

Sharm El-Sheikh Adaptation Agenda

TECHNICAL REPORT

2030 Adaptation Outcomes for Human Settlements

Boston Consulting Group and UN Climate Change High-Level Champions Joint Publication



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EXECUTIVE SUMMARY

Human settlements must adapt and build resilience to protect against the worsening impacts of climate change. Many governments remain unprepared and under-resourced to undertake the transformation needed. It makes sense to focus adaptation and resilience (A&R) efforts in cities, which are home to the majority of the world's population and are centres of social, economic, and government activities.

To increase the resilience of vulnerable people everywhere, the UN Climate Change High-Level Champions are advocating for action around five **Sharm el-Sheikh Adaptation Outcomes for Human Settlements: building safe homes, investing in nature-based solutions, hardening social infrastructure, increasing the use of waste as a secondary resource, and deploying early warning systems**. These are a subset of the sizable portfolio of localised A&R projects that many cities need to implement to protect their people, economies, and ecosystems. Any portfolio should be made up of projects that a) *create resilient infrastructure*, b) *create resilient services and communities*, and c) *improve risk management and crisis response*.

Moving from projects to action requires both robust A&R planning and mobilisation of funding. One of the biggest challenges for cities to build resilience is the unlocking of capital for the high-cost projects that are needed; since many of these projects are justified on the basis of protecting against future economic (and social) losses, they do not lend themselves to investors looking for positive cash flows. Now, however, is the moment to bring together the right actors, from both public and private sectors, to find solutions that ensure the necessary portfolio of A&R actions are implemented, whilst considering impacts on carbon emissions. This is particularly true in emerging-economy human settlements where the economic and social costs of climate inaction are already being incurred most acutely.

This report details essential actions for building resilience across human settlements, deep dives into the Sharm el-Sheikh Adaptation Outcomes for Human Settlements, discusses available sources of funding for A&R projects, and amplifies the UN Climate Change High-Level Champions' call to action.

This report should be read in conjunction with the 2030 Adaptation Outcomes for A&R Planning, 2030 Adaptation Outcomes for A&R Finance, and 2030 Adaptation Outcomes for Food & Agriculture reports.

I. INTRODUCTION TO THE SHARM EL-SHEIKH ADAPTATION OUTCOMES FOR HUMAN SETTLEMENTS

The **Sharm el-Sheikh Adaptation Outcomes** are a series of bold actions that will enable 4 billion people to become more resilient to the increasingly frequent and severe impacts of climate change. Led by the UN Climate Change High-Level Champions and amplified by the Egyptian COP27 Presidency, the Adaptation Outcomes include actions across the systems that form the basis of our collective global resiliency, including food and agriculture, water, oceans, infrastructure, and human settlements. Critical enablers to build resilience across these systems are robust adaptation and resilience (A&R) planning and A&R finance.

It is essential to build resilience in human settlements, particularly in cities, where climate hazards have the most direct impacts on lives and livelihoods. In the Race to Resilience, the UN Climate Change High-Level Champions are advocating for action around five **Sharm el-Sheikh Adaptation Outcomes for Human Settlements** launched at COP27:

- 1) 1 billion people have better design, construction, and access to finance to live in decent, safe homes by 2030**
- 2) \$1 trillion invested in nature-based solutions for communities in urban areas by 2030**
- 3) Harden social infrastructure to ensure access to basic and essential community services**
- 4) Increased use of waste as a secondary resource to boost the livelihoods of informal workers and reduce open waste burning 60% by 2030, lowering pollution levels, and improving the health of local communities**
- 5) Smart and early warning systems reach 3 billion people by 2030**

These outcomes were identified, and targets defined by the Climate Champions in consultation with non-state actors across sectors. Implementing these actions to create resilience for human settlements calls for immediate action by state and non-state actors globally, including national governments, subnational governments, funders, the private sector, and others. All must collaborate around defining targets and delivering measurable outcomes.

In this report we provide an overview of climate impacts on human settlements and deep dive into the **Sharm el-Sheikh Adaptation Outcomes for Human Settlements**. Based on our work with cities, regions, and countries, we discuss the actions decision-makers can take to protect infrastructure, services and communities and to improve risk management and crisis response, as well as how to unlock critically needed capital for A&R efforts. Finally, we amplify the Climate Champions' call to action and discuss how key actors can mobilise efforts around this important moment.

II. THE CHALLENGE FOR HUMAN SETTLEMENTS

See [2030 Adaptation Outcomes for A&R Finance](#) and [2030 Adaptation Outcomes for A&R Planning](#) reports for more details.

Human settlements are increasingly vulnerable to climate change

Human settlements globally are being affected by multifaceted climate hazards that are both intensifying and increasing in frequency. Examples are abundant in developing countries, which are often the most vulnerable and hardest hit, but also in developed countries. In 2015, a severe heat wave in “developing” North India led to spikes in heat-related afflictions and increased pressures on health services, with more than 2,000 deaths recorded. In Delhi, temperatures exceeded 50 degrees Celsius (approximately 120 degrees Fahrenheit) in homes with tin roofs, which are common in developing cities and where vulnerable populations often reside. In 2021, 100% of houses in “developed” Grand Isle, Louisiana, were severely damaged by Hurricane Ida, with 40% of them declared uninhabitable.

Mitigation alone is not a sufficient response to intensifying climate impacts. Human settlements must adapt and build resilience. The cost of inaction will be great, both the financial cost due to damaged assets and reduced GDP and the socioeconomic cost due to lives lost, impacts on vulnerable populations, and disrupted social services. By 2050, for example, an estimated 800 million people will be living in cities where sea levels could rise by more than half a metre. Since 90% of urban areas are coastal, this is predicted to cause \$1 trillion in global economic costs to cities.¹ Average summer temperatures of 35 degrees Celsius (95 degrees Fahrenheit) and resulting heat stress will cause \$2.4 trillion in global economic costs by 2030 due to reduced productivity.² Furthermore, climate change will affect natural assets and biodiversity with increased ocean temperatures harming coastal wetlands and sea level rise (SLR) and storms destroying marshes.³

Geospatial and advanced analytics reveal the extent of predicted impacts. In Lagos, Nigeria, BCG analysis found that even with a middle-of-the-road climate scenario,⁴ by 2050 a combination of SLR and extreme events like storm surges and land subsidence could result in nearly \$30 billion climate-inaction-related costs, more than 10 times the state annual budget in 2022. This will in part be the result of 165 square kilometres being inundated with seawater; 700,000 people (50% of whom are vulnerable) needing to be relocated at a cost of \$6 billion; \$5 billion in damages to infrastructure including transportation, power, and communications; and a decline in GDP due to economic disruption and loss of productivity. When factoring in the effects of extreme temperatures, the total cost of climate inaction increases to more than \$30 billion; other climate events or more severe scenarios may drive this number even higher. Beyond financial costs, there will be immeasurable impacts on lives. BCG analysis predicts over 20,000 heat-related deaths by 2050, nearly one-third of which could be children. Seawater will

¹ C40 Cities. The Future We Don't Want report (2018), based on analysis of 2,586 global cities by C40 Cities.

² ILO. Working on a Warmer Planet report (2019).

³ USDA. Biodiversity and Climate Change (2012).

⁴ Shared Socioeconomic Pathways 2, middle-of-the-road climate scenario: The world follows a path in which social, economic, and technological trends do not shift markedly from historical patterns. Development and income growth proceeds unevenly, with some countries making relatively good progress while others fall short of expectations. Global and national institutions work towards but make slow progress in achieving sustainable development goals. Environmental systems experience degradation, although there are some improvements and overall the intensity of resource and energy use declines. Global population growth is moderate and levels off in the second half of the century.

inundate the homes of more than 1.4 million people, 350,000 of them women, and extreme heat could drive more than 50,000 additional people under the poverty line. Natural ecosystems and biodiversity will also be affected, with more than 80% of Lagos's wetlands affected.⁵

Cities, where climate impact will be greatest, are unprepared

All human settlements will be affected by climate change and require localised and robust A&R actions. Within human settlements, however, it is especially important to focus A&R efforts on cities.

Cities are particularly susceptible to climate risks. This is in part because they are where most of the world's population lives, and where the population will continue to grow. Today, city residents account for approximately 4 billion people, or 56% of the world's population; that number is poised to increase 1.5 times, to 6.7 billion people (i.e., 7 of 10 people in the world) by 2050.⁶ Cities are also susceptible because approximately 90% are coastal and thus vulnerable to flooding from sea level rise and powerful storms.⁷ In addition, high concentrations of human activity in cities exacerbate exposure and vulnerability to climate impacts. One such example is how the intrinsic impact of SLR on a coastal city is increased by the threat of land subsidence due to widespread underground water drilling, which leads to accelerated coastal flooding.

Cities are centres of social, economic, and government activities. A&R actions implemented in cities tend to have a high socioeconomic ROI with a spill-over effect into other human settlements. More than 80% of global GDP is generated in cities.⁸ Individuals frequently rely upon urban jobs for their livelihoods, and individuals in neighbouring rural settlements often rely upon urban health care facilities. In addition, climate adaptation largely falls within the mandate and authority of cities, which have historically been responsible for planning and implementation of fundamental actions to build community resilience, both within the city and in surrounding areas.

Cities have major gaps in A&R preparedness. In places such as low-lying Southeast Asian islands or African megacities where SLR and heat intensity are having massive impacts, infrastructure such as roads and homes are often not climate-proofed, and people are not covered by directly protective measures like insurance. This is in part due to a lack of robust A&R planning: Of 812 cities globally only 459 have A&R plans as disclosed in CDP, and those that do often fail to incorporate climate risk or actionable measures.⁹ Furthermore, A&R is not sufficiently mainstreamed into existing plans and policies (e.g., urban planning). To date, only five of the 35 OECD countries have revised at least one building code to account for climate risks.¹⁰ Without actionable planning, with specific projects that can be funded and implemented, A&R actions are fragmented, with inadequate coordination between various stakeholders, and can lead to maladaptation. Preparedness challenges are compounded in developing countries, which are not only more susceptible to climate impacts but often lack the institutional capacity and technical capabilities to incorporate climate risk into planning.

A&R funding and resources are massively inadequate

Approximately \$46 billion was deployed towards A&R in 2019/20 from the public and private sector, meaning A&R financing will need to grow significantly to meet the estimated \$140 billion to \$300 billion needed by 2030.¹¹ Local governments are usually unable to afford the

⁵ BCG analysis

⁶ United Nations. Revision of World Urbanization Prospects (2018).

⁷ C40 Cities. The Future We Don't Want report (2018).

⁸ World Bank

⁹ CDP. Cities on the Route to 2030 (2021).

¹⁰ Global Commission on Adaptation. Adapt Now: A Global Call for Leadership on Climate Resilience (2019).

¹¹ UNEP. Adaptation Gap report 2021.

incremental costs of climate change adaptation. In addition, there is often a lack of appropriate allocations in national budgets, insufficient flow from national to local authorities, a lack of city-scale-specific financial instruments to tackle A&R needs, and challenges with cities in developing markets accessing international capital markets directly (i.e., sub-sovereign lending).

III. SHARM EL-SHEIKH ADAPTATION OUTCOMES AND BEYOND

Although cities can implement a range of A&R solutions to protect people, economies, and ecosystems, the right portfolio of solutions needs to be specific to the local context and account for localised climate risks. For example, cities on the coast will need solutions for flood-proofing, while some rural and more arid settlements with strong dependence on local agriculture may need drought protection.

The decision as to which solutions to employ will require trade-offs to achieve maximum impact from often limited funds and will depend upon a city's priorities. Based on experience working with a large number of cities, it is clear that for any set of climate impacts in a local area, a suite of solutions in three key categories will be needed:

- Resilient infrastructure
- Resilient services and communities
- Improved risk management and crisis response

IIIa. Resilient infrastructure

A substantial portion of city infrastructure is not resilient and there will be a high cost of inaction, particularly in developing countries. For example, the estimated cost of direct damages from floods, storms, earthquakes, and other natural hazards on power generation and transportation infrastructure assets in low- and middle-income countries is \$18 billion per year. The estimated cost of infrastructure disruptions on households and firms in low- and middle-income countries is \$391 billion to \$641 billion annually.¹² In Lagos, we projected \$5 billion in city infrastructure damage due to SLR and extreme temperatures by 2050, affecting 11% of the transportation sector, 12% of the power grid, and 13% of the communications network. More than 400 health care centres and over 500 education centres will be disrupted, affecting more than 2 million patients, and limiting school access for over 500,000 students, respectively.

As decision-makers plan to increase infrastructure resilience, nature-based solutions (NBS), which tend to have dual mitigation and adaptation benefits, should be included in the consideration set. Research by the International Institute for Sustainable Development (IISD) found that under certain circumstances, nature-based infrastructure (NBI) costs approximately 50% less than equivalent built infrastructure while delivering the same—or better—outcomes. As well as lower initial costs, NBS tend to be cheaper to maintain, more resilient to climate change, and have additional benefits such as protecting ecosystem services and biodiversity.¹³ Analysis from RMI shows that globally, investments in urban NBS have a benefit-to-cost ratio of nine-to-one. Restoring mangroves along the Lagos coastline, for example, can protect 500,000 to 800,000 people against SLR while also acting as a carbon sink and costing up to 100 times

¹² World Bank. *Lifelines: The Resilient Infrastructure Opportunity* (2019).

¹³ European Commission. *Biodiversity and nature-based solutions: analysis of EU-funded projects*, Publications Office of the European Union (2020).

less than a seawall. Rather than installing inefficient air conditioners that exacerbate emissions, planting trees or installing green roofs can protect against extreme heat.

The Climate Champions are calling for action around **two Sharm el-Sheikh Adaptation Outcomes related to resilient infrastructure:**

- 1) 1 billion people have better design, construction, and access to finance to live in decent, safe homes by 2030
- 2) \$1 trillion invested in nature-based solutions for communities in urban areas by 2030

Beyond these two solutions, there is a broader set of A&R solutions that can be implemented as part of a localised portfolio to make a city's infrastructure resilient. While not exhaustive, some particularly important levers for human settlements being affected by sea level rise, flooding, and heat intensity include:

- Flood-proofing construction to protect against inland and coastal flooding
- Weatherising homes and critical transportation systems to protect against heat and extreme precipitation
- Adopting cool surfaces (e.g., white roofs, white walls, cool pavement) and leveraging thermally efficient building design and superefficient cooling equipment to protect against extreme heat
- Fortifying urban drainage systems to withstand severe flooding and erosion
- Building coastal defence grey infrastructure and restoring mangroves to protect against sea level rise and extreme flooding

Sharm el-Sheikh Adaptation Outcome #1: 1 billion people have better design, construction, and access to finance to live in decent, safe homes by 2030

Many people do not live in homes protected from climate hazards. The number of people living in substandard housing is expected to more than double to 3 billion over the next 15 years,¹⁴ and there are disproportionate impacts on vulnerable populations. The World Bank noted that the effects of disasters and climate change are more than twice as significant for poor households than others because they tend to be located in the most vulnerable areas, ones with lax housing standards and limited or no access to credit or insurance.¹⁵

This adaptation outcome aims to provide well-constructed, safe homes as they offer families shelter, sanitation, and security from increasing climate risks. Making housing safe and disaster resilient helps protect lives and livelihoods and build sustainable communities. The World Bank's Lifelines report found that the overall net benefit of investing in resilient infrastructure in developing countries amounts to \$4.2 trillion over the lifetime of new infrastructure, with a \$4 benefit for each \$1 invested. There are three key elements to achieving this:

- **Design solutions** help homes withstand climate hazards. Examples include green roofs to absorb water during heavy rain, stilts to protect against flooding, and cool roofs and natural airflow channels to protect against extreme heat.
- **Construction solutions** can further fortify homes. These include the use of climate-proof materials such as fire-resistant concrete or ceramic roof tiles and trombe walls that capture solar heat.
- **Access to finance** is a critical enabler empowering individuals, in particular the vulnerable, to afford safe homes and mortgages

¹⁴ UN Stats (2019).

¹⁵ World Bank. Unbreakable : Building the Resilience of the Poor in the Face of Natural Disasters (2017).

Target: To have 1 billion people in safe homes by 2030, building upon targets from Race to Resilience partners. Roof Over Our Heads seeks to deliver resilient homes and public infrastructure to meet the estimated need of 2 billion people living in informality in 2050. This amounts to approximately 1 billion people in 2030. Similarly, the Extreme Heat Resilience Alliance aims to provide 500 million people worldwide with heat-resilience solutions by 2030—heat is a major component of extreme temperature, which accounts for approximately 40% of climate impacts on livelihoods. This amounts to approximately 1 billion people when scaled up two times to include other climate hazards.

Partner spotlight: Roof Over Our Heads (ROOH) seeks to deliver resilient, low-carbon, and affordable homes and improve public infrastructure through finance (mobilising public and private finance at scale so that people in need can build and retrofit homes), design (catalysing innovation for better-designed houses that are resilient and low carbon), construction (working with industry to provide resilient homes to those who live in informal settlements), and governance (tackling the challenges of planning, administration, and policy implementation).

Partner spotlight: Extreme Heat Resilience Alliance (EHRA) aims to tackle the growing threat of extreme urban heat for vulnerable people worldwide. The alliance aims to reach 500 million people with heat-resilience solutions by 2030 by educating decision-makers linked to vulnerable communities about risks and impacts of extreme heat, developing policy recommendations that enable effective heat-risk-reduction interventions, creating tools to support the implementation of heat-resilience measures, and providing better access to affordable capital for long-term intervention. At COP27, EHRA announced the launch of Cool Capital Stack, a new Arsht-Rock initiative to mobilise all forms of capital to invest in cooling solutions to improve health, well-being, and livelihoods in the face of rising temperatures and extreme heat.

Partner spotlight: Build Change and the **Climate Resilient Housing initiative** are at the forefront of ensuring access to disaster- and climate-resilient housing globally. Since 2004, Build Change has made over 2 million people and 200,000 buildings safer in more than 24 countries worldwide. Build Change addresses the three major barriers to resilient housing—people and policy, money, and technology—to drive systems change in resilient housing. The Climate Resilient Housing initiative, powered by Build Change, forges partnerships, catalyses action, and drives investment to ensure climate-resilient housing for all.

Partner spotlight: The Sustainable Urban Resilience for the Next Generation (SURGe) is a COP27 Presidency Initiative in collaboration with UN-Habitat and ICLEI – Local Governments for Sustainability. It aims to strengthen the implementation of climate agendas in cities, unlock urban climate finance, build capacity, accelerate technology and innovation, and ensure equity. The initiative works across building and housing, energy, waste and consumption, mobility, and water to help advance adaptation outcomes across human settlements for the most vulnerable.

Sharm el-Sheikh Adaptation Outcome #2: \$1 trillion invested in nature-based solutions for communities in urban areas by 2030

Climate change and biodiversity loss is increasing with the expansion of urban settlements. Steering towards a 1.5-degree pathway requires net-zero emissions by 2050, with a 35 Gt emissions gap to be closed by 2030. A maximum 70% to 80% of that 35 Gt gap can be reduced by proven and emerging technology, leaving a remaining gap of at least 20% to 30%. Nature-based solutions (NBS) can be deployed to make human settlements more resilient, with the dual benefit of addressing mitigation. For example, rather than relying on traditional adaptation methods like grey infrastructure (e.g., seawalls), mangroves can help reduce the impact of coastal flooding while also sequestering carbon. Moreover, NBS are cost-effective.¹⁶ Adopting NBS in infrastructure projects can save \$248 billion per year. Investing in urban NBS could yield cumulative environmental, social, health, and direct economic benefits worth \$7.7 trillion (or, less initial and lifetime/ongoing costs, net benefits worth \$6.2 trillion).

Target: To invest \$1 trillion in NBS in urban areas by 2030. The target is based on data from RMI, which operates in the climate mitigation and A&R space. In its upcoming report *Growing to Its Potential: The Value of Urban Nature for Communities, Investors, and the Climate*, RMI predicts a global investment gap in urban nature of \$135 billion per year between now and 2030. Annual investments in urban nature were around \$28 billion in 2019 (equivalent to \$32 billion in 2022), so investments must scale up four times. This amounts to approximately \$1 trillion between 2023–30.

Partner spotlight: The Champions team in Africa is working with the African Cities Water Adaptation Fund (ACWA) to leverage \$5 billion in finance by 2032 to jump-start transformative Urban Water Resilience projects in 100 African cities, with at least \$3 million committed for immediate piloting in two African cities. The ambition is to build water resilience for 29 million people in the 100 cities, create 69,000 jobs, and save 137 million cubic metres of water.

Partner spotlight: RMI is catalysing rapid, market-based change in the world's most critical geographies to be aligned to a 1.5 degrees Celsius (approximately 35 degrees Fahrenheit) future. RMI's new work fills important knowledge gaps, quantifying the total global investment opportunity that urban nature offers, the investment gap, and urban NBS's energy- and carbon-savings potential. RMI's new report *Growing Urban Nature to Its Potential* is a call to action to local governments and the financing community to scale up investment in and implementation of urban NBS and to develop innovative financing solutions. RMI is a partner in the Nature for Cool Cities Challenge, which seeks to scale up implementation and support for urban nature-based solutions, demonstrating urban NBS's ability to mitigate the urban heat island effect, avoid emissions, and reduce energy demand. The effort challenges cities to pledge to increase or enhance the proportion of nature-based cooling solutions in their cities by 2030, with demonstrable progress by 2025. Partners—including Mission Innovation, RMI, SEforAll, UNEP, WRI, and WWF—invite funders and solutions providers to join RMI to enable a prize to support cities in the Global South in achieving their pledges.

¹⁶ Raymond et al. A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas (2017).

IIIb. Resilient services and communities

While climate-proofing infrastructure helps protect people, there are additional A&R solutions needed to protect the most vulnerable and increase overall resilience at a community level. As many city residents and urban communities do not currently benefit directly from protective A&R measures, programmes with direct social impact can help protect lives and livelihoods.

The Climate Champions are advocating for action around **two Sharm el-Sheikh Adaptation Outcomes related to resilient services and communities:**

- 3) Harden social infrastructure to ensure access to basic and essential community services
- 4) Increased use of waste as a secondary resource to boost the livelihoods of informal workers and reduce open waste burning 60% by 2030, lowering pollution levels and improving the health of local communities

Beyond these, a broader set of A&R solutions should be implemented to make social services and communities resilient. A few important levers include:

- Providing resources to support individuals opting to relocate (e.g., people living in coastal flood-risk areas)
- Creating social safety nets, social insurance, and subsidies to improve residents' ability to cope with shocks
- Integrating monitoring and surveillance systems for risk factors such as waterborne diseases and heat impacts
- Improving water and sanitation quality and access such as public drinking fountains and new sewage treatment plants

Sharm el-Sheikh Adaptation Outcome #3: Harden social infrastructure to ensure access to basic and essential community services

Social infrastructure forms the backbone of human settlements. Examples include health care (e.g., hospitals and elder homes), education (e.g., universities and schools), religious and cultural centres (e.g., temples and museums), and transportation (e.g., buses and roads). They are essential to everyday life as they consist of necessary services to encourage the economic, social, cultural, and physical and mental well-being of human settlements.

As social infrastructure is exposed to climate hazards, access to basic and essential community services is frequently affected. The flooding of schools can hamper education. Storms can wash out roads, impeding access to medical centres and disrupting hospital operations by causing power outages. For example, in 2012, Hurricane Sandy resulted in the evacuation of 6,500 patients from hospitals and nursing homes in New York City, and 1.1 million children unable to attend school for a week.

It is vital to harden social infrastructure to ensure access to basic and essential community services. In doing so, better design and construction methods must be incorporated when building social infrastructure. Equally vital is the upgrading and renewing of existing social infrastructure.

Partner spotlight: A Decent Life for a Climate Resilient Africa aims to integrate climate action into sustainable urban development in Africa by connecting adaptation, resilience, mitigation, and access to innovative solutions to improve the quality of life of Africa's rural communities. The initiative builds on Egypt's Sustainable Development Strategy: Egypt Vision 2030 initiative Hayah Karima, which targeted 60 million people, or 58% of Egypt's

population, living in 4,658 villages across the country, at a total cost of \$40 billion, and led to an increase in the percentage of green investments by 20% of the public investment plan.

Key actor spotlight: The **Urban Sustainability Directors Network (USDN)** works to create equitable, resilient, and sustainable communities by advancing the field of local government resilience and preparing practitioners to be catalysts of transformative change. More than 2,000 individuals participate in USDN from 256 cities and counties across the United States and Canada, representing more than 100 million residents. USDN pioneered Resilience Hubs, community-led facilities that provide crucial everyday programming and services to increase the social and economic resilience of communities year-round, that are also retrofitted with resilient power, communications, and other essential infrastructure to support communities during a disruption and throughout recovery. Hubs provide local governments and disadvantaged communities a pathway to build relationships, collaborate, and center community needs.

Sharm el-Sheikh Adaptation Outcome #4: Increased use of waste as a secondary resource to boost the livelihoods of informal workers and reduce open waste burning 60% by 2030, lowering pollution levels and improving the health of local communities

With the rise of rapid urbanisation and exponential population growth, global waste is projected to increase by 70% by 2050.¹⁷ Instead of channelling waste as a secondary resource through recycling and reusing, the practice of open waste burning—burning unwanted materials at low temperatures in an unrestrained manner—has become widespread among major dumpsites and individual households. There are considerable impacts on human settlements from environmental, health, and economic perspectives. Open waste burning is one of the key culprits behind air pollution and greenhouse gases. Moreover, burning waste that could instead be used as a secondary resource leads to economic waste. For example, the amount of municipal solid waste produced in African cities that is recyclable is approximately 70% to 80%, an economic value of \$8 billion annually.¹⁸

Although the consequences of open waste burning are well documented, it remains a problem. While it is estimated that 41% of global waste is burned openly, this figure is likely even higher in developing nations.¹⁹ A key reason behind this challenge is the lack of alternatives—waste management systems are often weak in developing nations. Therefore, it is important to increase the use of waste as a secondary resource. Apart from the benefit of reducing open waste burning, it also has the potential to boost the circular economy and create job opportunities for informal workers, who are already playing a prominent role in the waste management system, especially in developing countries, by converting waste into tradable commodities.

Target: It is estimated that a 60% reduction of open waste burning by 2030 could be achieved in Africa by addressing the systemic deficiencies—including attitudinal, institutional, and infrastructural deficiencies—in waste management systems and promoting circularity through the use of recyclable waste as secondary resources input.²⁰

Partner spotlight: The 50 by 2050 initiative will be launched by the Egyptian government at COP27. The initiative aims to treat and recycle at least 50% of the solid waste produced in Africa by 2050. By achieving this target, Africa would contribute to increasing the global

¹⁷ World Bank. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050 report (2018).

¹⁸ UNEP. African Waste Management outlook report (2018).

¹⁹ R20 Regions of Climate Change (2016).

²⁰ Engineering X (2022).

waste treatment rate above 50% and reduce overall effects of waste pollution on human health, biodiversity, food systems, and resource scarcity. It will catalyse greater investment and efforts to develop waste management ecosystems and resources, and rapidly address the rooted challenges by increasing solid waste treatment and recycling capacities, setting the necessary level of policy-making, and raising global contribution and involvement.

IIIc. Anticipation of risks and improvement in crisis response

Many governments do not have sufficient risk management measures in place, including reactive and proactive measures. For example, one-third of the global population is not covered by early warning systems (EWS), increasing their vulnerability to climate impacts. Vulnerable populations are disproportionately affected as most people not covered by EWS live in small island developing states and the least developed countries. For example, 60% of people in Africa are not covered by EWS.²¹

The Climate Champions are calling for action around **one Sharm el-Sheikh Adaptation Outcome related to risk anticipation and response:**

5) Smart and early warning systems for natural disasters reach 3 billion people by 2030

Beyond this solution, there is a broader set of A&R solutions that can be implemented to improve risk management and response. Some particularly important ones include:

- Optimising disaster response and services (e.g., evacuation, cleanup, critical service restoration, training first responders)
- Providing insurance to reduce vulnerability through pre-event risk reduction and post-event compensation (e.g., emergency funds)
- Providing community education, including climate risk awareness programmes and household management in the face of climate hazards
- Creating policies to integrate risk into urban planning, including updating land use plans, integrating flood-proofing standards into building codes, and banning groundwater extraction

Sharm el-Sheikh Adaptation Outcome #5: Smart and early warning systems reach 3 billion people

Lives, jobs, and infrastructure are frequently lost due to lack of warning about impending climate hazards and the ability to prepare for them. In the last five decades, there has been a weather-, climate-, or water-related disaster every day on average, resulting in 115 deaths and \$202 million losses daily.²² An early warning system (EWS) is an integrated system that forecasts and warns citizens of incoming climate hazards, allowing people and authorities to prepare and minimise impacts of impending hazards (e.g., predicting when and where storms will occur and providing time to evacuate). There are four key elements to a successful EWS: detecting hazards and developing forecasts; analysing risks and incorporating info; rapidly disseminating warnings; and activating emergency plans. EWS have become smart in recent years with advanced technologies. For example, advancements in computer vision now allow urban surveillance cameras to detect and monitor flood levels, and artificial intelligence can warn of tipping points in real-world systems.

²¹ World Meteorological Organization

²² World Meteorological Organization. WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019) (2022).

EWS are highly effective in saving lives. They can provide crucial time needed to save lives and protect infrastructure and communities from acute risks, and they enable better long-term preparedness. Following improved implementation of EWS globally in the last 50 years, there have been three times fewer lives lost despite a five-time increase in recorded disasters in the same period.²³ Beyond saving lives and infrastructure, EWS protect the wider economy. Longer-term integration of EWS with agriculture forecasting, for example, can predict the impacts of low precipitation on harvests, allowing for food distribution planning. EWS also offer a strong return on investment. According to the Global Commission on Adaptation, EWS are the greatest adaptation measure, providing more than a tenfold ROI and massively reducing damage (e.g., just 24 hours' warning of a coming storm or heat wave can reduce the ensuing damage by 30%; spending \$800 million on such systems in developing countries would avoid losses of \$3 billion to \$16 billion per year). Despite the benefits, EWS coverage is still low. One-third of the global population is not covered by EWS and there are disproportionate impacts on vulnerable populations.

Target: To reach 3 billion people with EWS by 2030. This target builds upon industry targets from partners including UN REAP, a prestigious global actor driving collective action to protect 1 billion more people with EWS by 2025. Assuming linear scaling, this is equivalent to 3 billion people by 2030.

Partner spotlight: UN REAP (Risk-informed Early Action Partnership) works to ensure that 1 billion more people are covered by new or improved EWS (including heat wave warning), connected to longer-term risk management systems, and supported by effective risk communication and public stakeholder dialogue to prompt informed action.

Partner spotlight: Cities Race to Resilience are undertaking and reporting on resilience actions across the world. The **City of Salvador (Brazil)** monitors meteorological systems that cause rainfall through radar and satellite images and has a Civil Defence Preventive Plan including a Warning and Alarm System in 10 risk areas for landslides and floods as well as designated resident reception points. 42 Centres for Protection and Civil Defence were created in various risk neighbourhoods, directly benefiting more than 2,000 people.

IV. MOBILISATION OF FUNDING

See [2030 Adaptation Outcomes for A&R Finance](#) and [2030 Adaptation Outcomes for A&R Planning](#) reports for more details.

As only limited funds are being committed to A&R, it has been notoriously difficult for cities to access funding due to the actual or perceived lack of bankability of A&R projects. For example, while climate-proofing homes and buildings protects against future losses, it does not obviously lend itself to a positive cash flow for an investor. However, cities can begin unlocking financing by identifying the right funders, both public and private, for various A&R projects.

There are growing opportunities for investment in **cash flow-generating projects** where ROI is based on actual financial return. Examples might include the development of climate data and tools, which can then be licensed or sold at a profit. The private sector is well positioned to infuse capital into these A&R efforts. Cash flow can also be generated by **projects with carbon-offsetting benefits**, where ROI is contingent on carbon markets that facilitate the trading of emission allowances. Such projects might include nature-based solutions and

²³ World Meteorological Organization. WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019) (2022).

regenerative agriculture practices, which generate credits that can then be sold to governments and private sector organisations seeking to offset their residual emissions. This can include removal credits (e.g., mangrove restoration) or protection credits (e.g., forest conservation).

For **A&R projects that are not cash flow generating**, there is still a business case to be made to mobilise public and private finance flows to protect against future damages (i.e., preventing the cost of climate inaction). This might include **projects that increase the resilience of a company's assets, supply chains, and revenue streams**, which can attract corporate investment. For example, in a region in Southeast Asia, we identified coastal manufacturing facilities that would benefit from investing in strengthening coastal embankments near their facilities to prevent damaged infrastructure costs, reduced revenue from disrupted manufacturing output, and increased operational and insurance costs.²⁴ Such projects when too large or risky for corporate financing alone can leverage public-private partnerships, where governments inject catalytic capital to enable private sector investment in A&R. An example is an industrial goods player in North Africa that needs fresh water for its operations. To mitigate against the impacts of droughts, the company plans to install a desalination plant. To make this a more compelling business case, the government will offer capital at a lower financing rate in exchange for the company providing desalinated water to the local community. Here, private sector partnerships are a win-win—the company protects its assets, and the government protects its citizens.

Lastly, there are some **public good projects** (e.g., climate-proofing public infrastructure) that are not cash flow generating and require concessional financing and a mix of loans. These are most suited for governments in partnership with bilateral agencies, development finance institutions, or public climate funds.

Ultimately, planning and implementation of project pipelines will require a mix of financing sources: grants, low-cost public funding, funds specifically allocated for addressing climate change challenges, and commercial investment.

V. CALL TO ACTION

Now is the moment for actors around the world to work together towards adapting and building resilience in human settlements against the impacts of climate change. We know what the solutions are and we are able to estimate the huge costs to delay or inaction. Society as a whole needs to rise to this challenge with the following having a key role:

- **National governments** to facilitate and enable subnational governments in planning and implementing A&R efforts. This includes having policies that support climate action at the subnational level and ensuring sufficient funding and sovereign guarantees.
- **Subnational governments**, including cities, states, and regions, to implement a portfolio of A&R projects tailored to the local context and optimised for social, economic, and natural impact. These projects should ensure resilient infrastructure, services and communities, and risk management and crisis response measures. Projects may include but are not limited to the Sharm el-Sheikh Adaptation Outcomes of building safe homes, investing in nature-based solutions, hardening social infrastructure, increasing the use of waste as a secondary resource, and deploying early warning systems.

²⁴ BCG analysis

- **Local private sector** to invest in A&R implementation where there is a public benefit. Beyond projects with an obvious business case (i.e., where there is a clear ROI), corporations should partner with local governments in cases where protecting company assets and revenue can benefit both the company and the public.
- **Funders**, both public and private, to invest in the growing pool of A&R investment opportunities:
 - Government funders and corporations should leverage growing opportunities for traditional revenue return such as those enabled by carbon markets
 - Governments should partner with corporations to co-finance measures that benefit the company's operations and the local community alike
 - Donor agencies should provide grants for feasibility studies and technical assistance and other forms of concessional funding for public goods projects
- **Other organisations** (e.g., NGOs, academia, and civil society including philanthropy) to provide human settlements with technical capacity and capabilities, funding for A&R implementation, and advancing research and education to raise awareness and encourage behavioural change by the public.

APPENDIX: PARTNERS, ORGANISATIONS, AND INITIATIVES

Sharm el-Sheikh Adaptation Outcomes	Race to Resilience Partner / COP27 Presidency Initiative*	Other organisations
1 billion people have better design, construction, and access to finance to live in decent, safe homes by 2030	<ul style="list-style-type: none"> • SURGe-Sustainable Cities: Sustainable Urban Resilience for the Next Generation (SURGe)* • Roof Over Our Heads (ROOH) • Climate Resilient Housing • Extreme Heat Resilience Alliance (EHRA) 	<ul style="list-style-type: none"> • Build Change • REALL • UN Habitat • Habitat for Humanity • World Green Building Council • Resilience Rising • C40 Cities • ICLEI • RMI • UNEP • WRI • NIUA • Arsht-Rock Resilience Center • Mission Innovation IC7: Innovation Community on Affordable Heating and Cooling of Buildings • GCOM • SEforALL
\$1T invested in nature-based solutions for communities in urban areas by 2030	<ul style="list-style-type: none"> • SURGe* • ACWA fund • ICLEI • WRI • Scale for Resilience Nature-based solutions 	<ul style="list-style-type: none"> • RMI • UNEP • SEforALL • WWF • The Nature Conservancy - water funds
Harden social infrastructure to ensure access to basic and essential community services	<ul style="list-style-type: none"> • Decent Life for a Climate Resilient Africa* • Climate Heritage Network • Scale for Resilience Nature-based solutions 	<ul style="list-style-type: none"> • Urban Sustainability Directors Network • RMI
Increased use of waste as a secondary resource to boost the livelihoods of informal workers and reduce open waste burning 60% by 2030, lowering pollution levels and improving the health of local communities	<ul style="list-style-type: none"> • 50 by 2050 Initiative on Waste* • Engineering X 	<ul style="list-style-type: none"> • ICLEI • Practical Action • WEIGO • UNEP • UN Habitat • CCAC • ISWA
Smart and early warning systems reach 3 billion people	<ul style="list-style-type: none"> • WMO – Aware initiative • UN REAP • DARAJA (Resurgence) 	<ul style="list-style-type: none"> • GSMA • UN ITU • Resurgence • Red Cross • SDI Affiliates • UK Met Office • CREWS

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About Boston Consulting Group

Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we work closely with clients to embrace a transformational approach aimed at benefiting all stakeholders—empowering organisations to grow, build sustainable competitive advantage, and drive positive societal impact. Our diverse, global teams bring deep industry and functional expertise and a range of perspectives that question the status quo and spark change. BCG delivers solutions through leading-edge management consulting, technology and design, and corporate and digital ventures. We work in a uniquely collaborative model across the firm and throughout all levels of the client organisation, fueled by the goal of helping our clients thrive and enabling them to make the world a better place.

About UN Climate Change High Level Champions

The UN Climate Change High Level Champions engage non-State actors to support governments in delivering the goals of the Paris Agreement. Working with the Marrakech Partnership - a global alliance of more than 320 major initiatives and coalitions - the Champions enhance the ambition of cities, regions, businesses and investors and other non-State actors, to collectively race towards a fair, resilient and zero carbon world.