

The background of the entire page is an aerial photograph of a dense, vibrant green forest. A clear, blue river winds through the center of the forest, creating a meandering path. The lighting is bright, highlighting the textures of the tree canopy and the calm surface of the water.

GAR

**Global Assessment Report
on Disaster Risk Reduction**

GAR Special Report 2023

**Mapping Resilience for the
Sustainable Development Goals**



United Nations

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EXECUTIVE SUMMARY

Global warming will surpass 1.5°C above pre-industrial levels during the next decade, due to greenhouse gas emissions. The constant rise in temperatures and related impacts combine with other pressures, thus increasing risk and undermining resilience. The increasing interconnectedness of people and human systems increases the risk of compound and cascading crises.

The maps in this report highlight how factors such as the rapid deterioration of biodiversity, the degradation of land and stress on water resources, lower the capacity of human systems to withstand hazards that are occurring more frequently and with greater intensity. Currently, only 50 per cent of countries have operational early-warning systems and even fewer have legislation in place to connect these systems to preparedness and response plans that can ensure prevention and anticipatory action, as well as response. Humanitarian needs are also rising, as disasters and conflict continue to create enormous human suffering.

While progress continues to be made towards increasing access to electricity, water, healthcare and education, progress towards reducing extreme poverty has been challenged by COVID-19 climate change and other factors (World Bank, 2022a). This has led to growing inequities and pressures on the planet, which are reversing other hard-won development gains. This is particularly the case for lower-income countries, who contribute the least to the causes of climate change and where the most vulnerable populations reside. These adverse impacts occur because the

pursuit of human development has not adequately considered the inadvertent effects on ecosystems and livelihoods. Building in resilience-thinking can accelerate the required paradigm shift for the benefit of people, the planet and prosperity, and future generations. However, interventions and investments in resilience must become more targeted, more systems-oriented and more capable of scaling-up. Systems must not only be able to recover from disasters but need to be adaptive and transformative to build a more sustainable, prosperous and equitable future.

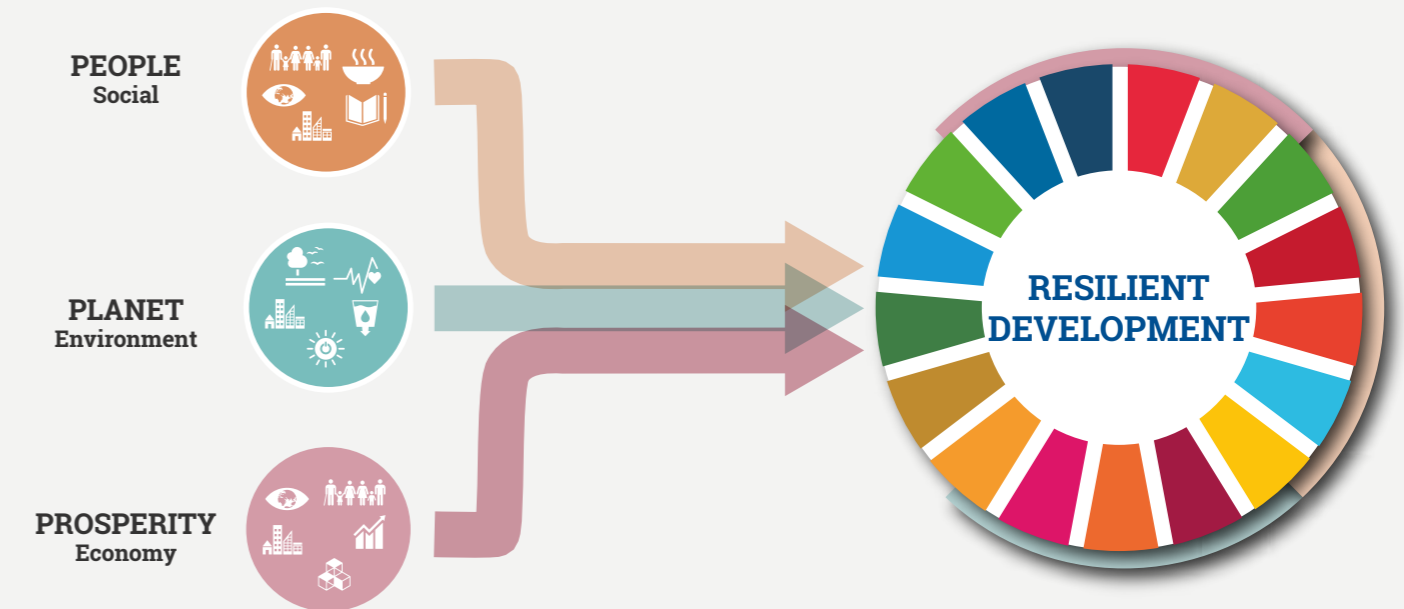
Developed to cover the period 2015-2030, the Sustainable Development Goal (SDG) framework has agreed targets and indicators and a data-gathering system that has been accepted and is being applied by United Nations Member States across the globe¹. Figure 1 shows the existing web of Sustainable Development Goals (SDGs) targets and indicators, that covers key interconnected progress across people, planet and prosperity. However, all too often, the progress data is collected independently in silos. When this same data is looked at holistically from the perspective of resilience-building, key resilience deficits that are holding back sustainable development become evident.

The maps in this report highlight a number of these resilience deficits that are holding back achievement of key sustainable development goals. At the same time, the report's action case examples show that this is not inevitable, and how action is possible on every continent to stop the worsening spiral of risk and disasters and to accelerate SDG target achievement.

Addressing resilience gaps will require the unprecedented scaling-up from with both resilience investment and adaptation action both from within the public and private sectors, particularly for the most vulnerable countries. As these investments take time to mobilize and prepare, delay will increase the inevitable costs. Action is needed now. Disaster risk reduction sits at the nexus between development, humanitarian and climate change action, and can

help foster more-sustainable resilient action in each. Readjusting development pathways requires a re-examination of how prosperity is measured, and a greater emphasis on resilience as key element of sustainable development today and in the future.

Figure 1. Resilient development – people, planet and prosperity



Source: UNDRR, 2023

¹ The Sustainable Development Goals Report 2022 shows that “we still lack timely, high-quality and disaggregate data to fully understand where we are and where we are headed. Investment in data and information infrastructure should be a priority of national governments and the international community” (United Nations, 2022a).

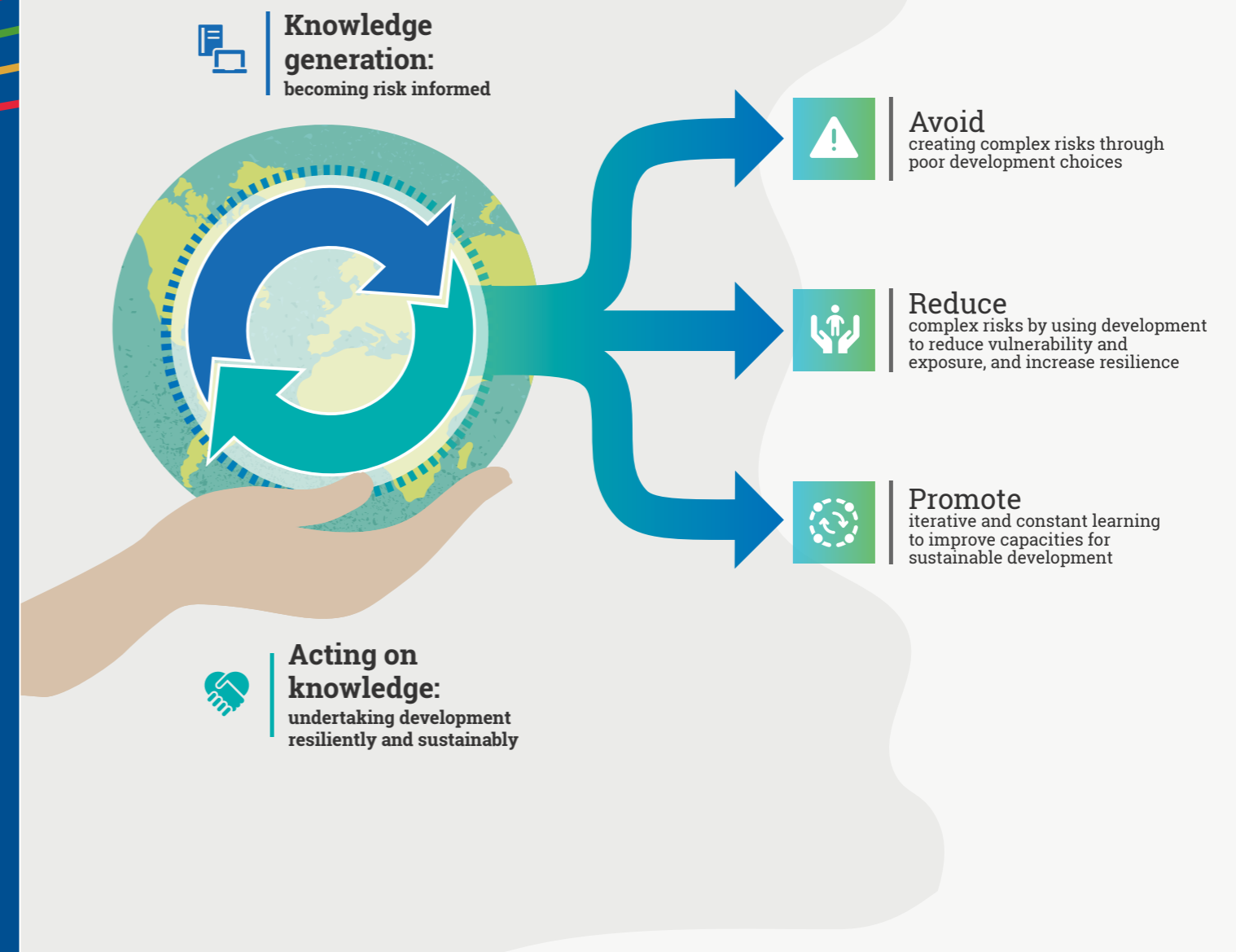
1. WHY RESILIENCE MATTERS:

This report explores what risk-informed sustainable development looks like in an increasingly complex and risky world. It highlights how risks are interconnected and how pitfalls can be transformed into opportunities to build resilience. It aims to support government policymakers charged with the difficult and innovative work of risk-informing development to face the increasingly complex set of threats resulting from the deepening climate crisis and other hazards. It also aims to highlight how resilience-building must be central to the framing of a more risk-informed post-2030 agenda.

The Sustainable Development Goals (SDGs) provide a framework of agreed collective goals for attaining sustainable development entitled *Transforming Our World: The 2030 Agenda for Sustainable Development* (United Nations, 2015a). United Nations Member States are mandated to collect and report data on their progress towards achieving their SDG targets. Using this information to assess resilience deficits at the macro scale is a 'quick win' to identify where risk reduction is needed. Given the imperative to transition to a carbon-neutral development model, understanding where resilience-building can create positive feedback loops and co-benefits is particularly important now.

The impacts of climate change are causing existing hazard events to become more intense and occur with greater frequency. These impacts combine with other risks and threats such as conflict, epidemics or inflation, creating compound crises, a phenomenon increasingly referred to as a polycrisis. Left unaddressed, these compound crises draw increasing amounts of resources into reactive responses rather than into prevention for building long-term resilience. These reactive responses can lead policymakers to choose maladaptive policies, which inadvertently worsen the impacts. Such trends amplify vulnerabilities and distract from addressing the root causes behind these risks.

Figure 2. Core elements and aims of resilient sustainable development



Source: Nadin, R. and Opitz-Stapleton, S. (2019) Figure 2: Risk-informed development and its core aims. In: *Risk-informed development: from crisis to resilience*. ODI and UNDP.

To reverse this downward spiral, countries and communities need to build systems that can prevent or better manage risk. This can include taking action such as investing in resilient infrastructure that can withstand disaster impacts, improving early-warning systems to reduce losses, and improving economic and social opportunities that can reduce underlying vulnerability to hazards. This ability to withstand risk, and recover from

disasters, in a manner that is transformative and bounces forward, is at the root of resilience (Alessi et al., 2020).

Urgent action to reduce risk is fundamental to simultaneously achieving the SDGs of the 2030 Agenda (United Nations, 2015c), the targets of the Paris Agreement (United Nations, 2015a) and the Sendai Framework for Disaster Risk Reduction 2015–2030

Table 1. Definitions of resilience

Definitions of resilience

PEOPLE

"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner." (UNDRR, 2017)

"The ability of individuals, households, communities, cities, institutions, systems and societies to prevent, resist, absorb, adapt, respond and recover positively, efficiently and effectively when faced with a wide range of risks, while maintaining an acceptable level of functioning and without compromising long-term prospects for sustainable development, peace and security, human rights and well-being for all." (UN CEBC, 2020)

PLANET

"The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation." (IPCC, 2018)

PROSPERITY

"Economic resilience has two components: instantaneous resilience, which is the ability to limit the magnitude of immediate production losses for a given amount of asset losses, and dynamic resilience, which is the ability to reconstruct and recover." (World Bank, 2014)

(United Nations, 2015b). The pathways to achievement are inextricably linked, and positive action towards one needs to accelerate achievement of the others. It does not have to be a trade-off.

Fostering resilience requires governments, the private sector and civil society to better understand how choices or inaction to promote societal well-being (people), ecological or biosphere well-being (planet) and economic well-being (prosperity) interact to build or undermine resilience. The increasing interdependence of ecosystems and humanity reinforces the need to maintain the resilience of all systems. This is why the people, planet and prosperity paradigm is integral to forging sustainable development pathways, and why actions to promote peace and partnerships are so essential.

Understanding how to identify and measure vulnerabilities, or deficits, in resilience, as well as how to develop interventions that address current and future needs, is at the core of sustainable development. Figure 2 shows how becoming risk-informed is integrally linked to action that mitigates risk by avoiding poor development choices, reducing vulnerabilities and promoting the continual review and learning of resilience-building.

Building resilience makes physical assets stronger, and also creates more sustainable systems and ways of working. As a concept, resilience can describe a system trait (e.g. a disaster-resilient water-supply system), a process (e.g. resilient agricultural practices) or an outcome (e.g. a resilient city) (Moore et al., 2017). Strengthening resilience is critical to withstanding and responding to shocks and to achieving a country's development objectives (United Nations, 2020). Table 1 shows the definitions of resilience related to people, planet and prosperity.

Creating the conditions for sustainable development requires accelerated transformations in key systems, including food, water and energy, making them more effective at addressing growing demand while sustainably managing natural resources.

2. UNDERSTANDING RISK TO PEOPLE, THE PLANET AND PROSPERITY

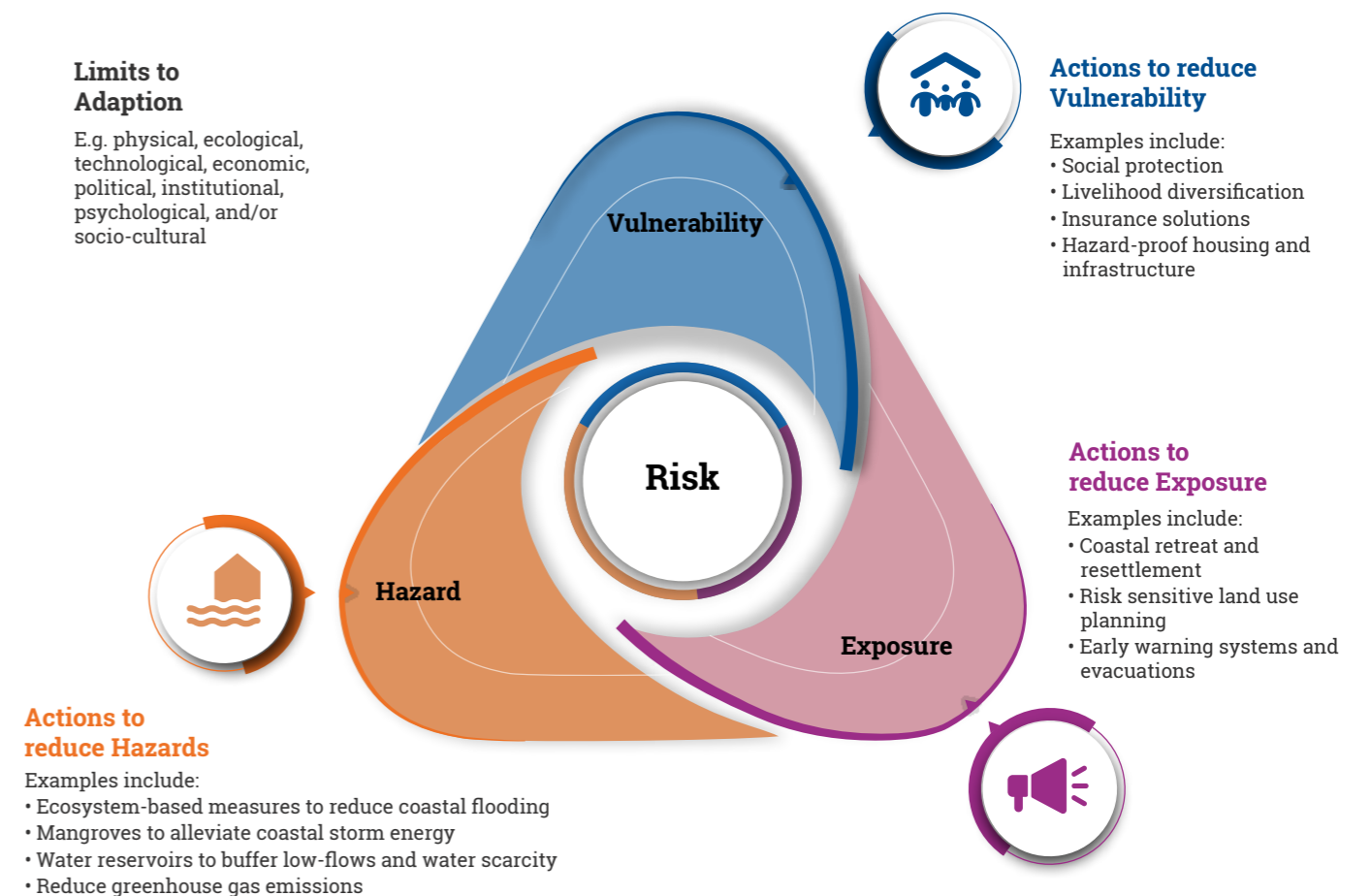
Risk is a function of how a hazard combines with vulnerability and exposure (Figure 3) (UNDRR, n.d.a). In other words, understanding the risk posed by hazards requires a better understanding of vulnerability and exposure. Vulnerability refers to the conditions determined by physical, social, economic and environmental factors or processes that increase the susceptibility of an individual, a community, assets or systems, to the impacts of hazards. Exposure refers to the location of people, infrastructure, housing, production capacities and other tangible human assets in hazard-prone areas. Disasters occur when any of these elements of risk is not reduced or adequately managed.

The choices and action taken today will affect the future relationships among hazards, vulnerability and exposure. For example, the most pressing way to reduce climate hazards currently is to reduce greenhouse gas emissions, which are currently making climate-related hazard events more intense and more frequent.

Understanding how those hazards lead to disasters in a country, and how they are likely to change in the future, is necessary to pre-emptively adapt to those impacts.

The ten resilience deficits, illustrated by 15 maps below, show how hazards are increasing vulnerability

Figure 3. Options for risk reduction through adaptation



Source: Adapted from (IPCC, 2019a)

and creating deficits in SDG progress. Combing risk modelling and drawing on the IPCC Representative Concentration Pathways (RCPs), assuming that the world will pass 1.5°C of warming above pre-industrial levels by the 2030s, the maps highlight the impacts of hazards, such as heatwaves, drought and air pollution, to show how they progressively inhibit progress in attaining the development objectives. In so doing, the maps utilize the SDGs to show the resilience gap found in people, planet and prosperity. Drawing from IPCC, the maps have been developed through a process of co-creation, drawing on expertise from across the United

Nations system. Experts from technical United Nations agencies such as UN DESA, UN-Habitat, UNDP, WHO, UNCTAD, UNCCD, FAO, UNICEF, ILO and the UN Map Division, worked with UNDRR and a team of expert global modellers to interrogate existing SDG data, available hazard maps and foresight data for climate change and other key drivers, such as demographic and urbanization trends. The maps are not presented as static projections, but instead show key inter-relationships across people, planet and prosperity SDG indices, and point to future potential development pathways based on business and usual action. A more detailed explanation of the sources

and methodology is available in the last chapter of this report and on the UNDRR website². An online version of maps and openly available data is available through the cited agencies and through the UNDRR Risk Information Exchange (UNDRR, n.d.b).

This report refers to “The Representative Concentration Pathways (RCPs), which describe four different 21st century pathways of greenhouse gas (GHG) emissions and atmospheric concentrations, air pollutant emissions and land use (IPCC, 2014).” RCPs range from RCP 2.6 (low-emission scenario) to RCP 8.5, which is the highest emission scenario. At the time the Representative Concentration Pathways (RCPs) were published, they included three scenarios that could represent emission developments in the absence of climate policy: RCP4.5, RCP6 and RCP8.5, described as, respectively, low, medium and high-end scenarios in the absence of strong climate policy (van Vuuren et al., 2011). RCP8.5 was described as representative of the top 5 per cent scenarios in the literature.” (IPCC)

In this report, estimates of urban damage due to floods are based on RCP 4.5, and work hours lost due to heat stress estimates are for RCP 2.6 and 6.0. Global-warming levels, which represent the increase in global surface air temperature from the pre-industrial era are applied to maps that depict drought projections, mean near surface air temperature and extreme sea levels.

As many of the SDG indicators are interrelated, the maps attempt to show some of these connections and to highlight the need to develop, longer term, more-integrated systems and analysis. They show that although progress is being made in attaining several SDG objectives, the way this progress is attained is itself often causing the pressures on planetary systems. These pressures, including increasing impacts of climate change and resource scarcity, are undermining progress in other SDGs. For example, while more people have access to electricity, the generation of that electricity is predominantly from the burning of fossil fuels, which contributes to climate change.

Taken together, the maps demonstrate why sustainability requires maintaining a balance between key systems, including the social (people), ecological (planet) and equitable economics (prosperity), to achieve resilient sustainable development. Recognizing the interdependence of these systems will reduce one progressing at the expense of the other, and it will create opportunities for synergies to improve the well-being of all three.

The case examples that accompany each map show that action to reduce resilience and thereby accelerate sustainable development is possible, but needs to be scaled-up urgently. Key elements for how to do this are the subject of Chapter 3 and draw on existing good practice lessons from the sustainable development, climate change and DRR communities. Finally, Chapter 4 encourages a re-examination of the way prosperity and development are defined and conceptualized, and draws a series of conclusions as to how competing interests can be rebalanced to attain more-sustainable development pathways.

² www.undrr.org



SUSTAINABLE DEVELOPMENT GOALS

PEOPLE

The sustainable development goals have the well-being of people at their core. Key SDG targets that highlight human well-being include: 1.5, 2.1, 2.4, 4.6, 11.5 and 13.1. At their core these SDGs aim to “end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment” (United Nations, 2015c).





SUSTAINABLE DEVELOPMENT GOALS

PLANET

The existing SDG indicator framework highlights that people can only prosper in a world where natural systems are nurtured and sustained. Key SDG targets that focus on planetary sustainability include 3.9, 6.4, 7.1, 7.2, 7.3, 11.6, 15.3 and 15.5. Overall, they aim to “protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations” (United Nations, n.d.b).



1 NO POVERTY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



SUSTAINABLE DEVELOPMENT GOALS

PROSPERITY

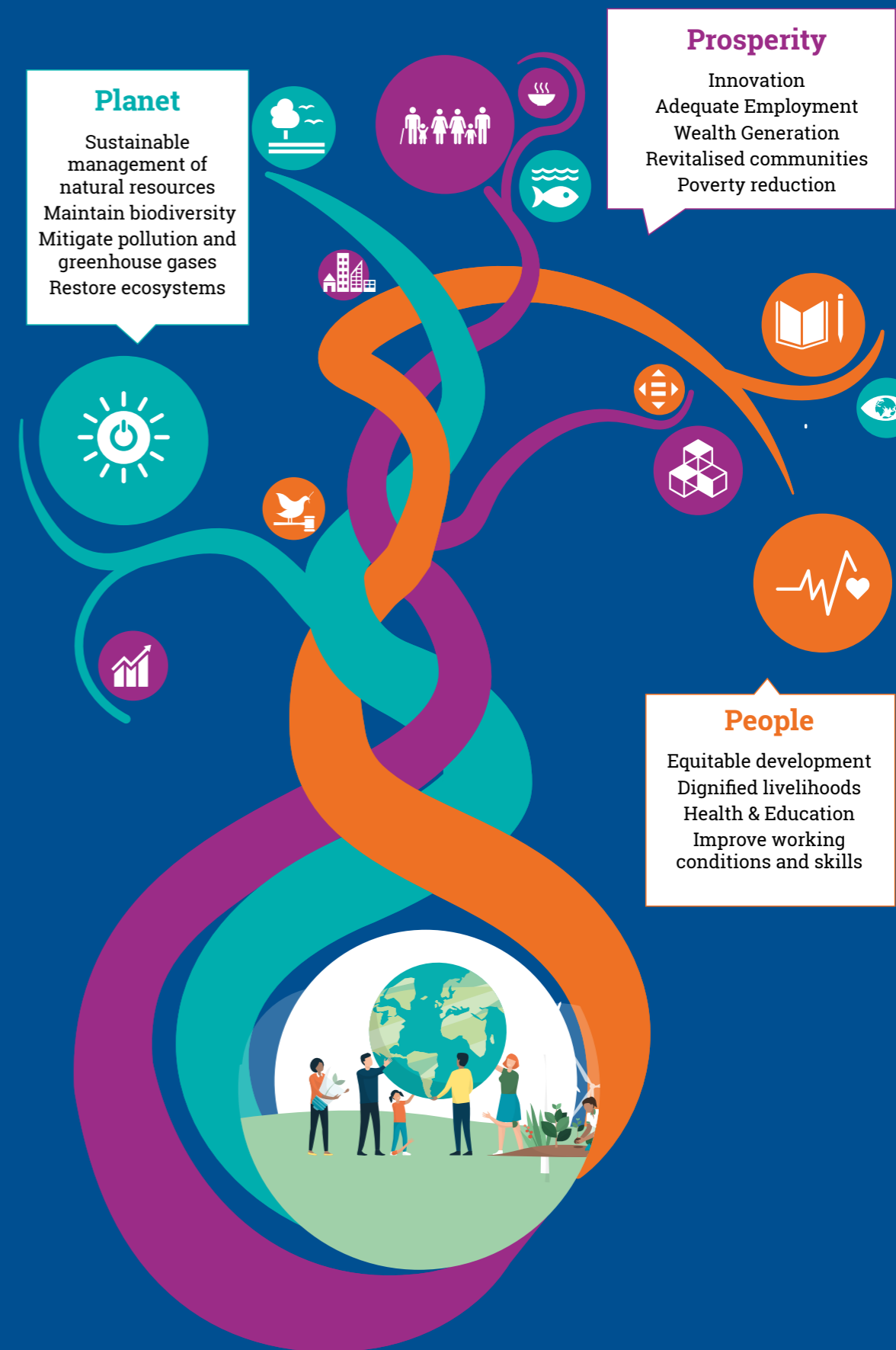
Ensuring that “all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature” is a central facet of the Sustainable Development Goals (United Nations, n.d.b). Key SDG targets that highlight the importance of ensuring current and future prosperity across the globe include 1.1, 8.2, 8.5, 9.a, 11.1, and 13.1.



3. HOW TO BUILD A MORE RESILIENT FUTURE

Taking action to address resilience deficits in a rapidly changing world is challenging, but not impossible. The action cases included in this report are examples of positive resilience-building in action. Figure 4 illustrates pathways to making sustainable development choices.

Figure 4. Pathways to making sustainable development choices



Source: Adapted from (IPBES, 2021)

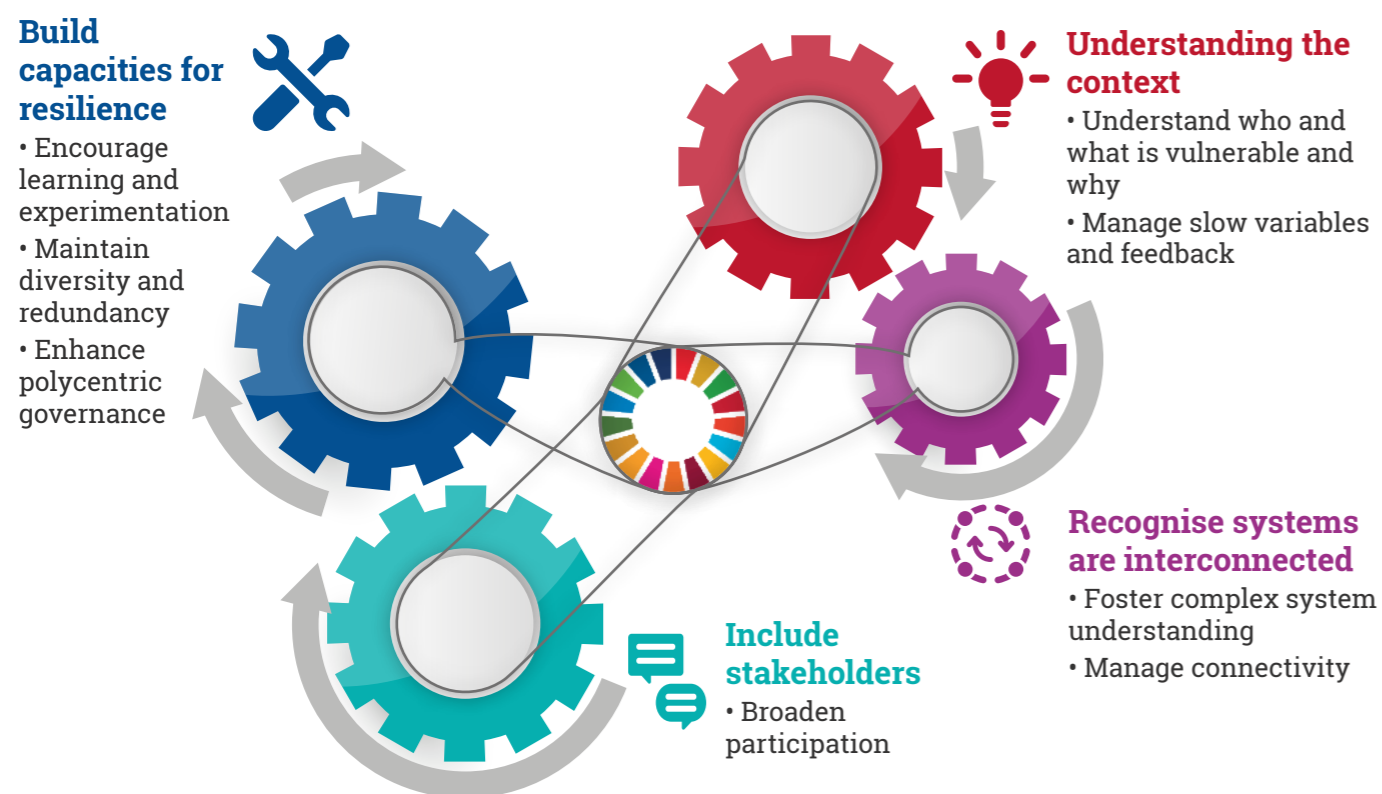
In 2020, UNDP Common Guidance on Helping Build Resilient Societies, highlighted the four key elements, in Figure 5 below, that help make sustainable development resilient.

In 2022, the Global Assessment Report of UNDRR echoed these same themes, while the IPCC Report of the same year also highlighted the importance of resilient sustainable development, and expanded on key themes. Resilience can be seen as a key connector between climate change, disaster risk reduction and sustainable-development action. The experience gained through action now is also essential to improving foresight capacity, and to fostering more-collaborative, participatory processes, and an agile and anticipatory style of governance that will be essential for a volatile climate future (UNDP

Global Centre for Public Service Excellence, 2018). The action cases in this report highlight that countries and communities are already applying these elements in their policies and actions to build a more resilient future.

Figure 5 summarises how key elements of sustainable development need to include understanding risk, recognising systems are interconnected, including stakeholders and building capacities for resilience.

Figure 5. Elements of sustainable development



Source: Adapted from (United Nations, 2020)

Table 2. Summary of key resilience elements and related action cases

Key UN guidance/ IPCC element	Why it matters	Relevant action case examples from the report
3.1 Understand the risk and context	Understanding risk is the bedrock priority of the Sendai Framework, from which other actions stem.	All
3.1.1 Understand who and what is vulnerable and why	When developing a strategy, who needs resilience, and from what, are the first questions to ask? In answering, it is important to understand how changes in one system affect other systems, so the integrity of the whole can be addressed (United Nations, 2020).	Fiji Yemen
3.2 Recognize systems are interconnected	Understanding how systems are interconnected is important in deciding what type of strategy is needed and where to prioritize investments. Given that the impacts of climate change increase over time, this requires a capacity to understand how slow-onset feedback affects already complex systems (United Nations, 2020).	All
3.2.1 Foster complex system understanding	Although systems are interlinked, each actor has its own set of needs and thinking patterns that dictate how they interact and affect other elements within the same system. Using a complex-systems approach is a way to move beyond reductionist thinking, to appreciate the integrity of the system as a whole. Doing so allows policymakers to anticipate the range of impacts and to avoid inadvertent maladaptive interventions.	European Union Yemen
3.2.2. Manage connectivity	Connectivity refers to the way different components within a system interact. This connectivity can either be a source of risk or a source of resilience. For example, a family network can help its members through difficult times but, as experienced during the COVID-19 pandemic, the same interaction can contribute to spreading the disease. Socially, connectivity can build cohesion and help build trust, and bring different insights and perspectives. However, too much homogeneity can lower innovation and critical reasoning.	Barbados Jamaica and St Lucia
3.2.3 Manage slow variables and feedbacks	Slow-onset variables and feedback accumulate in natural systems gradually, increasing exposure to threats. For instance, increasing temperatures may slowly reduce the productivity of certain types of crops, leading to more food insecurity. Deciding how to intervene to modify slow-onset processes requires an understanding of how they are changing and why.	Great Green Wall India

3.2.4 Maintain diversity and redundancy	<p>In nature, diversity and redundancy are critical to resilience. That a diversity of species performs the same or similar functions means that when one species is no longer able to function, the others fill in the gap. In human systems, the concept of redundancy is often avoided, to reduce costs. However, as seen in the examples, maintaining diversity can significantly improve resilience in multiple sectors, from water to energy.</p>	<p>Maldives European Union</p>
3.3 Include multiple stakeholders	<p>Including multiple stakeholders increases resilience as it allows more people to participate, thus mobilizing society to take collective action to protect itself from common risks. Broadening participation requires more time and resources, but the intervention that is decided upon will have greater buy-in and the chances of it being sustainable will have improved (United Nations, 2020).</p>	<p>All</p>
3.3.1 Broaden participation	<p>Broadening participation expands the scope of knowledge and builds legitimacy. It ensures information circulates through the system and maintains cohesion and unity of purpose. As creating constructive participation can often be time-consuming, it requires adequate preparation to harness the positive aspects of broadening participation.</p>	<p>Brazil India</p>
3.4 Build skills and capacity for resilience	<p>The capacity of people and systems to withstand and adapt to shocks can be improved if the following three methods are pursued in parallel: facilitating learning and experimentation, building diversity and redundancy so several actors can perform the same or similar functions, and ensuring all actors are working collaboratively to address a common set of challenges (United Nations, 2020).</p>	<p>All</p>
3.4.1 Encourage learning and experimentation	<p>Adaptive management and learning are vital to maintaining the versatility needed to navigate through volatile, uncertain and changing circumstances. Optimizing performance requires continual testing and adapting of approaches based on impact and experience.</p>	<p>Brazil</p>
3.4.2 Foster flexible and connected 'polycentric' governance	<p>Polycentric governance occurs when several actors operate together to address a common set of problems. This capacity to work collaboratively requires the actors to operate under a common set of norms and rules. This element complements the other elements as it allows for greater diversity and participation to be utilized effectively.</p>	<p>Indonesia</p>

4. CONCLUSIONS:

The SDG indicators were established to unify and broaden the way the world measures progress towards sustainable development. As demonstrated in this report, they can also be useful in understanding the interconnectedness of people, the planet and prosperity, and the importance of building resilience across these systems.

The SDG indicators are also a way to move beyond viewing progress as simply a matter of growth in GDP. Although GDP is a useful reference for the size and growth of an economy, it is not an accurate measure of what makes life worthwhile. While GDP measures the level of consumption, it does not show how growth affects the standard of living or if development is sustainable. And even though it shows average earnings, it does not consider how those earnings are distributed within a society.

The speed and scale of climate-change impacts on planetary, human and economic health will accelerate as the global temperature surpasses 1.5°C above pre-industrial levels. Figure 6 shows the generational impacts of climate change. These impacts will combine

with other pressures, including degrading planetary health, conflict and other hazards, to create compound risks that undermine the sustainability of achievements made in global development.

These compound or layered hazards have a higher aggregate impact than if they were to occur separately. Moreover, the speed at which they occur erodes resilience, as systems are not afforded the time to recover. If humanity is to continue to progress and achieve the desired development objectives, a more holistic approach is required that balances human progress with the need to maintain the integrity of natural ecosystems.

