



## Foundations for source-to-sea management

### Case Study – Lake Hawassa

#### Piloting the source-to-sea approach in the Lake Hawassa Sub-Basin

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;
- highlighted the opportunities and challenges associated with implementing the source-to-sea approach to management; and
- built local capacity for taking a holistic approach to natural resource management and economic development.

The Lake Hawassa Sub-Basin is located 275 km south of Addis Ababa and covers approximately 1,400 km<sup>2</sup>. Lake Hawassa is 90 km<sup>2</sup> in size and is the endpoint of an endorheic hydrological system, with some limited groundwater outflow.

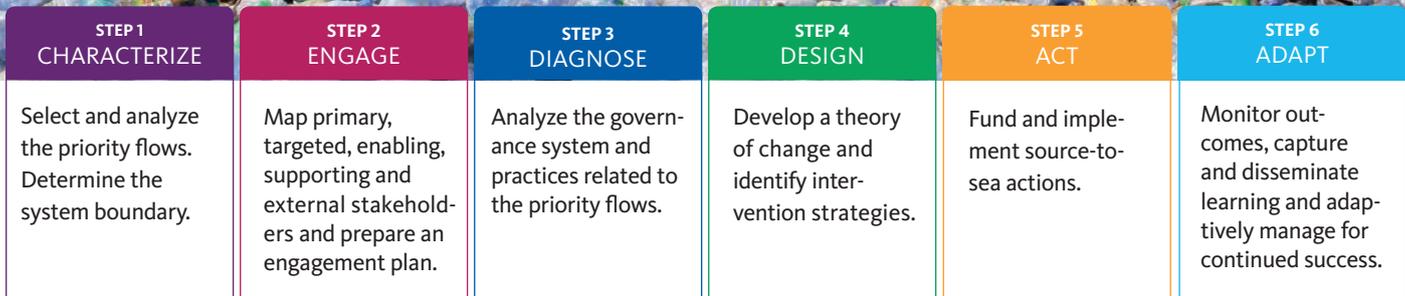
With as much as 750 km of gullies<sup>1</sup> in the sub-basin, erosion and sediment flows into Lake Hawassa is one of its greatest threats. Erosion has increased dramatically, largely due to expansion of agriculture over the past 50 years and sand mining, and has resulted in the loss of neighbouring Lake Cheleleka.

Plastic pollution to the lake is also growing alongside increases in population and use of plastic products in Hawassa, tourism, fisheries, and growing industry. It is estimated that 68 per cent of plastic waste goes uncollected, with approximately 950 tonnes of plastic waste entering the lake every year<sup>2</sup>.

The closed nature of the sub-basin allows the application of the source-to-sea, or in this case, source-to-lake, approach (Figure 1, next page) to be used to address some of the bottlenecks that are inhibiting appropriate sediment and solid waste management in the basin.



**FIGURE 1**  
Six steps of the source-to-sea approach.  
Photo: Georgette Mrakadeh-Keane



## Framing the challenge

Local partners identified two priority issues – sediment and plastic pollution – that threaten the health of Lake Hawassa and current management systems struggle to control. While the problems posed by each are very different, source-to-sea approaches (or source-to-lake in this case) can be similarly successful in forming new solutions.

**Why sediments?** Cultivation and agroforestry have expanded steadily in the region, reducing vegetation cover and accelerating sediment erosion. Sand mining, which is prevalent and interferes with the rehabilitation of gullies, aggravates this further. Roughly 68,000 m<sup>3</sup> sediment flows into Lake Hawassa each year<sup>1</sup>. In addition to filling in the lake, this has resulted in reduced biodiversity and fish stocks in Lake Hawassa, and flooding caused by sediment loading in drainage systems. These directly impact agriculture, fishing and tourism in Hawassa City and the health and livelihoods of communities throughout the basin.

**Why plastics?** Rapid population growth, industrial development and changing lifestyles in Hawassa City are leading to more plastic being used and improperly disposed of in and around Lake Hawassa. Plastic litter is costly to clean-up, spreads disease (such as malaria), kills fish and can cause flooding by clogging up drainage systems. Urban areas generate an estimated 16 tonnes of plastic waste per day, accounting for nearly 65 per cent of the total in Hawassa City, tourist spots (25 per cent) and rural areas (10 per cent) account for the remainder. More than two-thirds of the plastic waste in urban and tourist areas is not collected. Rural areas have little to no collection at all. Of the uncollected plastic waste about 20 per cent ends up in Lake Hawassa or in drains leading to the lake<sup>2</sup>.

**Why source-to-lake?** No ministry in Ethiopia has the mandate for sediment management, instead different ministries have responsibilities related to the one or more behaviours and practices that have accelerated erosion as well as the impacts, outcomes and solutions. Coordination between ministries, and their local offices, to develop a

coherent approach to reducing erosion is the only way to protect Lake Hawassa. While fishers’ livelihoods are being impacted by plastic pollution in Lake Hawassa, those responsible for the mismanagement of plastic waste are not directly linked to the lake. This further emphasizes the need for an approach that strengthens cooperation between stakeholders and builds a shared vision for the future of the lake.

## Engaging stakeholders

Reducing sedimentation and plastic pollution in Lake Hawassa requires the involvement of a broad range of stakeholders from government and business, non-governmental organizations and academia and citizens who represent interests and activities across the source-to-lake system. Creating a shared understanding of the issues forms the basis for finding solutions that can be adopted and implemented across all sectors.

Identifying stakeholders to engage includes asking:

- Who is being impacted?
- Whose actions need to change?
- Which government institutions are responsible?
- Are there financiers who can help?
- Are there others who can bring solutions?

To understand how best to engage each stakeholder, it is helpful to determine their level of interest and influence in reaching the desired future.

About 100 relevant stakeholders involved in sediment and plastic pollution issues in the Lake Hawassa Sub-Basin were brought together for consultation and capacity building workshops. Through interactive exercises using the source-to-lake approach, stakeholders identified sources of and impacts from sedimentation and plastic pollution.

Stakeholder groups were also identified in response to the questions above, which triggered new ideas of who may be interested in addressing these local challenges. Ethiopian

Airlines was suggested as an external stakeholder who, because of their interest in promoting Lake Hawassa as a tourist destination and the threat of erosion to the airport, has a vested interest in resolving these two issues.

## Addressing governance gaps

For both sediment and plastic flows, lack of coordination between institutions and sectoral actors are primary obstacles to appropriate management. Challenges to coordinate mandates and actions are found both between the ministries as well as across the different levels of government (federal level, regional, state government and city administration). Failures in the oversight of sand mining, for example, reflects this problem. It is unclear who has the mandate for managing this and the small size of operations may mean that they are not targeted by environmental enforcement measures. Other sediment governance gaps include low levels of enforcement of regulations for fuelwood collection and insufficient resources to support forest rehabilitation.

Many problems relating to plastic litter are a result of several broad challenges, such as insufficient coordination between local government institutions; limited overall solid waste management capacity; weak local enforcement; and underinvestment in solid waste management collection and disposal facilities. There are also specific areas that require improvements, such as the disposal of medical waste from health centres, rural plastic waste collection and disposal, and leakage during collection and transport of plastic litter to local waste disposal facilities.

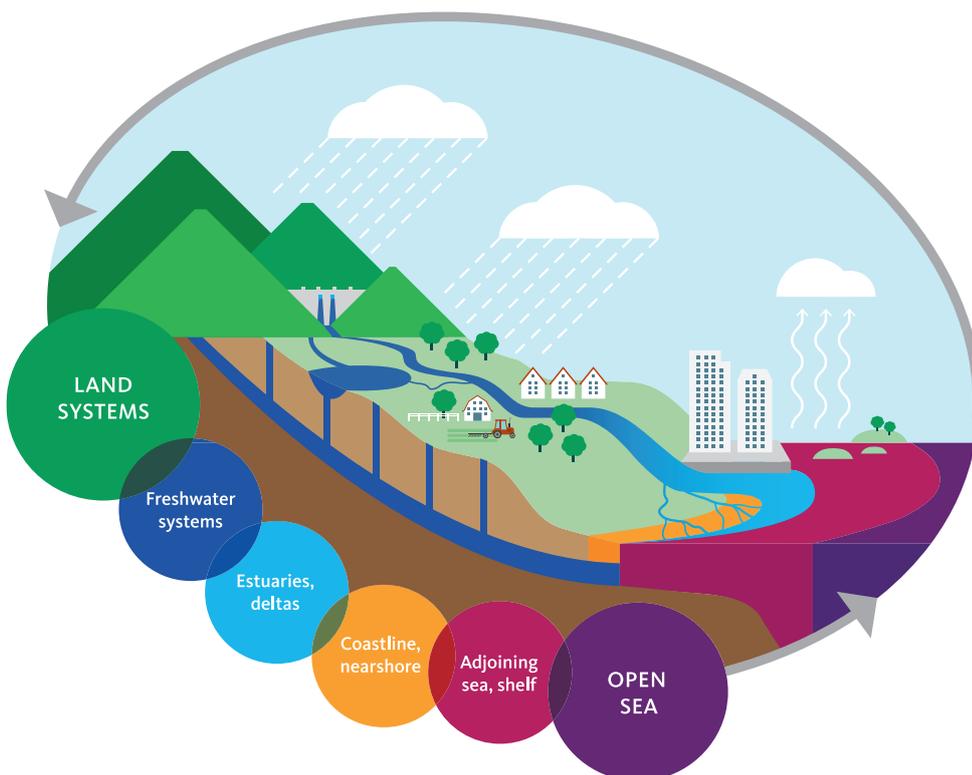
Existing institutional frameworks to manage sediment and solid waste face challenges to coordinate key actors, enforce established provisions, and access adequate resources for

implementation. Taking a source-to-lake approach to management provides four main benefits:

- 1 Priority actions for the reduction of sediment erosion and plastic pollution will be identified holistically rather than being restricted to an action space whose parameters are governed by a single institution or instrument.
- 2 Activities or actions taken by different institutions will be coordinated to ensure that interventions are coherent and not solving problems in one place while exacerbating them elsewhere. While this helps to ensure that priorities are being addressed, it also fosters collective action.
- 3 Overlaps or gaps in governance institutions or instruments are identified and can be addressed to avoid conflicts and/or failures to act.
- 4 New resources for addressing sediment erosion and plastic pollution may be unlocked by understanding the connections between different segments of the source-to-lake system and the stakeholders involved, thereby widening the net of actors who collectively support and advocate for actions to address these issues.

## What comes next?

Without significant and strategic responses from stakeholders across the region, Lake Hawassa will be inundated with sediment and plastics. The sedimentation problem has deep historical roots that the governance system has consistently been unable to control. Plastic pollution has emerged quickly, outpacing current capabilities to collect, dispose or recycle it before plastic waste reaches the lake. The source-to-lake approach was constructed to address



**FIGURE 2**  
Understanding the source-to-sea system.



Photo: Ruth Mathews

such issues – both new and old – that current management systems struggle to address.

The findings of this pilot pointed to some immediate priority measures that can be taken to improve coordination, address issues that are currently overlooked and enable local stakeholders to identify a plan on who to engage to take this forward. It also demonstrated that the source-to-sea concept can be adapted to fit a ‘source-to-lake’ context. This recognizes the similarities in characteristics in an endorheic lake basin as compared to a sea or ocean and shows its viability to be applied in an even broader array of settings around the world.

More importantly, the pilot provided promising signals that setting the foundations for source-to-lake management

can help support a path toward concerted, coordinated actions to protect Lake Hawassa’s ecosystem and sustain economic development in the region. It did so through a step-wise process. This began by building a shared knowledge base on sources, causes and impacts of sediment and plastic pollution, then engaging stakeholders from across the source-to-lake system to develop a common vision for the future, followed by assessing the strengths, weaknesses, gaps and eventual opportunities for improvements in the governance system.

These together establish the foundations for source-to-lake management to take root. With this foundation in place, it is possible to take the next step in the approach: designing a theory of change and defining an action plan that will lead to the stakeholders’ shared vision for the future.

## About this publication

This document has been authored by Josh Weinberg, Ruth E. Mathews, and David Hebart-Coleman. 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](http://www.siwi.org/source-to-sea).

## References

- 1 Belete, M.D. (2020). Foundations for Source-to-Sea Management: Characterization of sediment flows in Lake Hawassa Sub-Basin, Ethiopia. SIWI.
- 2 RWA. (2020). Source-to-Lake Analysis of Plastic Waste Management in Lake Hawassa 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.

