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KEY POINTS

- Seaports are critical for global trade and development and vital for access to the blue economy
- Port assets are at considerable and growing risk of climate change impacts, with implications for the sustainable development prospects of the most vulnerable nations
- In the light of long infrastructure lifespans and worsening climate projections, as well as the cost of inaction, timely adaptation action must be an urgent priority
- Multifaceted approaches to adaptation are required, including adequate finance and capacity building
- For developing countries, major scaling up of investment in adaptation, including in the form of grants, rather than loans, will be critical.

Climate-resilience of seaports: Adequate finance is critical for developing countries but remains a major challenge*

Climate change impacts on seaports can result in significant and costly damage, operational disruption and delay across global supply chains, with important implications for international trade and the sustainable development prospects of the most vulnerable countries. Timely and effective action on adaptation is a matter of growing urgency. Major scaling up of capacity-building and finance will be critical for developing countries, and time is of the essence.

Climate-resilient seaports are critical for sustainable trade development

With over 80% of global trade in goods carried by sea, seaports are key nodes in the network of global supply chains and critical for access to global markets, as well as the ocean economy. At the same time, these complex infrastructure assets, often integrated within large urban agglomerations, are at the frontline of climate change. Rising mean and extreme sea levels and extreme weather can result in significant damage, as well as costly disruption and delay across supply chains, with potentially far-reaching consequences for international trade and the sustainable development prospects of the most vulnerable nations.

* This document has not been formally edited.

Economic losses can be extensive, particularly in regions affected by tropical cyclones, related storm surges and waves: total losses from weather/climate-related disasters in 2017, including the devastating Caribbean hurricane season, were estimated at US$320 billion[1] with damages and losses in many affected SIDS amounting to a significant share (or multiple) of GDP.[2] Hurricane Dorian (2019) caused estimated losses of US$3.4 billion for the Bahamas alone,[3] and Hurricane Sandy (2012) caused over US$60 billion losses in New York, New Jersey and Connecticut, including extensive damage and a week-long shut-down of the United States New York/New Jersey container port.[4]

Enhancing the climate-resilience of seaports and other critical transport infrastructure will be key to advancing the 2030 Agenda for Sustainable Development and to achieving progress on the objectives of other international agreements, including the Paris Agreement, the Sendai Framework for Disaster Risk Reduction, the SAMOA Pathway, and the New Urban Agenda.

Climate change hazards and impacts

Many climatic hazards can affect seaports, such as heat waves, which can be dangerous for human health and significantly increase the need and costs of energy; extreme winds that endanger the operation of cranes and berthing operations; or heavy precipitation, giving rise to flash floods. However, mean sea-level rise and associated extreme sea-levels pose a particularly important threat of coastal flooding, which is growing.

Sea-level rise is largely driven by global warming and sea-level rise projections are being continuously revised upwards, with recent projections suggesting that, by 2100, under the intermediate GHG emissions scenario, global sea-level rise will be 44 – 76 cm higher than the mean of the 1995–2014 period.[5] Higher mean sea levels, combined with future extreme storm surges, waves and tides, could generate devastating extreme sea level events, which pose a particular threat to seaports across the globe.

Extreme sea-levels (ESLs) are set to increase almost everywhere, threating ports in all regions, with effects worsening under increasing global warming. Even in a 1.5 °C warmer world – as soon as in the 2030s, ESLs of a magnitude so far expected to occur once a century, may occur as often as once in a decade, in many South American, African, Persian Gulf, South-East Asian and Pacific ports. In a 3°C warmer world, many ports could experience ESLs of this magnitude several times per year.[6]

These projections have important implications for the adaptation of ports to climate change. Ports are infrastructure assets with long lifespans and planning horizons, and changes in the recurrence of extreme sea level events over the course of coming decades will significantly increase the risk of flooding at facility level. This risk, therefore, needs to be both assessed and effectively addressed as a matter of urgency, before any major impacts materialize. Given what is at stake, failure to take effective action is not an option.

The need for action is clear and urgent

Given the extensive economic costs of inaction,[7] climate-resilience and adaptation of seaports is a matter of strategic socio-economic importance.[8] This is particularly the case for vulnerable coastal developing countries, archipelagic and sea-locked countries, such as SIDS,[9] which depend on their ports as lifelines for external trade, food and energy security, as well as tourism – often an important contributor to GDP, and in the context of Disaster Risk Reduction (DRR).

In many SIDS these critical infrastructure assets are at high and growing risk[10] of climate change impacts such as coastal flooding, from as early as in the 2030s.[11] To increase levels of preparedness and help mitigate impacts, there is also an important need to upscale support for Early Warning Systems, which, as highlighted by the United Nations Secretary-General, should be available to protect all global citizens within the next five years.[12]

1 Munich RE (2018). Hurricanes cause record losses in 2017 - The year in figures.

2 E.g. in Dominica, 226% of GDP. See Government of the Commonwealth of Dominica (2017). Post-Disaster Needs Assessment, Hurricane Maria.

3 IADB (2020). Impact of Hurricane Dorian in the Bahamas.

4 Nat Commun 12, 2720 (2021); https://www.nj.com/news/2013/10/port_authority_sandy_22billion_outlines_recovery_measures.html.

5 IPCC (2021). Summary for Policymakers.

6 Asariotis (2021). Climate change impacts on seaports: A growing threat to sustainable trade and development.

7 See https://unctad.org/topic/transport-and-trade-logistics/policy-and-legislation/climate-change-and-maritime-transport as well as EDF (2022). Act Now or Pay Later: The Costs of Climate Inaction for Ports and Shipping.

8 UNCTAD (2020). Report of the Multi-year Expert Meeting on Transport, Trade Logistics and Trade Facilitation on its eighth session.

9 UNCTAD (2019). Outcome document. COP 25 High Level Panel discussion "Climate resilient transport infrastructure for sustainable trade, tourism and development in SIDS".

10 IPCC (2018). Special Report. Global Warming of 1.5 ºC.

11 Monioudi, I.N., et.al. Reg Environ Change (2018) 18:2211–2225. Climate change impacts on critical international transportation assets of Caribbean Small Island Developing States (SIDS): The case of Jamaica and Saint Lucia; IPCC (2018).

12 UN News (2022). UN weather agency to spearhead 5-year early warning plan, boosting climate action, 23 March.

The IPCC Sixth Assessment Report underlines the need for accelerated action on both mitigation and adaptation, in the light of increasingly worsening projections regarding climate hazards and related impacts, as well as growing concerns about climate change mitigation progress and pledges.[13]

Multifaceted approaches to adaptation and financing are needed

Effective adaptation requires "fit-for-purpose" risk assessment procedures at local and facility levels, bridging of potential data and knowledge gaps,[14] and the development of appropriate technical and management solutions that reduce vulnerability and allow for decision-making under uncertainty. In this context, supportive legal and policy frameworks have an important role to play, and some progress has been made in this respect recently, with climate change adaptation increasingly being integrated into national policy and planning instruments,[15] as well as into some legal instruments.[16]

Also important are standards, guidance, and methodological tools[17] to assist stakeholders on the ground. To this end, the Marrakech Partnership for Global Climate Action has developed a number of recommendations, together with milestones towards 2050.[18] The International Standardization Organization has developed two standards to assist in adaptation and related vulnerability and risk-assessments;[19] PIANC, the global Association of Waterborne Transport Infrastructure, has produced detailed technical guidance on adaptation planning for ports, as well as on selecting, designing and evaluating options for resilient infrastructure.[20] The European Commission has developed detailed technical guidance on the climate proofing of infrastructure,[21] which will be relevant for environmental impact assessments required under EU law, and for EU infrastructure project funding.

While these developments are encouraging, major scaling up of finance as well as capacity building will be critical for developing countries but remains a major challenge.

OECD estimates that US$6.9 trillion in new infrastructure investment are needed annually, to meet the SDGs by 2030, with around 10 per cent of this amount reflecting additional needs due to climate change.[22] However, in 2020, private sector investment in transport infrastructure fell significantly.[23] International project finance can play a significant role in large-scale infrastructure projects that require multiple investors, particularly in developing countries and LDCs. Yet, despite a significant increase in project finance activity relevant to the transport sector in 2021, the respective increase in value was only marginal.[24]

At the COP 26 in Glasgow, developed countries committed to scale up support for adaptation in developing countries, particularly in LDCs and SIDS.[25] However, with estimated adaptation costs in developing countries five to ten times greater than current public adaptation finance flows,[26] significant acceleration of efforts will be required in this respect. According to OECD estimates, in 2019, just $20 billion went to adaptation projects, less than half of the funds for mitigation projects.[27] Only a fraction of this amount will have been targeting climate change adaptation for ports and other critical coastal infrastructure. Moreover, the majority of public climate finance appears to be provided in the form of loans[28] and other non-grant instruments, including to LDCs and SIDS. According to OXFAM, in 2017-2018, for instance, only around 20% of reported public climate finance was estimated to be grants, compared to 80% reported as loans and other non-grant instruments; of all reported climate finance, an estimated 40% was non-concessional.[29]

13 IPCC AR6 https://www.ipcc.ch/assessment-report/ar6/.

14 Port Industry Survey on Climate Change Impacts and Adaptation UNCTAD/SER.RP/2017/18/Rev.1.

15 UNEP (2021). Adaptation Gap Report; UNCTAD (2020); Climate Change Impacts and Adaptation for Coastal Transport Infrastructure: A Compilation of Policies and Practices. UNCTAD/DTL/TLB/2019/1.

16 EU Climate Law, Article 5.

17 See the methodology developed by UNCTAD, https://sidsport-climateadapt.unctad.org./.

18 UNFCCC (2021). Climate Action Pathway - Transport.

19 https://www.iso.org/standard/68507.html; https://www.iso.org/standard/68508.html.

20 https://www.pianc.org/publications/envicom/wg178; https://www.pianc.org/publications/envicom/ptgcc-1.

21 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:C:2021:373:TOC.

22 OECD (2018). Investing in Climate, Investing in Growth.

23 UNCTAD (2021), COVID-19 Report-Update.

24 UNCTAD World Investment Report 2022.

25 https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact/cop26-outcomes-finance-for-climate-adaptation#eq-2.

26 UNEP (2021). Adaptation Gap Report.

27 OECD (2021). Climate Finance Provided and Mobilised by Developed Countries: Aggregate Trends Updated with 2019 Data.

28 Nature 598, 400-402 (2021).

29 https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621066/bp-climate-finance-shadow-report-2020-201020-en.pdf?sequence=1&isAllowed=y.

Considerations for policymakers

Ports are critical for global trade and sustainable development but are at high and growing risk of climate change impacts. In the light of long infrastructure lifespans and given the cost of inaction, the need for effective response measures is becoming increasingly urgent.

However, better availability and access to infrastructure adaptation finance, including in the form of grants, rather than loans will be critical from the perspective of developing countries, often at the frontline of impacts but with low adaptive capacity, and facing a worsening debt crisis. This will require a major collaborative effort by policymakers and development partners and a shift in focus. [30]

In the light of what is at stake, resilience-building, adaptation and DRR for ports and other critical transport infrastructure assets should be considered a most valuable investment for a sustainable future. Overall net benefits of investing in resilient infrastructure in developing countries could amount to US$4.2 trillion over the lifetime of new infrastructure – a $4 benefit for each dollar invested in resilience.[31]

Drawing on synergies with energy efficiency, decarbonization and renewables can provide important co-benefits for both mitigation and adaptation, reduce related energy needs and costs and increase energy security. This is an important consideration in the light of skyrocketing energy prices, especially for developing countries that are at the forefront of climate change impacts, but whose income streams have been hard hit by the pandemic, such as SIDS.

Policy coherence and synergy among climate change, DRR, sustainable development and COVID-19 recovery strategies and plans could yield major benefits, especially for the most vulnerable communities.

30 UNCTAD (2021). The Bridgetown Covenant at para 87.

31 Hallegatte S, et al. (2019). Lifelines: The Resilient Infrastructure Opportunity. Sustainable Infrastructure. World Bank.

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