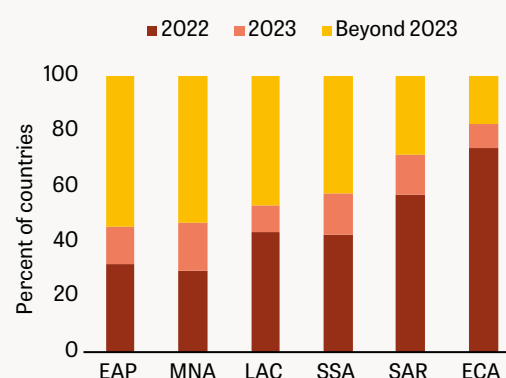
Source: GEP, June 2022

In SSA, the war in Ukraine is amplifying an already-bleak outlook for inflation, and rapidly increasing living costs could elevate the risk of social unrest. Given the sources of growth in the region and the nature of economic linkages with Russia and Ukraine, the war in Ukraine may well have only a marginal impact on overall economic growth. However, according to Africa's Pulse (April 2022), the largest impact of the war in Ukraine on SSA is on the increasing likelihood of civil strife arising from food- and energy-fueled inflation amid an environment of heightened political instability. From 4.5 percent in 2021, inflation is projected to jump to 6.2 percent in 2022 before moderating to 5.1 and 4.5 percent in 2023 and 2024 respectively (Figure 7). As price pressures reduce food affordability and real incomes across the region, more people are expected to fall into extreme poverty, especially in countries that rely heavily on imports of food and fuel and those that already have large vulnerable populations.

The war in Ukraine could increase inflationary pressures in the ROC. The direct impact of the war on trade is likely to be minimal as Russia accounts for 2.2 percent of Congo's imports and 0.1 percent of Congo's exports. Meanwhile, Ukraine accounts for 0.3 percent Congo's imports and near zero percent of Congo's exports. However, although overall inflation is expected to average 3.3 percent in the medium-term, the war will amplify food inflation which is expected to outpace overall inflation, putting the food security of poor and vulnerable households at risk in a country where more than half of the population already live in extreme poverty and struggle to meet basic needs.

High oil prices could bolster Congo's growth prospects, budget revenues, and the current account balance in the short term. Oil represents about 80 percent of total exports and about 60 percent of fiscal revenues. Substantially higher oil prices due to the war in Ukraine is projected to widen the current account surplus to 17.0 percent of GDP in 2022. High oil export receipts could increase total revenues to 27.9 percent of GDP in 2022 (from 23.4 in 2021), leading to a projected fiscal surplus of 4.8 percent of GDP in 2022 despite the increase in oil subsidies (Figure 8). Congo's debt stock may also decrease faster as debt repayments to Congo's two largest external commercial creditors is tied to oil prices.

Figure 7: Inflation in Sub-Saharan Africa, 2016–2024f

Figure 8: Congo's fiscal balance and debt, percent of GDP
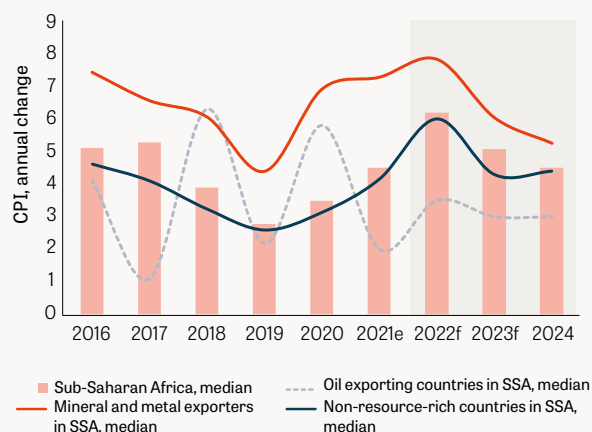
Source: Africa's Pulse, April 2022; Staff calculations based on data from national authorities
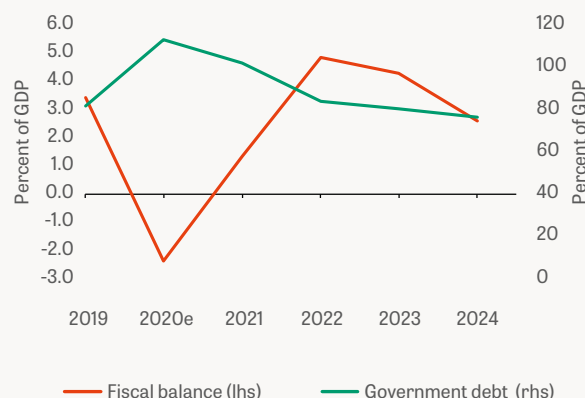
1.1.2   Growth was held back by the oil sector in 2021 while the non-oil sector started to recover

Despite higher oil prices and increased global demand, oil production declined in 2021. Production fell by nearly 11 percent year-on-year reaching an estimated 100 million barrels by end-December 2021 (Figure 9). This decline was mostly due to postponed investments by oil companies and technical

challenges. Maturing oil fields are also impacting oil production in Congo, which along with the expected gradual transition of the global economy away from fossil fuels, further highlight the urgent need to diversify the economy. As a result of lower oil production, the oil sector contracted by 10.6 percent in 2021.

Figure 9: Oil production continued to decline in 2021
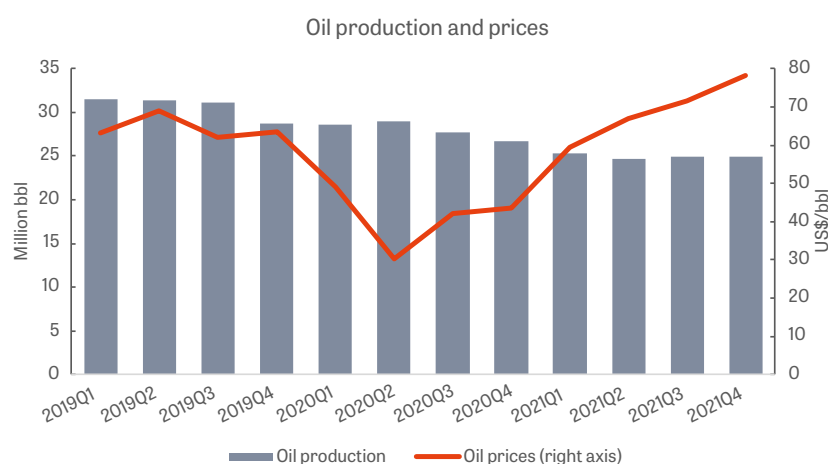
Source: World Bank, Congolese Authorities.

By contrast, the non-oil sector recorded its first year of growth since 2014. Non-oil growth reached an estimated 3.1 percent in 2021, partially mitigating the impact of the oil sector contraction on overall growth (Figure 10). The recovery of the non-oil sector was driven by the resumption of economic activities following the gradual lifting of pandemic containment measures, increased use of locally sourced inputs by large firms, and the partial repayment of domestic arrears, which helped expand domestic credit. As a result, all sub-sectors of the non-oil economy registered positive rates of growth. The agriculture sector and non-oil industry sector each grew by an estimated 1.5 percent in 2021. The services sector, which had been severely impacted by COVID-19 restrictions in 2020, grew by an estimated 3.9 percent in 2021.

Although rising domestic demand bolstered overall aggregate demand in 2021, the external sector hampered growth. Private consumption increased, driven by the partial removal of COVID-19 restrictions. Government consumption also increased due to higher spending on goods and services. Following the pandemic-induced collapse of investment in 2020, gross investment started to rebound in 2021 with higher foreign direct investment and the partial clearance of domestic arrears. The reopening of the economy and increased consumption led to an increase in real imports while the decline in oil production led to a contraction of exports in real terms.

Figure 10: Oil sector declined while the non-oil sector started to rebound in 2021
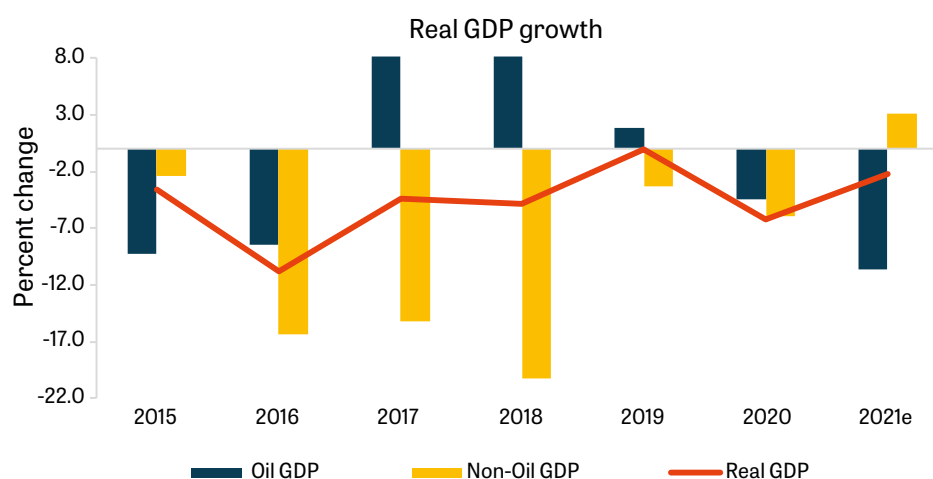
Source: World Bank staff estimates, Congolese Authorities.

1.1.3   Despite the fall in oil production, fiscal and external positions improved

An increase in export receipts resulting from higher oil prices improved the current account balance in 2021. Despite lower oil production in 2021, higher oil prices led to a nominal increase in export revenues. The current account surplus is estimated at 10.9 percent of GDP in 2021, compared to a surplus of 0.9 percent of GDP in 2020, driven by an improvement in the trade balance. At the same time, higher debt service payments led to the decline of ROC's reserves to 2.4 months of imports at the end of 2021, against 2.8 months in 2020.

Fiscal consolidation resumed in 2021. Despite the fall in oil production, government revenues in 2021 increased from 21.6 percent of GDP in 2020 to 23.4 percent of GDP thanks to higher oil prices. ROC's budget continues to rely on revenues from the oil sector with non-oil revenues (excluding grants) estimated at only 8.7 percent of GDP in 2021 (11.5 of non-oil GDP). According to the 2022 Public Finance Review, ROC's domestic revenue mobilization is an ongoing challenge with several constraints including weaknesses in tax administration, a narrow tax base eroded by exemptions and limited coverage, and weak revenue collection from less developed sectors (e.g., forestry, mining, and environment). Regarding expenditures, total expenditure declined from 23.9 percent of GDP in 2020 to 22.0 percent in 2021 (Table 2). The increase in revenues together with a moderation in public spending led to a fiscal surplus for 2021 estimated at 1.4 percent of GDP (compared to a deficit of 2.4 percent of GDP in 2020). Nevertheless, expenditure composition remains significantly biased toward current expenditures at the expense of productive public investment.

Credits: Freepik

Table 2: Key fiscal indicators, percent of GDP

	2018	2019	2020	2021e
Overall Balance	5.4	3.4	-2.4	1.4
Primary Balance	7.6	8.0	-0.6	3.4
Total Revenues and Grants	25.5	27.3	21.6	23.4
Oil Revenues	17.0	17.6	10.8	14.2
Tax Revenues	7.6	8.1	9.2	7.5
Taxes on Goods and Services	3.1	2.2	2.4	2.0
Direct Taxes	3.3	4.5	5.1	4.1
Taxes on International Trade	1.3	1.4	1.7	1.5
Non-Tax Revenues	0.2	0.3	0.2	0.5
Grants	0.1	0.8	0.5	0.5
Other Revenues	0.7	0.5	0.9	0.7
Expenditures	20.2	23.8	23.9	22.0
Current Expenditures	17.0	18.8	18.0	16.2
Wages and Compensation	4.8	4.7	5.8	4.8
Goods and Services	2.3	2.4	2.6	3.6
Interest Payments	2.2	4.5	1.8	2.1
Current Transfers	7.7	7.2	7.8	5.7
Capital Expenditures	1.9	3.7	3.8	3.4
Other Expenditures	1.3	1.4	2.1	2.4
Annex Budgets and Special Accounts	0.8	0.9	1.2	1.2
Common Charges	0.5	0.5	1.0	1.3

Note: e = Estimate.
Sources: Congolese authorities and World Bank staff estimates and projections

In 2022H1, the budget recorded a surplus, and the Government revised its budget law to account for the impacts of the war in Ukraine. As a commodity exporter, ROC is currently benefiting from higher oil prices with exports receipts increasing significantly and bolstering government revenues. According to data from the Ministry of Finance, revenues collected increased by 94 percent year-on-year (y-o-y) in 2022H1. At the same time, total expenditures increased by 26 percent (y-o-y), leading to a fiscal surplus of CFAF 447 billion (nearly 5 percent of GDP) in 2022H1. Spending is expected to have increased by 2022H2 as the government maintains administrative controls on the prices of a wide array of consumer necessities (e.g., gasoline, electricity tariffs, cooking gas, and several food staples). These price controls are increasing the subsidy bill and have also contributed to more frequent shortages of some of these necessities, especially fuel shortages which have become more common since the start of the war. The increase in oil prices (which is leading to higher-than-expected revenues) and the effects of the war in Ukraine on food prices and oil subsidies (which are leading to higher-than-expected expenditure) prompted the government to revise the 2022 Budget Law in August 2022, increasing revenues for the year by nearly fifty percent and expenditure by eighteen percent relative to the initial budget law for 2022.

1.1.4   BEAC tightened its monetary policy in 2021

Due to concerns over the downward trend of foreign exchange reserves, BEAC tightened its monetary policy in late 2021. Despite higher oil prices and the additional Special Drawing Rights allocation (equivalent to US$1.4 billion) by the IMF in 2021 for the CEMAC region, by the end of 2021, BEAC's international reserves represented just over three months of imports of goods and services in the region. To respond to the risks arising from low foreign reserves, an extraordinary Monetary Policy Committee meeting was held on November 25, 2021, at which the BEAC increased the policy bid interest rate, TIAO, by 25 basis points to 3.50 percent. In March 2022, BEAC further increased the TIAO to 4.0 percent amid concerns about recent inflationary pressures due to the war in Ukraine.

Improvements in banking system solvency and liquidity are strengthening financial sector stability. The stock of non-performing loans (NPLs) declined by 16.8 percent (y-o-y) in December 2021. NPLs represented 17.2 percent of gross loans at end-2021, down from 21.7 percent at end-2020 (Figure 11, right panel). The partial clearance of government arrears to the private sector and banks helped increase credit to the economy (by 10.5 percent higher y-o-y at end-2021) and contributed to this reduction in NPLs (Figure 11, left panel). The payment of arrears along with growth in deposits improved banks' liquidity. The country's financial sector continues to be largely dominated by banks, and the decline in NPLs is a positive sign for the stability of the sector, although significant vulnerabilities remain as the NPLs ratio is still high by international standards.

Figure 11: Credit to the economy increased and NPLs decreased, but vulnerabilities remain high

Bank deposits and credit to the economy (in CFAF billion)

NPL to gross loans ratio (%)
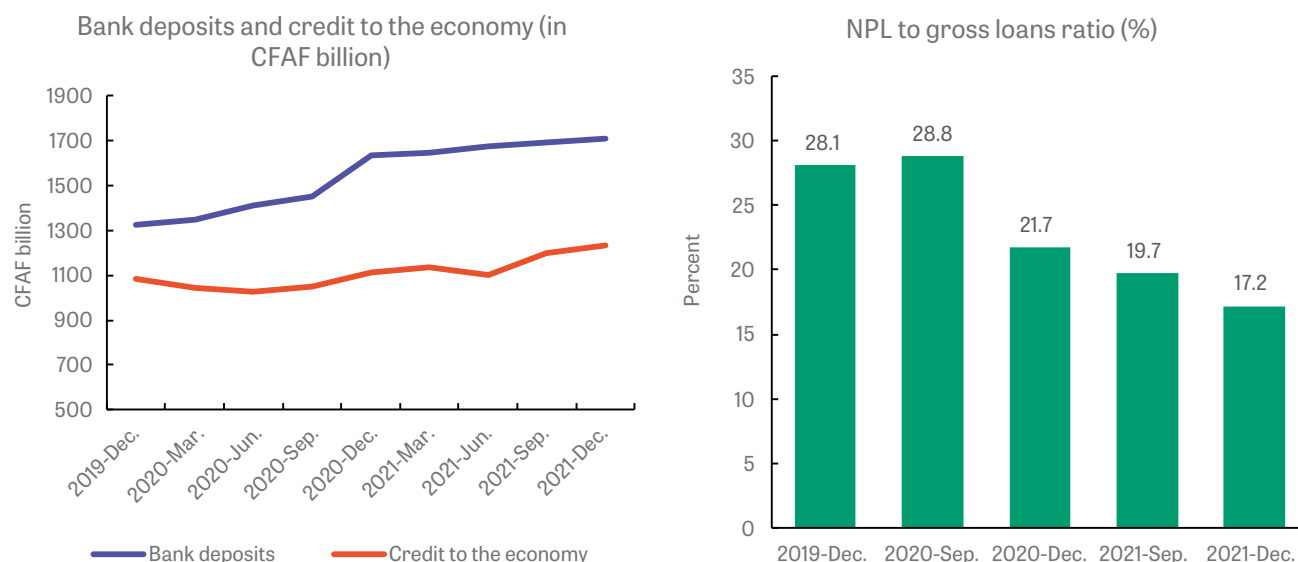
Source: BEAC.

1.1.5   The level of public debt decreased, but ROC's debt is still classified as in distress

The debt situation improved significantly in 2021. Public debt fell sharply from 113.2 percent of GDP in 2020 to 102.2 percent of GDP in 2021 (Figure 12, left panel). The decline in public debt as a share of GDP in 2021 was driven by high external debt amortization payments tied to oil prices and higher nominal GDP. Liquidity support during 2021 was received through the G20 Debt Service Suspension Initiative which allowed ROC to reschedule about US$161 million of arrears and debt service payments due in 2021 (following the rescheduling of about US$98 million in 2021 under the first phase of the initiative). External public debt constituted 56.2 percent of GDP as of end-2021 compared to 66.3 at end-2020. Domestic debt stood at 45.9 percent of GDP in

2021 compared to 46.9 percent of GDP at end 2020. Due to its limited access to international financial markets, ROC is increasingly reliant on domestic financing through the issuance of Assimilable Treasury Bills and Assimilable Treasury Bonds.[6] As such, treasury bills and bonds represented 33 percent of total domestic debt in 2021 (and 15 percent of GDP).

While ROC's debt is classified as in distress due to outstanding arrears with some external creditors, the debt is assessed as sustainable. The decline in oil prices in recent years and elevated levels of non-concessional borrowing led ROC's debt to be classified as unsustainable in 2017. The 2019 debt

restructuring agreement with China helped reduce the debt-to-GDP ratio to just above 80 percent, but the COVID-19 crisis worsened the country's indebtedness in 2020. However, higher oil prices, improved debt management (including restricting new external financing to concessional loans), and recent debt restructuring agreements with two of Congo's three largest oil traders (Trafigura and Orion) helped restore debt sustainability in the second half of 2021. Furthermore, in late January 2022, the government signed a debt restructuring agreement with the remaining large oil trader (Glencore) and continues to actively pursue negotiations on debt restructuring with Chinese

commercial creditors. However, even though Congo's overall and external debt are assessed as sustainable, they remain classified as "in distress" because of outstanding arrears. By the end of 2021, the stock of arrears (excluding unaudited domestic arrears) represented about 25.2 percent of GDP (compared to 35.4 percent of GDP in 2020). The country's external arrears stood at 11.5 percent of GDP while audited domestic arrears represented about 13.7 percent of GDP in 2021. Domestic arrears which are currently being audited are estimated at an additional 12.1 percent of GDP (Figure 12, right panel).

Figure 12: Public debt and audited arrears decreased in 2021
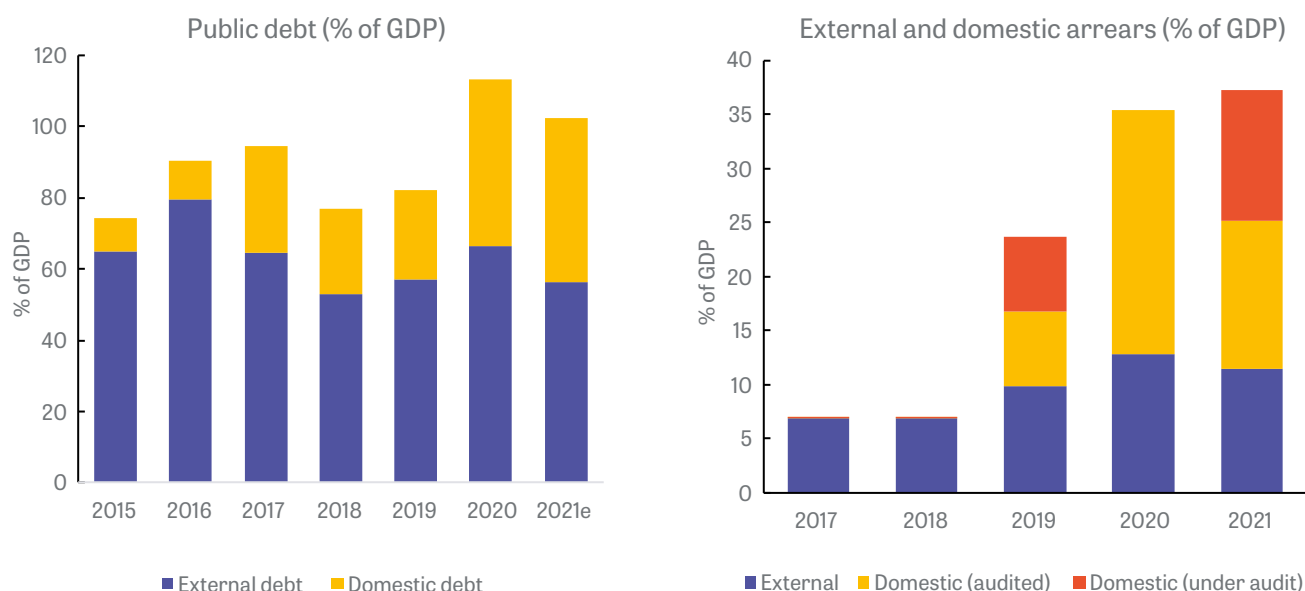
Note: For 2021, the domestic arrears under audit reflect arrears for 2019-2020 that are currently being audited. These audits of 2019–20 government domestic arrears are expected to be finalized in 2022.
Source: World Bank, Congolese Authorities, Congolese Amortization Fund 2021 Debt Report.

1.1.6 Socio-economic challenges of households have been exacerbated

The economic contraction in 2021, in conjunction with a rising population, continued to reverse previous progress in poverty reduction. ROC had substantially reduced poverty, with the poverty rate declining from 50 percent in 2005 to 33 percent in 2014 because of strong economic growth. With the economy contracting every year since 2015 (coupled with continued population growth), the poverty rate has been going up, reaching 50.2 percent in 2020 (using the international poverty line of US$2.15 PPP a day). With real GDP per capita falling by an estimated 4.6 percent in 2021, poverty rates rose further to 52.0 percent in 2021 (Figure 13, left panel). Moreover, human capital development has stagnated over the last decade, with Congo's score for the World Bank Human Capital Index at 0.42 in 2020 (from 0.41 in 2010) remaining well below the average for lower-middle income countries of 0.48.

In 2021, inflation remained contained below the 3.0 percent regional Central Bank target, but food inflation was higher. Inflation reached 2.0 percent in 2021, up from 1.4 percent in 2020. However, disruptions in global supply chains and high international commodity and agricultural prices exerted inflationary pressures on domestic food prices, which increased by about 3.4 percent, especially affecting the poor. The war in Ukraine is exacerbating existing supply chain issues and has led to shortages which are increasing food prices (Figure 13, right panel). Food inflation averaged 6.3 percent in 2022H1 while overall inflation remained relatively contained at an average of 2.8 percent in 2022H1. The increase in food prices is extremely concerning for ROC as it will worsen food insecurity in a country where 56 percent of the population already live in households classified as severely food insecure.[7]

The increases in food prices in 2021 and 2022H1, which have exceeded overall inflation, also reflect ROC vulnerabilities to global food price volatility. ROC tends to be particularly impacted by increases in international agricultural prices due to the country's high dependence on food imports, which represent 30 percent of Congo's total merchandise imports and about 80 percent of domestic food consumption. The consecutive shocks of the COVID-19 pandemic and the recent war in Ukraine have exacerbated the costs and risks of Congo's continued dependence on food imports. To try to reduce Congo's reliance on food imports, the development of the agriculture sector is the first strategic area in the new ROC National Development Plan 2022-26.[8] In June 2022, ROC also adopted a "resilience plan on the food crisis 2022-23", with the objective of protecting households and businesses from the impact of the food crisis.[9]

Figure 13: Poverty rates have continued to rise, and food prices are also increasing

Actual and projected poverty rates and real GDP per capita

Poverty rate (%)   Real GDP per capita (constant LCU)

- International poverty rate
- Lower middle-income pov. rate
- Upper middle-income pov. rate
- Real GDP pc

Consumer Price Index (%, y -o-y)

Percent year-on-year

- - - CPI   —— Food inflation   —— Energy inflation
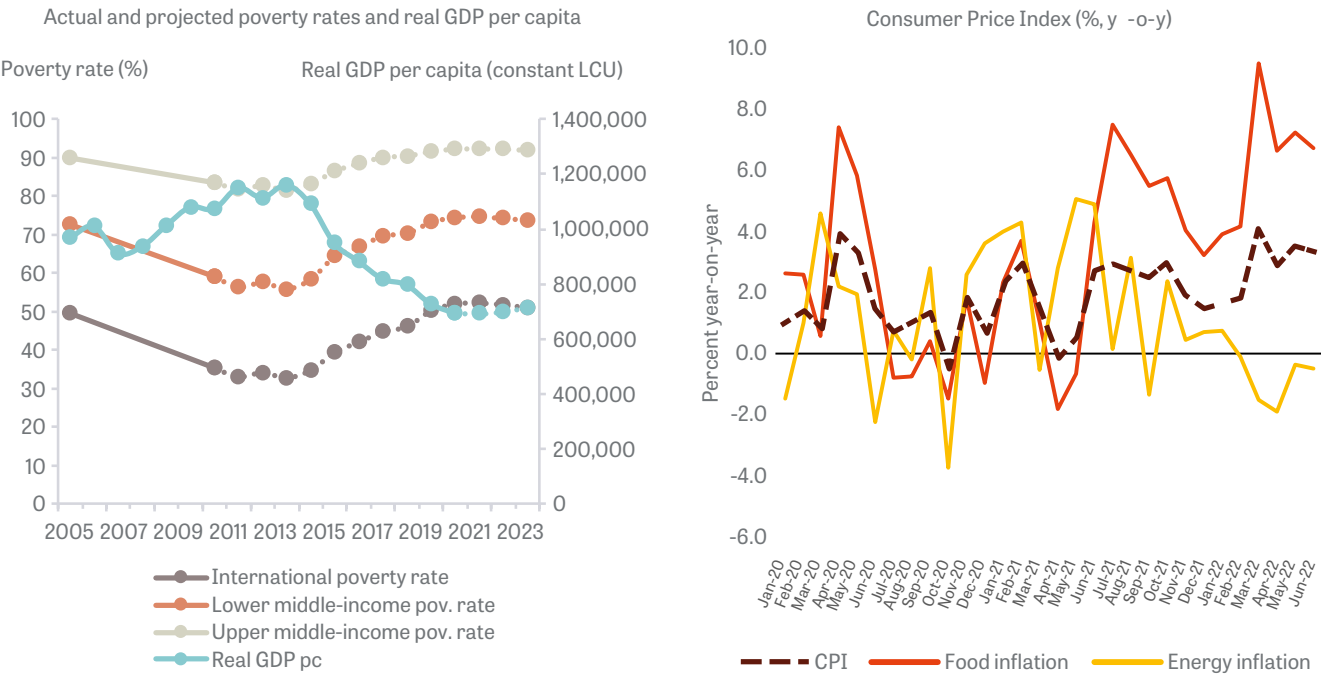
Source: World Bank, National Institute of Statistics.

1.2   *Short-term Outlook and Options Going Forward*

1.2.1   Global economic recovery is set to soften considerably in 2022

The war in Ukraine has triggered a sharp deceleration of global activity, adversely affecting many SSA economies where recoveries are moderating as surging inflation is hitting vulnerable populations. Following a strong 5.7 percent rebound in 2021, global economic activity is projected to moderate significantly to 3.0 percent in 2022-23.[10] The 2022 growth moderation is projected to be broad-based with dampened recoveries in most EMDEs. Commodity importers are facing strong headwinds because of surging prices of imported food and fuel. Output growth in SSA is expected to soften to 3.7 percent in 2022 and improve slightly to 3.8 percent in 2023, after an estimated 4.2 percent growth in 2021. Elevated commodity prices are boosting activity in some large SSA exporters of metals and energy. However, rapidly rising inflation, due to a combination of domestic factors and global supply bottlenecks exacerbated by the war in Ukraine, is rapidly eroding domestic demand across the region. In many countries, especially low-income countries reliant on food imports from Russia and Ukraine, food shortages and higher costs of living could push many more people into poverty and acute food insecurity,

severely dent recovery prospects, and increase the risk of social unrest. High costs of fuel and fertilizers, along with worsening drought conditions could severely constrain agricultural activity and food availability in a number of countries in SSA.

Global sentiment continued to sour through the first half of 2022 while volatility in commodity prices increased substantially because of the war in Ukraine and new lockdowns in China. After recovering from the Omicron shock earlier this year, the global composite Purchasing Managers' Index (PMI) has continued to trend down, albeit remaining above its June 2020 level (Figure 14, left panel). Manufacturing PMI has continued to weaken as well, adversely affected by supply bottlenecks and concerns over rapidly rising input costs, surging inflation, and less favorable prospects for the global recovery. Meanwhile, investor confidence deteriorated sharply in April, with the global Sentix index plunging to its lowest level since August 2020 (Figure 14, right panel). Global commodity prices have surged this year as the war in Ukraine severely has disrupted global trade in energy, food, and fertilizer (see Box 1).

Figure 14: Global sentiment continue to trend down over surging inflation

Global PMI Index

Global Sentix Index
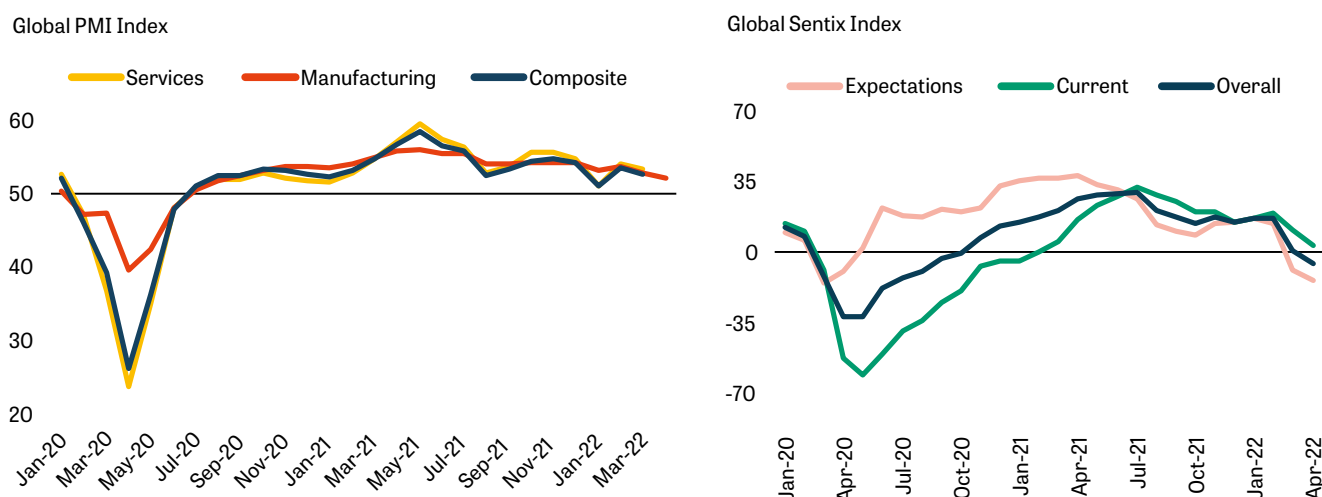
Notes: left panel: JP Morgan Global Purchasing Manager's Indexes, seasonally adjusted. A value above 50 indicates expansion. Last observation is April 2022.
Right panel: A positive value indicates improving sentiment. Last observation is April 2022.
Source: Bloomberg; Haver Analytics; World Bank.

1.2.2   ROC's economy is expected to rebound

ROC is expected to gradually recover from its seven-year economic recession. GDP growth is projected at 1.9 percent in 2022, driven by the non-oil sector as oil production is projected to remain unchanged in 2022. The economy is expected to then rebound, with GDP growth projected to average 4.1 percent in 2023-24 (Table 3). Oil sector growth would be driven primarily by the resumption of investments by oil companies, including in asset maintenance, which had been postponed due to the pandemic and negotiations on a new regime of tax concessions with oil companies. Higher oil prices due to the war in Ukraine would further incentivize oil companies to increase

oil production (expected in 2023). Non-oil economic growth will be spurred by several factors. The removal of COVID-19 restrictions in early 2022, especially the curfew that was in place since the beginning of the pandemic, will help strengthen the recovery especially for services (accommodation, food service activities, transportation). The continued clearance of government arrears to domestic firms will support private investment across all economic sectors. The proportion of the population living below the international extreme poverty line of US$2.15 PPP per day will slightly decline to an average of 51.7 percent in 2022–24. Overall inflation is projected to remain above BEAC's

3.0 percent target in 2022-2024.[11] Food inflation is expected to remain elevated, worsening food insecurity. The return of real GDP per capita to the pre-COVID level of US$1,800 by 2030 will require the economy to grow by 4.5 percent on average starting in 2025. Lower growth will further delay the recovery of income per capita.

The fiscal balance is expected to remain positive. Thanks to higher oil prices, oil revenues will drive an increase in total revenues to an average of 27.4 percent of GDP in 2022-24. Furthermore, the gradual recovery of tax arrears and improved non-oil revenue mobilization resulting from tax administration reforms, such as e-filing and e-payments and the launch of taxpayer service centers, are also expected to contribute to the growth of tax revenues. Expenditures are also set to increase to an average of 23.5 percent of GDP in 2022-24 as the government is expected to use some of the fiscal space from higher oil revenues to increase social spending, public investment, and subsidies. As a result, the fiscal surplus is projected at 4.8 percent of GDP in 2022 and 3.4 percent during 2023–24.

Debt is expected to continue to decline, but clearance of arrears is needed for the country to come out of debt distress. Expenditure moderation and significant oil revenues will help reduce the debt stock. Public debt is thus anticipated to decline to 84.0 percent of GDP by 2022 and to 76.3 percent of GDP by 2024. The Government still owes external arrears; and until these arrears are cleared, the country will remain classified as "in debt distress." While the debt is assessed as sustainable, there are several risks to its sustainability, in particular negative oil price shocks. Furthermore, tighter conditions in the CEMAC regional markets, global monetary policy normalization (which could increase the servicing cost of external debt with variable interest rates, which account for 18.5 percent of ROC external debt), and exchange rate depreciation are all risks to Congo's debt sustainability. These risks, including negative oil price shocks, are, however, substantially mitigated by debt service to the largest external commercial creditors being tied to oil prices, and availability of financing from Congo's financial market.

Table 3: Key economic indicators of the Congolese economy

Real economy	2018	2019	2020	2021[e]	2022[f]	2023[f]	2024[f]
				(Annual percent change, unless indicated otherwise)			
GDP growth	**-4.8**	**-0.1**	**-6.2**	**-2.2**	**1.9**	**3.7**	**4.5**
Demand							
Private consumption	4.6	1.6	-6.9	8.5	8.8	6.7	5.8
Government consumption	-4.7	-18.7	-33.1	16.9	10.1	4.9	5.7
Gross fixed investment	-25.2	-2.3	-45.0	9.5	8.9	9.7	9.3
Exports	11.4	7.4	-11.1	-12.2	0.1	5.0	6.1
Imports	5.1	3.2	-36.3	2.5	10.1	11.0	10.3
Production (oil vs non-oil)							
Oil GDP	12.0	1.8	-4.5	-10.6	0.0	5.1	6.7
Non-oil GDP	-20.3	-3.3	-5.9	3.1	3.2	3.0	3.4
Production (economic sectors)							
Agriculture	-1.1	0.2	4.5	1.5	3.0	3.1	3.5
Industry	-7.9	0.2	-3.7	-7.9	0.6	4.6	5.9
Services	-4.2	-1.8	-9.2	3.9	3.4	3.0	3.4
Real GDP per capita	**-7.2**	**-2.6**	**-8.6**	**-4.6**	**-0.6**	**1.2**	**2.0**
Inflation, consumer prices (annual %, period average)	**1.2**	**2.2**	**1.4**	**2.0**	**3.4**	**3.3**	**3.2**
Fiscal accounts				(Percent of GDP)			
Overall fiscal balance- including grants	5.4	3.4	-2.4	1.4	4.8	4.3	2.6
Primary fiscal balance	7.6	8.0	-0.6	3.4	7.1	6.5	4.9
Total public debt	77.0	81.9	113.2	102.2	84.0	80.6	76.3
External public debt	52.9	57.1	66.3	56.2	45.2	40.8	38.6
Selected monetary accounts				(Annual percent change)			
Credit to the economy	-4.2	-4.7	3.0	11.0	10.9	11.5	5.1
Broad money	-4.0	7.9	18.0	5.8	14.3	34.1	23.7
External Accounts				(Percent of GDP, unless otherwise indicated)			
Current account balance	8.9	-0.8	0.9	10.9	17.0	8.3	5.0
Net foreign direct investment	3.0	3.4	2.4	3.8	3.6	4.1	4.4
External Accounts							
GDP per capita - nominal (US$)	2,606.6	2,369.7	1,899.8	2,357.1	2,574.0	2,515.6	2,446.3
GDP (current LCU, billions)	7,593.0	7,470.6	6,034.0	7,412.0	9,253.0	9,265.8	9,233.2
GDP (current US$, billions)	13.7	12.8	10.5	13.3	14.9	14.9	14.9
Oil production (Millions of barrels)	121	123	112	100	100	105	112
Crude oil (U.S dollars per barrel)	66	59	39	67	98	90	78

Sources: Congolese authorities, BEAC, and World Bank staff estimates and projections

Downside risks to the macroeconomic outlook come from several factors. Risk factors to future macroeconomic outcomes include uncertainties related to the pandemic and oil production, the volatility of oil prices, a protracted war in Ukraine and related spillovers, weak reform implementation, tighter conditions in regional financial markets, adverse weather conditions which could impact agricultural production, and global food prices. The emergence of new variants of COVID-19 could prolong the pandemic and cause further economic disruption worldwide or in ROC where the vaccination rate is very low. A shortfall in oil production and an unexpected decline in oil prices would have a significant impact on export receipts and government revenues. Growth in the non-oil sector depends partly on the progress of diversification efforts, public finance reforms, and clearance of domestic debt (which threatens the financial situation of the private sector and of the banking system). Given the uncertainty around the duration of war in Ukraine, domestic inflation could significantly rise above the regional target of 3.0 percent due to the rise in global food prices induced by the war. Such developments could call for a further tightening of monetary policy that, in turn, could undermine the already fragile recovery.

1.2.3 Several reforms were implemented recently, but significant challenges remain

Reforms implemented over the past two years, including some recommendations from the 8th Economic Update, relate to public finance management, governance, debt management, and transparency. In 2020-21, the government enhanced revenue mobilization by substantially reducing subsidies to oil sector SOEs and by increasing excise taxes on tobacco and imports of old vehicles. Debt management and transparency have been strengthened by several actions including: debt restructuring agreements with oil traders, partial clearance of domestic arrears, publication of annual debt reports for 2020 and 2021 (including publication of the debt stock of the ten largest SOEs in 2021 for the first time), and adoption and publication of a new medium-term debt management strategy for 2022-2024. Transparency in the extractive sector has improved with the publication of ROC National Petroleum Company (SNPC) financial statements for 2019 and 2020 (published in 2020 and 2021) and the 2019 Extractive Industries Transparency Initiative report in December 2021. Also in December 2021, the government adopted a law regulating factoring and another regulating leasing which will help enhance financial inclusion and access to finance for small and medium enterprises. The government is also strengthening anti-corruption with the ratification of a new anti-corruption law in March 2022 although accompanying decrees on conflicts of interest rules and procedures are still being drafted. While significant challenges remain, including the application of newly implemented laws, these reforms undertaken over the past two years are critical to improve governance, maintain fiscal and debt sustainability, build trust in government, and improve the business environment.

Options going forward could include policy actions to continue strengthening fiscal and debt sustainability. While the government has recently implemented several reforms, ROC still faces significant challenges in mobilizing

domestic resources which may impede long term debt sustainability and the implementation of the new National Development Plan 2022-2026. Furthermore, although Congo's debt is now classified as sustainable, the debt is still assessed as in distress due to outstanding arrears.

→ *Domestic revenue mobilization could be enhanced by:* (a) streamlining tax expenditures, which have eroded the tax base, by identifying and quantifying exemptions (through tax expenditure analyses) to help close policy gaps created by value-added tax policy and laws that create exemptions and zero and reduced rates, including incentives aimed at attracting foreign direct investment; (b) Improving the business environment by terminating without delay any formality that duplicates the procedures of the Congolese Agency of Business Creation; and (c) increasing revenues from the forestry, mining, and hydrocarbon sectors by ending value-added tax exemptions on domestic purchases made by extractives companies; and by optimizing the use of the information technology system for the collection of taxes from forestry companies (Système informatique de vérification de la légalité et de la traçabilité des bois, SIVL).

→ *Debt management and transparency could be enhanced by:* (a) finalizing the government's strategy for the clearance of domestic arrears and preventing the accumulation of new arrears by strengthening cash management (e.g., sign a convention with BEAC setting out the operating and management procedures for the Treasury Single Account to make it fully operational); (b) pursuing negotiations for a second round of debt restructuring agreements with China, and finalizing debt restructuring negotiations with Chinese

commercial creditors ; (c) continuing to not enter into any contractual obligations for new external public and publicly guaranteed non-concessional debt ; and (d) improving annual debt report by extending SOE debt coverage beyond the ten largest SOEs.

Actions should be taken to mitigate the impact of the war in Ukraine. The most significant negative impact in Congo of the Ukraine war is expected to be the rise in food prices which will impact the poorest the most. The government could: (a) use some of its oil windfall gains to provide cash transfers to help low-income households with rising food prices through the Lisungi social safety net program and boost school feeding programs; (b) ensure that the budget allocated to social sectors in the 2022 and 2023 Budget Laws is fully executed and free of delays by prioritizing social expenditures (to improve on the 65 percent execution rate for pro-poor spending in 2021); (c) support farmers and the agriculture sector to reduce the country's dependence on food imports by providing training to farmers, improving farmers' access to inputs and finance for leasing or buying equipment, and securing land rights; and (d) work with the private sector to increase the processing of cassava (which is abundant and cheap in Congo) to partially substitute for wheat flour by collaborating with large mills in Congo (e.g., Minoterie du Congo) to produce cassava flour in large quantities, facilitating access to financing and providing training to small businesses to help them produce cassava flour, and by conducting a cassava flour campaign drive for bakeries and consumers.

The resurgence of COVID-19 remains a significant risk for Congo's economic recovery and increasing vaccination remains critical to save lives and reduce the chances of new outbreaks in Congo. Actions to boost vaccination will need to focus on tackling

hesitancy, improving confidence in the health system, and making it easier to get vaccinated. These could be helped by: (a) communicating clearly and consistently about the safety and availability of the vaccines as well as the risks posed by the virus; (b) working with health workers and community leaders (traditional chiefs, local politicians, religious leaders, and other community leaders) to design and implement communication and outreach programs about COVID-19 vaccines; (c) making access to vaccines easy and at minimal cost to households in terms of time and effort; and (d) offering vaccines during routine healthcare visits, supported by targeted communication. This approach was tested by Congo's Ministry of Health in the health district of Loandjili in Pointe-Noire and could be extended to other parts of the country.
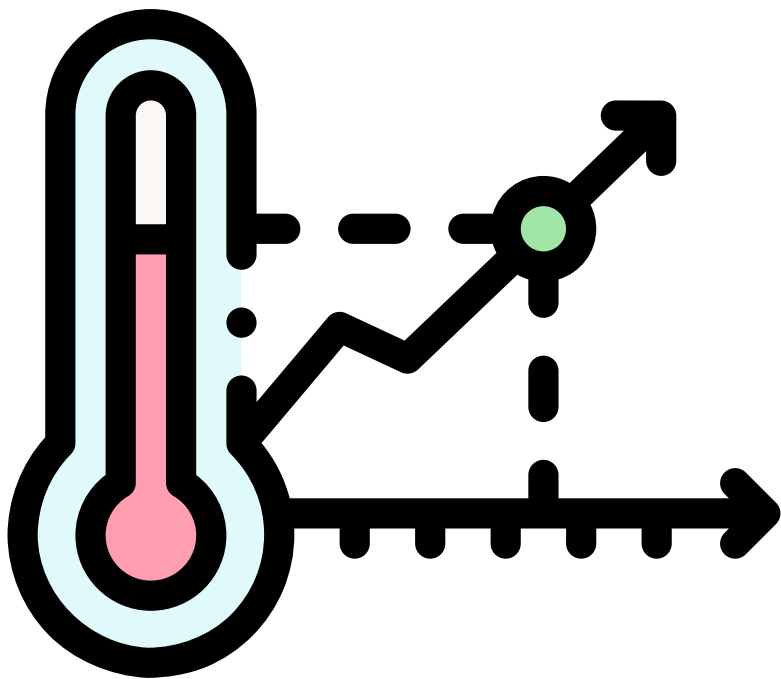
2

The Social and Economic Impacts of Climate Change in the Republic of Congo

✖

2.1   Risks of climate change for Congo and ways to address them

2.1.1   Projections of Congo's climate depend on how global emissions evolve

ROC is one of the most vulnerable countries to climate change. At present, Congo has a favorable climate for agriculture and is rich in natural resources such as oil, minerals, and forests. Most of the country has a tropical savannah climate, with tropical monsoon and tropical rainforest climates in the north of the country. It has a bimodal rainfall pattern and temperature structure. Outside its two largest cities, it is one of the least densely populated areas in Africa.[12] These characteristics are relevant in assessing the country's vulnerability to a changing climate. The combination of the country's exposure, sensitivity, and ability to adapt to the negative impacts of climate change is assessed by the Notre Dame GAIN Country Index which ranked Congo 169th out of 182 countries in terms of resilience to climate change in 2019.[13] In particular, Congo is not well equipped to respond to climate- and natural disaster-related shocks because of its low levels of agricultural technology, lack of climate-resilient transportation infrastructure, and dearth of medical staff.

Climatic change is already making Congo hotter, with more erratic rainfall, and these changes are likely to accelerate in coming decades. Between 1901-1910 and 2011-2020, mean annual temperature increased by 0.6°C, along with increases in both average maximum temperatures and average minimum temperatures (Figure 15). Mean annual precipitation has not changed significantly but precipitation has been accompanied by more erratic and extreme rainfall.[14] The intra-seasonal precipitation patterns during the September-November and March-May rainy seasons have fluctuated in recent years, both shortening and lengthening seasons, increasing the unpredictability of rainfall.

Figure 15: The average temperature in ROC has increased but precipitation has shown little trend

Annual mean temperature in (°C)

Annual mean precipitation (mm)
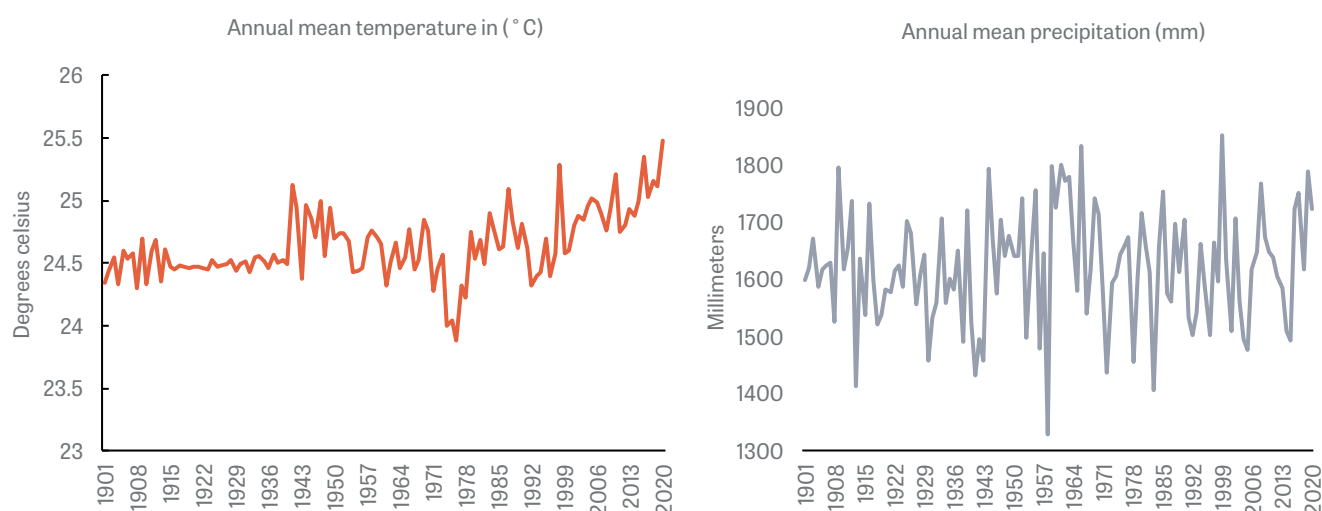
Source: World Bank Climate Change Knowledge Portal.

Looking forward, projections of Congo's climate depend on how global emissions evolve. Three global scenarios (usually called Representative Concentration Pathways) are considered: (a) an optimistic scenario under which GHG reductions lead to average global temperatures increasing by 1.5°C from pre-industrial levels; (b) a moderate scenario that stabilizes the increase at 2°C; and (c) a pessimistic scenario under which no further measures are taken to stabilize temperatures beyond those already committed and temperatures could rise as much as 5-6°C by the end of this century.[15] For 2050 and 2090, the three scenarios' projected changes in average temperatures and precipitation in Congo show considerable differences. Therefore, the impact on Congo's climate will depend on the trajectory of global emissions (Figure 16). While the impact of global climate scenarios on average temperature in Congo is small in 2030, it increases over time, and dramatically so by 2090 under the pessimistic scenario. The projections for average annual precipitation are less clear. They show a small increase in 2030, a larger increase in 2050, followed by a smaller increase in 2090.

Figure 16: Projected changes in mean temperature and precipitation in ROC

Projections of change in mean temperature in ROC, by scenario (degrees celsius)

Projections of change in mean annual precipitation in ROC, by scenario (millimeters)
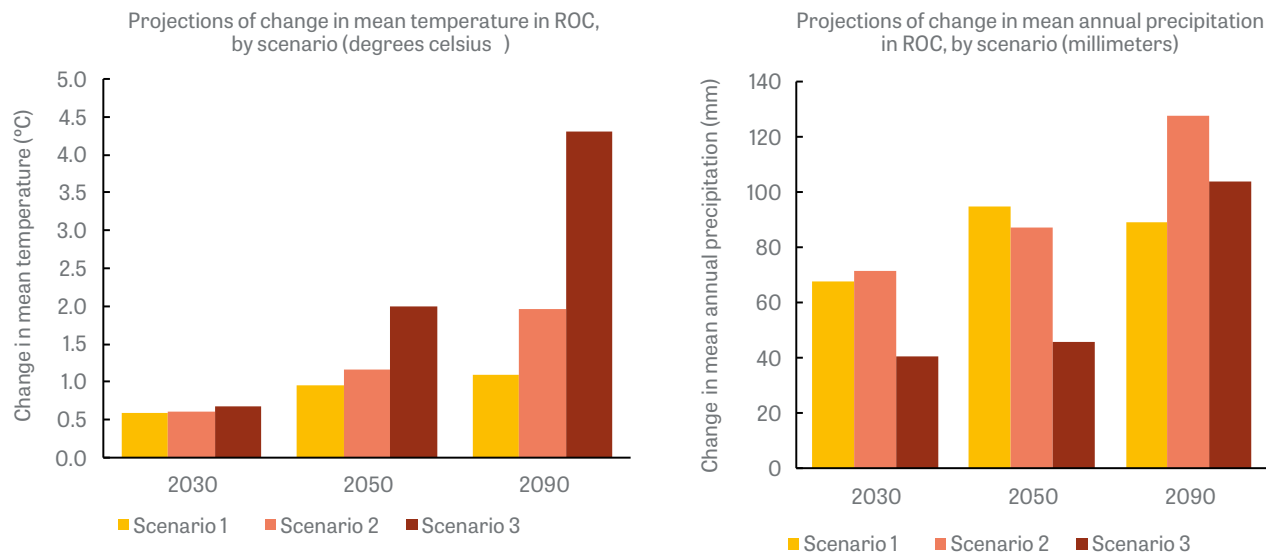
Note: according to three climate change scenarios. Scenario 1 is the optimistic scenario, scenario 2 is the moderate scenario, and scenario 3 is the pessimistic scenario. Projections are from the baseline represented by the averages for the period 1995-2014 to 2030, 2050 and 2090.
Source: World Bank Climate Change Knowledge Portal.

For Congo, the more concerning aspects of climate change are the degree of uncertainty, spatial variation, and seasonal variation of both temperature and rainfall. These three aspects are both more complex and more concerning than the national changes in mean temperature and rainfall.

→ *The projected mean values have uncertainty ranges around them*. For temperature, the range between the 10th percentile and 90th percentile is about four percent in 2050 and eight percent in 2090. For precipitation, the ranges are much wider and for all months include both a decrease and an increase in precipitation under all scenarios.

→ *Increasing and more extreme precipitation will affect some regions more than others*. Brazzaville is projected to have less precipitation (compared to other areas) in all scenarios, and some regions such as Bouenza and Plateau have smaller increases or declines in some scenarios by 2050. In general, the far south of Congo may see little change in precipitation, likely because of the moderating effect of the oceanic climate.

→ *Seasonal variation of precipitation will intensify*. Congo has two rainy seasons, from March to May and from September to November. February through March experience the highest temperatures while June to August have the lowest. In seasonal terms, precipitation is projected to decline in the months of June to September, making the dry season drier, but rainfall is projected to increase in the period of November to December.

2.1.2 The impact of climate change on the welfare of ROC's people is already observable

Overall impacts

Assessments of the impact of climate change on Congo have identified the agriculture sector and flooding as key concerns. Qualitative assessments have been undertaken as part of the government's National Communications (2001 and 2009) and Nationally Determined Contributions (NDC) (2015 and 2021) to the United Nations Framework Convention on Climate Change. In addition, the World Bank's Global Facility for Disaster Reduction and Recovery (GFDRR) has provided a quantitative estimate of likely damages from climate change (with a focus on agriculture) and considered possible adaptation measures. Congo's National Communications identified the following sectors as the most vulnerable to the adverse effects of climate change: i) water resources; ii) coastal zones; iii) agriculture; iv) forestry; v) health and human settlements; and vi) energy. The GFDRR assesses Congo's risk from natural hazards as shown in Table 4.

Floods are a recurring natural hazard in Congo, exacerbated by climate change. Many areas are seasonally flooded due to exceptional rainfalls that affect human settlements, agriculture, public health, and biodiversity. The increase in extreme rainfall driven by climate change has resulted in elevated levels of damages in recent years. Extreme flooding in 2019 and 2020 affected approximately 170,000 people in Sangha department and 200,000 in

Likouala department as well as many people in the departments of Cuvette and Plateaux. Precipitation in the Likouala department was twice the seasonal average, and the water level of the Ubangi River reached a record height last seen in 2009. The floods devastated a large part of agricultural production, contributing to a significant increase in food prices and making United Nations emergency humanitarian assistance necessary.

Observed changes in Congo's climate have already affected the country's main agricultural zone and harmed those most vulnerable. Changing patterns of precipitation make agricultural activities more difficult and less productive (as well as raising the risk of flooding). As temperatures continue to rise, increased rates of evapotranspiration are expected to damage certain crops more than others. The poor are the most affected by such changes, as agriculture is their main source of income. Women are also particularly affected, as they have the poorest quality land, fewer resources, and less access to technology to adapt to climate change impacts.

Congo is vulnerable to diseases that are influenced by climatic factors. The leading and second-leading causes of mortality in the country are from vector-borne and water-borne diseases, respectively. Most notably, malaria is a large concern for the country as it is the leading cause of child and adolescent mortality and absorbs on average 40 percent of health expenditures. Where increases in temperature and precipitation combine, conditions for the parasites improve and cases of malaria are likely to increase. Vector-borne diseases are expected to increase in ROC as wetter and warmer conditions become more prevalent.

Over the past 25 years, surface water flows have been very low. Only 75 percent of the urban population has access to piped water in their homes and only ten percent in

Table 4: Key natural hazards

Risk	Threat Level
River flooding	HIGH
Urban flooding	HIGH
Wildfires	HIGH
Coastal flooding	MEDIUM
Extreme heat	MEDIUM

Source: https://thinkhazard.org/en/report/59-congo

rural areas. Water treatment infrastructure and distribution networks are outdated and have not kept pace with the growing urban population. With climate change and more extremes of precipitation, water stress will increase, adding to the pressures on urban water availability.

The impact of climate change on the welfare of Congo's people is already observable and will rise over the coming decades. Studies of the country as part of global exercises have shown that there are already losses arising from lower labor productivity as temperatures rise.[17] Estimates from various studies have been combined, along with some additional analysis, to derive the figures presented in Figure 17 and Table 5.[18] The estimated impacts analyzed in this report fall into the following categories: agriculture fisheries and forestry; health; extreme events (arising from floods and sea level rise); and labor productivity. Details of the methods of assessment of losses (or gains) are provided in.

→ *Floods and sea level rise* include loss of property as a result of extreme events and impacts of sea level rise. With rising temperatures and increased frequency and intensity of extreme events, damages are estimated to increase.

→ *Health costs* include mortality effects of heatwaves, increased incidence of water-borne diseases, consequences of under-nutrition, malaria, meningitis and other vector-borne diseases. Epidemiological studies conducted by various research groups have established links between increases in temperature and precipitation and these health effects.

→ *Agriculture, fisheries, and forestry* include costs of declines in crop yields and livestock productivity from higher temperatures, productivity of forests as the growth rates of trees are affected, and fisheries as the reproduction, growth and survival of fish are affected.

→ *Labor productivity* covers reduction in productivity from working at higher temperatures, especially outdoors.

Floods and sea level rise account for around five percent of the costs of these categories in 2030 and in 2050. These costs are made up of damages to assets such as housing and public infrastructure as well as expenditures undertaken to protect assets against future sea level rise and storm surges associated with the rise in sea levels. They do not include estimates of loss of life.

Health costs are about five percent of the cost in 2030, rising to nine percent in 2050. They are projected to rise over coming decades, driven by diarrheal infections and hunger. Costs are derived from the value of premature mortality using methods developed by the World Bank (see for details). The effects on health are also concentrated on the more vulnerable sections of society, which face higher risks of for diarrheal infections due to inadequate access to water supply and sanitation. Improvements in these services, as agreed under Sustainable Development Goal 6 (Ensure availability and sustainable management of water and sanitation for all), become even more important with climate change. With extreme heat, usually determined as the 84th percentile of the daily maximum temperature, incidence of illness and death increase rapidly for elderly people. This is among the anticipated impacts in ROC, given the expected increase in conditions of extreme heat.

Climate change is expected to exacerbate hunger and malnutrition for households that suffer income loss or crop failure. Already half of the population is severely food insecure, 53 percent of the population lives under the national poverty line,[19] and malnutrition rates have exceeded 15 percent in some places.[20] With imports covering around 80 percent of food consumption and prices likely to rise with climate change, poor households will find it increasingly hard to feed themselves (Box 2).

Agriculture and labor productivity account for most of the costs. Costs in agriculture (including loss of labor productivity in that sector) make up about one-third of the combined cost for the four categories considered here in 2030 and 2050, while labor productivity losses in the rest of the economy make up close to 60 percent.

Box 2: Climate change and poverty

The potential long-lasting impact of climate change on agriculture productivity is a critical threat to poverty alleviation in ROC. Poverty is characterized by low purchasing power, rural predominance, exposure to environmental risk, population displacement, insufficient access to social and economic services, increasing youthfulness, rapid urbanization, and few opportunities for formal income generation. Climate change will hit hardest the Congolese population that already faces social and economic challenges such as living in poverty. There is a growing consensus that climate change will cause more harm to the poor because they rely more heavily on natural resources for survival that are susceptible to destruction by floods and drought caused by climatic changes.[21] In Congo, poverty is more prevalent in a rural areas, with 57 percent of the poor living in rural areas which rely heavily on agriculture as their primary income source.[22] Rural households losing part of their main source of income due to climate shocks will tend to migrate to urban areas in search of better living conditions and opportunities, thus, adding to the already large number of urban poor also facing environmental hazards related to climate change. Because agricultural production is primarily a rural activity that sends food to urban areas, any decline and shortage of locally produced agricultural products will also impede food availability and access in urban areas. Consequently, climate change may well result in food access issues that are likely to become more and more significant over time. Not only will the availability of certain staple local agricultural foods be affected, but crop failures can further influence the poverty status of large numbers of people.

The urban poor are disproportionately threatened by the environmental hazards and other risks related to climate change. Although poverty remains predominantly a rural phenomenon, urban poverty is important in ROC. Brazzaville and Pointe Noire, despite a relatively low poverty incidence, are home to about a third of the poor.[23] Urban people's vulnerability to climate change is inextricably linked with poverty, since the urban poor tend to live in poorly constructed homes, often in communities exposed to environmental hazards such as floods, landslides, or droughts, and in areas lacking basic health services or infrastructure.[24] Many of the poor face growing problems of severe flooding due to increased storm frequency and intensity associated with climate change. Rapid urbanization and urban population increases have also led to large numbers of people, especially the poor, settling and living in fragile areas such as floodplains in and around urban areas.[25]

Figure 17: Cost of climate change is the highest in the area of labor productivity

Shares of Climate Costs: 2030

5%
5%
58%
32%

Shares of Climate Costs: 2050

5%
9%
54%
32%

■ Floods and SLR   ■ Health   ■ Agriculture   ■ Labor Productivity
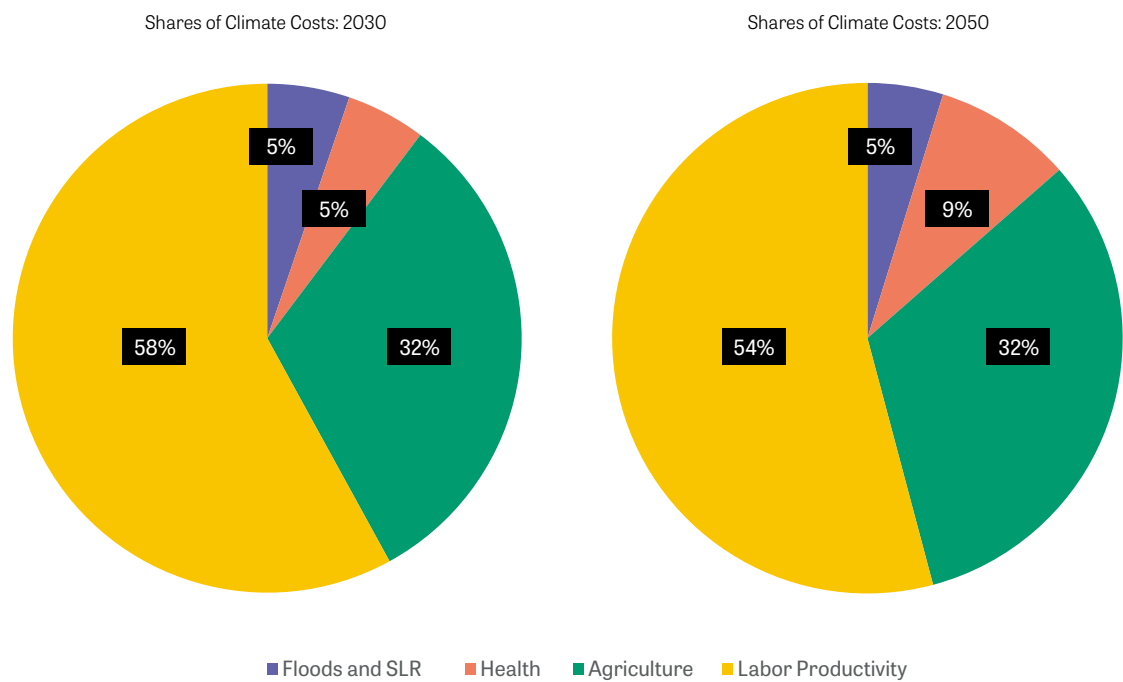
Note: Moderate scenario. The shares do not vary much between scenarios.
Source: Table 5.

Table 5: Costs of climate change in ROC by category and global scenario

	Area of Impact	Costs in USD Million 2020 Prices					As % of total cost for the 4 areas		
		2010	2030		2050		2010	Scen. 2 2030	Scen. 2 2050
			Scen. 2	Scen. 3	Scen. 2	Scen. 3			
Floods and SLR	Inland Floods	0.9	0.9	0.9	1.2	1.2	9.4%	5.2%	4.8%
	Sea Level Rise and Floods	35.6	136.0	136.2	136.0	134.1			
Health	Diarrheal Infections	14.3	27.3	27.1	81.0	83.6	23.6%	5.0%	8.8%
	Extreme Heat	7.5	18.2	18.1	30.8	31.8			
	Hunger	26.8	36.4	36.2	58.6	60.5			
	Malaria and Vector Borne	35.7	36.4	36.2	58.1	60.5			
	Meningitis	7.1	13.7	13.6	22.0	22.7			
Ag. Fishery and Forestry	Agriculture	45.3	793.9	796.1	888.2	916.8	12.2%	31.7%	32.3%
	Fisheries	0.9	18.1	18.0	18.3	17.7			
	Forestry	0.9	18.1	18.0	18.3	17.7			
Labor Productivity	Labor Productivity Exc. Ag	212	1517	1521	1549	1600	54.8%	58.0%	54.1%
Total		**387**	**2616**	**2621**	**2862**	**2946**	**100.0%**	**100.0%**	**100.0%**

Note: Scen. 2 is moderate scenario. Scen. 3 is pessimistic scenario. SLR is sea level rise. Health costs are valued at the cost of a life lost due to climate change as per Narain and Sall (2016), World Bank. As there are no large differences among the three scenarios, only two scenarios are presented.
Source: See Annex I. Adapted from DARA (2012) and IFPRI (2017).

Cost effects of climate change on agriculture

The agricultural sector (crops and livestock) accounted for around 7.9 percent of GDP in 2020, its share of the economy having increased over the past 15 years from 2.9 percent in 2005. The whole agriculture sector, which includes crops, livestock, forestry and fisheries, accounted for 10.5 percent of GDP in 2020 (Figure 18). During 2005 to 2020, real growth in agriculture has included 3.6 percent growth per annum for crops, 4.3 percent for livestock, 3.2 percent for silviculture and forestry and 3.1 percent for fisheries. Over the same period (2005-2020), overall GDP grew at an annual rate of only 1.2 percent, although it has been contracting since 2015 on account of trends in the oil sector.

Figure 18: Agriculture sector output has increased but its share of GDP remains small

Agriculture sector output (% of GDP)
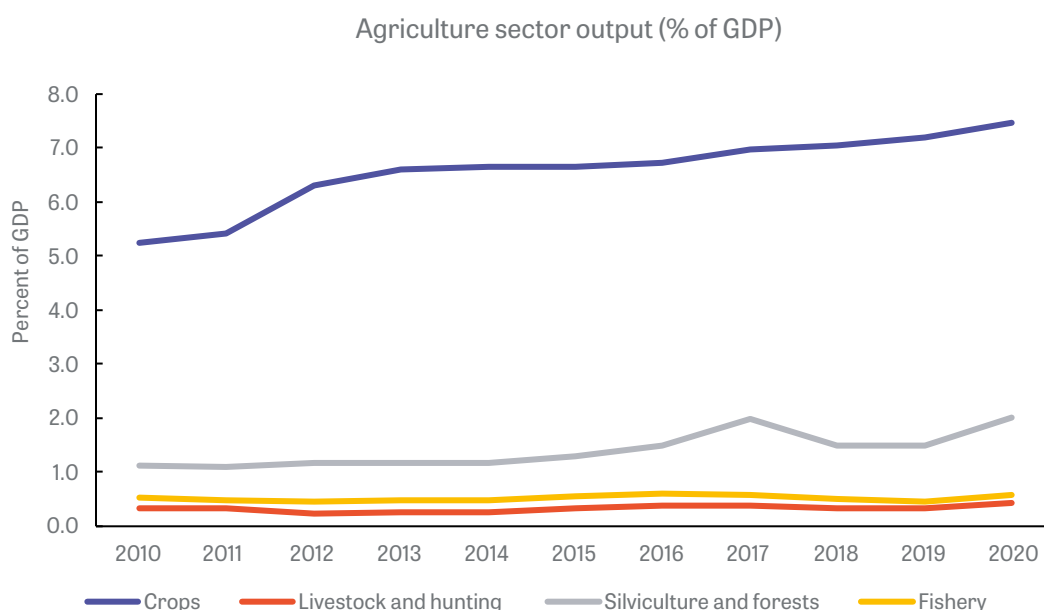
Source: National Institute of Statistics.

As the NDC for 2021 notes, agriculture is underdeveloped in the Congo, with only two percent of land being used for food production and with very rudimentary techniques. Thus, there is potential to achieve significant growth, though a prudent approach will be required to protect Congo's valuable ecosystems. The main crops grown are maize, millet, rice, bananas, other fruits and vegetables, groundnuts, and cassava. According to Food and Agriculture Organization (FAO) data, these products accounted for 74 percent

of gross agricultural sector output in 2017. Rice is cultivated in the Niari Valley and in the Djambala district. Livestock husbandry has traditionally been performed on a limited scale in the country, with cattle, sheep, goats, pigs and poultry being reared. Agribusiness (i.e., value addition through processing or marketing of primary products) is mainly confined to sugar and maize production on 312,000 ha. As a result, about 80 percent of food products intended for urban areas are imported, using scarce foreign exchange and increasing food security risks. A similar concern applies (but to a lesser extent) to fisheries, where maritime and river fishing as well as aquaculture cover only 60 percent of consumption. The government seeks to increase overall agricultural production six-fold to achieve self-sufficiency by 2035.

Climate change is projected to result in substantial losses of agricultural output in Congo. These losses are estimated at about five percent of the sector's output in 2030 and at about ten percent in 2050. These estimates are based on the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) developed by the International Food Policy Research Institute (IFPRI), which is the most widely used model to estimate the effects of climate change on agriculture. Details of the model are given in Box 3. The overall loss of output in the agricultural sector is estimated for a given year relative to what it would have been without climate change.

Box 3: The IMPACT Model of climate, agriculture, and water

IMPACT is a network of linked economic, water, and crop models.[26] It is a partial equilibrium multi-market economic model which simulates national and international agricultural markets. The economic model is embedded in an integrated modelling system that links information from climate models (Earth System Models), crop simulation models (for example, Decision Support System for Agro-technology Transfer), and water models. The links to water and crop models support the integrated analysis of changing environmental, biophysical, and socioeconomic trends, allowing for varied and in-depth analysis on a variety of critical issues of interest to policymakers at national, regional, and global levels. The core multimarket model focuses on global and national markets of 159 countries. Agricultural production is estimated on the basis of land supply, allocation of land to irrigated and rain-fed crops, and determination of yields. Production is modelled at a subnational level, including 320 regions called food production units. The multimarket model simulates 62 agricultural commodity markets. The modelling covers all major crops and livestock products.

The model draws on the Shared Socioeconomic Pathway database for projections of population and GDP trends based on socioeconomic scenarios. IMPACT takes, as a base case, a 'middle of the road' pathway assuming social, economic, and technological trends do not shift markedly from historical patterns. The modelling allows for farmers to change their crop mixes to climate conditions (i.e., autonomous adaptation).

The largest losses are expected in the production of millet, bananas, and other fruits and vegetables. Modest output declines are expected for maize, cassava and groundnuts (Figure 19, left panel).[27] The projected changes in physical output and its value at world prices due to climate change are given in Table 6.[28] Despite the projected decreases in output for most commodities covered in the study, climate change is expected to accelerate the rise in global food prices, as global demand is projected to increase at a faster rate (as a result of higher population and higher per capita income) than supply (which declines for many crops) (Figure 19, right panel). Consequently, their value will grow despite the loss of yield, so hardly any decline in the total value is expected.

Figure 19: Quantity of agriculture output will decline due to climate change, but the nominal value of some crops will rise

Change in quantity of output relative to no climate change (%)

Change in value of output relative to no climate change (%)

■ 2030   ■ 2050
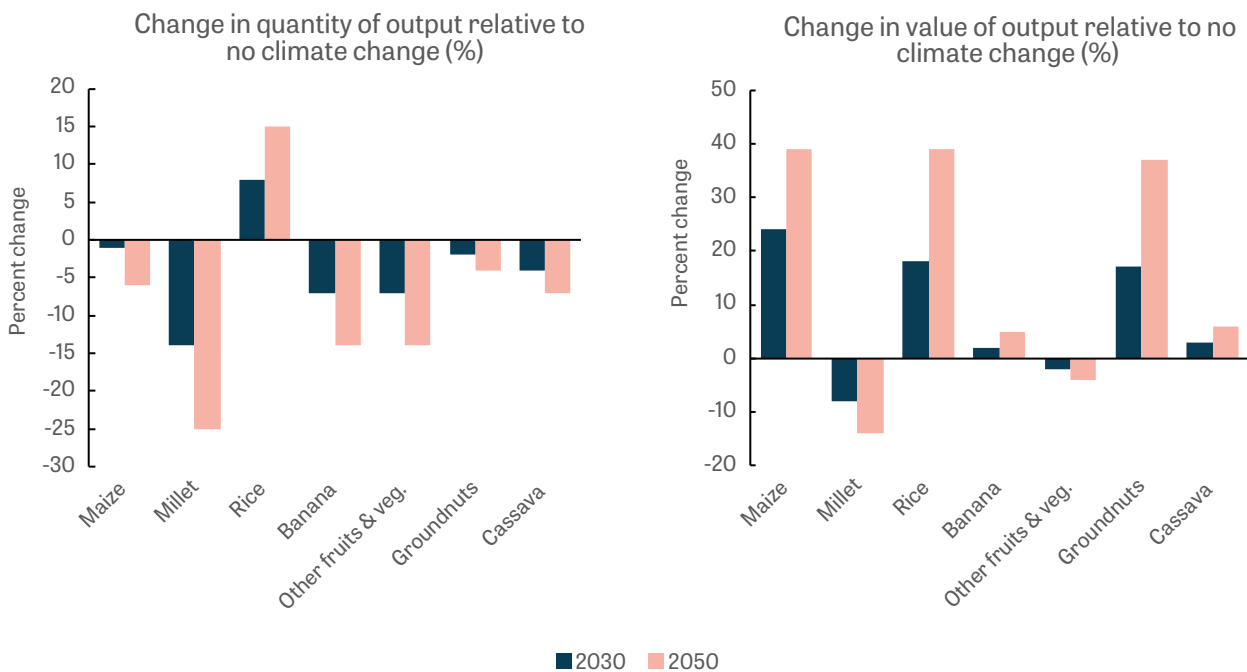
Note: Figures shows change in quantity and value of output when comparing the pessimistic scenario (scen. 3) to no climate change.
Source: Table 6.

The results from this in-depth assessment, which shows small losses in value of output, differ from the potential loss in total value that occurs overall under climate change. As observed earlier, with no relative price changes, total value would decline by five to ten percent. The difference is likely because of larger losses in other products (especially livestock-related commodities such as meat, milk, and eggs which make up 25 percent of gross agricultural production). If correct, it would imply the need for strong support for this sub-sector to limit these losses, along with support for the crop sub-sector to shift production towards varieties less vulnerable to climate-related losses and higher prices. While there are many sources of uncertainty in this analysis, the overall direction of the findings is clear.

Table 6: Climate induced changes in quantity and value for selected commodities

	'No climate change' scenario		Pessimistic scenario		Change in supply		As % of 'No climate change' scenario	
	2030	**Scen. 2 2050**	**2030**	**Scen. 2 2050**	**2030**	**Scen. 2 2050**	**2030**	**Scen. 2 2050**
Output (in 1000 metric tons)								
Maize	13.6	15.8	13.4	14.9	-0.2	-0.9	-1%	-6%
Millet	13.6	13.8	11.7	10.4	-1.8	-3.5	-14%	-25%
Rice	6.7	11	7.2	12.6	0.5	1.7	8%	15%
Banana	180.2	255.2	167.3	220.1	-12.9	-35.1	-7%	-14%
Other fruits & veg.	652.5	983.9	604.5	843.1	-48	-140.8	-7%	-14%
Groundnuts	53.5	83.8	52.6	80.5	-1	-3.2	-2%	-4%
Cassava	13.3	15.6	12.8	14.5	-0.5	-1.1	-4%	-7%
Total	**933.4**	**1379**	**869.6**	**1196.2**	**-63.8**	**-182.8**	**-7%**	**-13%**
Output (in US$ millions)								
Maize	2.3	3.1	2.8	4.3	0.5	1.2	24%	39%
Millet	4.5	4.6	4.1	4	-0.4	-0.7	-8%	-14%
Rice	2.8	5	3.3	7	0.5	2	18%	39%
Banana	118.7	167.5	121.3	176	2.7	8.5	2%	5%
Other fruits & veg.	660.8	1126.4	649.9	1083.9	-10.9	-42.4	-2%	-4%
Groundnuts	45.2	72.4	53	98.9	7.8	26.6	17%	37%
Cassava	1.7	2.2	1.8	2.3	0	0.1	3%	6%
Total	**835.9**	**1381.2**	**836.1**	**1376.5**	**0.2**	**-4.7**	**0%**	**0%**

Note: in 1000 metric tons and US$ millions, 2030 and 2050.
Source: IFPRI (2017).

In interpreting the results, two other factors should be borne in mind. First, the IFPRI analysis in Table 6 assumes some adaptation to climate change, notably changes in the land allocated to different crops to reflect changes in relative returns. If such adaptation does not occur, the projected losses will be greater. Second, the analysis does not take into account the loss of labor productivity in agriculture due to climate change. As noted, there is expected to be a big decline in output from labor, which by 2030 amounts to nearly US$2.2 billion. According to the World Bank's World Development Indicators,[29] one-third of total employment in Congo is in agriculture. If labor productivity in agriculture is assumed to fall by the overall average, incomes of agricultural workers would decline by US$725 million by 2030. This is not accounted for in the assessments from the IFPRI model as it is not a loss for the sector, which is measured as a decline in value added. Nevertheless, it affects workers in that sector significantly.

▌ 2.1.3   Adaptation measures should be aligned with the government's NDC

Adaptation to climate impacts should be aligned with the government's NDC. Drawing on the information of climate change impacts across different sectors, the following policy implications can be proposed to adapt to them. They are intended to add to the adaptation measures under consideration in the NDC, proving empirical support for some of them and making some suggestions for actions in areas not covered in the NDC.

Agriculture. Congo's NDCs identify the need to improve the management of water for agriculture and to increase food production through an increase in land under cultivation as well as an increase in productivity through technology adoption. There is a lot of concern about the country's high level of reliance on food imports. Technology adoption is seen as particularly important for livestock rearing where the introduction of new technologies could deliver a four-fold increase in productivity. The latest NDC sets the unconditional goal of inclusive climate-smart agriculture.[30] The conditional goal is an extension and replication of infrastructure, technology, training and management of information to promote climate-smart agriculture among smallholders to improve food security and nutrition and build the resilience of vulnerable farmers. The NDC envisages subsidies to farmers to support these goals, but it does not provide details of the design or cost of the subsidies. In general, engagement of smallholder farmers in sustainable agriculture value chains through mutually advantageous partnerships between groups or cooperatives of farmers and agroindustry companies is one of the best approaches to achieve these goals. The analysis here emphasizes the importance of adjusting crop selection to climatic factors. It also gives an indication of the direction of prices of different crops in the coming decade and beyond.

Labor productivity. The impact of climate change on labor productivity is underestimated and is expected to affect lower income individuals most, as explained in Box 4. The issue has been relatively ignored in the policy discussions of climate change but is now getting more attention. It is not covered in ROC NDCs. A recent detailed study for Ghana found that labor productivity losses rose sharply with temperature and were particularly high in the agriculture sector. Poverty also increased as a result.[31] Actions to address the problem include changes in working hours, longer breaks, and use of heat protective equipment.

Box 4: Climate change and productivity of workers

Given the large share of labor in total value-added, the damage to labor productivity caused by high temperatures has been identified in many recent studies as central to the economic costs of a changing climate. Higher temperatures reduce labor productivity, particularly for workers in occupations exposed to the heat such as agriculture and construction and especially in the presence of high humidity. However, although outdoor workers are most affected, heat affects all workers without access to cooling. These impacts on productivity are additional to the costs from premature mortality caused by heat-related illness.

Labor productivity is reduced by high temperatures through three main channels:

→ Workers choose to put in less effort, working more slowly and taking more breaks;

→ Heat stress and dehydration increase mistakes and accidents in the workplace;

→ Extreme heat stress raises the risk of heat-related illnesses and poor sleep increases the risk of workplace accidents as well as directly undermining productivity.

A number of studies aim to quantify the impact on labor productivity. Short-run damage estimates of a hotter climate consistently cluster around a loss of labor productivity by about two percent per degree Celsius above room temperature.[32] In a recent study, current climate conditions are found to already negatively affect labor, with global annual effective labor being a factor of 0.23 below the optimum due to historical warming.[33] By 2030, the global cost of lower labor productivity due to heat is estimated to reach US$2.5 trillion per year;[34] and productivity in SSA and South Asia will be most harmed by future warming.[35] Within countries, the poor are, in general, the most vulnerable because of high geographic exposure, high occupational vulnerability, and low adaptive capacity.[36]

Health. As part of the unconditional measures in Congo's NDC, the government identifies activities to control malaria vectors and notes that an overall health adaptation strategy is under preparation. The conditional measures also include investments to expand access to drinking water and basic sanitation in rural areas to decrease malaria and other vector-borne diseases, investments to improve environmental health services, and application of the concept of "healthy islands."

Extreme events. The NDC focuses on coastal regions, where unconditional measures include planting of mangroves, construction of coastal defenses and a detailed evaluation of coastal risks under climate change. The NDC also provides for strengthening of flood defenses, early warning systems, and response preparedness for such events. The conditional measures go further to encompass investments in coastal defenses from sea level rise, stabilization of soils and mapping of dangers to assist planning. Investments in these zones should be part of an overall structural transformation that encompasses making infrastructure more resilient, as well as strengthening the natural capital that protects such zones against climatic factors.

Forestry. The impact of climate change on the forests of the ROC are estimated to be around US$18 million by 2030 (Table 5). These arise from damages to trees and reduced rates of growth for some species, resulting in losses for the timber and wood processing industries. These will increase with time at a rate that depends on the trajectory of global emissions. In terms of forestry's share in overall climate-related damages, however, the estimated losses in Congo are relatively small.

The importance of adaptation to climate change for forestry arises because of the growing importance of the sector in carbon sequestration. As the national NDC notes, the country's forests absorb 72,700 kiloton equivalent of CO_2. This vastly outweighs Congo's emissions of greenhouse gases through combustion of fossil fuels, which amounted to only an estimated 7,608 kiloton equivalent of CO_2 in 2020. As part of its adaptation to climate change, the country aims to maintain or even increase the carbon sequestration potential of its forests through better management of the sector and reforestation. Options for management of the forests include:

→ Adapt forest systems to climate change by stopping land degradation, by controlling topsoil erosion, and by improving water quality and soil productivity;

→ Create sites with improved production capacity in connection with the forest products processing industry;

→ Reduce the risks and consequences of forest fires through management and warning systems; and

→ Better manage pest and plant disease outbreaks.

The NDC envisages budget expenditure of US$1,016 million to 2030 without external assistance (unconditional measures) and US$3,795 with external assistance (conditional measures). Planned expenditures for adaptation are the highest for food protection followed by water and sanitation. However, conditional expenditures are on average 2.9 times greater than unconditional expenditures across categories (Figure 20). There is no evaluation of the benefits of the different investments in terms of reduced risks and higher or more stable outputs by sector. Without such an assessment, it is difficult to justify which measures to prioritize among the long list proposed measures.

Figure 20: Conditional expenditures are much greater than the unconditional ones in all categories

Planned expenditure for adaptation to 2030 ($Million)
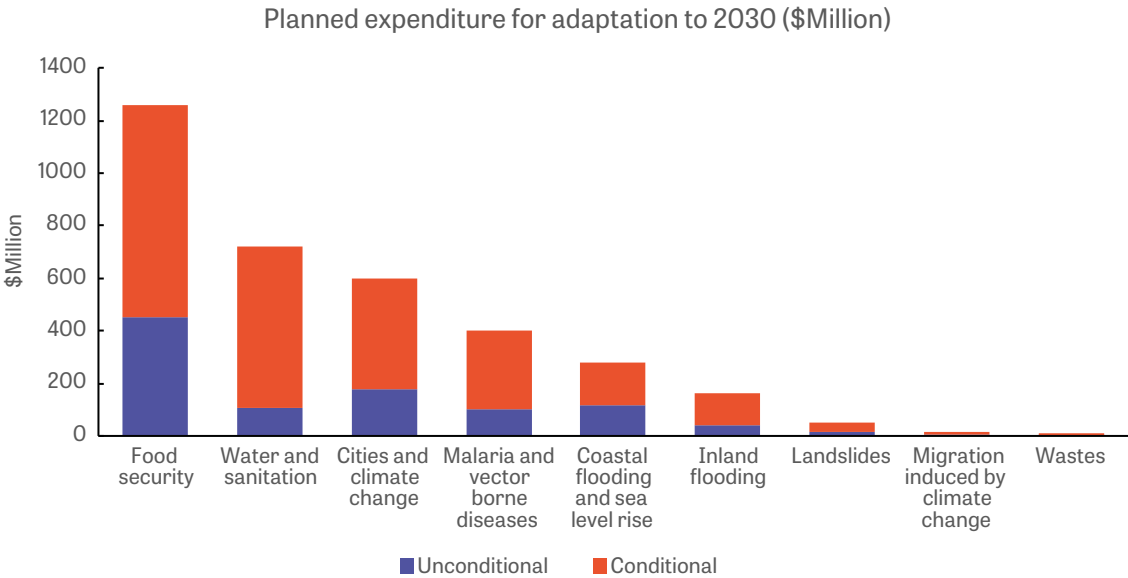
Source: NDC (2021).

2.2 Greenhouse gas emissions (GHGs) challenges and opportunities for Congo

2.2.1 Climate change could reduce global oil demand and revenues for ROC

ROC's economy will be affected by global changes in the markets for fossil fuels and carbon. In the case of fossil fuels, oil is expected to remain an important energy source for a few decades. However, starting around 2040, the transition to a low carbon economy is likely to permanently reduce global oil demand.[37] This outlook could reduce investment in ROC's oil fields, which in turn would reduce output and weigh on oil revenues and exports (given that Congo relies on oil receipts for about 80 percent of its export revenues and 60 percent of its fiscal revenues). Production is expected to peak in 2024 and then settle at 62 percent of peak production by 2040, driven by the depletion of oil fields and reduced prospects for profitable investments at prospective medium-term oil prices (Figure 21).

Figure 21: Transition to a low carbon economy is expected to permanently reduce global oil demand

Oil production in ROC, 2020-2040 (millions of barrels)
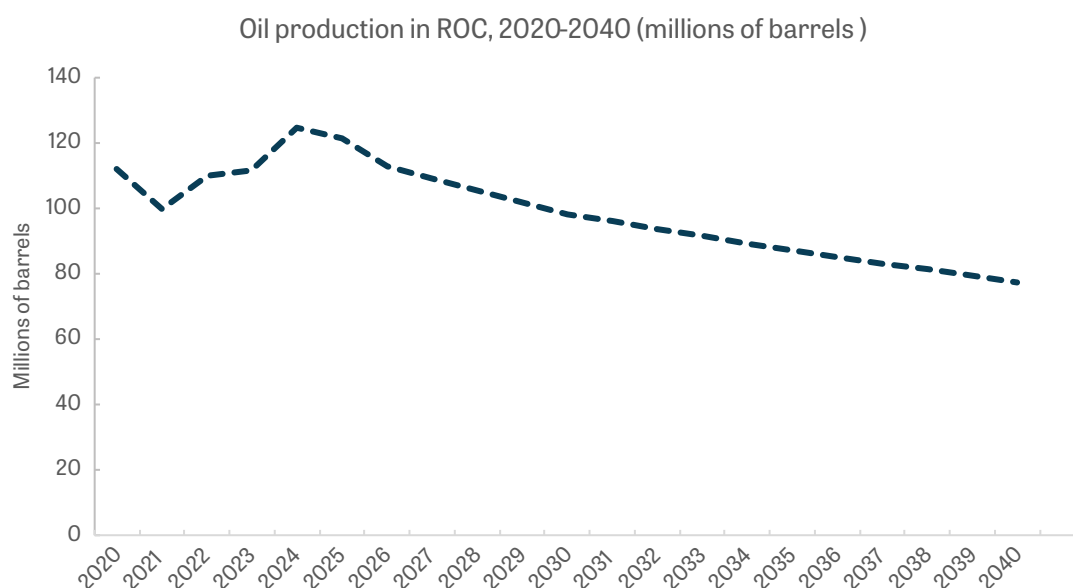
Source: IMF, Republic of Congo Selected Issues Paper, 2021.

A decline in oil revenues would have significant negative effects, especially in the absence of sufficient economic diversification. As the IMF noted,[38] economic growth will suffer from reduced oil sector activity and activity in the closely linked sectors. Large revenue declines combined with the country's large domestic and external debt obligations will require cuts in public spending. These are likely to affect public employment as wages constitute one third of non-interest government spending. Lower fiscal revenues, exports, and GDP will make it difficult to service debt. Sovereign risk premiums will be raised by the higher contingent liabilities stemming from oil sector SOEs. As the IMF further observes, if

similar pressures are realized in other CEMAC countries, BEAC, the regional central bank, might be forced to devalue the currency. Given the significant negative effects expected for ROC, the country should prepare for the decrease in oil demand through economic diversification (see section 2.3), by addressing constraints such as insufficient human capital, information and communications technology (ICT) and electricity infrastructure, bottlenecks in the business enabling environment, and unrealized potential in sectors such as tourism.

2.2.2   Achieving ROC's mitigation targets will require substantial resources

While mitigation of GHGs can have important development benefits, some of the measures also have cost implications for Congo. The carbon intensity of ROC has decreased steadily over the past seventeen years: from 0.208KG/PPP$ (kilograms of CO_2 emissions per dollar of GDP) in 2000 to 0.148 in 2017.[39] In 2017, Congo's economy was slightly less carbon intensive than the average for Sub-Saharan Africa (0.197) or for all low-income countries (0.126).

The National NDC presented at the COP26 (NDC, 2021) is based on three scenarios for emissions going forward to 2030. They are: (a) a business-as-usual scenario under which total emissions would rise from 10,405 kilotons of CO_2 equivalent in 2017 to 15,279 kilotons in 2030, (b) an 'unconditional mitigation scenario' under which emissions in 2030 would decline to

12,000 kilotons, and (c) a 'conditional mitigation scenario' (subject to external financing being available) under which emissions in 2030 would decline to 7,081 kilotons. The business-as-usual scenario would imply an increase in carbon intensity relative to 2017 of 47 percent, the unconditional scenario would imply an increase in carbon intensity of 15 percent, and the conditional scenario would imply a decrease in carbon intensity of 32 percent.

The unconditional and conditional scenarios concentrate on reducing GHG emissions from waste and deforestation.[40] In the unconditional scenario, energy sector emissions would decline by eight percent, which would rise to 20 percent if external funds were made available (Figure 22).

Figure 22: External funds would support a significant increase of mitigation actions
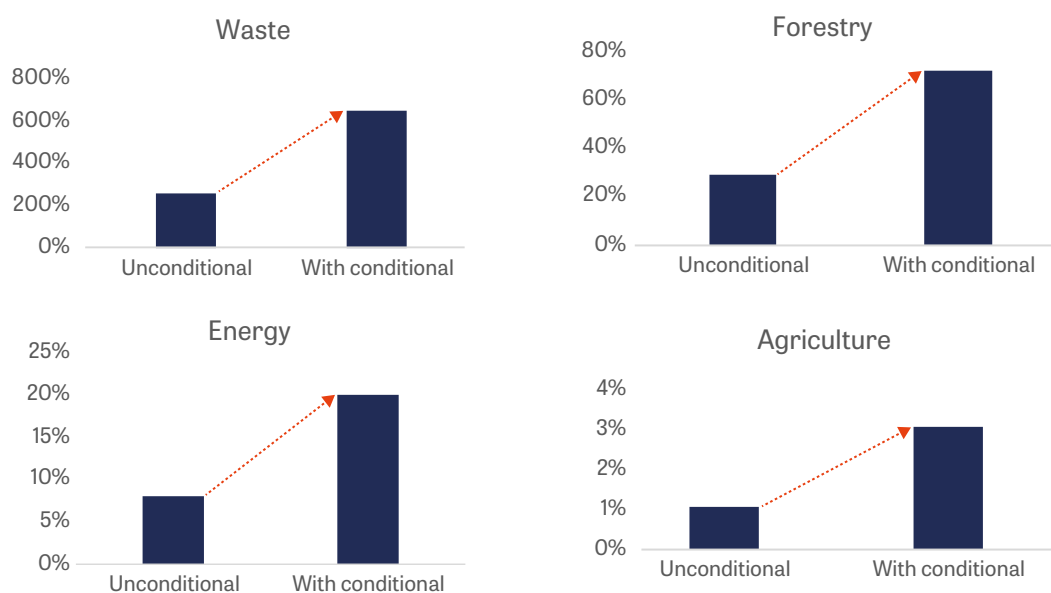
Source: NDC (2021).

The NDC estimates the total financial envelope needed to achieve the conditional targets at US$12.5 billion over the period 2021-2030. Unfortunately, the NDC provides a breakdown of mitigation costs covering only $4.395 billion. Details of the costs by sector are given in Annex II of the NDC. There is no indication, however, of the cost effectiveness of the different investments in terms of cost per ton of GHGs abated. Thus, it is difficult to prioritize the proposed expenditures. In addition, a large share of total costs is conditional on external finance. With 98 percent of measures requiring external funding, the NDC indicates that almost the entire mitigation program depends on such funding being provided. Further, a very large share of costs for programs are unlikely to generate significant reductions while involving very large outlays. For example, 60 percent of the cost of the entire transport program is devoted to 18-meter-long electric buses.

Achieving the mitigation goals of the NDC will require substantial resources, both domestic and international. There are, however, potential instruments for mobilizing them and, moreover, doing so in a way that enhances green growth, resulting in benefits for the economy and society. These could include investments and legal framework to reduce gas flaring and the sale of carbon offsets to monetize the carbon sequestration services provided by the country's forests and peatlands.

To ensure harmony of the mitigation program with the development agenda, it is also important to ensure that investments in infrastructure and capital (especially that linked to energy) take into account the future demand for the services of those assets. Investment in oil or gas power generation, for example, may provide a good return in the short term, but as use of fossil fuels are phased out and taxes are imposed on products made with such fuels for export (via a border tax adjustment), the assets may be unusable and become stranded assets.

2.2.3 Mitigation actions have cost implications, but there are also financing opportunities

The market for carbon sequestration

The Republic of Congo is well placed to play a role in reducing net global carbon emissions and to benefit financially. The country is a net carbon absorber (sequestrator). Two-thirds of the territory is covered by dense tropical forest which serves as a major global carbon sink. There is also a huge amount of peatland (an area the size of England) in the *Cuvette Centrale* covering the northern Republic of Congo and the Democratic Republic of Congo[41] which holds as much carbon as the United States releases from burning fossil fuels in a year. On a net basis, ROC absorbs 1.5 percent of the world's annual carbon emissions, mainly through changes in land use and forestry,[42] which is more than the country emits from the use of fossil fuels.

International carbon markets, however, are currently designed in a way that does not adequately compensate Congo for its contribution to climate change mitigation. International carbon credit markets are still nascent, and there is no internationally determined price. Buyers purchase carbon credits to reduce GHGs or offset part of their emissions. Sellers generate credits through activities that increase emission absorption. In the case of forestry, actions to conserve and enhance forests are all credit generating.

A further difficulty arises in the way the carbon credits work in the forestry sector. A carbon credit is not generated for the actual amount of emissions absorbed by a seller—the logical counterweight of the emissions produced by the buyer—but the change in emissions absorbed relative to a baseline year. If Congo could sell carbon credits internationally, based on the Emission Reduction Program Agreement signed between the Republic of Congo and the World Bank, the country could gain US$5 million per year (one million tonnes of CO_2 equivalent valued at US$5 per tonne). The amount of revenues from sequestration that is being planned under the NDC will depend on what baseline is taken for the reductions. Table 7 gives the figures for emissions from the forestry sector and the reductions relative to business-as-usual and relative to emissions in 2020 respectively. If the baseline is business-as-usual, emissions reductions in 2025 would earn (at the current price of US$5 per tonne), US$4.7 million in 2025 and US$6.2 million in 2030 under the unconditional scenario and US$15.6 million in both 2015 and 2030 under the conditional scenario. If, however, the baseline is 2017 emissions, the receipts would be US$0.8 million in 2025 and nothing in 2030[43] under the unconditional scenario and US$11.7 million in 2025 and US$8.7 million in 2030 under the conditional scenario. Thus, the baseline for the carbon credits is a critical factor as is the price agreed for a credit (Figure 23). The price is expected to rise over time.

Table 7: Changes in emissions from forestry in ROC

Emissions of CO_2 from Foresty (Kilotons)				
Scenario	2017	2020	2025	2030
BAU	2947	3218	3729	4319
Unconditional	2947	3218	2793	3071
Conditional	2947	3218	609	1199

Reduction in Emissions from Forestry (Kilotons)			
Relative to BAU	2020	2025	2030
Unconditional	0	936	1248
Conditional	0	3120	3120
Relative to 2017			
Unconditional	-271	154	-124
Conditional	-271	2338	1748

Source: NDC (2021)

Figure 23: The baseline for the carbon credits is a critical factor as is the price agreed for a credit

Revenues from carbon sequestration by scenario ($Million)
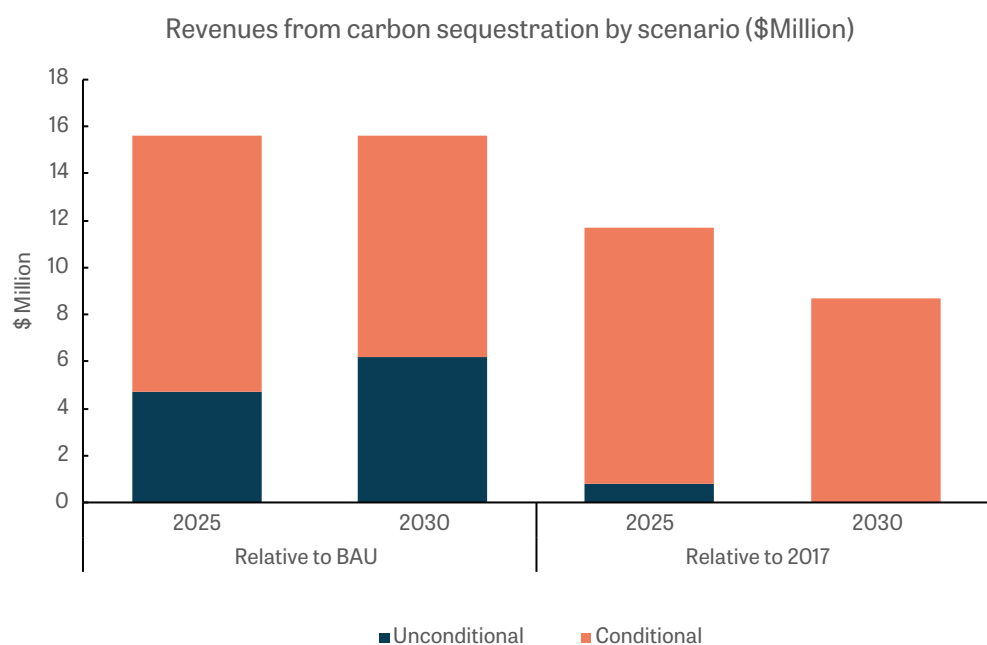
Note : Emission reduction used to compute carbon credit under business-as-usual scenario is the difference between emission in 2025 (or 2030) relative to what it would have been in 2025 (or 2030) if there had been little or no effort to limit carbon dioxide emissions. For 2017, the baseline to compute emission reduction for carbon credit is always the same, that is, the amount of emission in 2025 (or 2030) compared to what it was in 2017.
Source: NDC (2021).

While the current prospects of Congo raising income from carbon sequestration by its forests are modest at present, there are developments that could change the situation. In particular, its neighbor Gabon is actively involved in developing a green bond that will raise revenue by selling carbon offsets to private corporations.[44] Similar programs of selling carbon offsets to corporations committed to net zero emissions in the coming decade could be undertaken in the Republic of Congo. To encourage the reduction in deforestation, carbon pricing could be applied in the form of a 'feebate', so a ton of carbon not emitted from the forestry sector relative to a baseline would earn the owner a rebate equal to the carbon price while a ton emitted would incur a charge equal to the carbon price.

Updating legislation to monetize associated gases

Gas flaring is a substantial source of carbon dioxide–equivalent emissions and a wasted opportunity to put gas to use. The World Bank's Global Gas Flaring Reduction Partnership estimates that the total volume of natural gas flared globally was 142 billion cubic meters in 2020,[45] which is enough gas to power all of SSA. ROC is among the world's top gas flaring countries, ranking 17th in flaring volumes but only 30th in oil production. Ending routine gas flaring could help Congo comply with its commitment to Zero Routine Flaring by 2030[46] and to commitments to reduce its carbon emissions under its NDC. This would not only help address climate change, but ROC could recover and monetize associated gas, instead of flaring it into the atmosphere.

Updating the regulatory framework of routine gas flaring is a prerequisite to monetizing associated gas. Gas associated with oil production in ROC is currently being flared (i.e., burned). Congo's current laws and regulations and its financial sanctions are insufficient to reduce flaring and venting.

During an address in January 2022, the President of the Republic of Congo outlined that the Government "will launch the country's economic recovery via plans to liquefy gas. Offshore gas will no longer be flared; it will be recuperated, liquefied and then exported – a first for the country."[47] Robust regulation is a necessary incentive for oil companies to reduce flaring and is crucial to creating an enabling and compulsory environment to eliminate routine gas flaring from oil production sites.[48] As such, ROC could implement legislation that would allow for use and recovery of associated gas and subsequently monetarize it. This could include adjusting the legal and regulatory framework (the Hydrocarbons Code and the Gas Utilization Regulation) by clarifying the circumstances under which flaring, and venting are acceptable. Substantial sanctions could be put in place to motivate asset operators to move towards elimination of routine flaring. At the same time, the regulator's capabilities and resources could be strengthened to allow for efficient and objective enforcement.

Potential of a Carbon Tax

Carbon taxes or equivalent pricing for fossil fuel emissions can simultaneously advance climate, domestic environments, fiscal, and economic goals.[49] Over 50 national and subnational governments have implemented pricing through carbon taxes or emissions trading schemes, though the global average CO_2 price is currently only US$2 per ton. The IMF has developed an analytical tool to help countries track progress towards their Paris mitigation pledges.[50] The tool provides standardized analyses, on a country-by-country basis for 135 member countries (including ROC), of carbon pricing and other mitigation instruments. Details of the model are given in Annex 3.

For ROC, carbon prices in 2030 of US$35 or US$70 per ton of CO_2 are considered and found to have a significant reduction in GHGs at a very low cost in terms of welfare. Over this period, under business-as-usual, the IMF model estimates GDP in ROC to increase by eight percent and CO_2 emissions to decline by 23 percent between 2017 and 2030.[51] Under carbon taxation, a reduction of GHGs relative to business-as-usual by 2030 is estimated to be a further six percent with a $35 tax and ten percent with a $70 tax. The model also calculates both the narrow economic cost (roughly the loss of GDP) as well as a welfare cost. For ROC, the IMF model projects hardly any welfare cost of a carbon tax of $70 and hardly any economic cost.

These carbon pricing instruments have important fiscal and social impacts, but the revenues raised can help mitigate them. First, carbon pricing would result in significant increases in energy prices. At the same time, the tax would result in a large increase in budget revenues which could allow the government to support households and companies harmed by the rise in energy prices. In addition, the tax could incentivize consumers to reduce their use of oil and gas, which would further reduce the budgetary cost of fuel subsidies. Finally, if more of the production of fossil fuels is exported, foreign exchange receipts will increase. There is no doubt that a carbon tax would have to be complemented by a broad strategy, which would encompass the use of associated revenues, assistance to vulnerable households and firms, gradual price reform, stakeholder consultations, and public communications.[52] The overall effect of a carbon tax, including the changes in prices of all products, will then depend on how the revenues are used. Overall, there is a case for ROC to thoroughly study the possibility of introducing a carbon tax as an instrument for meeting its NDC commitments. However, any mitigation measure, including the introduction of carbon tax, should be designed to be as closely linked as possible to the country's overall development agenda.

Credits: Unsplash

2.3   Actions that could enhance Congo's resilience to the effects of climate change

Congo's long-term growth requires adjusting to the realities of climate change and adopting key adaptation actions with a focus on reducing impacts on agriculture and labor. Enhancing the country's resilience in the face of a hotter, wetter, and less predictable climate in the future argues for action across four areas:

→ *In agriculture:* A key driver of adaptation in agriculture should be to strengthen food security. Farmers (especially smaller and more vulnerable ones) will need support to overcome the effects of climate change. They will need information about the response of crop yields to changing patterns of temperature and precipitation in their area as well as access to more resilient seed varieties. Assistance will be most important in the agricultural subsectors most affected: livestock and fruits and vegetables (especially bananas). The promotion of "Climate Smart Agriculture" with strong engagement from smallholder farmers can increase productivity, enhance resilience, reduce emissions, contribute to rising rural incomes accompanied by falling deforestation and reduced GHGs while preserving biodiversity.

→ *To support labor productivity:* Labor rules can prohibit working during extreme heat, encourage the adoption of cooling technology, and require the use of heat sensors by those managing the workforce.

→ *In health:* A measure that has proved to be successful in reducing mortality from heatwaves is an early warning system (to forewarn health services of impending heatwaves) which is compatible with the country's communications facilities and supported by back up services. A technologically-appropriate early warning system can reduce mortality during heatwaves. Investments in clean water and to control mosquitoes (e.g., bed nets, residual spraying, prompt treatment of diagnosed patients and mosquito repellent sprays and coils) will be needed to battle the climate-driven rise in disease.

→ *Coastal areas:* ROC could prepare and implement a detailed plan for coastal protection from sea level rise and storm surge to prepare for extreme climate events. Coastal ecosystems have an important role in building resilience. Seagrasses and coral reefs provide a wide range of protective services. Wetlands act to limit storm surges as well as help to regulate the climate. Unfortunately, these ecosystems are being degraded in many areas worldwide, and ROC is no exception. In terms of adaptation, protecting such systems can play a significant role. A review by the United Nations Environment Program of the 'adaptation gap' notes that nature-based solutions for adaptation can cost less than hard engineered approaches for addressing climate hazards.[53] When well-designed and implemented, they have potential to generate large economic returns because of the multiple societal benefits they deliver in addition to reducing climate risk. Such solutions should be seen as part of structural transformation of the coastal zones in response to sea level rise and coastal ecosystem transformation driven by climate change

At the same time, Congo should continue to contribute to global efforts to reduce GHG emissions through protection of its forests and peatlands and, eventually, carbon taxation. ROC has both opportunities and obligations to participate in the global commitment to net zero by 2050:

→ *Forests and peatland:* Carefully managed development of ROC's forests and protection of its portion of the Congo peatlands provide opportunities for international carbon credits, ensure preservation of the country's extensive biodiversity, and work to protect the livelihoods of local communities who rely on the forests.

→ *Reduce flaring and venting of associated gases:* the government could adopt a decree that will strengthen the current regulatory framework by clarifying circumstances under which flaring and venting are acceptable and that would introduce specific financial penalties for flaring and venting gas to encourage compliance and the search for solutions to avoid flaring.

Furthermore, ROC should diversify its economy to prepare for the prospect of shrinking global oil demand as the world's economy transitions to a low-carbon economy. Key policies that could support the Government's diversification efforts and help Congo transition to a more sustainable economic development model agenda include:[54]

→ *Accelerate human capital development:* the government should ensure adequate and timely release of funding to service delivery units in health and education by adopting a legal instrument that establishes a formula-based allocation (for service delivery units) and prioritizes commitment and disbursement of funds to service delivery units in the health (health centers) and

education (schools) sectors. In addition, the government could also adopt legislation that defines the modalities for the recruitment of health personnel and teachers and efficiently adjusts the deployment of staff throughout the country using a financial incentive mechanism.

→ *Improve the coverage and quality of ICT and electricity infrastructure:*[55] In the digital sector, the government could strengthen competition in the fiber optic wholesale market and the international submarine cable market to improve affordability of digital services. For electricity, the government could thoroughly review the current tariff regime to allow the electricity company to cover its costs and to roll-out the infrastructure necessary to face increasing demand and reduce outages (but an adjustment, if any, in the tariff regime should protect the most vulnerable clients).

→ *Support ecotourism development:* The government could safeguard natural heritage assets by ensuring wildlife protection authorities have sufficient resources and a clear mandate to stop poaching, illegal hunting, and wildlife trafficking in protected areas and buffer zones. Tourism governance could be improved by ensuring stable leadership at the Ministry of Tourism and Leisure and create a long-term vision for the sector that reduces the risk of inconsistent strategies for tourism development.

Annex
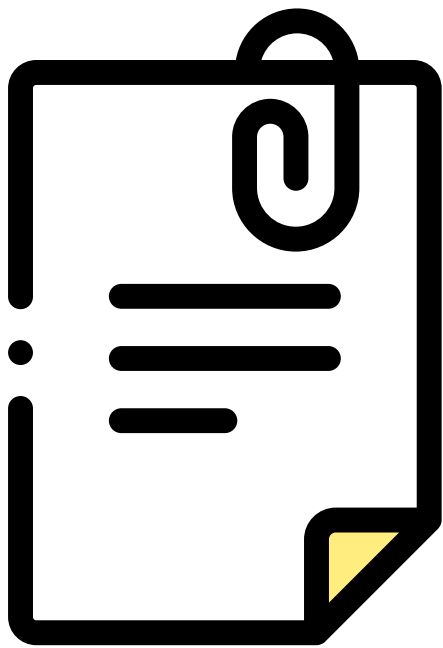
Annex 1:
Estimating the Impacts of Climate Change

Overview

The methodology in the DARA study and other studies of the impacts of climate change consists of estimating, first, a baseline scenario without climate change and then a second scenario in which the same economic and environmental structures face climatic changes. The actual estimates of losses and gains with climate change are the difference between the two scenarios. The economic valuations in each case draw on a wide economic literature, which has used a mixture of methods, including partial equilibrium models, general equilibrium models and a range of engineering cost models. In general, the socioeconomic baseline is GDP in 2010 and estimates of losses/gains are made against what that GDP would have been without the climate change that was experienced.

The following is a brief summary of the models applied under different subgroups of environmental disasters, health, agriculture forestry and fishery and labor productivity.

Environmental Disasters. The DARA study identified disaster-related extreme events under three categories: floods and landslides, storms, and droughts. Floods, landslides, and storms were reported in terms of excess deaths (which were not valued in monetary terms) and excess damages to property (which were estimated in monetary terms) relative to a baseline GDP. Drought-related costs were valued from the loss of crops. In each case, a climate impact factor was calculated, which attributed a percentage of damages from environmental disasters to climate change.

Health. The model estimates in term of excess deaths associated with climate change from diarrheal infections, malaria and other vector borne diseases, meningitis, malnutrition, and extreme heat-related events. The calculation of 2030 estimates use the McMicheal, et. al. (2004) climate impact factors for 2030 and the disease burden projected for 2030, using population projections from the United Nations for all diseases except meningitis and heat related events where different models are used (Adamo, et. al.(2011) for meningitis which is linked to drought, and Curriero, et. al., (2002) for heat related events).

The estimation of health impacts allows for the effect of future development on incidence of diseases such as diarrhea, malaria etc. In particular, it is expected that emerging markets will gain in capacity to deal with diseases that more advanced economies have largely eradicated. For heat related events it allows for the diffusion of air-conditioning and the proportion of population over 65. Projections of excess deaths to 2050 are proportional to the population at risk, which increases in line with population growth in different age groups, and to the increase in mean temperature. This is not ideal but more detailed modelling was not possible.

Agriculture. The DARA study took the climate effect on agriculture from the detailed country-based impact values provided by Cline (2007), which combined a range of models estimating impacts of climate change on land-based agricultural output. More up-to-date analyses, however, have been carried out by IFPRI (IFPRI, 2017), which extends to 2050. Hence, for this sector, the IFPRI data have been used.

Fisheries. The climate impact factors were taken separately for inland fisheries and marine fisheries: the former from O´Reilly et al. (2003) and the latter from Cheung et al. (2010). For inland fisheries O'Reilly et al. (2003) estimate a 30 percent decrease in fish yields over the last 80 years (1920-2000) due to climate change in Lake Tanganyika. Given the highly restricted ability of inland fish populations to migrate, the study from Lake Tanganyika is deemed to be representative of in-land fish responses to climate change globally, although variations in losses would no doubt exist. For want of a broader set of studies, the implications of O'Reilly are extrapolated. A decrease of the same magnitude is assumed for 2000 to 2030 due to the accelerating temperature changes. Climate impact factors for inland fisheries are assumed to be 0.9 in 2010 and 0.7 in 2030 in Africa. These values serve as a benchmark to determine the climate impact factors of the other regions.

Forestry. From the US Forest Service (2010), data concerning the potential area covered by forest in the period 1961-1990 was obtained (km2 in 1975) and the simulated estimations for 2071-2099 (km2 in 2085) under the climate change effects retrieved. This information was necessary to assess the change in the vegetation potential trend during the period under consideration under a A1B scenario.[56] Then the hypothetical projected forest surface in 2030 was obtained by multiplying the potential forest-trend, found with the previous operation, for the forest surface in the year 1990 (FASTEST, 2012), an operation made for each country.

Labor Productivity. Labor productivity is a major impact of climate change, along with health and other effects of higher temperatures in the workplace.

In order to obtain the relative losses in terms of GDP for a given year, several corrections have been implemented to take into account people working in air-conditioned places using the data from Isaac and van Vuuren, 2009. Afterwards the corrected productivity values were translated to shares of GDP using the labor demand elasticity, differentiated by sector for every country, using the data provided by Min 2007 and Wacker et al. 2006, derived using the Cobb–Douglas model and a climate factor value reflecting the percentage of GDP exposed to temperature changes (outdoor workers and indoor without air conditioning). The formula for the percentage GDP loss in year *t* is:

$$GDP\_Per\_Cost_t = (P_t + C_t).LE.CF_t$$

Where P_t is the incremental working day loss in the year (2000, 2010, and 2030) for the country, C is the high-latitude productivity gain (if present), *LE* is the labor elasticity, and *CF* is the climate factor showing the GDP percentage affected by climate change.

To avoid double counting with the index "Cooling", the costs were corrected by reducing the losses in productivity for workplaces where air conditioning systems are or will be installed.

While the Heating and Cooling indicator includes both commercial and residential energy costs, the correction might be considered exaggerated, but it was not possible to distinguish adequately between people working from home or not internationally.

The extension of the estimates for 2030 from this source to 2050 was based on the analysis of Roson and Sartari (2016). Furthermore, using estimates from Roson and Sartari, the loss of productivity is broken down into losses in agriculture, industry, and services.

Annex 2:
Costs of Mitigation by Sector

NDC (2021) gives the following breakdown of costs of mitigation by sector ($ Thousand).

Emissions Source/Re-newables	Mitigation Measure	2022-2025	2026-2030
Agriculture	Reduction of methane from rice	1,338	1,338
Energy Biomass	Generation of electricity from biomass	34,139	32,564
	Generation of electricity from biogas	1,215	4,859
Households	Replace fluorescent bulbs with LED	2,370	3,511
	Efficient wood burning stoves	40,000	55,000
	Efficient electric stoves	5,025	6,700
	Efficient refrigerators	32,425	45,396
Energy Services	Higher Efficiency in dishwashers	0	0
	Higher Efficiency in hotel refrigerators	0	20
	Higher Efficiency in hotel washing machines	41	41
	Higher Efficiency in energy servicing	33	38
	New central cooling office equipment	66	132
Energy Distribution	Increase efficiency in the network	23,973	28,767
Forest	Reforestation	3,600	3,600
	REDD Avoided deforestation	-2,017	-2,017
	Assisted regeneration of forests	2,400	2,400
Wastes	Incineration of factory wastes	28,889	28,889
	Municipal waste de-composting	4,877	4,877
Industry	Switch from heavy fuel oil to natural gas	3,124	3,124
Fugitive Emissions	Reduced flaring of gas	21,732	21,732
Hydro	Mini-hydro off-network	20,000	40,000
Solar	Solar residential water heaters	0	47
	Solar PV Large scale	600	500
	PV for homes	1,575	1,800
	PV for chalets	15	21
	Mini solar diesel networks	24,000	27,000
	Solar street lights	22,848	36,556
Transport	Electric cars	0	7,200
	Electric buses over 18 meters	758,500	1,902,500
Wind	On-shore wind farms	2,025	6,500
Total		**1,632,553**	**2,762,595**
Of which	*Conditional Amount is*	*1,594,560*	*2,706,487*

Source: NDC (2021).

Annex 3:
Modeling a Carbon Tax

The IMF model for analyzing the carbon tax provides standardized analyses, on a country-by-country basis for 135 member countries (including the Republic of Congo), of carbon pricing and other mitigation instruments. The model starts with use of fossil and other fuels for the power generation, transport, industrial, and household sectors and projects this forward in a business-as-usual scenario using assumptions about: (i) future GDP growth; (ii) income elasticities for energy products; (iii) rates of technological change (e.g., that improve energy efficiency); and (iv) future international energy prices. An economy-wide model then looks at the impacts of the introduction of a carbon tax at a given time (and sustained after that date) on output in different sectors as well as prices, government revenues and expenditures and all components of the external account.

For Congo, carbon prices (in 2017 US$ and covering all fossil fuels) in 2030 of US$35 or US$70 per ton of CO_2 are considered and found to have a significant reduction in GHGs at a very low cost in terms of welfare. Over this period, under Business as Usual, the IMF model estimates GDP in ROC to increase by 8 percent and CO_2 emissions to decline by 23 percent between 2017 and 2030. These projections are not obviously consistent with those of the NDC presented by the government. The difference lies in the interpretation of business-as-usual. The IMF includes some measures that reduce emissions and may be viewed as something between the NDC business-as-usual and the NDC Unconditional Scenario. Under carbon taxation, a reduction of GHGs relative to business-as-usual by 2030 is estimated to be a further 6 percent with a $35 tax and 10 percent with a $70 tax. Thus a $35 tax would result in emissions by 2030 of about 7,400 kilotons, which is close to the unconditional target of 7,081 kilotons. The model also calculates both the narrow economic cost (roughly the loss of GDP) as well as a welfare cost, which is a combination of the economic cost less the benefits of lower particle pollution in the form of people's valuations of lower health risks. There are also some benefits from less congestion and fewer road accidents under a carbon tax. For ROC, the IMF model projects hardly any welfare cost of a carbon tax of $70 and equally no economic cost either. For further details, see IMF (2019).

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Endnotes

1. Although official cases are relatively low, according to ROC's 8th Economic Update, ROC has a low rate of COVID-19 testing which, with findings from seroprevalence studies, suggest that the true number of infections may be far higher than the number of confirmed cases. https://openknowledge.worldbank.org/bitstream/handle/10986/36570/Republic-of-Congo-Economic-Update-8th-Editon-Living-in-Times-of-COVID-19.pdf?sequence=1&isAllowed=y

2. Acceptance of COVID-19 vaccines in the Republic of Congo: From intention to action. https://blogs.worldbank.org/africacan/acceptance-covid-19-vaccines-republic-congo-intention-action

3. World Bank, CEMAC Quarterly Economic Barometer, May 2022.

4. See the Eighth Edition of the Republic of Congo Economic Update for more information on the impact of COVID-19 on households, firms and the Congolese economy in 2020. https://openknowledge.worldbank.org/bitstream/handle/10986/36570/Republic-of-Congo-Economic-Update-8th-Editon-Living-in-Times-of-COVID-19.pdf?sequence=1&isAllowed=y

5. The identified impacts of the war in Ukraine on the global economy and SSA are from the June 2022 GEP report and the April 2022 Africa's Pulse report.

6. Assimilable Treasury Bills are securities issued on the regional market for periods of 13, 26 and 52 weeks, with a nominal value set at one million CFA francs. Similarly, Assimilable Treasury Bonds are issued for periods greater than or equal to two years, with a nominal value of 10,000 CFA francs.

7. FAO, IFAD, UNICEF, WFP and WHO. 2022. The State of Food Security and Nutrition in the World 2022. https://www.fao.org/3/cc0639en/online/cc0639en.html

8. The new Plan is articulated around six strategic areas: agriculture, industry, special economic zones, tourism, digital economy, and real estate. It also identifies peace and political stability, governance, business environment, and environmental protection as the four cross-cutting areas that will support its successful implementation.

9. The resilience plan is articulated around six areas: promotion of an import substitution policy by encouraging the development of local production for basic products; facilitation of the transport of basic products; stabilization of prices of essential food and agricultural products; support for local producers; rigorous application of administrative, fiscal and parafiscal measures; and protection of vulnerable people.

10. GEP, June 2022.

11. The Government maintains administrative controls on the prices of a wide array of consumer necessities (e.g., gasoline, electricity tariffs, cooking gas, and several food staples), some of which it supports with budget subsidies (e.g., gasoline and electricity tariffs). These price controls, in conjunction with a projected growth in domestic agricultural production, are expected to moderate the rise of inflation. However, they may also lead to an increase of oil and gas subsidies as well as more frequent refined oil shortages.

12. World Bank, Climate Change Knowledge Portal.

13. Data for six key sectors (food, water, health, ecosystem services, human habitat, and infrastructure) is included. https://gain-new.crc.nd.edu/ranking/vulnerability

14. https://climateknowledgeportal.worldbank.org/country/congo-republic/climate-data-historical

15. Climate Model: Temperature Change (RCP 8.5) - 2006 - 2100 - Science On a Sphere (noaa.gov)

16. United States' National Oceanic and Atmospheric Administration.

17. Development Assistance Research Associates (DARA), 2012; International Food Policy Research Institute (IFPRI), 2017; Lincke and Hinkel (2018).

18. There are other categories of costs associated with climate change, such as higher energy costs of cooling and possible loss of ecosystem services. To avoid double counting costs and to be consistent with Country Climate and Development Reports methodology, the focus is on the categories included.

19. http://www1.wfp.org/countries/congo

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26. IFPRI (2017)

27. The effects of changes in temperature and precipitation, the latter especially during the growing season, affect crops differently. These are the results of the agronomic investigations.

28. The model was run by IFPRI for only Representative Concentration Pathways 8.5 (the pessimistic scenario). As such it points to the impacts in the most pessimistic case. To convert the loss in physical output into monetary values, world prices are taken from the IFPRI model. This is a less than ideal approach but estimates of domestic price changes are not available for all commodities. The effects of world price changes and their expected evolution with climate change can be calculated for some crops from work done by IFPRI. The crops covered for ROC are the key ones of maize, millet, rice, bananas, other fruits and vegetables, groundnuts, and cassava

29. https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=CG

30. Unconditional refers to what Congo can implement based on its own resources and capabilities while conditional refers to what Congo can implement with additional external funding.

31. Saeed, et. al. (2021).

32. Park, (2016).

33. Dasgupta, et. al. (2021).

34. Ro (2021).

35. Dasgupta, et. al, (2021).

36. Park (2016).

37. Cherif, R., et al. (2017). Riding the Energy Transition: Oil Beyond 2040. IMF Working Paper WP/17/120. IMF, Washington DC. https://www.elibrary.imf.org/view/journals/002/2021/226/article-A001-en.xml

38. IMF, Republic of Congo Selected Issues Paper (SIP), 2021.

39. https://data.worldbank.org/indicator/EN.ATM.CO2E.PP.GD.KD?locations=XM. It measures all GHG emissions converted into CO2 equivalent and divides them by GDP measured in dollars converted using a purchasing power parity exchange rate.

40. The waste management sector has negative net emissions under the unconditional and conditional scenarios. This reflects plans to use waste for power generation, GHG emissions that would have entered the atmosphere to replace fossil fuel sources, resulting in negative net emissions.

41. The 'idea': Uncovering the peatlands of the Congo Basin (mongabay.com)

42. Cherif, R. et al. (2017). Riding the Energy Transition: Oil Beyond 2040. IMF Working Paper WP/17/120. IMF, Washington DC. https://www.elibrary.imf.org/view/journals/002/2021/226/article-A001-en.xml

43. The net receipts in that year are negative, in which case no transactions would take place.

44. https://www.ft.com/content/4f0579ac-409f-41d2-bf40-410d5a2ee46b.

45. World Bank (2021).

46. Global Initiative to Reduce Gas Flaring: "Zero Routine Flaring by 2030" https://thedocs.worldbank.org/en/doc/a903b5e6456991faf3b5e079bba0391a-0400072021/related/ZRF-Initiative-text-list-map-102.pdf

47. https://energycapitalpower.com/the-republic-of-the-congo-to-upgrade-gas-in-pursuit-of-zero-flaring/

48. World Bank 2022. Financing Solutions to Reduce Natural Gas Flaring and Methane Emissions https://openknowledge.worldbank.org/bitstream/handle/10986/37177/9781464818509.pdf?sequence=4&isAllowed=y

49. Carbon taxes are charges on fossil fuels, with rates equal to the fuel's CO2 emissions factor multiplied by a CO2 emissions price. They can be comprehensively applied and should cover imported but not exported fuels.

50. IMF (2019). Fiscal Policies for Paris Climate Strategies: From Principle to Practice. http://www.imf.org/external/pp/ppindex.aspx

51. These projections are not obviously consistent with those of the NDC presented by the government. The difference lies in the interpretation of BAU. The IMF includes some measures that reduce emissions and may be viewed as something between the NDC BAU and the NDC Unconditional Scenario.

52. See Carolyn Fisher's analysis of Carbon Pricing with Rebating for Industry for details of how to combine such pricing with complementary measures related to industry.

53. Narayan et al 2016, https://doi.org/10.1371/journal.pone.0154735; Reguero et al 2020, https://doi.org/10.1016/j.ecolecon.2019.106487.

54. The 2022 Republic of Congo Country Economic Memorandum provides detailed information on key policies and reforms to build the foundations for a "diversified development" in ROC that will support long-term economic growth.

55. See the 2022 Country Economic Memorandum for a detailed discussion on reforms to improve the coverage and quality of digital and electricity infrastructure.

56. In terms of the Representative Concentration Pathways s now in use, this scenario is somewhere between Pathway 6 and Pathway 8.5. See: https://ethz.ch/content/dam/ethz/special-interest/usys/iac/iac-dam/documents/group/climphys/knutti/publications/rogelj12natcc.pdf