



Source-to-sea management is key to climate security

Source-to-sea management is an important approach for both climate mitigation and adaptation. It embraces system-wide thinking and acknowledges the interdependencies of flows and services throughout river basins, deltas, coasts and marine areas. By addressing these linkages, it makes it possible to achieve much-needed coordination across institutions, sectors and public uses. A new study indicates that many countries see a need for such enhanced coordination in their climate actions.

Current management and governance structures are often based on a limited understanding of linked ecosystems, which can make them unable to deal with complexities presented by climate impacts on interdependent social and ecological systems. The 2019 IPCC Special Report on the Ocean and Cryosphere concluded with high confidence that fragmented governance – across sectors and in governments – prevents effective responses to the increasing climate-related risks faced in the ocean and cryosphere.¹

Pairing source-to-sea management with national climate planning can help address this fragmentation and bolster environmental and economic resilience while contributing to water, climate, ocean and biodiversity-related SDG targets. This position draws on conclusions from a study conducted in 2019 by the Alliance for Global Water Adaptation (AGWA) and the Stockholm International Water Institute (SIWI) analysing the extent to which source-to-sea issues are already imbedded in national climate plans (Nationally Determined Contributions [NDCs] and National Adaptation Plans [NAPs]).

Climate resilience flows from source to sea | Source-to-sea management addresses the linkages between ecosystems from the river basin and connected aquifers, deltas, estuaries, coastlines, adjoining seas and the open ocean.² These ecosystems are linked through the key flows of water, biota, sediment, materials, pollutants and plastic, and ecosystem services as indicated in Figures 1 & 2.

Understanding of the impacts of climate change on each of these flows can support more strategic actions to bolster resilience and sustain valuable ecosystem services and explore real options for

investments in blue growth. This includes not only how the flows are altered by variations in climate, but also how they are affected by other climate mitigation or adaptation actions and human activities (*See box on next page*). As described in the following section, source-to-sea management can be effective in addressing climate impacts across these flows and linked ecosystems through evaluating trade-offs and identifying co-benefits with adaptation and mitigation measures in source-to-sea systems.

How can climate planners and decision-makers blend elements of the source-to-sea approach into national priorities for adaptation and mitigation actions?

1. Integrate source-to-sea assessments into climate mitigation and adaptation planning processes to ensure that implications on source-to-sea flows, and the ecosystem services that are influenced by them, are well understood.
2. Build capacity to coordinate land, coastal and fresh-water management into national climate planning to maximize system-wide benefits.
3. Plan for coordinated source-to-sea actions to build system resilience.
4. Monitor outcomes, capture and disseminate learning and adaptively manage for continued success.

How climate impacts source-to-sea flows



Figure 1. Key flows connect land, water, deltas, coasts and sea.

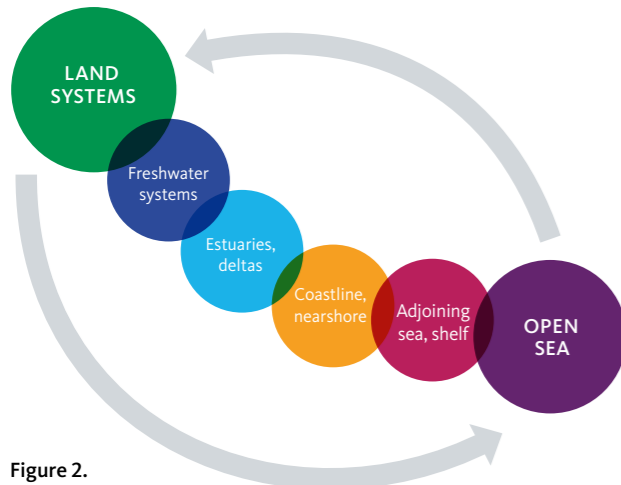


Figure 2. Source-to-sea system.⁶

Source-to-sea systems are connected through key flows of water, biota, sediment, materials, pollutants and plastic which impact the functioning of ecosystems and the services they provide. Some examples of how these flows both effect and are influenced by changes in climate include:

Water, sediment and biota flows: Changes in land use, coupled with climate change, can contribute to decreased overall water availability and drought as well as increased flood risk or flood severity along rivers and deltas. As competition for limited resources grow, water scarcity has also been shown to travel downstream as resources are utilized upstream.³ While dam and reservoir construction are common actions to mitigate and adapt to climate change, it risks disrupting pathways of fish that serve as important sources of protein and income for many vulnerable populations. It is also the most important factor influencing land-ocean sediment flows, trapping around 30 per cent of global sediment flows.⁴ This contributes to erosion of riverbeds and coasts as well as sediment starvation of deltas downstream. Combined with sea-level rise and other effects of climate change, the consequences can be serious.

Pollutant and material flows: Poor water quality limits the ability of ecosystems to sequester carbon and provide other needed services. For example, maintaining blue carbon stocks in the earth's oceans requires healthy freshwater from rivers. If the water that reaches the ocean is too polluted or if the quantity is greatly reduced, the carbon storage potential of the ocean risks being compromised. Degradation of tropical peatlands is another example that turns important GHG sinks into significant sources of emissions as they are drained and reclaimed for other uses.⁵



Photo: iStock

Source-to-sea support to reaching NDCs | An initial step in linking source-to-sea management to climate planning processes is to raise awareness among national climate planners and decision-makers. In 2020, the next round of Nationally Determined Contributions, NDCs, will be submitted to the UNFCCC Secretariat, outlining the efforts of each country to reduce national emissions and adapt to the impacts of climate change. A key question of practical importance to address for them will be: How can source-to-sea management enhance their efforts to meet development goals while addressing climate change through their NDCs?

In order to understand the extent to which source-to-sea issues are currently imbedded in these national climate plans, an analysis of 102 NDC and INDCs (intended Nationally Determined Contributions) from low- to middle-income countries with marine coastlines was done by AGWA in 2019. The use of sixteen terms related to land-use, water resources, and coastal management (as well as cross-cutting issues) was analyzed in those documents.

The analysis found that a majority of NDCs referenced terms relevant to all three of these areas (as well as cross-cutting issues, such as ecosystem-based management and pollution). This demonstrates that climate planning spans domains across the source-to-sea system. The analysis also found that estuaries and deltas, wetlands/marshes, sediment and pollution were referenced relatively few times, despite their important role in climate adaptation and mitigation. It would therefore be beneficial for countries to review

how source-to-sea management can support the implementation of current NDCs as a means to strengthen coordination, address trade-offs and realize co-benefits with adaptation and mitigation actions for land, water, deltas, coasts and oceans. This should also be prioritized in the planning of the next round of NDCs as well as in Long-term Strategies (LTS) and National Adaptation Plans (NAP).

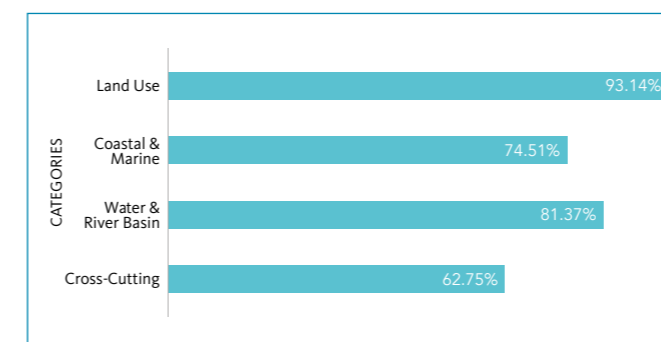


Figure 3. Percentage of countries which highlighted each category. Of the 102 countries whose NDCs were reviewed in the study, nearly half had references to all four categories of search terms.

Conclusions and way forward | Applying source-to-sea management as part of national climate planning is key to climate security. As the first round of NDCs is set to be finalized in 2020, governments can use this opportunity to enhance their commitments by ensuring that the governance and management from source waters to coastal and estuarine and marine systems are incorporated in ways that recognize the interdependent nature of these ecosystems.

Recommendations | The following recommendations can help climate planners and decision-makers blend elements of the source-to-sea approach into their individual national contexts.

1. Integrate source-to-sea assessments into climate mitigation and adaptation planning processes to ensure that implications on source-to-sea flows, and the ecosystem services that depend on them, are well understood. A large majority of the reviewed NDCs in the study included components linked to water and coastal management, or land use planning. The analysis also found that estuaries, delta, and wetland systems, as well as sediment and pollution issues, may require increased consideration in climate adaptation and mitigation planning. Systematic assessment of key pressures and drivers of altered key flows along the source-to-sea continuum could help identify priorities for adaptation or mitigation actions likely to benefit the system as a whole.

2. Build capacity to coordinate land, coastal and freshwater management into national climate planning to maximize system-wide benefits. National commitments for adaptation and mitigation actions commonly span the fields of land use planning, integrated water resource management, and coastal zone management. Mapping stakeholders will help determine who needs to be engaged in the capacity building exercises for decision-makers as well as who can assist with planning, implementation and monitoring at local, national and trans-boundary levels.

3. Plan for coordinated source-to-sea actions to build system resilience. Applying source-to-sea management in climate adaptation and mitigation actions requires funding that focuses on a long-term, holistic strategy that builds system resilience, alongside efforts to reach sectoral targets. Innovative funding could include blended finance, payment for ecosystem services, or green bonds are some options that can be explored.

4. Monitor outcomes, capture and disseminate learning and adaptively manage for continued success. Choosing suitable indicators will also help demonstrate how various elements of the source-to-sea continuum connect and affect each other and how they support mitigation and adaptation actions outlined in NDCs and NAPs.

Action Platform for Source-to-Sea Management | The Action Platform for Source-to-Sea Management (S2S Platform) is a multi-stakeholder initiative that helps freshwater, coastal and marine experts to contribute to global knowledge generation on source-to-sea interconnections, connect and engage in collaborative projects, promote best practices, and take collaborative action to improve the management of land, water, coastal and marine linkages. The S2S Platform is an important resource for parties looking to learn more about source-to-sea management and apply it to their climate mitigation and adaptation planning.

Learn more at www.siwi.org/source-to-sea

References

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- ⁶ Mathews, R. E., Tengberg, A., Sjödin, J., & Liss-Lymer, B. (2019). Implementing the source-to-sea approach: A guide for practitioners. SIWI, Stockholm

About this publication

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