# Applying a Sustainable Asset Valuation (SAVi) to the Ecological Restoration of the Beira Lake in Colombo:

## Assessing the Economic Value of Restoration Interventions

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SAVi Sustainable Asset Valuation

IISD International Institute for Sustainable Development

MAVA FONDATION POUR LA NATURE

ALTAIR

# The Scope of This SAVi Assessment

Indocean Developers (Pvt) Ltd., the project developer of the Altair building in Colombo, Sri Lanka, requested a SAVi assessment on the economic value of different options for restoring the ecological health of Beira Lake, an artificial freshwater lake located in the city centre. That assessment reveals what the restoration options would mean for the lake's water clarity and the associated impacts on property values and recreational spending from the local population and tourists.

The SAVi assessment demonstrates that interventions devoted to restoring the ecological health of South-West Beira Lake are effective both from an environmental standpoint and also from the perspective of economic development opportunities for the city of Colombo. As the assessment considers the effectiveness and benefits of these restoration options relative to their costs over the 2020–2025 timeframe, it also highlights the varying benefit-to-cost ratios and provides evidence for prioritizing investments.

## Why Use SAVi?

SAVi calculates the environmental, social and economic risks and externalities that impact the financial performance of infrastructure projects. These variables are typically ignored in traditional financial analyses.

SAVi is a simulation tool that is customized to individual infrastructure projects. It is built on project finance and systems dynamics simulation.

Visit the SAVi webpage: iisd.org/savi

# The Intervention Scenarios

The SAVi assessment considered four intervention scenarios and each rely on a set of assumptions.

**Table 1.** Scenarios and assumptions for interventions

| Scenario | Share of wastewater treated | | Nutrient removal efficiency of wastewater treatment facilities | | Dredging: removal of lake bottom sediments |
|---|---|---|---|---|---|
| | 2020 | 2025 | 2020 | 2025 | 2021 |
| **Scenario 1:** Business-as-usual (BAU) | 80% | 80% | 80% | 80% | — |
| **Scenario 2:** Wastewater treatment upgrades | 80% | 100% | 80% | 96% | — |
| **Scenario 3:** Dredging of lake deposits | 80% | 80% | 80% | 80% | 180,000 m³ |
| **Scenario 4:** Combined wastewater treatment and dredging | 80% | 100% | 80% | 96% | 180,000 m³ |
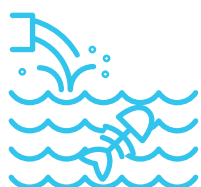
**Scenario 1**, "business-as-usual," assumes that there is no change to current trends, such as the level of wastewater treatment or the absence of lake dredging. Expected levels and pace of population growth, as well as the inflow of nutrient loadings from untreated stormwater, are also specified in this scenario.

**Scenario 2** assumes that there is a greater investment in upgrading wastewater treatment facilities over the years 2020–2025 to reduce the amount of nutrient loadings reaching the lake compared to what is projected under current trends. Other assumptions remain as in Scenario 1.

**Scenario 3** keeps the level of wastewater treatment and all other assumptions the same as in Scenario 1, with the only change being a one-time dredging of the lake bottom in 2021 to remove the high volume of phosphorus deposits. This intervention targets the reduction of phosphorus being reintroduced into the lake.

**Scenario 4** incorporates the increased investments in upgrading wastewater treatment facilities, as well as the one-time dredging in 2021. All other assumptions are the same as in Scenario 1.

# Results of the SAVi Assessment

The figure below highlights the relationship between lake water clarity improvements achieved per intervention scenario and the associated property value increases around the restored part of the lake. The combined Scenario 4 leads to by far the highest increases in property values once interventions are being implemented, whereas Scenario 2 yields only slight increases, and Scenario 3 yields even lower increases over time.

**Figure 1.** Changes in cumulative property values (undiscounted) around South-West Beira Lake in relation to water clarity improvements per scenario
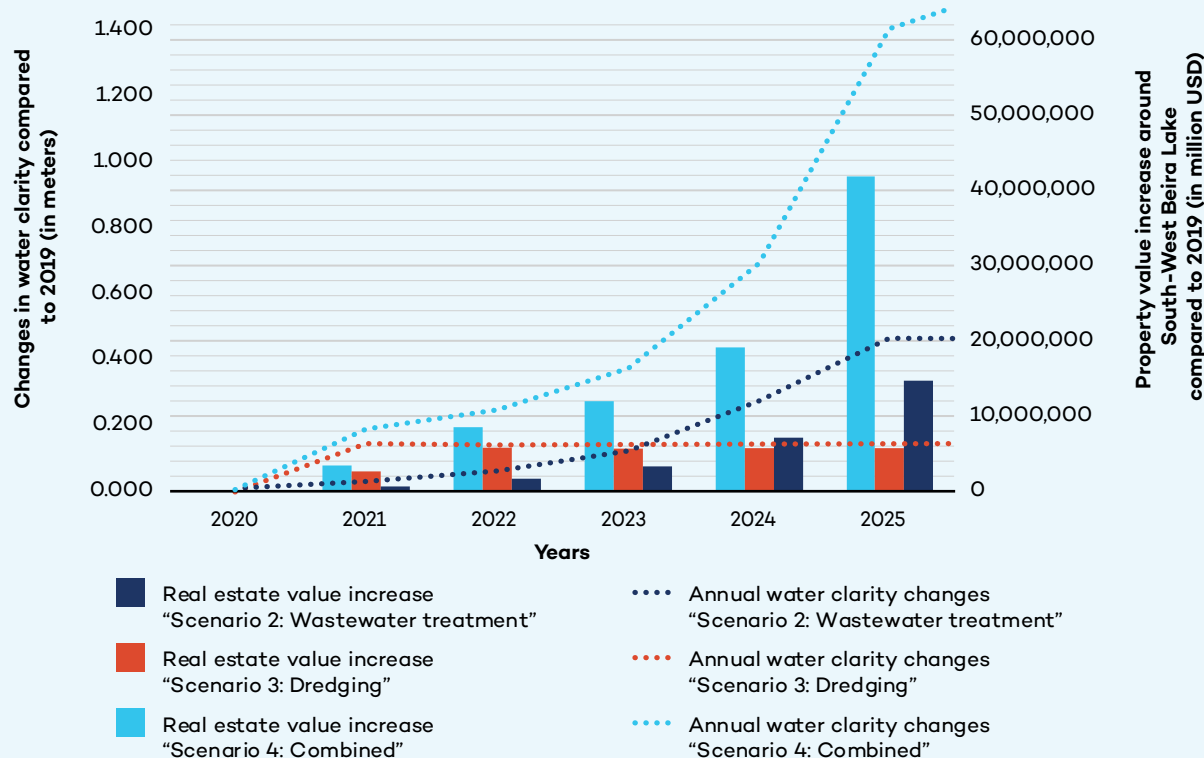


The below table indicates the cumulative additional spending for recreation from local residents and tourists visiting South-West Beira Lake when the water clarity level of 0.4 m is exceeded. In line with the above explanations on property value effects, Scenario 4 also yields by far the highest amount of cumulative additional spending for recreation between 2020 and 2025, while the other scenarios generate respectively lower spending volumes.

**Table 2.** Added recreational spending (USD)

| Added annual spending from local recreation and tourist visits | 2017–2019 (annual average before intervention) | 2025–2027 (annual average after intervention) | Cumulative spending (2020–2025), discounted |
|---|---|---|---|
| **Scenario 1:** Baseline | 0 | 0 | 0 |
| **Scenario 2:** Water treatment | 0 | 5,343,750 | 10,332,808 |
| **Scenario 3:** Dredging | 0 | 1,923,800 | 6,860,153 |
| **Scenario 4:** Water treatment + Dredging | 0 | 5,343,750 | 19,613,859 |

# SAVi's Integrated Cost-Benefit Analysis

**Table 3.** Cumulative costs and benefits per intervention scenario (2020 to 2025) relative to BAU, in USD and discounted

| Costs and benefits (in USD, discounted) | Scenarios | | | |
|---|---|---|---|---|
| | **1. Business-as-usual (BAU)** | **2. Wastewater treatment upgrades** | **3. Dredging of lake deposits** | **4. Combined: wastewater treatment and dredging** |
| **Costs** | | | | |
| Costs for wastewater treatment upgrades | | | | |
| Nitrogen removal technology | — | 479,314 | — | 479,314 |
| Phosphorus removal technology | — | 140,718 | — | 140,718 |
| Cost of sediment removal | — | — | 5,712,616 | 5,712,616 |
| **Total cost (2020 to 2025)** | — | **620,032** | **5,712,616** | **6,332,648** |
| **Benefits** | | | | |
| Property value net change by end of 2025 | (172,770) | 14,266,034 | 5,098,886 | 43,221,392 |
| Additional spending for recreation by local population | — | 656,674 | 433,114 | 1,240,463 |
| Additional spending for recreation by tourists | — | 9,676,134 | 6,427,039 | 18,373,396 |
| **Total benefits (by end of 2025)** | **(172,770)** | **24,598,842** | **11,959,039** | **62,835,251** |
| **Net results** | **(172,770)** | **23,978,810** | **6,246,424** | **56,502,603** |
| **Benefit to cost ratio** | **N/A** | **39.67** | **2.09** | **9.92** |

The cost–benefit analysis shows that Scenario 2, involving investments into wastewater treatment upgrades, yields the highest benefits relative to the costs of implementation. Under this scenario, the benefit-to-cost ratio is 39.67—far higher than the values seen in the other three scenarios. The improvements in lake water clarity yield an increase in property values of USD 14.3 million by the end of 2025 (see Figure 1), as well as an increase in spending by locals and tourists by approximately USD 10 million over the 2020–2025 period (see Table 2).

Scenario 4 demonstrates even higher water clarity improvements and associated benefits. Property values increase by over USD 43 million by the end of 2025, and recreational spending increases over the years 2020–2025 to the tune of USD 19.5 million. The investment required for the wastewater treatment and lake dredging activities combined, however, amounts to USD 6.3 million. This is over 10 times the investment required in Scenario 2, with the benefit-to-cost ratio at 9.92.

While Scenario 4 provides the highest level of benefits, these will need to be considered against the cost of these investments, as well as the financial means available for making such investments relative to other priorities. If there are significant financial constraints, Scenario 2 may prove to be the most cost-effective option. Scenario 3 did not reach the level of benefits provided by Scenarios 2 and 4.

## About SAVi

SAVi is a simulation service that helps governments and investors value the risks and externalities that affect the performance of infrastructure projects.

The distinctive features of SAVi are:

- Valuation: SAVi values, in financial terms, the material environmental, social and economic risks and externalities of infrastructure projects. These variables are ignored in traditional financial analyses.

- Simulation: SAVi combines the results of systems thinking and system dynamics simulation with project finance modelling. We engage with asset owners to identify the risks material to their infrastructure projects and then design appropriate simulation scenarios.

- Customization: SAVi is customized to individual infrastructure projects.

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