

OPTIONS FOR ADDRESSING INFRASTRUCTURE RESILIENCE

WORKING PAPER

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Context and Opportunity

As early as 1999, UNDRR (then IDNDR) laid out the factors that increase the impact of natural hazards on infrastructure. These included:

- Extension of settlements driven by globalization,
- Human actions and decisions [Construction costs on flood plains for example are lower than on hilly ground.],
- Pressure stemming from economic activities increases infrastructure in fragile ecosystems.

While these drivers remain, new factors have emerged, including

- Rapid urbanization,
- Ageing and exposed infrastructure,
- Climate change and increased risk in the environment,
- Unsustainable investment decisions

Natural hazards and climate change affect infrastructure by destroying or damaging assets, placing human populations at risk, increasing operation and maintenance costs, and reducing revenues and socioeconomic benefits (the wider benefits to the economy).

This then reduces the financial and economic performance of investments in infrastructure. The EU estimates that climate change-related damage to infrastructure could grow tenfold under a business-as-usual scenario. If infrastructure is made more resilient, these impacts can be reduced (ADB).

According to World Bank (2019), infrastructure disruptions impose costs between \$391 billion and \$647 billion a year in low and middle-income countries. Studies suggest that natural hazards are responsible for 10 to 70 percent of the disruptions. Investing in disaster risk reduction is thus a precondition for developing sustainably in a changing climate. A recent report by the Global Commission on Adaptation, investing €1.6 trillion globally from 2020 to 2030 in risk reduction activities could avoid as much as €6.4 trillion in future losses.

A 2016 report by New Climate Economy highlights the need of approximately US\$90 trillion that needs to be invested in infrastructure over the next 15 years, more than what is in place in the entire current stock today. These investments would not only replace ageing infrastructure but also establish critical systems.

The European Green Deal, InvestEU, EC's Cohesion Policy, Structural funds and the Multi Annual Financial Framework and other instruments provide a global opportunity to prevent creation of new risk and build resilience of infrastructure. It is also critical to mainstream resilience of infrastructure across all EU policies, and ensure that all EU policies are risk informed.

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Barriers and Challenges

SHORT-TERM PRIORITIES

In connected markets, investments tend to flow to locations that offer comparative advantages, such as low labor costs, access to export markets, infrastructures and stability. However, **investment decisions rarely take into account the level of risk exposure in those locations, and opportunities for short-term profits continue to outweigh concerns about sustainability.** Consequently, large volumes of private capital continue to flow into hazard-prone areas, leading to significant increases in the value of exposed economic assets. Additional barriers to disaster resilient infrastructure include short-term business cycles and the need to reach break-even point (Shakou, Wybo, Reniers, & Boustras, 2019).

LACK OF SYSTEMS' THINKING

A large number of critical infrastructure undergo risk assessment, or if not, an environmental impact assessments

(EIA). However, **EIAs in most countries only consider potential hazards to the environment. External natural and man-made hazards, interdependencies or creation of new vulnerabilities are not systematically captured.** For that part, the scale of systemic risk stemming from the increasing vulnerability to infrastructure systems at national or local levels is still not fully embedded (UNDRR GAR 2019).

FINANCING DILEMMA

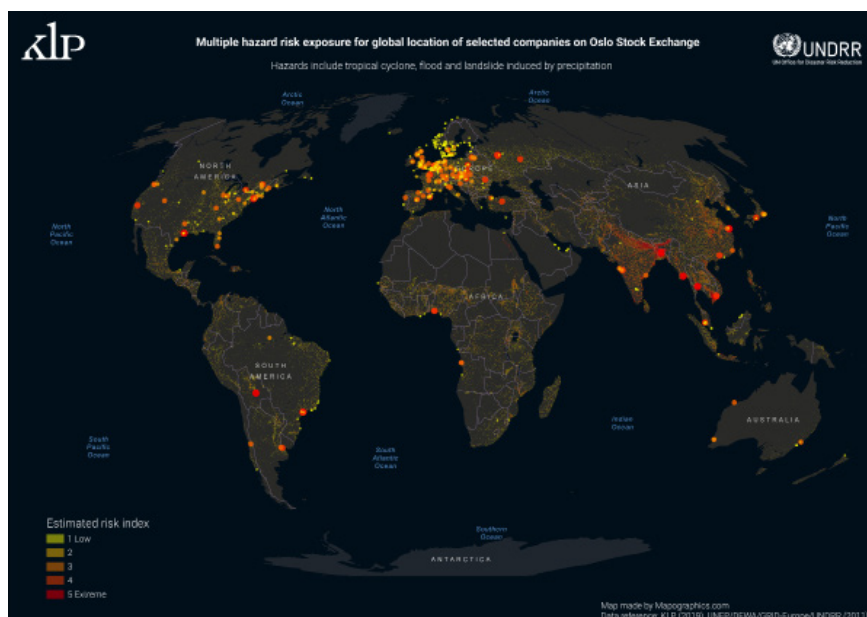
Investment required in infrastructure is immense and public sector resources are limited. This financing gap is not new, but it continues to grow rapidly. **The European Parliament in 2018, estimated that infrastructure investment needs for Europe are as much as €850 billion per year. According to Asian Development Bank (ADB) Central Asia will require upwards of \$33 billion in annual infrastructure spending through 2030 to meet development needs.** To meet the financing void, this approach needs to

change. Public funds are already in dire stress to meet health, education and social services requirements.

REGULATION AND OWNERSHIP

Policies, laws, acts and rules that govern infrastructure development are formulated by different authorities at the national, regional and local level. Infrastructure is equally owned at various levels such as at municipal level or state or regionally owned, then there are public or private and individual or those owned by cooperatives. Depending on the type of development a wide array of approvals is required by asset owners and at multiple stages. **Lack of clarity in ownership, absence of power at the necessary level and lack of adequate knowledge and capacity stands as a barrier to ensure compliance.** Moreover, governments, in majority of cases, are legally responsible for safeguarding critical infrastructure, and yet most of it is owned and operated by private sector.

Geotagging of infrastructure and overlaying them with future climate projection will allow investors to better understand exposure and dependencies.



www.undrr.org/news/un-and-norwegian-pension-company-forge-partnership-identify-financial-investments-risk

Options and Solutions

MEASURE AND MONITOR

To increase resilience of infrastructure investments it is necessary to monitor and measure their vulnerability, sensitivity, inter-dependency and exposure to risk. This shift requires investors, operators and decision makers to make sure that disaster and climate risks are considered in the location, design, construction, and operation of planned infrastructure investments. Equally, infrastructure regulators and operators need to facilitate the transition to resilience through the development and use of indicators that enable systems thinking that understand the complexity and interdependencies of global dynamics and recognize patterns of change (Lonsdale et al., 2015).

Critical infrastructures usually undergo load testing. The contract, technical specification or test methods contain the details of conducting these tests. **To ensure that all essential infrastructure is operating appropriately, at all times and under all conditions, these test methodologies need to include possible shocks originating from both climate and geophysical hazards in their development, installation and maintenance.** For that, all financial instruments should embed a robust screening process to ensure that investments are resilient to future disaster and climate risk.

ENHANCE KNOWLEDGE AND BUILD CAPACITY

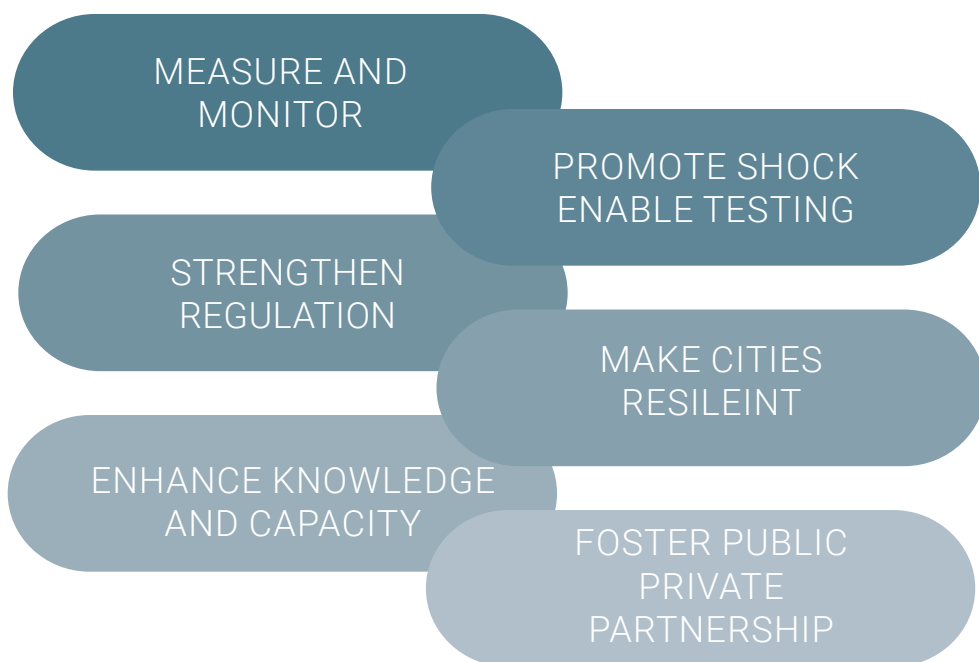
Infrastructure development, involves multiple stakeholders, who play a critical role. These include the public sector, investors, lenders, contractors, service providers/ operators and the end users. To attain true resilience, it is necessary to improve the knowledge and capacities of all the involved stakeholders. **Awareness**

raising, advocacy and training programmes targeting each stakeholder type in a national or local context is indispensable.

The Coalition for Disaster Resilient Infrastructure (CDRI) announced in 2016 under the leadership of Government of India and with the engagement of UNDRR is envisaged as a knowledge, exchange and capacity development partnership that will bring together national level governments, private sector, academia, multilateral development banks, and UN agencies as key stakeholders. CDRI will play the role of a knowledge, innovation and institutional development platform that connects global resources with regional and sectoral demands for infrastructure resilience.

STRENGTHEN REGULATIONS

Regulators have the responsibility to audit, ensure compliance, set national standards, provide guidance and administer the market. **The various certifications that are governed by regulatory authorities provide an opportunity for inclusion of disaster risk reduction measures.** Multiparty coordination is equally necessary between infrastructure owners, regulators and the public sector. **For infrastructure to be classified as 'sustainable,' regulators need to include natural hazards as a key criterion, as well as have a clear definition of resilience.** For that, there is a need to explicitly require institutional investors and as-set managers, as well as infrastructure developers, to integrate disaster risk reduction, climate change adaptation and resilience into their decisions.



Options to Address Infrastructure Resilience

FOSTER PUBLIC PRIVATE PARTNERSHIP

In order to meet the infrastructure demand and fill the financing gap, public private partnerships remain a good practice that needs to be further strengthened. Infrastructure investments are well suited to the portfolios of institutional investors (AECOM). However, infrastructure projects and assets requiring extensive capital investment, are often high profile, high value, and politically important, demanding stability. **Co-benefits, bankability and pipelines of infrastructure projects supported by strong commitment of national governments will drive markets' interest and foster stronger partnership between public and private sector.** Financing models based on PPPs which ensure that disaster and climate-related risk associated with new infrastructure is avoided or mitigated will strengthen communities and build confidence of taxpayers. It will equally expand existing markets and open up new economic opportunities (UN GAR 2013).

MAKE CITIES RESILIENT

70% of the estimated \$90 trillion investment in infrastructures is expected to take place in urban areas. However, local governments often lack adequate capacities, risk knowledge or powers to enforce necessary risk reduction measures (UNDRR 2017). Urban and land-use plans in too many cases are not based on risk assessments and are not aptly used for planning infrastructure projects. Disruption of services due to an asset failure has heightened impact on the community, not forgetting economic and reputational risk of the owner, operator, regulators, and especially the local government. **Local DRR strategies based on long term sustainable development vision, and linked to risk informed urban plans need to be the basis for all new infrastructure development.**

UNDRR, through the Making Cities Resilient Campaign "My city is getting ready!" (MCR), supports local governments to develop urban resilience plans and strategies. The campaign calls to improve urban resilience through DRR advocacy, knowledge sharing, learning networks, technical expertise and fostering multi-stakeholder partnerships.

This paper sets out some key reflections and recommendations on challenges and opportunities associated with bridging cybersecurity and disaster risk reduction aimed at assisting organizations to become more resilient in a rapidly evolving threat and risk landscape. Insights shared here are expected to be of relevance and interest to partners locally, nationally and internationally. A primary intention of this paper is to accelerate implementation of SDGs, the Sendai Framework for Disaster Risk Reduction 2015-2030 and contribute towards the 2021 European Forum for Disaster Risk Reduction.

Further reading

- **Sendai Framework for Disaster Risk Reduction 2015-2030.**
www.undrr.org/implementing-sendai-framework/what-sf
- **United Nations Global Assessment Report.**
<https://gar.undrr.org/>
- **Words into Action guidelines: National disaster risk assessment.**
www.undrr.org/publication/words-action-guidelines-national-disaster-risk-assessment
- **UNDRR's Making Cities Resilient Campaign.**
www.unisdr.org/campaign/resilientcities/
- **Coalition for Disaster Resilient Infrastructure.**
www.undrr.org/news/undrr-welcomes-indias-launch-global-coalition-disaster-resilient-infrastructure and <https://resilientinfra.org/>
- **Coping study on disaster resilient infrastructure.**
www.preventionweb.net/publications/view/31467