



CONCEPT NOTE¹
MEASURING INTERNAL RESILIENCE CAPACITY AND RECOVERY DURATION
IN SMALL ISLAND DEVELOPING STATES

1. BACKGROUND

1.01 Finance eligibility criteria and systems are often not suited to the unique challenges and constraints of Small Island Developing States (SIDS). These criteria depend mainly on Gross National Income (GNI) per capita as the measure of economic development in the country. However, even when small states have achieved high levels of income (GNI per capita), they can be impacted significantly by exogenous shocks. Importantly, pre-shock GNI does not capture well the needs arising from the various types of exogenous shocks. Further, some natural hazard events destroy productive and institutional capacity, amplify underlying structural vulnerabilities and limited implementation capacity, generate higher debt levels, and constrain investment in resilient infrastructure. These conditions contribute to a post-shock “vulnerability and resilience drag” that is much higher (of longer duration and higher cost) for small developing countries than for larger and more developed economies. However, conventional measures of GNI per capita do not capture this “vulnerability and resilience drag” and therefore can provide misleading signals about the financing needs for sustaining health and stability of the economy. Consequently, the use of narrow measures to access concessional finance does not contribute as effectively as intended or as possible to spur economic development.

1.02 Multilateral financial organisations have been challenged by international and regional stakeholders to think creatively about solutions and options to address SIDS’ vulnerabilities. Most SIDS are still not eligible for concessional financing because they are classified as middle- or high-income countries. There is a need to ensure that international financial systems support SIDS with structural vulnerabilities appropriately as well as those with the lowest GNI per capita. The call for the development of a globally accepted vulnerability metric as a more appropriate measure of small state economic development was first made in 1992 at the United Nations Conference on Environment and Development. The call was repeated by small states in 1994, in the Programme of Action for the Sustainable Development of small states. In 2019, during the United Nations (UN) General Assembly, members were again asked to “address limitations of an income-only assessment of development and graduation readiness”². Multilateral organisations including the Caribbean Development Bank³ (CDB), Commonwealth Secretariat (CS), and United Nations (UN) have responded to this challenge with increased effort in recent years to develop a Multidimensional Vulnerability Index (MVI).

¹ The Internal Resilience Capacity and Recovery Duration Adjuster research project is a collaboration between the President’s Office and Economics department. The research project is led by Dr. Hyginus “Gene” Leon with support from Ms. Andrea Power (Advisor to the President) and Mr. Ian Durant (Director of Economics) and comprises a team including Mr. Jason Cotton (Economist) and Mr. Krishna Clarke (Research Analyst).

² https://www.un.org/ga/search/view_doc.asp?symbol=A/74/L.3&Lang=E

³ The CDB has a long history in technical and analytical studies to understand the nature of vulnerability and policies to build resilience in the Caribbean Region. Early efforts made by the CDB to estimate the vulnerability of BMCs were completed by Crowards (2000). Since then, CDB has continued to respond to the need to understand vulnerability and resilience, including exploring innovative ways to improve its allocation of financial resources. The most recent efforts include: (i) the development of a Multidimensional Vulnerability Index (2019)³ working paper; (ii) a package of tools³ and resources to consider the impact of climate change on road infrastructure; and (iii) CDB financed the State of the Caribbean Climate Report, which was prepared to strengthen the decision-making processes that will be required to accelerate resilience-building efforts in the Caribbean.

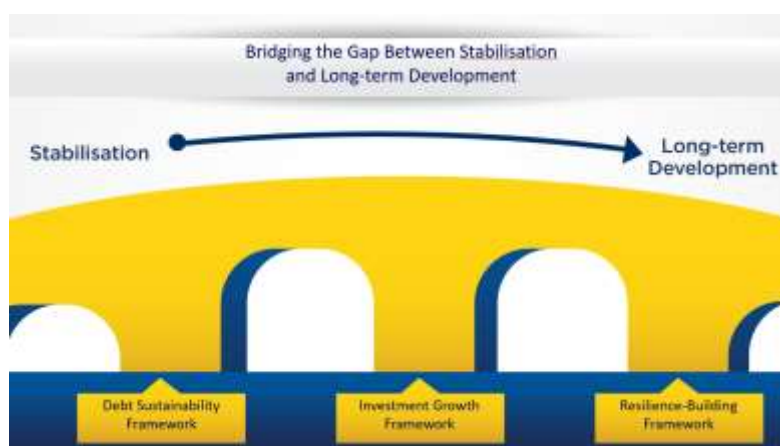
1.03 Within this context the CDB is reviewing its strategies and the way we “do business” including financing modalities to better serve the needs of our Borrowing member countries. Work is ongoing on improving the measurement and application of the concepts of vulnerability and resilience in resource access and allocation and this concept note is another step in that process. This concept note highlights the CDB’s latest thinking on measuring vulnerability and resilience and its application to financing eligibility and the marshalling of finance for small states. The note is structured as follows: (i) section 2 briefly reviews SIDS development challenges; (ii) section 3 outlines CDB’s proposition for its vulnerability and resilience framework; (iii) section 4 provides illustrations of the impact of a shock on the development trajectory of SIDS; (iv) section 5 details the algebraic expression of the vulnerability and resilience framework and (v) the note articulates the way forward in the final section.

2. SIDS CHALLENGES

2.01 Legacy structural weaknesses in SIDS have been exacerbated by the socioeconomic impact of the COVID-19 pandemic and more frequent exogenous shocks. Even prior to the onset of the 2008 global financial crisis and the COVID-19 pandemic, small states were grappling with economic, social, and institutional challenges that were constraining their capability to effect real and meaningful transformation of their economies. While the global financial crisis inflicted deep-seated economic and financial wounds, the COVID-19 pandemic and more recently the Russia-Ukraine war has gone even further, and pried open economic, health, and social wounds that now threaten the very existence of our small societies. Indeed, small states are currently experiencing a “triple threat” involving the devastation of people, the economy, and the environment. Further, our countries remain among the most vulnerable and least resilient in the world, making the recovery from shocks of long duration. This combined cocktail, resulting in low competitiveness and productivity, has reduced the scope for the region to realistically achieve many of the sustainable development goals by 2030.

2.02 The challenge before us is how best to navigate a safe path from legacy structural weaknesses to transformative development, while maintaining debt sustainability, enhancing macroeconomic and financial stability, and building resilience against shocks. This requires a holistic approach to development, creating a bridge between stabilisation and long-term transformation — in essence, integrating the debt sustainability framework of the International Monetary Fund, the investment-growth framework of the World Bank, and the resilience-building framework of the United Nations (See Chart 1). But coherence among these frameworks must be underpinned by access to adequate and affordable finance.

CHART 1: BRIDGING THE GAP BETWEEN STABILISATION AND LONG-TERM DEVELOPMENT



2.03 Without access to a financing ecosystem that can provide adequate and affordable finance SIDS will not achieve their development goals. Since all financing instruments are not created equal, we need a suite of instruments that can be combined coherently to manage diverse needs, while providing appropriate governance safeguards. This financing ecosystem must distinguish financing sources for rescue, recovery, and long-term repositioning. Establishing such a financing facility will require accessing funds from multiple sources (own generation, public and private sectors, and bilateral and multilateral development partners) that can be deployed for a development purpose through a suite of financial instruments. This instrument suite should be designed to require systemic internal coherence at each point in time as well as ensure policy consistency over time.

2.04 Although considerable effort has been undertaken on measures of economic vulnerability, which considers a country's susceptibility to external shocks and geophysical hazards, resilience has not been comprehensively incorporated to give an all-round perspective of a country's true welfare state and its capacity to recover after a shock. We therefore need a vulnerability metric that goes beyond susceptibility, and which can capture our ability to bounce back (resilience) from shocks. This has become especially evident in the past two decades where our Region has been struggling to cope with the impact of a multitude of severe environmental shocks that have decimated our capital stock and productive capacity.

3. CDB's PROPOSITION

3.01 We believe that vulnerability and resilience⁴ are two sides of the sustainable development nexus. Vulnerability can result from a loss of resilience and resilience can be slowed by changes in vulnerability. While vulnerability summarises why developing countries are not able to achieve higher potential development, it is unable to capture adequately how shocks increase vulnerability, reduce resilience, increase the duration to recovery, and limit sustainable development. Further, while several countries may face a similar likelihood of a hazard, their ability to recover from the shock while preserving the welfare of citizens can differ vastly. Many of our countries are stuck in the low resilience-high vulnerability quadrant of the development space and need to move to the high-resilience-low vulnerability quadrant for transformative development to occur.

3.02 CDB is proposing three specific tools that capture the structural vulnerability and resilience conditions in SIDS and developing countries in a dynamic and forward-looking framework. The framework focuses on measuring the Internal Resilience Capacity (IRC) of countries and the reality of much longer post-shock recovery times⁵ for developing countries. More specifically, it seeks to capture the reality that exogenous shocks in SIDS can lead to deep structural scars that can persist long after the occurrence of an exogenous shock event and can lead to longer recovery periods for developing countries and SIDS when compared with developed countries. These longer recovery periods also have implications on financing needs and the long-term development trajectory of the country. As such, the framework is applicable to SIDS in the Caribbean, Pacific, Atlantic, and Indian Oceans, and South China Sea, but as a resilience framework can be applied universally and in a customisable manner to all countries facing a variety of external shocks. The framework comprises three tools including the IRC metric, Recovery Duration Adjuster (RDA), and Vulnerability and Resilience Assessment Tool.

⁴ The Stockholm Resilience Center defines resilience as “the capacity of a system to deal with change and continue to develop”. It is about how humans and nature can use shocks like a financial crisis, climate change, or a pandemic to spur renewal. There is growing understanding that Resilience is therefore complex and multi-dimensional, embracing resistance; recovery (the speed of return to some pre-shock performance level); reorientation (ability to adapt); and renewal (resume their pre-shock growth path). So, resilience encompasses many dimensions— social, institutional, productive capacity, environmental, and financial. Simply put, there can be no sustainable development without resilience.

⁵ Highly vulnerable countries like SIDS take three to four times as long to recover real GNI levels after natural hazards and external shocks.

3.03 The design of the tools is anchored in the perspective that sustainable development is about improving the quality of the lives and capabilities of our people through building a resilient ecosystem that encompasses all dimensions of resilience (social, institutional, productive capacity, environmental, and financial resilience). Simply put, the structural deficiencies of the Caribbean Region and Small States in general cannot be overcome in a partial way, as this only leads to uneven or unsustainable progress. It is important therefore that we design holistically, but execute in a temporally coherent way that preserves definition of structure and recognises the inherent dynamics of motion

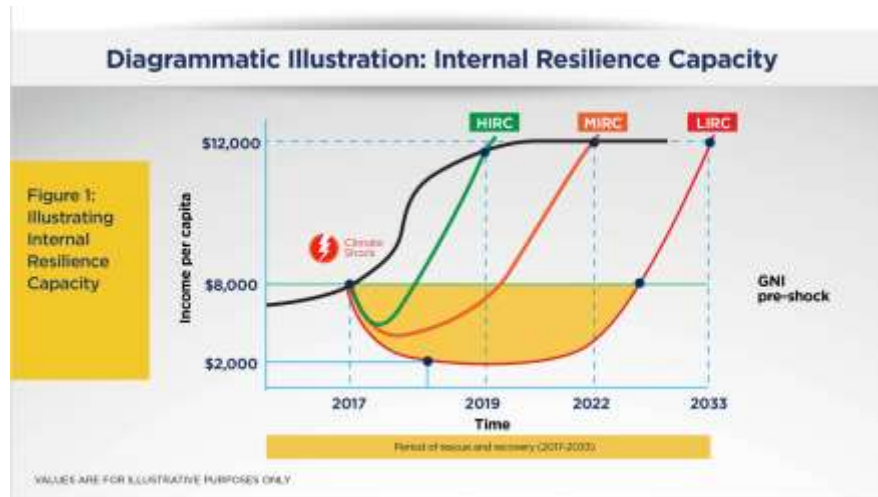
3.04 The IRC metric, which can complement or completely replace GNI, calculates threshold income levels for low internal resilience capacity, medium internal resilience capacity, and high internal resilience capacity. It is applicable in principle to all countries, meeting a key universality principle, and can function as the criterion for eligibility for concessional finance at a global level. This IRC metric captures the (*pre-shock*) structural and vulnerability factors that regularly constrain growth and development; distinguishes the magnitude, impact, and persistence of types of shock events (*the shock*); and incorporates factors (including exogenous, endogenous to policy interventions, state variables, and access to adequate and affordable finance) that influence resilience capacity and thereby the duration to recovery (*the post-shock*). With the IRC measure and an easily understandable dashboard for gauging the resilience capacity of countries (Low, Medium, and High), (See Chart 2), the eligibility to development or concessional finance will depend on need and resilience capacity and less on past income levels. The IRC framework also meets key principles articulated in the UN Secretary General’s report A/76/211: multidimensionality (definitional — multi-factor; and temporality — dynamics of motion), universality, and resilience.

CHART 2: INTERNAL RESILIENCE CAPACITY DASHBOARD



3.05 A key implication of the IRC metric is that the pre-event GNI is an inadequate metric for determining access to concessional finance in the context of shocks that decimate capital and output and in which overall resilience is low. For example, can we argue that if Dominica had an \$8,000 per capita GNI before a hurricane (e.g. Hurricane Maria) that decimates its Gross Domestic Product by 200 percent, that same \$8000 per capita GNI should still be used to determine access to concessional finance, even if the per capita GNI will be significantly lower during the 7 to 10 years the country will need to recover to the pre-shock \$8,000 per capita GNI? This measure should clearly not apply after the shock event and surely not for the duration period through recovery, given its overestimation bias (See Chart 3).

CHART 3: INTERNAL RESILIENCE CAPACITY AND RECOVERY DURATION



3.06 The RDA is an application of the IRC and provides an alternative approach to adjust GNI for the effects of the exogenous shock. The RDA proposes a resilience-adjusted per capita income measure that is better suited for and more equitable in allocating much-needed financial resources for developing countries, especially after crises. The RDA aims to calculate the loss associated with the shock event and adjust GNI to take account of the fact that it can take developing countries much longer (between 5 to 10 years) to recover from an exogenous shock, compared with developed countries. It proposes to address the issue of basing access to finance on pre-shock GNI, which is particularly onerous and inequitable when the magnitude of the crisis reduces GNI significantly and for long durations. The concept of duration to recovery, in turn, highlights the plight of countries facing multiple shocks within a period of recovery, for example, successive shocks of the global financial crisis, natural hazards, and the pandemic. Importantly, it allows a measure of welfare/GNI loss relative to pre-shock levels that can be used to tailor the need for concessional finance (See Chart 4).

CHART 4: RECOVERY DURATION ADJUSTER

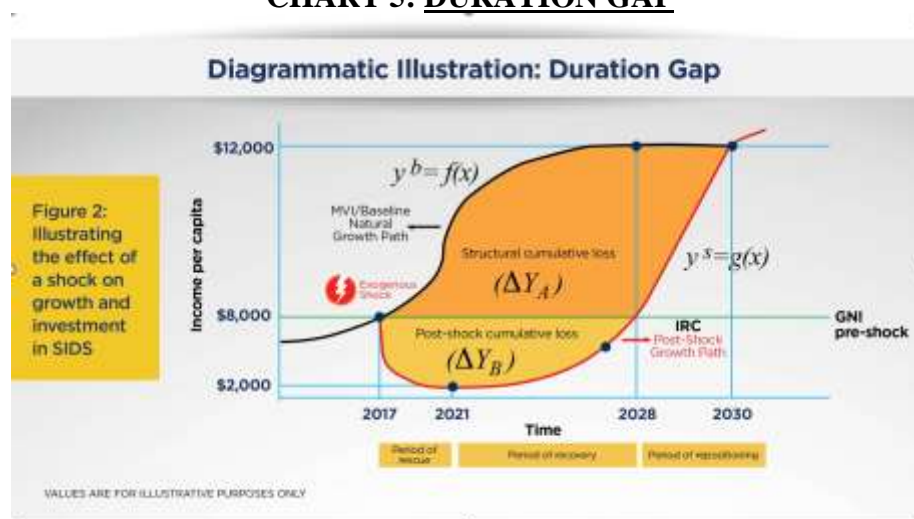


3.07 We supplement the global level assessment of the IRC and the country level assessment of the RDA with a Vulnerability and Resilience Assessment Tool. This tool provides a deeper diagnostic of inherent vulnerabilities in the economic, social, and environmental and resilience capacity dimensions — in other words, national vulnerability-resilience profiles. It enables the design of policy recommendations to address key deficiencies and to build resilience; can be linked to national development goals and mapped to national budgets; can provide a measure of accountability as well as a bridge from existing measures of vulnerability to sustainable measures of resilience; and is consistent with performance-based allocation models used by International Financial Institutions and Multilateral Development Banks.

4. DIAGRAMMATIC ILLUSTRATION

4.01 We illustrate the economic development path of SIDS prior to and after an exogenous shock. Chart 5 shows the effect of a shock on growth and investment by comparing the gap between the below-potential vulnerability-induced baseline growth path⁶ (MVI/Baseline - [$y^b=f(x)$]) that the country would have travelled in the absence of a shock—but taking account of existing structural, vulnerability, and resilience conditions—and the new path that the economy travels once the shock has occurred [$y^s=g(x)$]. The cumulative gap between these two curves measures the implicit loss of income (in general, welfare loss) arising from the shock; it also allows for a measurement of the length of time (duration) that it takes for the country to recover to its pre-event income (in general, welfare state) following the shock. This inability to recover quickly or “resilience drag” is associated with two types of losses: a structural cumulative loss [ΔY_A] and the post-shock cumulative loss [ΔY_B]. We define the duration gap as the length of time it takes after the shock to recover to the pre-shock income or welfare measure (in illustration, 2017-2028).

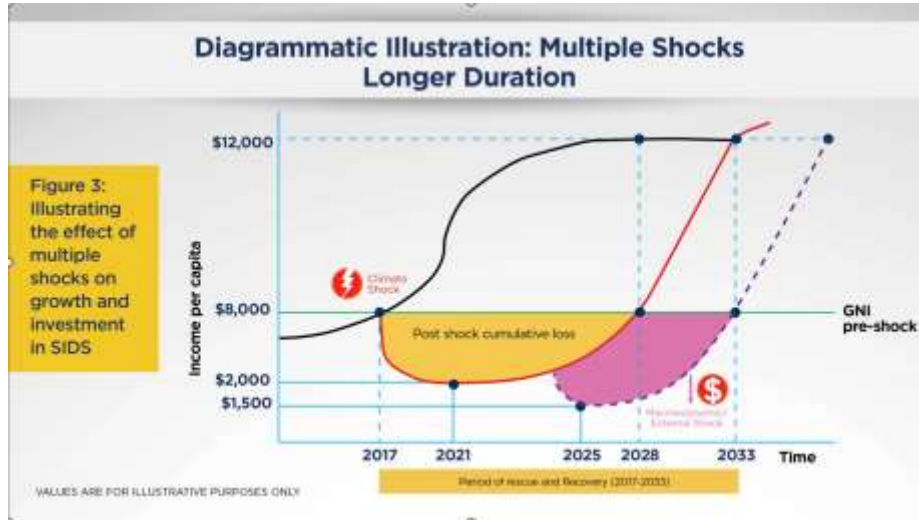
CHART 5: DURATION GAP



4.02 The framework can also accommodate cases of multiple shock events, where a second shock occurs during the recovery period from the initial shock — for example, a hurricane after the global financial crisis, or the COVID-19 pandemic after a hurricane. The effect of multiple shocks is to shift the post-shock trajectory downward and sideways, lengthening the duration to recovery and increasing the cumulative income or welfare losses (See Chart 6, illustrated as shifting from 2017-2028 to now 2017-2033).

⁶ This trajectory of the baseline growth path shows the less-than-optimal potential performance of the country, given its vulnerabilities. In other words, absent these vulnerabilities (including structural weaknesses), the country would be on a higher development trajectory.

CHART 6: ILLUSTRATION OF MULTIPLE SHOCKS AND LONGER DURATION



5. ALGEBRAIC EXPRESSION

5.01 We also present algebraically the RDA methodological approach in six steps. The first step provides a functional estimate for the Baseline (MVI) Growth Path/development trajectory under a no-shock scenario, taking into consideration the inherent structural vulnerabilities and existing resilience building policies in the country (See Chart 7). This trajectory shows the less-than-optimal potential performance of the country, given its vulnerabilities. In other words, absent these vulnerabilities (including structural weaknesses), the country would be on a higher development trajectory, with a higher level of income/welfare at each point.

5.02 The second step (the IRC post-shock Growth⁷ path/development trajectory) estimates the effect of various shocks on the development trajectory and differs from the no-shock scenario as it not only includes *changes to the vulnerability and resilience factors* that occur because of the shock, but also takes account of the *type and magnitude of the shock* as well as the *lower ability to mitigate the impact of the shock* owing, in part, to the country’s less-than-adequate access to needed finance. In the post shock scenario, GNI declines, and the time it takes for GNI to return to the pre-shock level is determined by the country’s IRC.

5.03 In the third step, the structural cumulative loss is computed as the cumulant of the difference between the estimated value of GNI under the MVI/Baseline growth path (no-shock scenario) and the pre-shock GNI value.

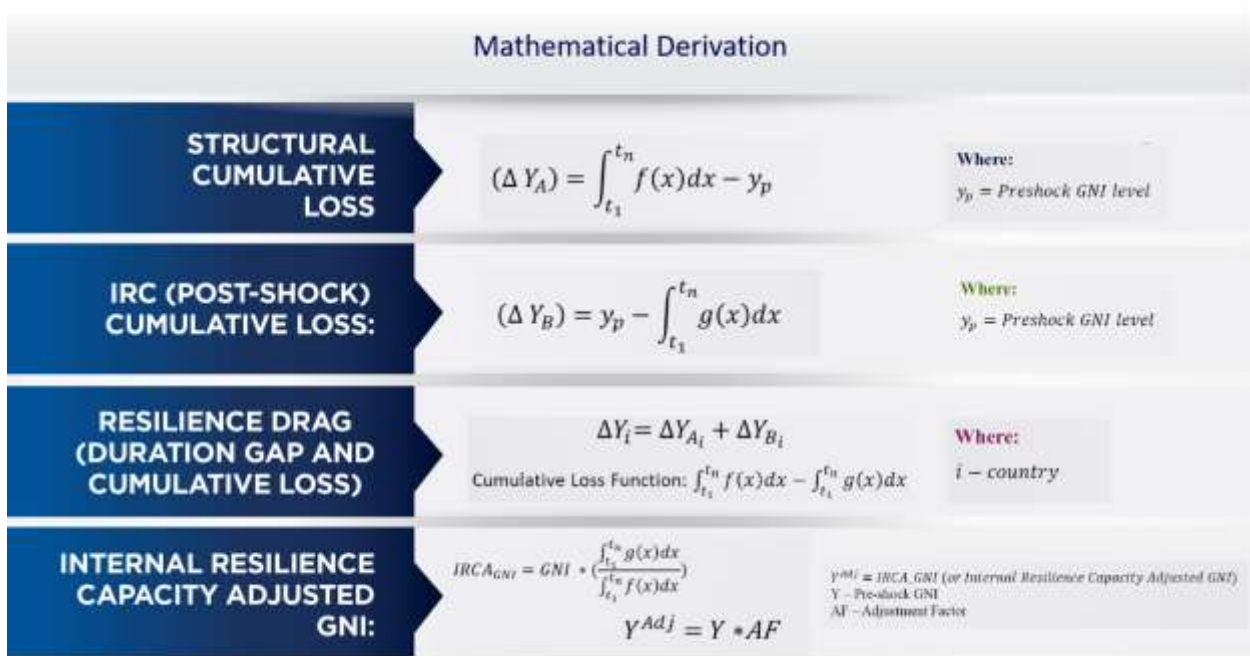
5.04 In the fourth step, the post-shock cumulative loss is measured as the cumulant of the difference between the estimated value of GNI under the IRC post-shock Growth path/development trajectory and the pre-shock GNI value.

5.05 The fifth step calculates the total cumulative loss as the summation of the no-shock (structural cumulative loss) and the post-shock cumulative loss.

⁷ The effect of an exogenous shock on the development trajectory and recovery period can be captured in what the CDB refers to as MVI+ which is equivalent to our IRC Post-shock Growth path/development trajectory.

5.06 In the sixth and final step, the IRC-adjusted GNI, which could be used to determine the extent or severity of need for access to concessional finance, is computed by adjusting the pre-shock GNI level by a factor based on the ratio of a cumulant measure of post-shock GNI (welfare) to the Baseline GNI (welfare). In this last step, the GNI adjustment links the augmented access to concessional finance to a compensating variation for the imputed income (welfare) loss arising from the shock.

CHART 7: ALGEBRAIC EXPRESSION OF THE RDA



6. THE WAY FORWARD

6.01 CDB is currently in the early stages of its empirical estimation of the IRC and RDA as well as a prototype for the vulnerability and resilience assessment tool. The process of refining and developing the methodology and empirical estimates will be an ongoing exercise and CDB is soliciting partnerships with development partners, and other regional and international institutions to advance these ideas promptly.