Foundations for source-to-sea management

LESSONS FROM THE FIELD

Woman crushes plastic bottles at recycling plant, Hawassa, Ethiopia. Photo: Georgette Mrakadeh-Keane

Piloting the source-to-sea approach

The Stockholm International Water Institute (SIWI), funded by the Federal Ministry of Economic Cooperation and Development (BMZ) conducted a project "Foundations for Source-to-Sea Management" to pilot the source-to-sea approach in the Vu Gia-Thu Bon River Basin, Viet Nam and the Lake Hawassa Sub-Basin, Ethiopia. By focusing on the first three steps of the source-to-sea approach, the two pilots:

- increased knowledge of priority local challenges constraining sustainable development;
- strengthened awareness of the linkages between upstream and downstream activities and their impacts;
- built local capacity for taking a holistic approach to natural resource management and economic development; and
- highlighted the opportunities and challenges associated with implementing the source-to-sea approach to management.

In this document we share some of our key learnings from applying the source-to-sea approach.

Lake Hawassa Sub-Basin

The Lake Hawassa Sub-Basin is located 275 km south of Addis Ababa and covers approximately 1,400 km². Lake Hawassa is 90 km² in size and is the endpoint of an endorheic hydrological system, with some limited groundwater outflow. It is due to the closed nature of the sub-basin that it was selected to pilot the source-to-sea, or in this case source-to-lake, approach.

Erosion and sediment flows are considered major issues in the basin and have been driven by sand mining and substantial land uses changes due to expansion of agriculture over the past 50 years. This has also resulted in the loss of neighbouring Lake Cheleleka. Plastic pollution to the lake due to increased population and use of plastic products in Hawassa, tourism, fisheries and growing industry has also risen as a significant threat. It is estimated that 68 per cent of plastic waste goes uncollected, with approximately 950 tonnes of plastic waste entering Lake Hawassa every year.[1]

Vu Gia-Thu Bon River Basin

Located in central Viet Nam, the river basin covers an area of 10,350 km², encompassing the entire provinces of Quang Nam and Da Nang, as well as part of Kon Tum province and is host to Hoi An and the Cu Lao Cham Islands, both popular tourist hubs. Originating in the Troung Son mountain range, the rivers eventually flow into the South China Sea.

Over 4,000 tonnes of plastic waste is estimated to enter waterways per year from the Vu Gia-Thu Bon basin[2], with impacts to tourism, fisheries and local residents through flooding and increased health risks. Plastic waste is generated primarily from households and the millions of tourists who visit the area annually. Being recognized as one of the top global contributors to marine litter, Viet Nam, and specifically the provinces of Quang Nam and Da Nang, are eager to find lasting solutions for preventing marine litter.

SIWI

Photo: iStock

6 steps
FROM SOURCE-TO-SEA

STEP 1 CHARACTERIZE	STEP 2 ENGAGE	STEP 3 DIAGNOSE	STEP 4 DESIGN	STEP 5 ACT	STEP 6 ADAPT
Select and analyze the priority flows. Determine the system boundary.	Map primary, targeted, enabling, supporting and external stakeholders and prepare an engagement plan.	Analyze the governance system and practices related to the priority flows.	Develop a theory of change and identify intervention strategies.	Fund and implement source-to-sea actions.	Monitor outcomes, capture and disseminate learning and adaptively manage for continued success.

The source-to-sea approach

The source-to-sea approach directly addresses the linkages between the source-to-sea segments of land, water, delta, estuary, coast, nearshore and ocean ecosystems leading to holistic natural resources management and sustainable economic development.

This approach provides a structured process to be undertaken with the goal of supporting source-to-sea management. It is intended to be a relatively fast and flexible approach that builds on an existing baseline of governance, planning and management. Thus, it can look different in different locations.

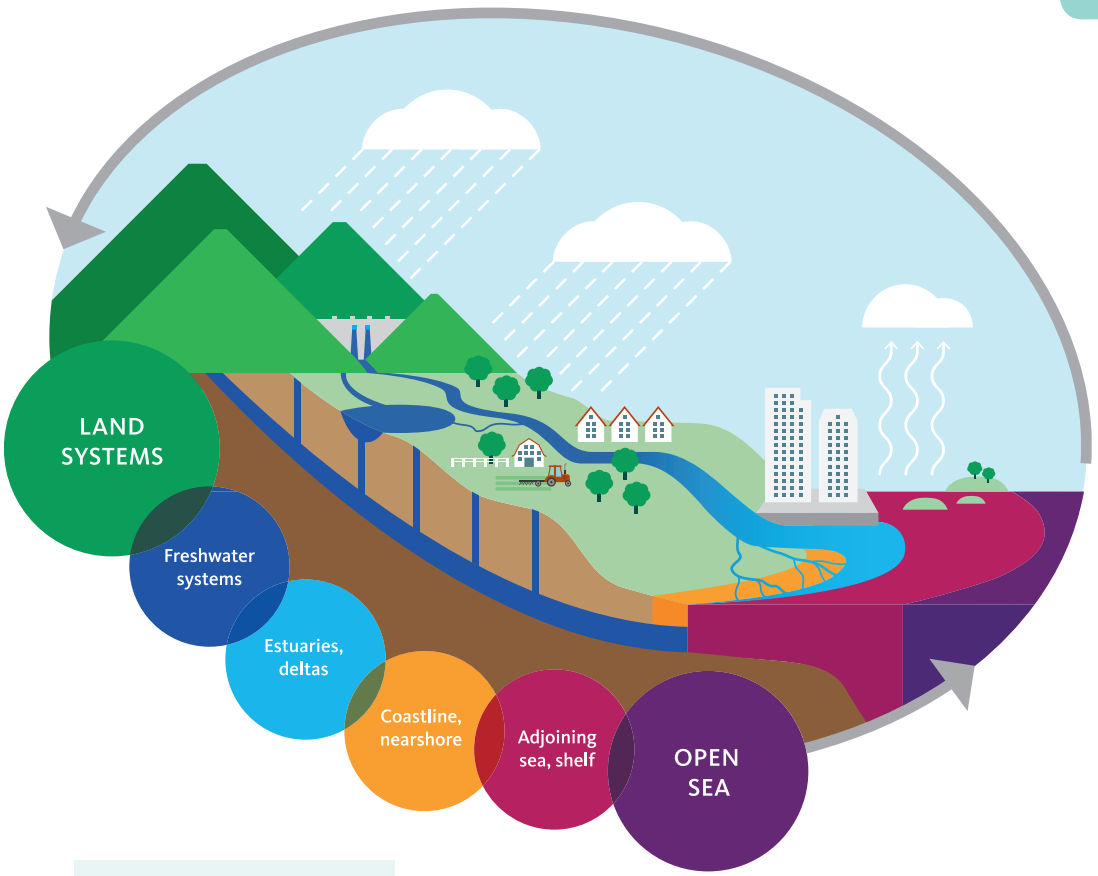
The intended outcome of the source-to-sea approach is to identify appropriate courses of action to address alterations of key flows that connect the source-to-sea segments: water, biota, sediment, pollution, materials, and ecosystem services. Doing so results in economic, social and environmental benefits.

The approach includes six steps through which linkages between source-to-sea segments and economic sectors are considered in order to identify and prioritize issues to be addressed across the source-to-sea system. The approach begins with understanding the pressures and drivers that have led to alterations in the key flows.

In combination with selecting an appropriate scale of intervention, engagement of stakeholders (both upstream and downstream) and a thorough understanding of the governance context sets the basis for defining a theory of change to guide planning and implementation. Monitoring and adaptive management round out the process and can be used to refine the theory of change and ensure continuous improvement toward long-term outcomes.

In this project, we have piloted the first three steps of the source-to-sea approach: Characterize, Engage and Diagnose.

Experts were commissioned to improve the knowledge base on the selected priority flows (sediment and plastic in Lake Hawassa Sub-Basin; plastic in Vu Gia-Thu Bon River Basin). Stakeholder engagement workshops were held and in-depth reviews of the governance systems completed. This was all done with a focus on building local capacity in the source-to-sea approach, allowing the process to be replicated in other areas and/or with other priority flows.



SOURCE-TO-SEA SYSTEM
The bio-physical continuum from land, freshwater bodies, deltas and coasts to the ocean. Source-to-sea systems are connected through key flows. Alterations in key flows can diminish valuable ecosystem services.

KEY FLOWS
The source-to-sea system is linked by six key flows: water, biota, sediment, pollutants, materials and ecosystem services.

Guiding practices

The guiding practices described below underpin the source-to-sea approach.

COLLABORATIVE ✓
Build upon existing institutions, established methods and on-going processes by embedding source-to-sea thinking into what is already there.

CONTEXT-DEPENDENT ✓
Adapt the source-to-sea approach to be responsive to the local context and ensure local benefits are not gained at the expense of negative impacts elsewhere in the source-to-sea system.

PRIORITIZING ✓
Target one or more source-to-sea flows to address the issues that hold the greatest potential for generating positive impacts for the system.

PARTICIPATORY ✓
Engage upstream and downstream stakeholders from different sectors to raise awareness about the impact of human activities and stimulate bottom-up decision making.

HOLISTIC ✓
Address upstream and downstream linkages across issues, impacts, stakeholders, desired outcomes, costs and benefits.

RESULTS ORIENTED ✓
Target intermediate outcomes that contribute to overall improved economic, social and environmental status of the source-to-sea system.

ADAPTIVE ✓
Learn by doing through pragmatic implementation, monitoring, evaluation and adaptive management to allow for early detection of progress or impediments in achieving desired outcomes and allows for effective course correction.

These practices served to guide the design and implementation of the pilot projects. In the next section we provide reflection on their application and the benefits they unearthed.

Building on existing relationships

COLLABORATIVE ✓

In selecting the sites for piloting the source-to-sea approach, we looked for locations where there were existing institutions and processes for collaboration through which we could introduce the source-to-sea approach.

In the Lake Hawassa Sub-Basin, the Rift Valley Lakes Basin Development Office (RVLBDO) has responsibility implementing Integrated Water Resources Management (IWRM), developing a basin plan and setting up a forum for effective networking. SIWI has an ongoing programme to provide capacity building to RVLBDO. This previously established relationship gave us a foothold for introducing the source-to-sea approach.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GmbH or GIZ) has an established programme in the Lake Hawassa Sub-Basin through its Natural Resources Stewardship Programme (NatuReS), a continuation of the

Informal workers sort recyclables at waste collection facility, Hoi An, Viet Nam. Photo: Minh Ha

Like any good framework for governance or management, the source-to-sea approach must be adapted to the local context.

International Water Stewardship Programme (IWaSP). They have formed a multi-stakeholder platform with active task forces addressing sediment erosion and plastic pollution in the sub-basin; expertise and commitment we were able to draw on in the project.

Partnering with RVLBDO and NatuReS provided the convening power needed to bring together active and knowledgeable local stakeholders who could provide detailed local knowledge and integrate the source-to-sea approach into their ongoing processes to protect Lake Hawassa.

The Vu Gia-Thu Bon River Basin was selected because it provided an excellent opportunity to apply the Source-to-Sea Framework for Marine Litter Prevention due to a strong commitment from national and provincial governments to tackle the marine litter issue. This commitment is evidenced by the formation of a Joint Coordination Committee to address shared concerns of Quang Nam Province and Da Nang City, one of which is plastic pollution.

Since SIWI does not have a local presence in the Vu Gia-Thu Bon basin, we enlisted the help of a local implementing partner, IUCN, with a long-standing history of working to improve coastal and marine management in the basin. They have strong relationships with local and regional government authorities and ties to the Joint Coordination Committee.

IUCN's local relationships ensured that workshops were well attended by government officials, including the Vice Chairman of the Provincial Peoples Committee from Quang Nam province. This has helped anchor the source-to-sea approach in the basin and has opened the door to supporting the development of an action plan on plastic waste.

Adapting to the landscape

CONTEXT-DEPENDENT ✓

While the concept is called source-to-sea to encapsulate all landscapes and ecosystems through which water flows, the approach can be applied to specific segments of a source-to-sea system or expanded to include a sea and its entire drainage area. Like any good framework for governance or management, the approach must be adapted to the local context.

How do you pilot the source-to-sea approach in a land-locked country? The source-to-sea approach has been developed to address the linkages between land, freshwater, coastal and marine environments, recognizing that oceans are the end recipient of activities across these different environments. Similarly, an endorheic lake basin, i.e., a lake that has no outlet, receives inputs from the entire land area surrounding it.

Lake Hawassa is an endorheic lake as are the other Rift Valley lakes in central Ethiopia. Piloting the source-to-sea approach in the Lake Hawassa Sub-Basin was an ideal opportunity to adapt the approach to a source-to-lake system. In many ways, applying the approach in the Lake Hawassa Sub-Basin mimicked a source-to-sea system on a much smaller scale, which simplified the geographic breadth needed to understand the priority flows and their impacts. It made it possible to bring together stakeholders who had first-hand knowledge of the full source-to-lake system.

Interviewing Addisu Lembebo, a young entrepreneur collecting plastic bottles, Hawassa, Ethiopia. Photo: Georgette Mrakadeh-Keane

Narrowing the scope for maximum benefit

PRIORITIZING ✓

Addressing all the key flows – water, biota, sediment, pollution, materials and ecosystem services – and their alterations from source-to-sea is a monumental undertaking that could stall action indefinitely. Prioritizing amongst the flows and alterations can deliver focus that will enable quick action to deliver results in the short-term.

In scoping the pilot locations, local priorities had already been identified: sediment erosion and plastic pollution were threatening Lake Hawassa and plastic pollution was high on the political agenda in the Vu Gia-Thu Bon basin. These local priorities were adopted in the pilots, avoiding the need to complete an exhaustive assessment of all source-to-sea flows.

In both sites, international experts were engaged to illustrate and quantify the breadth of the issues and provide international accepted methodologies for analysis. Local experts were engaged to gather additional detail through field studies and interviews. This body of knowledge was further complemented by local knowledge extracted and harnessed during the workshops held in Hawassa and Hoi An. With a small investment in these studies it was possible to get a general picture of the priority flows in order to quickly identify the issues to explore with the stakeholders and to provide direction in analyzing the governance system. They also highlighted priority areas for action to be taken for immediate results.

Leveraging local knowledge

PARTICIPATORY ✓

Participation of a range of upstream and downstream stakeholders representing different sectors needs to be secured to ensure successful application of the source-to-sea approach. By bringing together diverse stakeholders, sharing between them can lead to learning that opens up a more holistic understanding of the issues. This bottom-up engagement expands to include participation of all stakeholders needed to achieve locally identified desired outcomes.

Working closely with a broad cross-section of community members in Hawassa, ranging from local fisher people to representatives of local and regional government and INGOs working in the region allowed us to gather knowledge about the sources and impacts of sediment and plastic waste, key issues of concern, limitations that are stalling progress and activities that are proving successful. While some shared their commitment to protecting Lake Hawassa, others expressed frustration at talk with no action.

Getting this range of perspectives provided a strong basis for identifying future interventions. For example, Dr Mulugeta Dadi Belete, a respected expert on sediment erosion, highlighted the critical importance of working with farmers and pastoralists to support the planting of grasses that strengthen soil structure rather than weaken it. Expansion of grazing lands has been a lead cause for the formation of highland gullies.

In the Vu Gia-Thu Bon River Basin, a stakeholder consultation workshop with 85 participants revealed a full palette

Bicycle outside landfill. Hoi An, Viet Nam. Photo: Ruth Mathews

of perspectives that created a comprehensive picture of the challenges in preventing plastic pollution.

In both Ethiopia and Viet Nam, participants were quick to highlight the role that the tourism sector is playing in the proliferation of plastic bottles in waterways. In both locales, hotels were highlighted as hotspots for producing plastic waste. But they can also take steps to prevent plastic pollution while benefitting from its reduction. Through the stakeholder identification activities in the workshops, Ethiopian Airlines, who is eagerly trying to raise Hawassa as a tourist destination, and tour boat operators in Hoi An were identified as having vested financial interests in seeing the situation improve.

By engaging a full range of stakeholders, a more complete understanding of the issues in the Lake Hawassa and Vu Gia-Thu Bon basins, shared among the stakeholders, has established a foundation for identifying the elements that need to be considered in an action plan that will lead to the desired outcome.

Putting the pieces together

HOLISTIC ✓

Completing a baseline analysis of the instruments and institutions governing behaviours and practices related to priority flows, their alterations and impacts quickly conveys the need for upstream-downstream cooperation and cross-sectoral coordination.

In Viet Nam, the primary responsibility for environment management, pollution control and waste management sits with the Ministry of Natural Resources and Environment (MONRE) however, the Ministries of Construction, Agriculture and Rural Development, Health, Finance, Planning and Investment, Transportation, and Science and Technology all have mandates that contribute in some way to how plastic waste is managed. Furthermore, significant quantities of plastic waste are swept downstream from upstream rural communities that have little or no waste collection services. This plastic waste affects downstream communities that have higher collection rates but suffer the consequences upstream failures.

Considering the sources of sedimentation to Lake Hawassa are related to land use changes such as conversion to agriculture, grazing, logging for charcoal making and sand and gravel mining, it is evident that no one sector can deliver the solution. For example, while deforestation is happening in upland areas regulated by the Ministry of Environment, Forest and Climate Change. Once deforested, the land use is changed to agriculture and grazing – the domain of the Ministry of Agriculture and Rural Development. Deforestation is being driven by the need for charcoal, which is sold to many urban dwellers to use as their primary source of fuel, tying in the Ministry of Water, Irrigation and Energy. While none of these ministries have a direct mandate for controlling erosion, they each need to contribute to solving this problem.

As seen above, an understanding of local challenges makes it evident that a holistic approach that draws together stakeholders from across the source-to-sea system and strengthens coordination between sectors is needed to deliver sustainable and impactful results. Gaining awareness of the geography of the priority flows, stakeholders and governance provides insights into the networks of connection between issues,

stakeholders, instruments and institutions. A holistic approach will ensure that benefits are not accrued in one part of the source-to-sea, or source-to-lake, system at the expense of another part but are maximized for the system as a whole.

Small steps to big changes

RESULTS ORIENTED ✓

Source-to-sea management considers the entire source-to-sea system – stressing upstream and downstream environmental, social and economic linkages and stimulating coordination across sectors and segments. This level of transformation relies on smaller, intermediate outcomes that collectively improve the overall status of the system. In stemming the flow of sediments to Hawassa it was first important to have a full inventory of all the major sources of sedimentation and the behaviours that were leading to erosion. Through this understanding it was easier to break the problem down into related but smaller interventions to bring about specific changes in practices.

One such smaller intervention, that may have otherwise been overlooked, is the role that sustainable energy can play in saving Lake Hawassa. 84 per cent of total energy demands are met by burning wood, much of which is harvested from local shrublands and woodlands, weakening overall soil structure. This highlights an important role for the Ministry of Water, Irrigation and Energy in developing alternative sources of energy that can reduce the reliance on charcoal.

In the Vu Gia-Thu Bon basin, a more detailed assessment of waste disposal and collection in urban, rural and coastal settings was critical to understanding how and where plastic leakage occurs. In one coastal community where plastic waste was piled up along the sea wall, informal interviews with local residents revealed that waste collection services simply weren't available. Rather than having litter and garbage pile up around their houses, throwing trash over the sea wall presented the preferable alternative. To change this behaviour, it is necessary to understand what is driving it. In this case, the fees paid for waste collection services were not sufficient to make it financially feasible to provide them with the regularity needed, therefore residents were left to burn or illegally dispose of their own waste.

Understanding local challenges, engaging stakeholders and diagnosing the governance system provide the foundations for designing strategic interventions that will change the behaviours and practices such that the desired future condition of the source-to-sea system can be achieved. With this foundation, targeted activities can be undertaken that will begin the process of reducing the detrimental impacts of the alterations in the priority flows. With this progress, stakeholders will see the benefits of upstream-downstream cooperation and cross-sector coordination central to the source-to-sea approach to management.

Learning by doing the source-to-sea approach

ADAPTIVE ✓

The two sites selected for the pilot study offered great opportunities for comparing how the source-to-sea approach can be adapted to respond to different local contexts. The Lake Hawassa Sub-Basin is relatively small and allowed for the engagement of individuals who knew the entire basin and could reflect on its changes over several decades. The Vu Gia-Thu Bon basin, on the other hand, is large enough that no single person has knowledge of the entire basin. In both cases sharing between stakeholders enriched everyone's understanding.

Due to the boom in socio-economic development in the urban hubs of the Vu Gia-Thu Bon basin and its importance for tourism in Viet Nam, the region has benefited from interactions with international experts. This has led to more opportunities for capacity building for planning and management staff, leading to more exposure and responsiveness to emerging ideas in integrated resource management. Our capacity building workshop was able to build on this already existing expertise.

The Lake Hawassa Sub-Basin is in an earlier stage of socio-economic development and is only now growing in importance as an economic and population centre for Ethiopia. The region has had considerably less international intervention in stabilizing the environmental impacts currently facing Lake Hawassa, and despite having strong local knowledge, little resource exists to support and act upon it. However, these gaps may also serve as opportunity for anchoring the source-to-sea approach, as little is in place to impede its implementation. Lack of coordination mechanisms and management structures may make way for good governance systems to be installed.

In implementing the source-to-sea approach, it is important to engage marginalized and vulnerable populations who may be able to share unique insights and perspectives that will enhance the viability of solutions. In both the Lake Hawassa and Vu Gia-Thu Bon basins, the informal sector provides a valuable service in collecting and recycling of plastic waste, e.g., PET bottles. When holding stakeholder workshops in Hawassa, the less formalized management structures made it possible to engage a representative from an informal recycling enterprise. Whereas in the Vu Gia-Thu Bon basin, the provincial waste management company URENCO represented the sector.

There was balanced gender representation in the Vu Gia-Thu Bon workshops, with women taking leadership roles in presentations, group work and sharing learning. In Hawassa, few women attended and those who did were reticent to speak to the entire group. In future activities, creating an inclusive environment for both the informal sector and women will need to be a priority.

Workshop participants, Hoi An, Viet Nam. Photo: Ruth Mathews

The source-to-sea approach can be adapted to the local context, for example, adapting it to a source-to-lake approach in the Lake Hawassa Sub-Basin. It also supports adaptation over time as the local context is better understood. The local context will determine where the focus will need to be to build the foundations for source-to-sea management. While the source-to-sea approach provides a structured process for tackling local challenges, its application can be responsive to each unique local situation, as it develops over time.

About this publication

This document has been authored by Kanika Groeneweg-Thakar and Ruth E. Mathews. It has been produced as an outcome from the "Foundations for Source-to-Sea Management" project carried out by SIWI from September 2019–May 2020 and funded by the German Federal Ministry of Economic Cooperation and Development (BMZ). The authors and SIWI wish to thank BMZ and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) for their support.

Additional resources

This project followed the guidance provided in "Implementing the Source-to-Sea Approach: A Guide for Practitioners" and "Source-to-Sea Framework for Marine Litter Prevention: Preventing Plastic Leakage from River Basins". Both of these resources as well as many others can be found at www.siwi.org/source-to-sea.

References

1 RWA. (2020). Source-to-Lake Analysis of Plastic Waste Management in Lake Hawassa Basin. SIWI.
2 RWA. (2020). Source-to-Sea Analysis of Plastic Waste Management in Vu Gia-Thu Bon River Basin. SIWI.

About SIWI

SIWI's vision is a water wise world, where we recognize the value of water, and ensure that it is shared and allocated sustainably, equitably and efficiently, to meet everyone's basic needs.

Through applied research, policy consultation, capacity-building, and connecting key actors across sectors, SIWI stimulates the development of innovative policies and scientifically-based solutions to water-related challenges.

SIWI's Source-to-Sea Programme develops knowledge resources and implements projects globally. Since 2014 SIWI has been the host and coordinating body of the Action Platform for Source-to-Sea Management (S2S Platform). The S2S Platform is a multi-stakeholder initiative to exchange and generate knowledge, and support joint action for improved management of land, water, coastal and marine linkages.

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