ICSI International Coalition for Sustainable Infrastructure

CDRI Coalition for Disaster Resilient Infrastructure

Resilience4Ports (R4P) Indicators

Guidance Notes



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1. Introduction

Ports are critical nodes in global trade and regional economies, supporting supply chains, energy systems, food security and industrial development. However, their coastal locations and dependence on interconnected infrastructure make them particularly vulnerable to climate-related hazards, including sea-level rise, storm surges, coastal flooding, extreme precipitation, heatwaves, drought, coastal erosion, and changing wind and wave conditions (IPCC, 2023; UNCTAD, 2023). Climate-related disruptions can affect port infrastructure, cargo handling, energy supply, access routes and wider transport networks, creating cascading impacts across domestic and international supply chains. Strengthening port resilience therefore requires a systematic approach to understanding climate risks and vulnerabilities, prioritizing adaptation measures, and monitoring progress over time.



Climate resilience in ports extends beyond the protection of physical infrastructure. While engineering measures remain important, effective resilience also depends on governance, institutional capacity, financial preparedness, ecosystem management, stakeholder collaboration, business continuity and the capacity to adapt decision-making as climate risks evolve. A resilient port therefore needs the organizational capabilities and systems to anticipate, prepare for, withstand, respond to and recover from climate-related disruptions, while maintaining critical operations and supporting long-term sustainable development (IPCC, 2023).

CDRI and ICSI had established a Community of Practice (CoP) to inform the development a set of indicators focused on building port resilience, leveraging the knowledge and experience of experts and practitioners from various countries across the world. The experts guided the development of the indicators and ensured that the indicators and contextually relevant and implementable.

The Guidance note on R4P Indicators complements the Port Resilience Framework for Action developed by ARUP and The Resilience Rising by providing a structured mechanism for ports to assess their current level of resilience capability and identify where further action is needed.

While the Framework sets out what needs to change and the types of action that can contribute to resilience, the indicators help ports understand where they currently stand, identify gaps and track progress over time. The five R4P indicator areas capture many of the enabling conditions highlighted by the Framework, including resilient asset planning and management, integrated governance, financial preparedness, community engagement, effective response and recovery, and protection of natural ecosystems.

The two resources can therefore be used as complementary stages of a continuous improvement cycle. A port can use the indicators to establish a baseline and identify priority gaps, then use the Framework for Action to consider appropriate actions in line with maturity levels, actors and pathways for addressing those gaps. The quantitative supporting metrics can subsequently help monitor implementation and demonstrate progress.

Importantly, both approaches recognize that resilience is a whole-system and multi-stakeholder challenge. The Framework identifies the roles of governments, port owners and operators, investors, port users, designers, contractors and civil society, while the indicators provide a port-level mechanism for decision makers to assess organizational readiness. Resilience4Ports (R4P) Indicators provide a practical means of assessing various capabilities and translating the broader concept of resilience into measurable areas of performance. They can help ports establish a baseline, identify strengths and gaps, prioritize investments, support evidence-based adaptation planning and monitor progress over time. Unlike climate hazard and vulnerability assessments, which primarily examine hazards, exposure and potential impacts, resilience indicators focus on the policies, processes, institutional arrangements and capabilities that enable ports to manage climate risks effectively under conditions of uncertainty.

The indicators have been developed through an iterative process drawing on international frameworks, relevant standards, academic literature, consultation with port practitioners and pilot implementation. Further, the indicators were piloted with ports across five regions (Europe, Southeast Asia, Africa, the Middle East and Latin America), covering port and harbour authorities, commercial port operators, container terminal operators and major gateway ports. Findings and feedback from the pilots have informed the refinement of the indicators, assessment criteria, evidence requirements and practical application of the assessment tool. The approach is intended to be applicable across ports with different sizes, governance structures, operational characteristics and geographic contexts, while providing a consistent basis for assessing capabilities and identifying opportunities for continuous improvement.

Further the indicators also align with the international climate, disaster risk reduction, biodiversity and sustainability frameworks. In particular, it is aligned with the adaptation objectives of the Paris Agreement (UNFCCC, 2015), the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNDRR, 2015), the Kunming-Montreal Global Biodiversity Framework (CBD, 2022), the Sustainable Development Goals (United Nations, 2015) and the Global Goal on Adaptation (GGA). These frameworks provide the broader international context, while the R4P indicators provide a practical means for ports to assess their current capabilities, identify gaps and guide resilience-building actions.

1.1. Purpose of this Guidance

The R4P Indicator Guidance provides a practical and consistent framework for assessing and strengthening climate and disaster resilience maturity across ports, which also complements sustainable reporting mechanisms. It explains the purpose and application of the indicators, assessment methodology, evidence requirements and scoring approach, enabling ports to undertake transparent, consistent and repeatable assessments of their climate resilience capabilities. The Guidance is intended to support port authorities, terminal operators, infrastructure managers, government agencies, investors, development finance institutions, consultants and researchers.



2. What are the R4P Indicators?

What do the R4P Indicators measure?

The R4P Indicators measure a port's capability to manage climate- and disaster-related risk: whether the right policies, processes, institutions, finance, stakeholder relationships and ecosystem practices are in place to anticipate, prepare for, withstand, respond to and recover from disruptions.

The R4P Indicators provide a structured framework for assessing the capacity of ports and their wider ecosystems to manage climate- and disaster-related risks and disruptions. The indicators recognize that port resilience is multi-dimensional and depends not only on the robustness of physical assets and infrastructure, but also on governance, financial capacity, people and communities, and the health and resilience of coastal and marine ecosystems.

The assessment focuses on organizational readiness and capacity for climate resilience, rather than engineering design standards or quantitative climate risk modelling. It is intended to complement existing climate hazards and vulnerability assessments, asset condition surveys, engineering studies and emergency or business continuity plans.

How are the indicators structured?

The R4P Indicators are underpinned by six guiding principles:

- **Evidence-based,** drawing on documented evidence to support assessments
- **Risk-informed,** reflecting climate and disaster risks relevant to the local context
- **Adaptive,** recognizing resilience as an ongoing process of learning and continuous improvement
- **Practical,** enabling application across ports with different capacities, circumstances and levels of maturity
- **Consistent,** supporting repeatable assessments and the tracking of progress over time
- **Action-oriented,** ensuring that assessment findings inform resilience planning, investment and prioritization

The 22 indicators are organized under five interconnected headline indicators:



Each headline indicator is also supported by two quantitative metrics, giving 10 supporting metrics in total (see Section 2.7). These areas provide a holistic view of the capabilities and systems required to strengthen port climate resilience and should be viewed as interconnected. For example, effective climate-resilient infrastructure investment depends on sound governance and financial planning, while operational resilience can depend on workforce preparedness, community relationships and the condition of surrounding ecosystems.

Each headline indicator comprises a set of indicators that assess a specific aspect of port resilience. The indicators are designed to assess current resilience capability and progress over time rather than to prescribe a particular adaptation solution. This recognizes that the most appropriate resilience measures will vary according to a port's location, climate hazards, physical characteristics, governance arrangements, operational profile and available resources.

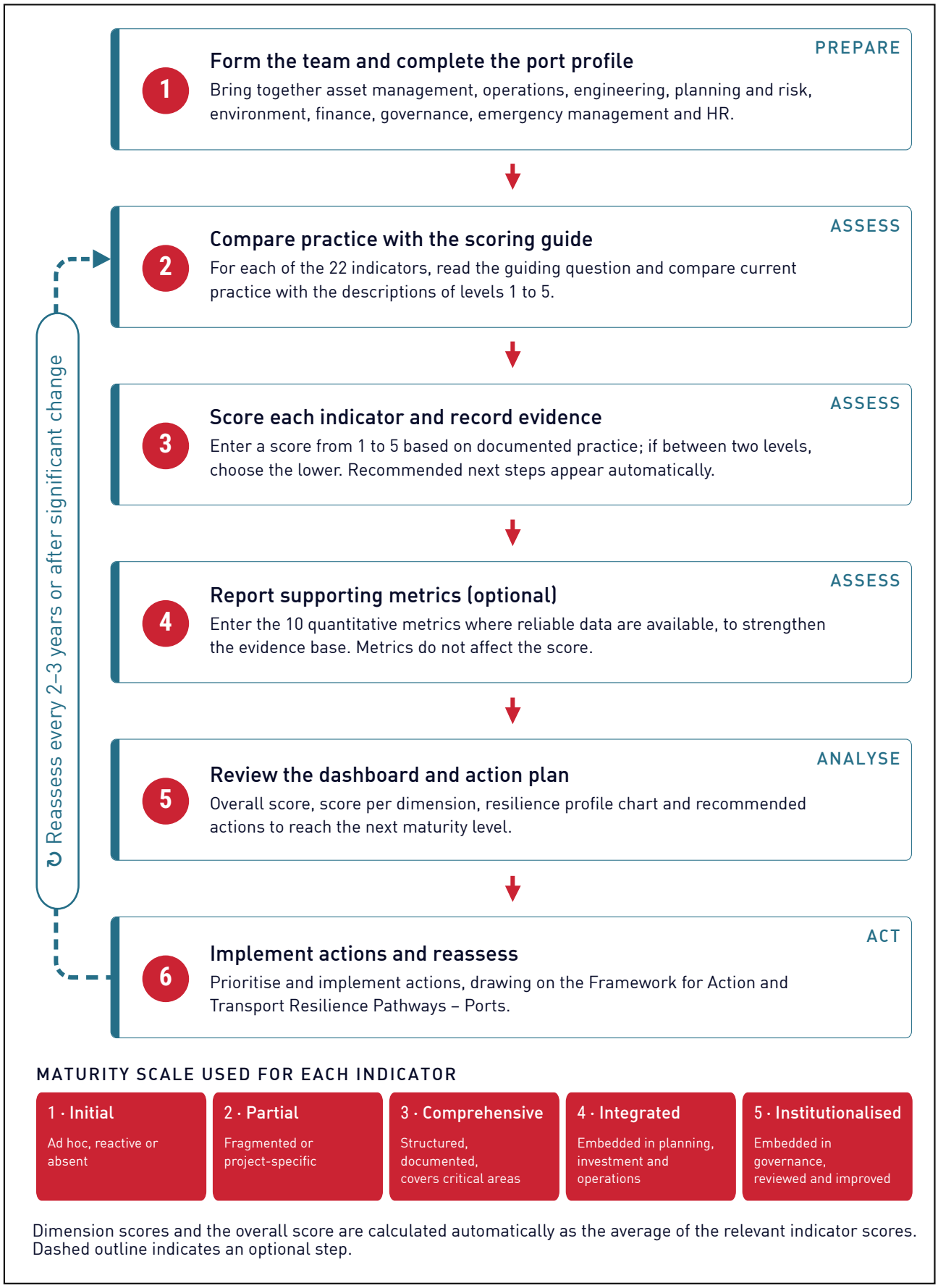
The framework also adopts a systems perspective, recognizing that ports operate as part of wider transport, logistics and infrastructure networks. Cross-cutting considerations such as systemic risk, infrastructure interdependencies, trade connectivity and supply chain resilience are therefore embedded across relevant indicators rather than treated as standalone areas.

How does a port conduct the assessment?

It will be a self-assessment, ideally undertaken by a cross-functional team from across the port organization (see Section 3). The indicators are assessed using a tiered maturity approach. The maturity levels describe a pathway from limited or largely reactive approaches towards increasingly systematic, integrated and continuously improving practices. The assessment is evidence-based, and ports are encouraged to support their assessment with relevant policies, plans, procedures, risk assessments, investment records, monitoring data, reports and other documented evidence. The maturity assessment is therefore intended to reflect demonstrated practice rather than aspirations or commitments alone. Where evidence is partial or informal, the lower maturity level should be selected, and the gap will be recorded as an improvement action.



How should the results be interpreted?



Dimension scores and the overall score are calculated automatically as the average of the relevant indicator scores. Dashed outline indicates an optional step.

The assessment produces a maturity profile across the five headline indicators, showing relative strengths, capability gaps and priorities for action. It is not a pass/fail rating or a ranking against other ports, and should be read in the light of each port's specific climate risks, operating context and resources. Repeating the assessment over time allows progress to be tracked against this baseline.

2.1 Assets and Operations (AO)

The AO indicators assess the extent to which climate and disaster risks are understood and incorporated into the management, planning, design and operation of critical port assets and interconnected systems. They recognize that physical infrastructure and operational systems are fundamental to maintaining port functions during and following climate-related disruptions.

The AO indicators cover:



They consider whether ports understand the climate risks affecting critical assets, incorporate those risks into investment and infrastructure decisions, maintain infrastructure in a climate-informed manner, prepare for operational disruption and recovery, and have access to the information and decision-support systems needed to manage changing risks. The assessment also considers critical interdependencies and the continuity of essential services and supply chains.

2.2 Governance and Institutions (GO)

The GO indicators assess the organizational structures, leadership, policies, planning processes and institutional capabilities that enable effective climate resilience. Strong governance provides the foundation for translating climate risk information into decisions, investments and operational practices.

The GO indicators cover:



These indicators assess whether responsibility for resilience is clearly established, whether climate considerations are embedded within strategic and operational planning, and whether ports have mechanisms to monitor performance and learn from exercises, events and experience. They also recognize that port resilience frequently depends on coordination with government agencies, transport providers, utilities, emergency services, neighbouring communities and other stakeholders across the wider port ecosystem.

2.3 Finance (FI)

The FI indicators assess the extent to which financial systems and investment decisions support climate and disaster resilience. Adequate and appropriately managed financial resources are essential for implementing adaptation measures, maintaining critical assets, preparing for disruption and managing financial consequences when climate-related events occur.



The FI indicators cover:

- **Financial planning, budgeting and resource allocation**
- **Financial risk assessment and exposure analysis**
- **Resource mobilization for climate and disaster resilience**
- **Financial risk management, risk transfer and insurance**
- **Resilience investment performance and benefit realization**

The indicators consider whether resilience is reflected in routine capital and operational budgeting, whether potential financial exposure and losses are understood, and whether ports have strategies for mobilizing resources from internal, public, private and international sources. They also consider financial protection mechanisms such as insurance, contingency funding and other forms of risk transfer, as well as whether investments are evaluated based on their resilience outcomes and benefits.

2.4 People and Communities (PO)

The PO indicators recognize that port resilience is fundamentally connected to the people who work in and around ports, and to the communities and wider stakeholders that depend on port activities. Climate impacts can create social and economic consequences that extend beyond the physical boundaries of the port, while effective adaptation can generate benefits for workers and surrounding communities.

The PO indicators cover:

- Inclusive participation in adaptation planning
- Resolution of community grievances and maintenance of community agreements
- Equitable distribution of adaptation benefits
- Reduction in climate-related social and economic impacts on communities

These indicators assess the extent to which ports engage affected stakeholders in adaptation planning, provide effective mechanisms for addressing concerns and grievances, consider equity in the distribution of adaptation benefits, and monitor the social and economic impacts of climate-related events. The indicators encourage meaningful participation and recognize the value of local knowledge and community perspectives in developing appropriate and effective resilience measures.

2.5 Coastal/Marine/Ecological (CO)

The CO indicators recognize the important role that coastal and marine ecosystems can play in reducing climate risks, supporting biodiversity and maintaining the environmental conditions on which ports and surrounding communities depend. They also recognize that port development and adaptation activities can affect ecosystems and that ecosystem condition can influence the resilience of port areas.

The CO indicators cover:

- Net change in ecosystem extent and protection
- Nature-based adaptation implementation and ecosystem condition
- Biodiversity governance and enabling policy

These indicators assess whether ports understand and monitor the condition and extent of relevant ecosystems, consider nature-based and hybrid approaches alongside engineered solutions where appropriate, and incorporate biodiversity and ecosystem considerations into planning and decision-making. The approach does not assume that nature-based solutions (NbS) will be appropriate in every location or for every climate risk. Instead, it emphasizes the systematic consideration of available options and the selection of measures according to their suitability, effectiveness, feasibility and local environmental context.



2.6 Headline Indicators

The five R4P headline indicators should be considered as interconnected and collectively provide a holistic view of port climate resilience. Together, they enable ports to assess current capabilities, identify gaps, prioritize improvement actions and track progress over time. The assessment should be interpreted in the context of each port's specific climate risks, operating environment, governance arrangements and available resources.

2.7 Supporting Metrics

In addition to the qualitative maturity indicators, Resilience4Ports includes a set of 10 supporting quantitative metrics. These metrics provide measurable information that can complement the maturity assessment, strengthen the evidence base and enable ports to monitor and benchmark aspects of their climate resilience performance over time.

The metrics are not intended to replace the maturity assessment or to provide a single measure of overall resilience. Rather, they provide additional context and help ports track tangible changes in areas such as critical asset identification, operational disruption, resilience planning, investment, multi-agency preparedness, community engagement and ecosystem management. Ports are encouraged to report these metrics where reliable data are available and to use consistent definitions and reporting periods to support meaningful comparison over time.

The 10 metrics are organized across the five R4P headline indicators, with two metrics supporting each headline indicator.

Headline Indicator	Metric Code	Metric Name	What It Measures
Assets & Operations (AO)	AO.M1	Percentage of Critical Assets Identified	Percentage of critical port assets identified and formally recorded. Indicates the extent to which the port has systematically documented assets essential for maintaining operations.
	AO.M2	Annual Operational Downtime Due to Climate and Disaster Events	Total number of operational downtime hours attributable to climate and disaster events during the reporting year. Helps assess operational disruption and resilience performance over time.
Governance & Institutions (GO	GO.M1	Percentage of Climate and Disaster Resilience Plans Reviewed and Updated	Proportion of applicable resilience-related plans reviewed and updated during the reporting period. Indicates whether resilience planning remains current and responsive to changing risks and circumstances.
	GO.M2	Multi-Agency Resilience Exercises Conducted	Number of multi-agency resilience exercises conducted during the reporting period, including emergency response, business continuity, climate scenario, and recovery exercises. Demonstrates coordination and preparedness efforts.
Finance (FI)	FI.M1	Annual Budget Allocated for Climate and Disaster Resilience Measures	Percentage of the annual port budget allocated to resilience measures such as preparedness, adaptation, business continuity, and disaster risk reduction activities. Reflects the level of financial commitment to resilience.
	FI.M2	Annual Budget Allocated for Financial Risk Transfer Mechanisms	Percentage of the annual port budget allocated to financial risk transfer mechanisms such as insurance, contingency funds, catastrophe financing, and related instruments. Indicates financial preparedness for managing potential losses.
People & Communities (PO)	PO.M1	Climate Resilience Training Coverage	Number and percentage of port workers (including contractors, where applicable) completing resilience-related training during the reporting period. Measures workforce preparedness and capacity building.
	PO.M2	Community Resilience and Social Impact Initiatives	Number of climate adaptation, resilience, or community engagement initiatives implemented to reduce climate-related social and economic impacts on surrounding communities.
Coastal / Marine / Ecological (CO)	CO.M1	Number of Nature-Based Solutions (NbS) Implemented within the Port Grounds	Number of nature-based or ecosystem-based approaches implemented within the port area to support ecological and climate resilience, such as wetlands, living shorelines, oyster reefs, and green infrastructure.
	CO.M2	Number of Recurrent Biodiversity Monitoring Schemes Implemented	Number of systematic biodiversity monitoring schemes undertaken on a recurring basis, covering species, habitats, invasive species, or biological indicators. Demonstrates the development of a sustained ecological evidence base.

3. Using the R4P Indicators

The R4P Indicator Assessment Tool provides a practical, user-friendly means for ports to apply the R4P Indicators and supporting quantitative metrics. The tool has been developed to enable ports to undertake a structured self-assessment of their climate resilience capabilities, record supporting evidence, generate assessment results, identify areas for improvement and provide suggested actions to progress towards higher levels of resilience maturity. Assessment results can also be used alongside the **Transport Resilience Pathways: Ports**[1] resource to identify relevant resilience measures and implementation pathways.

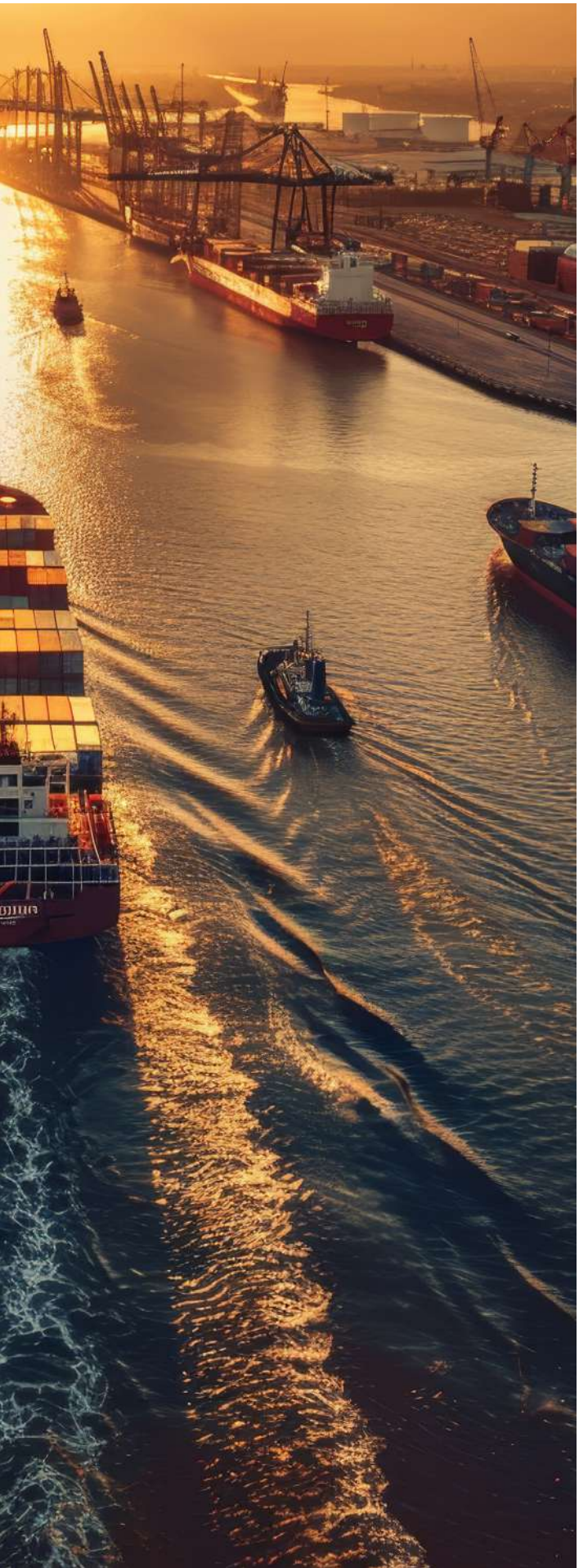
The *assessment tool* is open access and available for ports to download and complete as a self-assessment. The tool is designed to be applicable to ports of different sizes, locations and organizational structures, while providing a consistent approach to assessment, scoring and reporting.

Users are guided through the assessment process and provided with instructions on how to complete the indicators, provide supporting evidence and interpret their results. The platform will also provide access to relevant guidance and supporting materials to assist users throughout the assessment.

The tool is designed primarily as a port self-assessment instrument. Ports are encouraged to establish an internal assessment team involving relevant functions, such as asset management, operations, engineering, planning & risk environment, finance, governance, emergency management and human resources. A cross-functional approach helps ensure that the assessment reflects the breadth of resilience capabilities across the organization rather than the perspective of a single department.



[1] https://transport-pathways.org/



Following completion, the tool will generate an assessment profile showing the overall resilience maturity result. The results can be used to identify areas of relative strength, capability gaps and priorities for further action. The supporting quantitative metrics can additionally be used to establish baselines and monitor selected aspects of resilience performance over time.

The assessment results are intended primarily to support internal learning, planning and continuous improvement. Ports may choose to use their results to inform strategic planning, investment decisions, climate adaptation planning, risk management, sustainability reporting, stakeholder engagement and discussions with financiers or development partners.

To support consistency and comparability, ports should retain appropriate records of the evidence and assumptions used during the assessment and periodically repeat the assessment. Reassessment at an appropriate interval, such as every two to three years or following significant changes in climate risk, infrastructure or organizational arrangements, can help demonstrate progress and identify emerging priorities.

The online *assessment tool* will be accompanied by user guidance. These resources will explain how to navigate the platform, interpret the indicators, select appropriate evidence, apply the maturity levels, enter quantitative metrics and understand the resulting assessment profile. The tool is intended as a live resource that can be periodically reviewed and refined based on user experience, pilot findings and evolving practice in port climate and disaster resilience.

4. Emerging Lessons from the Pilots

Pilot application provided an opportunity to assess the R4P Indicators in practice across diverse port operational, institutional and geographic contexts. The pilots covered ports across Europe, Southeast Asia, Africa, the Middle East and Latin America. These included navigation and harbour-management functions, cargo and container operations, and ports operating under different governance and management arrangements. This diversity provided a practical basis for assessing the clarity, usability, relevance and applicability of the framework across different port contexts. The pilots were designed to inform the application and refinement of the R4P Indicators rather than to compare the resilience performance of individual ports.

5 Regions	Diverse Port Models	Different Functions
Europe	Port & Harbour Authorities	Navigation & Harbour Management
Southeast Asia	Commercial Port Operators	Cargo Operations
Africa	Container Terminal Operators	Container Operations
Middle East	Major Gateway Ports	Port Infrastructure & Services
Latin America		

Key Lessons from the Pilots

01 Applying a common framework across diverse port contexts

The overall indicator structure was found to be relevant and applicable across different organizational and operating environments. Application of individual indicators should reflect the roles and responsibilities of different organizations within the port ecosystem, including port authorities, harbour authorities and terminal operators.

02 Port resilience extends beyond the port boundary

Application of the framework reinforced the importance of hinterland transport, utilities, energy, water and wider supply-chain dependencies. These systems may sit outside direct port control but can determine whether port operations continue during and after disruption.

03 Recognizing control and influence

Port resilience outcomes may depend on government agencies, infrastructure operators and other stakeholders across the wider port ecosystem. Application of the indicators should therefore distinguish between areas under a port's direct control and those where resilience depends on coordination, influence or external dependencies.

04 Contextualizing resilience measures

Ports operate under different physical, climatic, ecological and operational conditions. Adaptation measures, including NbS, should therefore be considered according to their suitability, feasibility and effectiveness within the local context rather than applied uniformly.

05 Integrating resilience into existing systems

Ports may already have established enterprise risk management, asset management, emergency preparedness, business continuity, security and environmental management systems. The R4P Indicators can complement these systems by providing an integrated climate and disaster resilience lens across existing port functions and processes.

"At the Port of Tripoli, R4P Indicators provide a practical framework for assessing infrastructure, environmental, safety and emergency preparedness needs. They help translate risks into measurable priorities, guide investment and monitoring, and support more coordinated decision-making to strengthen operational continuity and long-term port resilience."

Office d'Exploitation du Port de Tripoli (OEPT), Port of Tripoli, Lebanon

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"Applying the R4P Indicators validates how Kuantan Port's dual East Coast Rail Link spurlines establish a resilient bypass for the Malacca Straits chokepoint to Kuantan Port. The efficient multimodal road-to-rail connectivity catalyzes our Carbon Capture, Utilisation and Storage ecosystem, while nature-based solutions support decarbonization, proving that structured resilience metrics optimise risk governance and maritime trade continuity."

By YH. Dato' Hasnita Mohd Hanapiah, General Manager of Kuantan Port Authority, Malaysia

Accessing and Using the Assessment Tool

The *assessment tool* is available as a downloadable Excel-based resource through the CDRI and ICSI websites, allowing port authorities and operators to undertake the assessment offline. The workbook provides instructions to guide users through the process, including navigating the relevant worksheets, reviewing assessment criteria, selecting appropriate maturity levels and recording supporting evidence. Users are encouraged to consult relevant departments to ensure that responses accurately reflect existing organizational practices.

Upon completion, the workbook automatically calculates maturity scores and generates a summary of results, including an overall assessment profile and dimension-wise performance. Users can review the results to identify areas for improvement and inform resilience planning. The completed workbook can be saved for future reference and updated during subsequent assessments to track progress over time.

Access the Tool Here:

https://cdri.world/transport/ports-infrastructure-resilience/
https://sustainability-coalition.org/publication/resilience4ports-r4p-indicators-guidance-notes/



How to use the R4P Self-Assessment Tool

Four steps to assess and improve your port's climate resilience

0 Before you start: fill in the port profile in tab **1. Start Here** and involve the relevant departments. The profile does not affect your scores.

1 ASSESS

Find your level

3. Scoring Guide

WHAT YOU DO

For each of the 22 indicators, Choose the level (1–5) that best matches your port.

WHAT YOU GET

A view of where your port stands on each indicator.

2 SCORE

Enter score and evidence

2. Self-Assessment

WHAT YOU DO

Enter the score and supporting documents in the score cells.

WHAT YOU GET

The maturity level, filled in automatically.

3 IMPROVE

Check next steps

2. Self-Assessment · 4. Improvement Actions

WHAT YOU DO

Read the actions for each indicator in improvement actios has the full pathway.

WHAT YOU GET

Actions to reach the next level.

4 REVIEW

Review results

5. Dashboard · 6. Supporting Metrics

WHAT YOU DO

Set priorities. Additional quantitative (optional).

WHAT YOU GET

Overall and dimension scores, a profile chart and an action plan.

↻ Repeat regularly and after major events to track progress.

The maturity scale

1 Initial	2 Partial	3 Comprehensive	4 Integrated	5 Institutionalised
Ad hoc or absent	Fragmented	Documented, covers critical areas	Embedded in planning and operations	Embedded in governance, reviewed

Example: Illustrative Assessment of Indicator AO.1

One indicator through the four steps

AO.1 **Risk Assessment and Critical Asset Identification** (Assets & Operations)

1 Scoring Guide

Tab 3 (summarised)

Level	Description	Typical evidence
1 Initial	No systematic risk assessment	Isolated technical reports
2 Partial	Separate studies, not integrated	Flood studies, hazard maps
3 Comprehensive ◀ Our port today	Documented assessment of all critical assets	Climate risk report, asset register
4 Integrated	Projections and cascading risks; guides investment	Scenario and systems analysis
5 Institutionalised	Embedded in governance; reviewed regularly	Board-approved strategy

2 Self-Assessment

Tab 2

Code	Indicator	Score (1–5)	Maturity level	Evidence
AO.1	Risk Assessment and Critical Asset Identification	3	3. Comprehensive	Climate risk assessment (2024); asset and risk registers

☐ You fill in ☐ Calculated automatically

3 Next steps to Level 4

Tabs 2 and 4

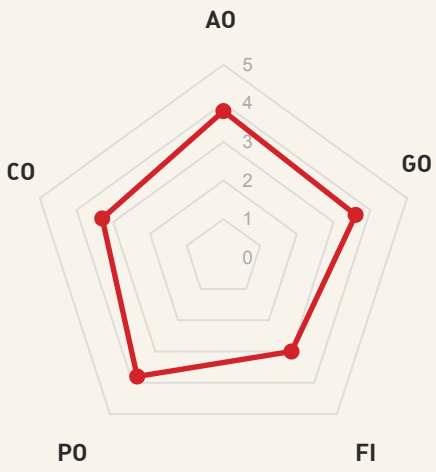
Level 1 → 2 | Level 2 → 3 | **Level 3 → 4** | Level 4 → 5

- ✓ Consider climate projections and scenario analysis
- ✓ Assess cascading risks with utilities and hinterland transport
- ✓ Use findings to prioritise investment

4 Dashboard

Overall resilience score **3.5** **4. Integrated**

Code	Dimension	Score
AO	Assets & Operations	3.8
GO	Governance & Institutions	3.6
FI	Finance	3.0
PO	People & Communities	3.8
CO	Coastal, Marine & Ecological	3.3



Illustrative scores

5. Additional Resources that can Complement the Assessment Process

01 Resilience4Ports Framework for Action[2]

The Port Resilience Framework for Action, developed through R4P, provides an important foundation for translating resilience ambitions into practical action. The Framework sets out ten goals across three dimensions: Economy and Society, Leadership and Strategy, and Infrastructure and Ecosystems, and provides a line of sight from policy and strategic decision-making through to implementation at the port and asset level. It emphasizes that port resilience requires action across organizational boundaries and throughout the wider port value chain, rather than focusing solely on physical infrastructure.

The R4P Indicators complement this Framework by providing a structured mechanism for ports to assess their current level of resilience capability and identify where further action is needed. While the Framework sets out what needs to change and the types of action that can contribute to resilience, the Indicators help ports understand where they currently stand, identify gaps and track progress over time. The five R4P indicator areas capture many of the enabling conditions highlighted by the Framework, including resilient asset planning and management, integrated governance, financial preparedness, community engagement, effective response and recovery, and protection of natural ecosystems.



The two resources can therefore be used as complementary stages of a continuous improvement cycle. A port can use the Indicators to establish a baseline and identify priority gaps, then use the Framework for Action to consider appropriate actions in line with maturity levels, actors and pathways for addressing those gaps. The quantitative supporting metrics can subsequently help monitor implementation and demonstrate progress.

Importantly, both approaches recognize that resilience is a whole-system and multi-stakeholder challenge. The Framework identifies the roles of governments, port owners and operators, investors, port users, designers, contractors and civil society, while the Indicators provide a port-level mechanism for decision-makers to assess organizational readiness.

[2] https://sustainability-coalition.org/publication/port-resilience-framework-for-action/

02 Transport Resilience Pathways - Ports[3]

The Transport Resilience Pathways - Ports resource can complement the R4P Indicators by providing a practical pathway for translating resilience principles into progressive improvements in infrastructure maturity. The guidance recognizes that ports sit at the intersection of climate risk, trade and interconnected supply chains, meaning that resilience needs to be considered throughout the infrastructure lifecycle rather than only at the operational stage.

In particular, the lifecycle framework provides a useful structure spanning needs identification, planning, delivery, and management, with activities including policies and plans, prioritization, feasibility and preparation, funding and financing, design, procurement, construction, operation and maintenance, and end of life.

The resource can therefore help ports move beyond simply assessing their current resilience capability towards identifying what needs to change to reach the next maturity level. For example, an indicator may establish that a port has a basic level of climate-risk consideration within its infrastructure planning. The Transport Resilience Pathways guidance can then help identify the relevant actions across planning, design, financing, procurement, construction and asset management that would support progression towards a more advanced and integrated level of resilience.

This creates a strong assessment-to-action connection: R4P can measure where a port is on its resilience maturity journey, while Transport Resilience Pathways can help inform how the port can progress along that journey. Used together, the two resources can support evidence-based investment decisions, strengthen the integration of resilience throughout the infrastructure lifecycle, and provide ports with a structured basis for demonstrating continuous improvement in their resilience maturity.

03 Global Goal on Adaptation (GGA)

The development of the R4P indicators was strongly informed by the evolving indicator framework under the Global Goal on Adaptation (GGA) and the UAE Framework for Global Climate Resilience. The GGA provided an important international reference point for understanding how adaptation and resilience can be translated from broad policy objectives into measurable progress.

The GGA indicator work was also valuable because it brought together a wide range of existing indicators, methodologies and data sources, while identifying gaps where additional indicators were required. This provided a strong basis for avoiding the creation of indicators in isolation and instead building on established approaches and internationally recognized concepts.

The GGA framework therefore provided a useful lens through which port resilience could be considered not simply as the robustness of physical infrastructure, but as a broader capacity to anticipate, absorb, adapt to and recover from climate-related risks.

The R4P indicators build on this foundation by translating the principles and emerging international thinking on adaptation measurement into a port-specific, practical and decision-relevant framework. In doing so, they help connect global adaptation objectives with the realities of port planning, investment, operations and long-term resilience, while supporting comparability, monitoring and continuous improvement across ports.

[3] https://transport-pathways.org/

04 Sustainable Development Goals (SDGs) - Reporting and Contribution

The findings from the R4P indicators can provide a practical mechanism for ports to demonstrate and strengthen their contribution to the UN SDGs. R4P Indicators can therefore complement the SDGs by translating global sustainability ambitions into port-specific measures of resilience and maturity. Ports can map their R4P indicators against relevant SDG targets and use their maturity levels to assess where they currently stand, identify gaps, and establish a pathway for progressive improvement. For example, the indicator 'Nature-based adaptation and ecosystem condition' can support SDG 9.1, which calls for quality, reliable, sustainable and resilient infrastructure.

This creates an opportunity for ports to move beyond simply stating that they 'support the SDGs' and instead demonstrate measurable progress through evidence-based indicators. A port could, for example, report its current R4P maturity level against a relevant SDG target, identify the actions required to move to the next maturity level, and track improvement over time.

Importantly, the same R4P indicator outputs can provide valuable evidence for ESG and sustainability reporting. R4P indicators can create a bridge between port resilience assessment, SDG alignment and ESG disclosure, enabling ports to use one coherent set of evidence to support strategic decision-making, demonstrate progress to stakeholders, and communicate their contribution to global sustainable development.

05 WWF Towards Nature Positive for the Ocean: Pathways for Port Sector Contributions[4]

The WWF Towards Nature Positive for the Ocean: Pathways for Port Sector Contributions report provides an important practical resource for advancing the coastal/marine/ecological-related indicators within the R4P framework. It translates the ambition of a nature-positive ocean into practical actions that ports can integrate across their planning, development and operational activities to contribute to the nature-positive global societal goal. Importantly, the report moves beyond a traditional ' do no harm' approach by encouraging ports to avoid, reduce, restore, regenerate, and transform (AR3T) to manage impacts and dependencies on marine and coastal ecosystems and to increase opportunities for long-term resilience.

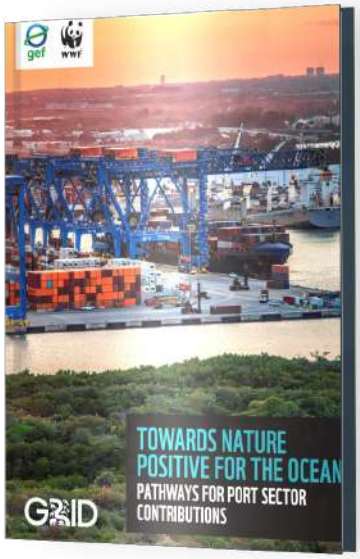
This provides a valuable basis for defining and strengthening maturity pathways for R4P coastal/marine/ecological indicators. A port at an initial maturity level may focus primarily on identifying its impacts and dependencies on marine ecosystems, while higher maturity levels could demonstrate the systematic integration of NbS, ecosystem restoration, biodiversity considerations and nature-positive outcomes into investment, infrastructure design and operational decision-making. The WWF pathways can therefore help translate an indicator assessment into specific actions required to progress from one maturity level to the next.

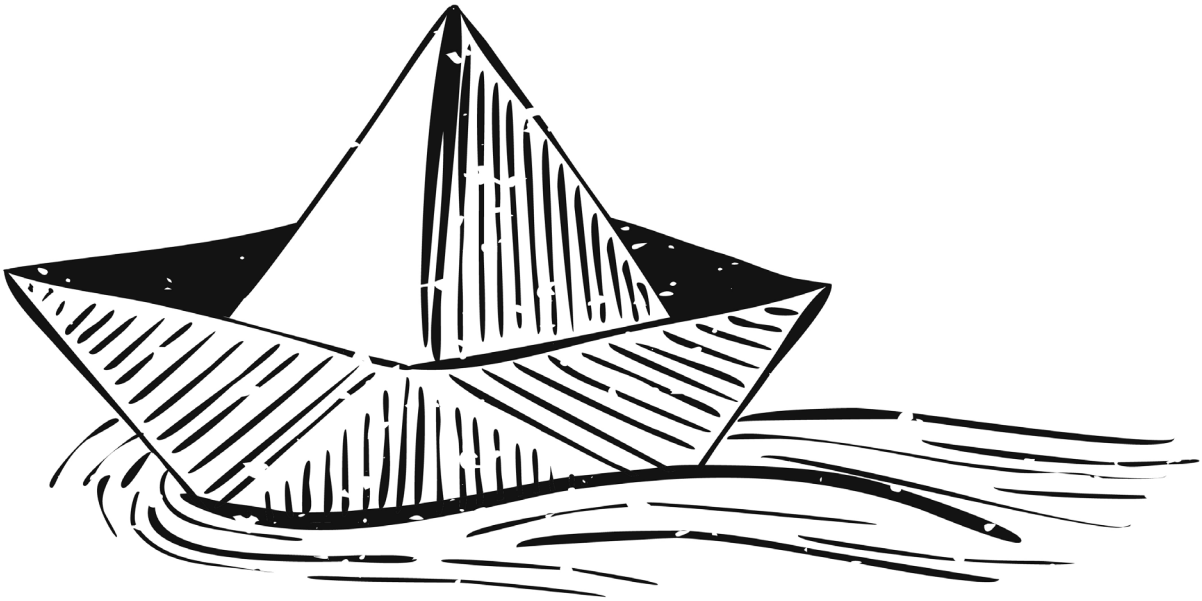
The report is also particularly valuable because it connects port actions with wider frameworks, including the SDGs, Global Biodiversity Framework, Taskforce on Nature-related Financial Disclosures and Science Based Targets Network, helping ensure that R4P coastal/marine/ecological indicators remain aligned with the broader international sustainability landscape. This strengthens the ability of ports to demonstrate measurable progress towards healthier oceans, biodiversity restoration and a more resilient and sustainable blue economy. Further, WWF's follow-on report,

[4] https://assets.worldwildlife.org/www-prd/documents/FINAL_WWF_Nature_Positive_Ocean_Pathways_Ports_Report_6.9.26.pdf

Monitoring, Measuring, and Tracking Progress Towards Nature Positive for the Ocean[5], can also be referenced to help companies begin to monitor and measure whether the actions they are taking to contribute to nature-positive and long-term resilience are having the intended results.

The report includes best practices and guidance for monitoring progress, as well as a synthesis of ecological indicators that can be used to measure the nature-positive action pathways.For example, the first report can be used to support companies in selecting which interventions or NbS to implement within the port grounds to improve resilience (CO.M1), and the second report can support the development of a biodiversity monitoring scheme (CO.M2). Further, this report could help ports identify the qualitative and quantitative data to collect to support descriptive reporting.





[5] https://www.worldwildlife.org/publications/monitoring-measuring-and-tracking-progress-towards-nature-positive-for-the-ocean/

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Note: This First Edition of the R4P Indicators Guidance Note represents the first phase of the framework and may be further refined based on stakeholder feedback, practical application and lessons learned from its use.



International Coalition for Sustainable Infrastructure

www.sustainability-coalition.org

Coalition for Disaster Resilient Infrastructure

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