

ENGAGEMENT

Over the past 14 months, Artesian has engaged with Australia's four largest ports; Port of Melbourne, Flinders Ports, NSW Ports, and Port of Brisbane. This arises from our analysis of new bond issuance and commitment to additionality through the pursuit of appropriately labelled securities, for example green, sustainable and social bonds. For this sector, our focus has been on climate impact risks both to and from ports, and the implications these risks have for bond issuer pricing.

SUMMARY

Global mean sea level (GMSL) has risen approximately 21–24 cm since 1880, with the rate of rise accelerating in recent decades. Current forecasts estimate a further rise of 29 cm to 1.1 meters by 2100, driven by melting glaciers, thermal expansion of seawater, and ice sheet loss. This trajectory poses significant long-term risks to coastal infrastructure, particularly ports, which are inherently exposed due to their coastal location.

Ports variously face a range of climate-related vulnerabilities, including:

- Sea level rise and storm surge leading to flooding of terminals and access roads;
- Increased frequency and severity of hurricanes and cyclones;
- Coastal erosion, undermining infrastructure integrity;
- Natural disasters impacting operations and logistics;
- Operational disruptions from extreme weather events.

At the same time, ports contribute to climate pressures, through notable greenhouse gas emissions from shipping activities, port machinery, and associated land transport systems.

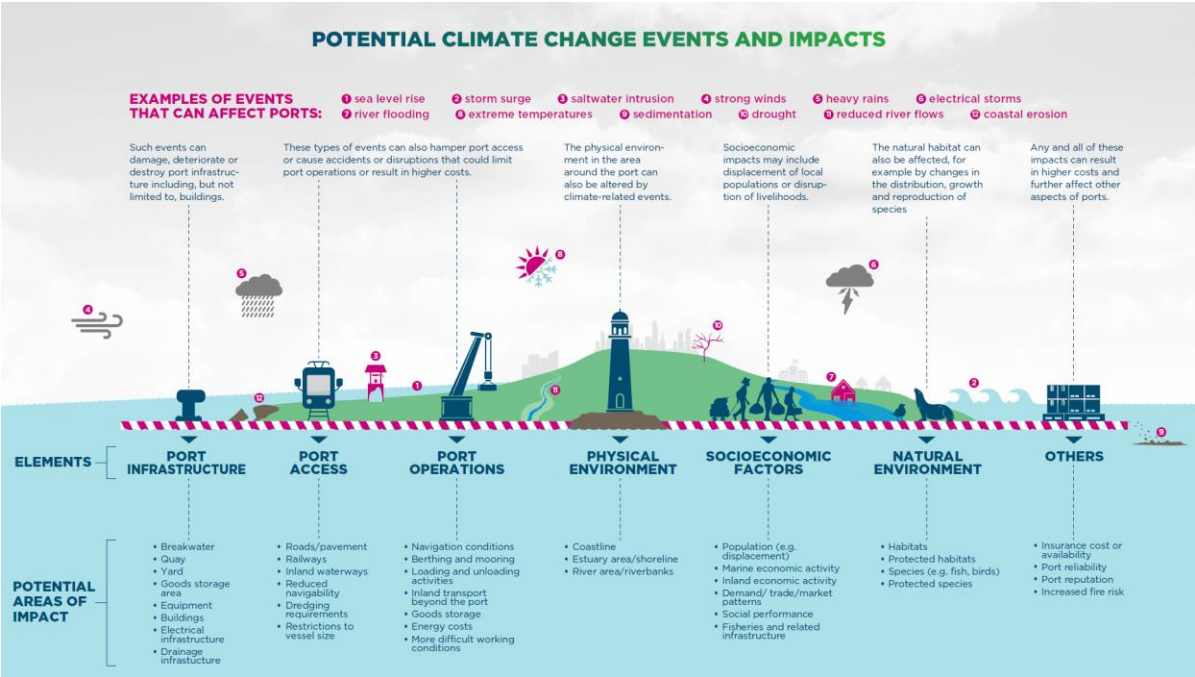
Despite these physical and transitional risks, ports occupy a strategically vital economic position:

- Over 80% of global trade by volume is transported by sea;
- In Australia, 99% of international trade by volume moves through ports;
- Ports are critical logistics hubs and major employment centres;
- They often function with limited competition and high barriers to entry, both geographically and economically;
- In Australia, regulated revenue models further entrench their economic durability.

This creates a complex investment landscape: while ports are economically indispensable, they are also exposed to long-term climate risks. As such, they represent a paradigmatic case of climate-integrated investment analysis, balancing material physical and transition risks against robust cash flows, monopolistic advantages, and critical national infrastructure status. Understanding this duality has been a key focus of Artesian's investment research, guiding the assessment of infrastructure assets through both a climate risk lens and an economic resilience framework.

IMPACT TO PORTS

Figure 1 – Potential Climate Change Events and Impacts



Source: Climate Risk and Ports, A Practical Guide on Strengthening Resilience, 2021 Inter-American Investment Corporation (IDB Invest)

IMPACT TO PORTS

Climate risk can be divided into two key aspects: physical risk and transition risk. By their very nature, ports are situated in hazard-prone areas along coastlines and near rivers, making them particularly vulnerable to storms and flooding. As climate change advances, ports will increasingly face challenges from rising sea levels and more frequent, severe weather events. This is outlined diagrammatically in Figure 1 above.

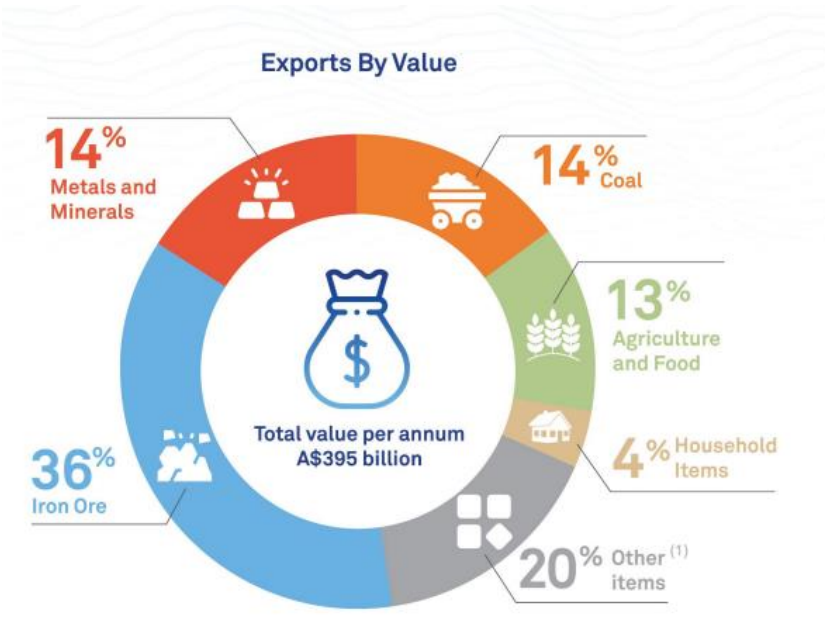
According to research from Oxford University, “86% of all ports are exposed to more than three types of climatic and geophysical hazards. Extreme conditions at sea (e.g. storms) are expected to cause operational disruptions to around 40% of ports globally.”¹ Whilst the Inter-American Development Bank noted that, “Given the magnitude and urgency of climate-related threats, ports must scale up preparedness and make their physical, operational and environmental infrastructure more resilient.”² Following a recent enterprise risk management (ERM) exercise, Maersk³ identified climate change – both physical and transition risks – as the biggest threat to its business.

Our engagement with Australian ports has highlighted that they are aware of these risks. Notably, the Port of Brisbane has undertaken the most comprehensive analysis to date, using scenario analysis to identify both physical and transition risks that could affect its assets and operations in the short and long term.

TRANSITION RISKS

All four ports acknowledge the potential for climate-induced shifts in trade flows, with particular concern around revenue losses stemming from decarbonization initiatives and the transition away from carbon-intensive commodities. This presents a significant risk for Australian ports exposed to high-emission sectors such as mining, transportation, and shipping and those reliant on a narrow range of fossil fuel-linked commodities.

Figure 2 – Export Trade Through Australia's Ports by Goods Type



Source: State of Trade 2024, Ports of Australia

According to our analysis, NSW Ports’ Port Kembla Coal Terminal is the second-largest coal export facility in New South Wales. It services the state’s southern and western coalfields and is a key coal export hub on Australia’s east coast

ECONOMIC & FINANCIAL IMPACT

As is the case globally, ports are crucial to the Australian economy. They handle the vast majority of domestic trade, serve as key hubs for industry and transport, and are significant providers of employment. Australian ports manage 99% of the country's international trade by volume, contribute \$264 billion annually to Gross State Product, and support 694,000 jobs across all states.

There is no significant competition between the five major urban ports in each state, primarily due to the geographic distances separating them and the limited overlap in their contestable cargo catchment areas. As a result, competition for major cargo trade is minimal. High barriers to entry exist due to the scarcity of viable alternative locations, the substantial capital investment required for port development, and supportive government policy. Consequently, revenue is largely 'protected' by their status as government-supported monopoly service providers.

SUMMARY

Risk Impacts

The most material climate risks to ports are as follows:

- Long-term physical climate risk to port infrastructure from forecast sea level rise. This risk affects not just individual ports (though some are more exposed than others), but potentially, the entire port network, as disruptions at one location can impact operations at others.
- Short and long-term physical risk to port infrastructure and operations from an increase in the frequency and severity of extreme weather events.
- Short and long-term transition risk arising from shifts in trade flows due to decarbonisation and evolving economic and regulatory conditions.

Notwithstanding the risks outlined above, the current impacts from sea level rise and severe weather events remain limited, with no material financial consequences to date.

Risk Management

Physical risks are generally well monitored and managed. However, there is some disparity and disconnect between port resilience strategies, actions and reporting in contrast to research highlighting the short and especially long-term climate risks and the forecast necessary consequent investment.

Investment Pricing

The market does not appear to fully price in climate risks to ports. We believe this disconnect is partly attributable to the following factors:

- Limited awareness of climate change impacts and rising sea levels, coupled with the perception that these are long-term risks, often extending beyond typical bond durations and investment horizons.
- A lack of detailed disclosure or discussion by ports themselves.
- The structural economic importance of ports and the strength of their cash flows, which may obscure underlying climate risks.

All four of the ports we have researched, represent strategic infrastructure. Their profitability and asset values are underpinned by strong monopoly market positions. Nonetheless, ports are economically critical assets that will need to be sustained, and likely expanded, to support global economic activity. Furthermore, the interconnectivity of the global port network is often overlooked. A disruption at one port can have cascading operational impacts on downstream or upstream ports within the supply chain.

Implications for Artesian

1. Artesian has invested, and will continue to invest, in Australian ports.
2. We believe the four major Australian ports face significant long-term physical and transition climate risks. These risks form the core focus of our ongoing engagement.
3. We consider the Port of Brisbane to be the most exposed to climate-related risks. Its location at the mouth of the Brisbane River makes it particularly vulnerable to extreme weather events. As such, Artesian regards its physical climate risk as higher than that of its domestic peers.
4. Our forward-looking engagement will focus on encouraging improved disclosure and understanding of:
 - The impacts of global mean sea level (GMSL) changes and severe weather events on these and other ports.
 - Port-specific resilience strategies and related capital expenditure.
 - Aggregate and port-level trade exposures, particularly to coal, and potential shifts such as increased EV-related trade.
5. We intend to expand our analysis to:
 - Additional ports to identify global best practices
 - Other maritime industries exposed to similar climate-related risks

As part of Artesian's commitment to creating and facilitating additionality in and through our investments, Artesian has recently submitted a proposal for the Catalytic Climate Finance Facility; The Southeast Asia Blue Innovation Facility (SEA Fund) to co-develop a \$500 million blended finance vehicle designed to drive maritime decarbonization, climate adaptation, and inclusive economic development across Southeast Asia.

NOTES

¹Multi-hazard risk to global port infrastructure and resulting trade and logistics losses, Jasper Verschuur, Elco E. Koks, Sihan Li & Jim W. Hall, Oxford Programme for Sustainable Infrastructure Systems (OPSIS), Environmental Change Institute, University of Oxford, Oxford, Institute for Environmental Studies, Vrije Universiteit Amsterdam, School of Geography and the Environment, University of Oxford, Oxford.

²Climate Risk and Ports, A Practical Guide on Strengthening Resilience, 2021 Inter-American Investment Corporation (IDB Invest).

³A.P. Moller-Maersk ('Maersk'), is one of the world's largest shipping and logistics companies with 67 port terminals.

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