March 2025

Policy Brief

Baltic Sea Centre | Stockholm University

Prepare for Sea-level Rise to avoid loss of lifes, land and resources

Sea-level rise is an ongoing and serious challenge requiring immediate policy and technological action. Through proactive planning and international cooperation, we can reduce risks and protect vulnerable communities.

Global sea levels have risen by approximately 25 cm since the 1800s and are accelerating. The primary causes include ocean thermal expansion, glacier and ice sheet melting, and changes in land water storage.

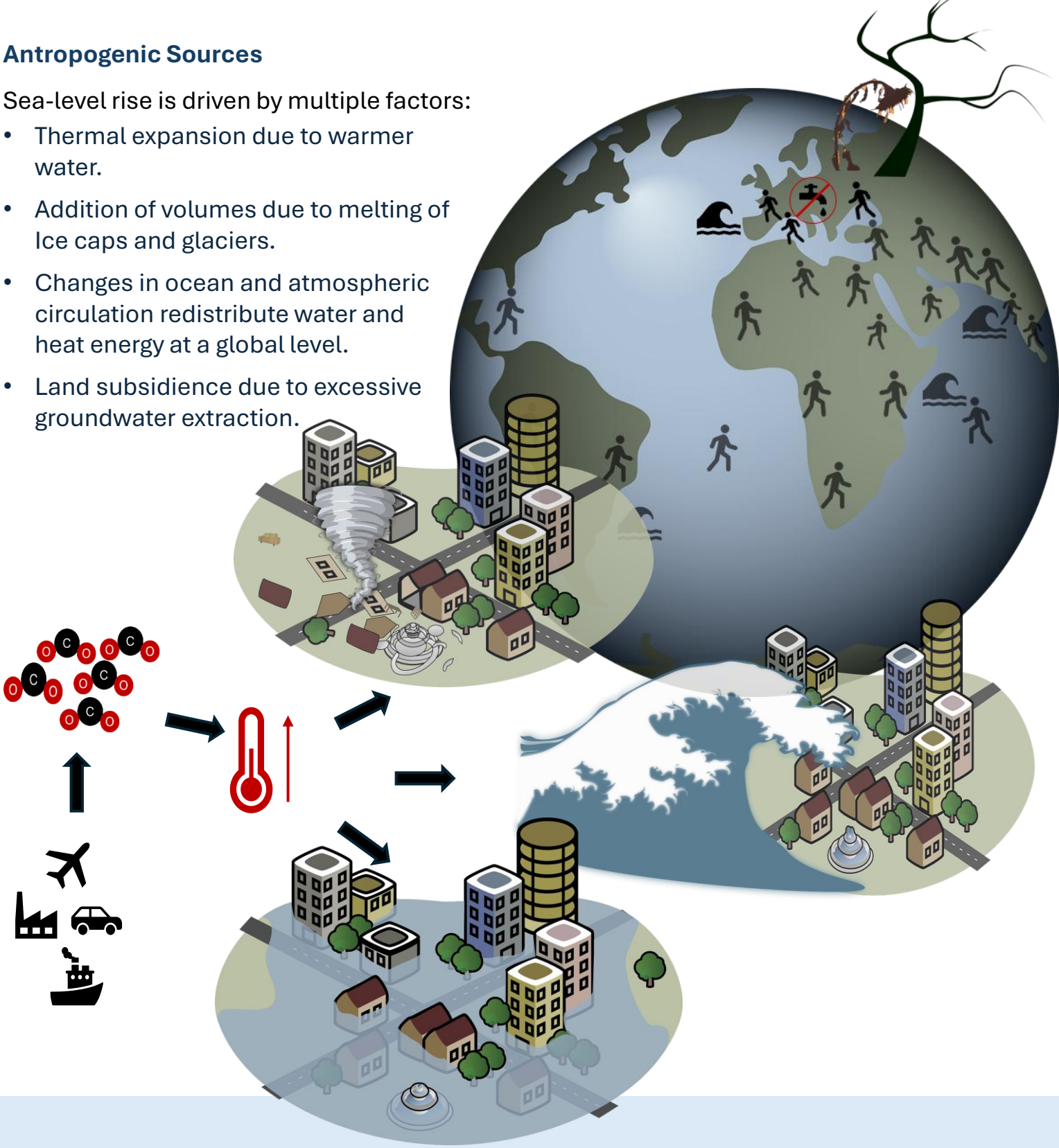
RECOMMENTATIONS

1. **Invest in Protective Measures:** Construct sea walls, restore wetlands, and implement coastal defenses.
2. **Plan for Adaptation:** Integrate sea-level rise into urban planning and building regulations.
3. **International Cooperation:** Enhance global collaboration to mitigate climate change effects and finance adaptation in vulnerable regions.

Antropogenic Sources

Sea-level rise is driven by multiple factors:

- Thermal expansion due to warmer water.
- Addition of volumes due to melting of Ice caps and glaciers.
- Changes in ocean and atmospheric circulation redistribute water and heat energy at a global level.
- Land subsidience due to excessive groundwater extraction.



CONSEQUENCES

Flooding and land loss

- Submergence and increases flooding of coastal land
- Disappearance of low-lying islands and cities.

Together these factors leads to millions of refugees and mass exodus.

Resource loss

Saltwater intrusion of surface and subsurface waters will lead to a severe shortage of potable water.

Increased erosion and habitat destruction in coastal areas lead to damaged agriculture and recreation areas.

Overall, Sea-level rise will lead to massive economic losses as well as costs due to the need for significant infrastructure investments

ACTIONS TO AVOID COST

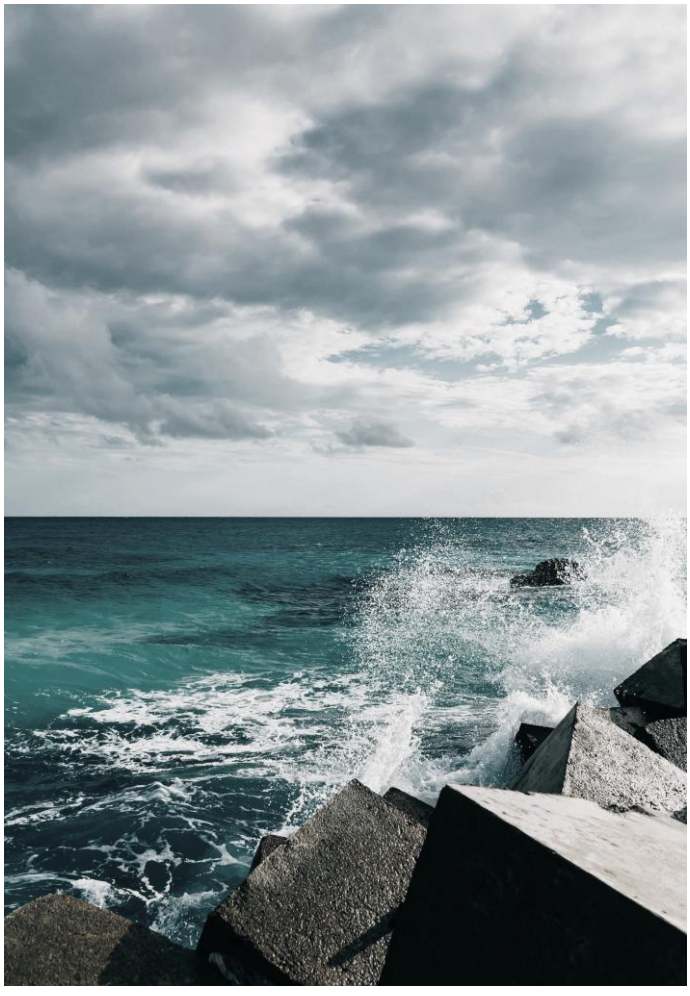
First aid kit

Invest in Protective Measures

Governments and municipalities must prioritize building resilient infrastructure, such as sea walls, flood barriers, and reinforced drainage systems. Natural solutions like wetland restoration and mangrove reforestation can also provide sustainable protection against storm surges and erosion.

Plan for Adaptation

Policymakers should integrate sea-level rise into long-term urban planning, including zoning regulations, building codes, and strategic land-use planning. Investment in early warning systems and climate-resilient construction is crucial.

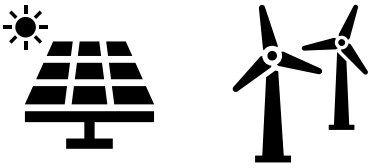


Long term solutions

Reduce Greenhouse Gas Emission

The root cause of accelerated sea-level rise is climate change driven by human activity.

Transitioning to renewable energy, improving energy efficiency, and promoting sustainable transportation are critical steps to slow down warming and its associated effects.



Strengthen International Cooperation

Many of the most affected regions lack the financial and technological capacity to adapt. Enhanced global collaboration is essential for knowledge-sharing, financial support, and coordinated climate policies to mitigate and adapt to sea-level rise.

Increase Public Awareness and Community Engagement

Educating the public on the risks of sea-level rise and involving local communities in adaptation strategies can lead to more effective and sustainable solutions.

KEY FACTORS INFLUENCING FUTURE SCENARIOS

The extent of future sea-level rise depends on several key factors:

Greenhouse Gas Emissions:

Higher emissions lead to more warming, accelerating ice melt and ocean expansion.

Polar Ice Sheet Stability:

If major ice sheets in Greenland and Antarctica destabilize, sea-level rise could be more rapid than current estimates.

Global Climate Policies:

Strong international action on emissions reductions and sustainability measures can limit temperature rise and slow sea-level increase.

Technological Advances:

Improved engineering solutions, such as flood barriers and land reclamation, could mitigate some impacts but may not be universally viable.

COSTS OF INACTION

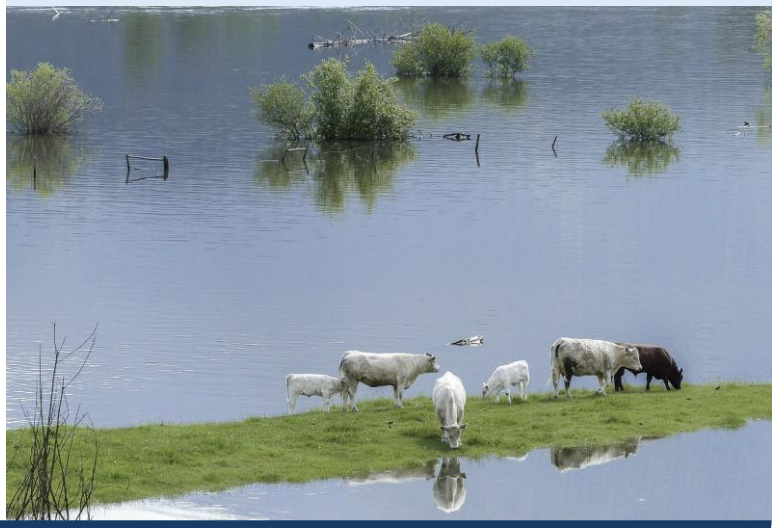
Estimated Costs of Inaction

According to Anthoff et al. (2010), the financial burden of sea-level rise without protective measures is substantial:

- **0.5 meters rise:** $170–200 billion USD
- **1 meter rise:** $1 trillion USD
- **2 meters rise:** $2 trillion USD

These costs include protective infrastructure, land loss, and relocation expenses.

Without intervention, economic and social costs will be even higher as key coastal areas and cities are affected.



BRIDGING THE GAP BETWEEN SCIENCE AND POLICY

This is a policy brief produced by Stockholm University Baltic Sea Centre. Scientists, policy analysts and communication experts work together to bridge the gap between science and policy. We compile, analyse and synthesise scientific research on Baltic Sea related issues and communicate it at the right moment to the right actor

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