

Valuing Blue–Green Water Services in the Omo-Gibe Basin, Ethiopia

Matthew McCartney, Mulugeta Tadesse and Radheeka Jirasinha

September 2026



Authors

Matthew McCartney, Research Group Leader – Sustainable Water Infrastructure and Ecosystems, IWMI, Colombo, Sri Lanka

Mulugeta Tadesse, Spatial Data Scientist, IWMI, Addis Ababa, Ethiopia

Radheeka Jirasinha Researcher - Freshwater and Wetland Management, IWMI, Colombo, Sri Lanka

Author contributions

Conceptualization: Matthew McCartney; Methodology: Matthew McCartney; Investigation: Mulugeta Tadesse and Radheeka Jirasinha; Data curation: Mulugeta Tadesse; Writing – original draft: Matthew McCartney; Writing – review & editing: Matthew McCartney, Mulugeta Tadesse and Radheeka Jirasinha; Project administration: Matthew McCartney and Radheeka Jirasinha; Funding acquisition: Matthew McCartney

Acknowledgments

This work was carried out under the CGIAR Multifunctional Landscapes Program. We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund (www.cgiar.org/funders/).

CGIAR Multifunctional Landscapes Program

The CGIAR Multifunctional Landscapes (MFL) Program supports integrated management of land, water, and biodiversity to strengthen resilience, improve livelihoods, and promote inclusive governance through holistic landscape approaches that protect ecosystems and enable diverse stakeholders to co-create solutions.

Learn more about the program: <https://www.cgiar.org/cgiar-research-portfolio-2025-2030/multifunctional-landscapes/>

Suggested citation

McCartney, Matthew, Mulugeta Tadesse, and Radheeka Jirasinha. 2026. *Valuing Blue–Green Water Services in the Omo-Gibe Basin, Ethiopia*. International Water Management Institute (IWMI).

© 2026 International Water Management Institute. Some rights reserved. This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).

Front cover photo: Upland stream, Ethiopia (*photo:* Matthew McCartney/IWMI).

Back cover photo: Upland mist, Ethiopia (*photo:* Matthew McCartney/IWMI).

Disclaimer

This publication has been prepared as an output of the CGIAR Multifunctional Landscapes Program and has not been independently peer reviewed. Responsibility for editing, proofreading, and layout, opinions expressed, and any possible errors lies with the authors and not the institutions involved.

Contents

Executive Summary	4
1. Introduction	5
1.1 Background	5
1.2 Basin Description	6
1.3 POD Portfolio	6
2. Objective and Conceptual and Methodological Framework	8
2.1 Objective	8
2.2 Contribution to MFL Theory of Change and the MFL Action Plan for the Omo-Gibe Basin	8
2.3 Conceptual and Methodological Framework	9
3. Workplan	14
3.1 Phase 1: Initiation, Scoping and Development of the Conceptual Framework (June–December 2026)	14
3.2 Phase 2: Development of Basin-Specific Valuation and Accounting Protocols (January–June 2027)	14
3.3 Phase 3: Physical Quantification of Water-Dependent Services and Benefits and Application of Valuation Methods (July 2027–March 2028)	15
3.4 Phase 4: Integration, Benefit Distribution and Trade-Off Assessment (April–June 2028)	16
3.5 Phase 5: Scenario Analysis, Final Validation and Application to Planning (July–December 2028)	16
3.6 Cross-Cutting Stakeholder Engagement and Adaptive Management	16
4. Conclusion	19
References	20

Executive Summary

This inception report sets out the rationale, conceptual framework and workplan for the *Value Blue–Green Water Services* Program of Deliverables (POD) in the Omo–Gibe Basin, Ethiopia. The POD is a contribution to IWMI's wider Water System Program, within the Multi-Functional Landscapes portfolio in the basin. It responds to a central challenge in water and landscape planning: the multiple benefits generated by water are often poorly recognized, incompletely valued and unevenly considered in decisions about land, water, energy and ecosystem management. This is particularly true for green water - soil moisture and evapotranspiration - which sustains rainfed agriculture, rangelands, forests and terrestrial ecosystems but remains largely invisible in conventional economic and water accounts. Blue water in rivers, lakes, reservoirs and groundwater is more visible through uses such as irrigation, hydropower and domestic supply, but its wider contribution to ecosystem functioning, livelihoods and downstream resilience is also frequently undervalued.

The Omo–Gibe Basin provides a compelling context for this work because water supports a highly diverse and interconnected set of landscape functions. In the upper and middle basin, rainfall, soil moisture and evapotranspiration underpin rainfed crop production, home gardens, enset systems, livestock production and broader rural livelihoods. In the lower basin, river flows and the seasonal flood pulse sustain flood-recession agriculture, floodplain grazing, fisheries, wetlands, riverine forests and aquatic ecosystems. At the same time, hydropower development, expanding irrigation, land-use change and climate variability are altering the timing, quantity and distribution of water, with implications for benefits, trade-offs and risks across sectors, locations and livelihood groups.

The overall objective of the POD is to develop and apply a basin-specific framework for identifying, quantifying and, where appropriate, valuing the benefits to people generated by blue and green water. The activity will build directly on the complementary *Blue–Green Water Accounting* POD, which will provide the physical evidence on precipitation, evapotranspiration, soil moisture, runoff, groundwater recharge, river flows and blue-water availability. These accounts will then be linked to water-dependent services and benefits, including agricultural production, livestock and grazing, fisheries, hydropower, domestic and productive water uses, wetlands, forests, rangelands and floodplain ecosystems. The purpose is not to produce a single aggregate monetary value for water, but to make visible how different components of the water cycle support people, livelihoods, economic activities and ecosystems across the Basin.

Subject to confirmation by stakeholders, it is proposed that the framework is grounded in the System of Environmental-Economic Accounting for Water (SEEA-Water) and the SEEA Ecosystem Accounting (SEEA-EA). It is proposed to adapt these established approaches to the hydrological, ecological and socio-economic realities of the Omo–Gibe Basin. A central feature of the methodology is that physical water–benefit relationships will be established before monetary values are assigned. For each priority service, the POD will identify the relevant water component, hydrological pathway, ecosystem or economic activity, and suitable valuation method. Depending on the service and available evidence, valuation may draw on production-function methods, market-based valuation, avoided or replacement costs, revealed or stated preference methods, benefit transfer or physical and qualitative indicators where monetary estimation is not sufficiently robust.

Avoiding double accounting will be a core principle. The framework will distinguish intermediate and final ecosystem services and will recognize where the value of water is already embedded in the value of agricultural output, hydropower, ecosystem services or other assets. Clear accounting boundaries will be developed for each service so that values are not counted more than once when water, ecosystems, economic activities and beneficiaries are considered together. This accounting discipline is essential if the results are to provide a credible basis for comparing benefits, co-benefits and trade-offs across the Basin.

The work will be implemented from 2026 to 2028 through five linked phases. The first phase will establish the conceptual framework, identify priority water-dependent services and validate the approach through stakeholder engagement. The second phase will develop basin-specific accounting and valuation protocols. The third phase will quantify priority water-dependent services and apply appropriate valuation methods. The fourth phase will integrate physical and monetary accounts to assess the spatial distribution of benefits, beneficiaries, co-benefits and trade-offs. The final phase will apply the framework to alternative management and development pathways and produce a validated decision-support package. Stakeholder engagement will run throughout the POD, ensuring that the framework, assumptions, data sources, methods and emerging results are reviewed and refined with national, basin and other relevant actors.

The expected contribution of the POD is both analytical and practical. Analytically, it will demonstrate how blue and green water accounting can be linked to ecosystem-service and economic valuation in a multifunctional landscape. Practically, it will generate evidence to support integrated land and water-use planning, trade-off assessment, scenario analysis and the prioritization of investments in conservation, restoration, irrigation, storage and other interventions. By making the contribution of water to agriculture, hydropower, livelihoods and ecosystems more explicit, the POD will strengthen the evidence base for decisions that seek to sustain multiple benefits across the Omo–Gibe Basin.

1. Introduction

1.1 Background

Water is fundamental to the functioning of the Omo–Gibe Basin’s landscapes, economies and ecosystems, yet its contribution to human wellbeing and development is not fully captured in conventional water management and economic assessments. The Basin contains a highly interconnected mosaic of rainfed and irrigated agriculture, pastoral and agro-pastoral systems, forests, wetlands, rivers, lakes and other ecosystems, all of which depend on different components of the water cycle. Blue water in rivers, lakes, reservoirs and groundwater directly supports irrigation, domestic and livestock uses, hydropower and aquatic ecosystems. At the same time, green water - the fraction of precipitation stored in the soil and returned to the atmosphere through evapotranspiration - underpins rainfed crop production, rangelands, forests and other terrestrial ecosystems. These different forms of water are not independent: they are connected through runoff, infiltration, groundwater recharge, evapotranspiration and atmospheric moisture flows. Understanding their combined contribution is therefore essential for identifying how the Basin’s water resources support people and nature and where changes in land and water management may create benefits, trade-offs or risks.

This POD, *Value Blue–Green Water Services*, responds to this need by developing a framework for valuing the benefits to people provided by blue and green water across the Omo–Gibe Basin. It builds on the broader proposition that water should be recognized not simply as a resource for abstraction and consumption, but as an asset that supports economic production, livelihoods, ecosystem functioning and human wellbeing. The framework underpinning this work draws on emerging approaches to integrating green and blue water accounting with ecosystem-service valuation and is informed by the principles of the Global Commission on the Economics of Water (GCEW, 2024). In particular, the approach seeks to address the invisibility of green water in conventional economic and water accounts, despite its fundamental role in sustaining rainfed agriculture and terrestrial ecosystems. The underlying concept (section 2) emphasizes that while blue water is partially reflected through uses such as irrigation, hydropower and municipal supply, green water remains largely invisible in economic metrics and policy frameworks, even though it supports food production, ecosystems and atmospheric moisture recycling.

Within the context of the CGIAR Multifunctional Landscapes (MFL) Science Program, the POD will translate these broader concepts into an approach that is relevant to the particular social, economic and ecological characteristics of the Omo–Gibe Basin. Rather than focusing only on individual water uses or particular parts of the Basin, the analysis will consider how blue and green water contribute to the multiple functions and benefits provided across the Basin’s landscapes; the upper middle and lower basin. This includes the contribution of water to rainfed and irrigated agriculture, livestock and other livelihoods, hydropower and domestic water uses, as well as the ecosystem services generated by wetlands, rivers, forests, rangelands and other ecosystems, including the floodplains in the lower basin. This is consistent with the proposed analytical framework, which combines the physical water accounting undertaken in the POD *Blue-Green Water Accounting* with economic attribution and ecosystem-service valuation, conducted in this POD.

A central premise of the work is that valuing water services requires understanding not only the quantity of water required to generate services but also the timing and movement within the landscape. Consequently, the analysis will link blue–green water stocks and flows to the economic and ecosystem functions that they support. The physical water accounts provided by the POD *Blue-Green Water Accounting* will provide the foundation by characterizing relevant components of the Basin’s water cycle, including precipitation, evapotranspiration, runoff, soil moisture, groundwater recharge and blue-water availability. These will then be linked, where data permit, to production, livelihoods and ecosystem services through appropriate valuation approaches. The proposed framework recognizes that market-based benefits, such as agricultural production and hydropower, need to be considered alongside less directly marketed ecosystem services, such as water regulation, carbon storage, habitat provision and, importantly in the Omo-Gibe Basin, livestock grazing, fisheries other ecosystem services that sustain livelihoods.

This POD is intended to demonstrate how blue–green water valuation (linked to water accounting) can support multifunctional landscape management and decision-making. The purpose is not simply to assign a monetary value to water or to individual ecosystem services. Rather, the analysis will help make visible the relationships between water, landscapes and people, providing evidence on where water generates multiple benefits, where benefits may be mutually reinforcing, and where interventions or changes in land and water management may involve trade-offs. In doing so, the work will provide a basis for considering alternative management pathways in terms of their implications for livelihoods, agricultural productivity, ecosystem services and broader societal benefits. This is particularly important in a basin such as Omo–Gibe, where decisions affecting water and land in one part of the Basin can influence the availability and functioning of water-dependent resources elsewhere.

This report sets out the proposed approach for delivering this work. Section 2 describes the objectives and the conceptual and methodological framework for valuing blue–green water services in the Omo–Gibe Basin. Section 3 presents the proposed workplan, including the analytical activities, stakeholder engagement, outputs and milestones through which the framework will be developed and applied. The workplan is deliberately presented as a proposed plan and will be refined through engagement with national and basin stakeholders, ensuring that the framework, data sources, valuation methods and priority applications are reviewed and validated as the work progresses. Section 4 concludes by summarizing the intended contribution of the deliverable to the MFL Science Program and to improved understanding of the multiple benefits generated by blue and green water in the Omo–Gibe Basin.

1.2 Basin Description

The Omo–Gibe Basin encompasses a pronounced gradient in climate, topography, land use and livelihood systems, extending from the relatively humid and densely cultivated highlands of southwestern Ethiopia through the middle Omo Valley to the arid lowlands bordering Kenya (Lautze et al., 2022). This creates strong upstream–downstream hydrological and ecological connectivity. In the upper and middle basin, agriculture is the dominant land use, with rainfed production of cereals such as teff, maize, wheat, sorghum and finger millet, together with enset, coffee, pulses and other crops. These production systems depend heavily on rainfall, soil-moisture storage and evapotranspiration and therefore illustrate the importance of green water as a productive resource. In contrast, the Lower Omo is characterized by a much stronger dependence on blue water and the seasonal flood pulse of the Omo River. Seasonal flooding supports flood-recession agriculture, grazing, riverine forests and wetlands, while river flows and associated sediment and nutrient transport contribute to aquatic productivity and fisheries. The Omo provides more than 80% of Lake Turkana’s annual freshwater inflow, meaning that hydrological changes in the basin have consequences that extend across the Ethiopian–Kenyan border.

These diverse water-dependent systems are increasingly influenced by major infrastructure and water-development investments, including the Gibe hydropower cascade, Koysha and expanding irrigation (Avery, 2012). The implications of such developments extend beyond changes in total annual water availability: changes in the timing, magnitude and duration of flows, particularly the flood pulse, can affect agricultural production, grazing, fisheries, ecosystem functioning and the resilience of different livelihood groups. The Basin therefore represents a complex social–ecological system in which blue and green water generate multiple, interconnected benefits to people and nature, while changes in water and land management can create trade-offs between these varied benefits (Kleinschroth et al., 2022).

The Omo–Gibe Basin provides a particularly compelling setting for the Value Blue–Green Water Services POD because the full contribution of water to people and ecosystems cannot be understood by considering blue water alone. Green water sustains much of the Basin’s agricultural production in the upper and middle basin, while blue water and its seasonal dynamics underpin critical ecosystem services and livelihoods downstream. Valuing these services will make these often overlooked benefits more visible and provide a stronger evidence base for understanding trade-offs and co-benefits associated with alternative land and water management decisions across the Basin.

1.3 POD Portfolio

The research reported here, on valuing blue–green water services, forms one element of a wider portfolio of work being undertaken by IWMI and partners in the Omo–Gibe Basin under the Multi-Functional Landscapes (MFL) Science Program. IWMI is leading nine Programs of Deliverables (PODs) that collectively aim to strengthen integrated land and water management and improve landscape multifunctionality across the Basin. The PODs span water accounting, blue–green water service valuation, land degradation, soil and water conservation, basin trade-off modelling, environmental flows, landscape multifunctionality planning, and inclusive governance. While each POD addresses a specific knowledge or decision-making need, together they form three interconnected layers of work - foundational science, integration, and solution and governance (Figure 1).

IWMI: Omo–Gibe Multifunctional Landscape (MFL) Program 2026

Water System Program: From Science to Solutions

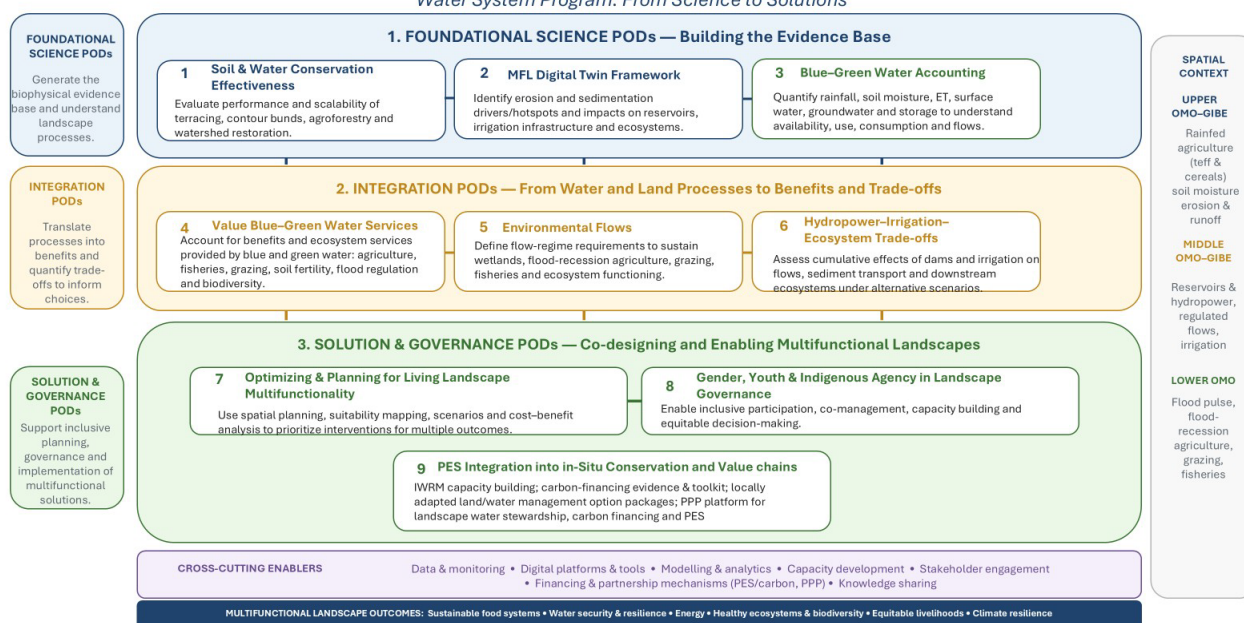


Figure 1. Conceptual framework for IWMI MFL Science Program funded PODs conducted in the Omo-Gibe Basin *source: authors' creation*

The foundational science PODs establish the biophysical evidence base needed to understand the Omo–Gibe landscape, including the spatial and temporal distribution of blue and green water and the processes governing land degradation, erosion, sediment dynamics and water availability. The integration PODs build on this evidence to understand the benefits, ecological requirements and trade-offs associated with different patterns of land and water use. Within this layer, the *Value Blue–Green Water Services* POD provides an important bridge between biophysical processes and human and ecological outcomes by translating changes in water availability, timing, distribution and use into the benefits generated for agriculture, livestock, fisheries, ecosystems and livelihoods. It directly complements the *Blue–Green Water Accounting* POD, which provides the quantitative basis for understanding where, when and how water is available, used and consumed; the environmental flows work, which identifies the flow characteristics required to sustain ecosystems and flow-dependent livelihoods; and the hydropower–irrigation–ecosystem assessment, which examines the implications of alternative water-management and development choices.

The solution and governance PODs use this integrated evidence to identify, prioritize and enable multifunctional landscape pathways. The valuation of blue–green water services contributes to this layer by making the benefits and potential costs of different water and land-management choices more explicit, thereby helping to inform spatial planning, optimization and the prioritization of investments in conservation, restoration, irrigation, storage and other interventions. Together with the gender, youth and Indigenous agency POD, which supports inclusive participation, local knowledge and equitable governance, these activities provide a pathway from evidence to action. Across the portfolio, data and monitoring, modelling and digital tools, capacity development and stakeholder engagement provide the enabling infrastructure for learning and adaptive management. The overall program logic is therefore: understand the system → account for blue and green water and ecosystem processes → value the benefits generated by these processes → assess trade-offs → identify and prioritize multifunctional solutions → support inclusive implementation and governance. Within this portfolio, the *Value Blue–Green Water Services* POD is not a standalone economic valuation exercise but rather an integrating component that helps translate the biophysical evidence generated by the wider program into information that can support decisions about how water and landscapes can be managed to generate multiple and sustainable benefits.

2. Objective and Conceptual and Methodological Framework

2.1 Objective

The overall development objective of this activity is to strengthen evidence-based decision-making on water, land and ecosystem management in the Omo–Gibe Basin by making the full range of benefits generated by blue and green water more visible and comparable. In combination with other PODs, the valuation is intended to support decisions on where and how water and landscape investments should be prioritized. By demonstrating the economic and societal benefits associated with different components of the water cycle, the activity will provide decision-makers with evidence to assess trade-offs among alternative uses of water and to identify opportunities for investments that generate multiple benefits.

To achieve this objective, the activity will develop and apply a blue–green water services valuation framework for the Omo–Gibe Basin that quantifies and, to the extent possible, values the benefits to people generated by blue and green water across the Basin. Building on the biophysical evidence generated through the complementary Blue–Green Water Accounting POD, the activity will examine how different components of the water cycle—including precipitation, soil-moisture storage, evapotranspiration, surface water, groundwater, river flows and seasonal flooding—support agricultural production, livelihoods, ecosystem services and wider societal benefits. The framework will move beyond valuing water primarily as an input to consumptive uses to recognize the multiple benefits generated by water as it moves through and supports landscapes and ecosystems. The resulting evidence will provide a basis for comparing alternative management and investment options, making currently under-recognized benefits visible in planning and appraisal processes, and informing more integrated approaches to water and landscape management in the Basin.

The assessment will adopt a basin-wide perspective, recognizing that the nature and value of blue–green water services vary substantially across the Omo–Gibe landscape. In the upper basin, the analysis will focus particularly on the benefits generated by green water through predominantly rainfed agricultural systems, including cereals such as teff and other crops and livestock production. The valuation will consider how rainfall, soil-moisture availability and evapotranspiration underpin agricultural productivity and rural livelihoods, while also recognizing the wider benefits associated with the upper basin as a source of downstream water flows. The objective is not simply to assign a monetary value to rainfall or soil moisture, but to understand the benefits that arise from the availability and functioning of these components of the water cycle.

In the middle basin, the assessment will consider the diverse combination of rainfed and irrigated agriculture and water-dependent ecosystems, including home gardens and enset (false banana) production. Here, the valuation will explore how blue and green water jointly support production and ecosystem services and how their relative contributions vary spatially and seasonally. Particular attention will be given to the multiple benefits generated where different water sources and landscape functions interact, as well as to potential trade-offs where water availability or changes in land and water management affect different users or services.

In the Lower Omo, the valuation will focus on the benefits generated by river flows, seasonal flooding and associated aquatic and floodplain ecosystems. This will include flood-recession agriculture, floodplain grazing, fisheries and other ecosystem services associated with riverine forests, wetlands and aquatic environments. The analysis will recognize that the value of blue water in this part of the Basin is not determined solely by the volume of water delivered downstream, but also by its timing, magnitude and duration and the ecological processes that these flows sustain. The assessment will therefore seek to capture the benefits associated with the seasonal flood pulse and the wider contribution of Omo River flows to downstream ecosystems and livelihoods.

A central objective of the activity will be to make visible the multiple benefits generated by blue and green water and their distribution across the Basin. The valuation will combine, as appropriate, economic valuation of market-based benefits such as agricultural production with assessment of ecosystem services and other benefits to people that are not fully reflected in conventional markets or water accounts. The underlying framework recognizes that green water is particularly poorly represented in conventional economic and water accounting despite its importance for agriculture and terrestrial ecosystems, while ecosystem accounting provides an opportunity to recognize hydrological functions and associated services. The resulting analysis will identify where blue and green water generate multiple co-benefits, where benefits may be complementary, and where changes in water availability or management could result in trade-offs between agricultural, livelihood and ecosystem outcomes.

2.2 Contribution to MFL Theory of Change and the MFL Action Plan for the Omo-Gibe Basin

The Value Blue–Green Water Services POD will contribute to the Theory of Change (ToC) and impact pathways of the MFL Science Program by translating the biophysical evidence generated through blue–green water accounting into an understanding of the benefits that water generates for people, livelihoods and ecosystems. The strongest

direct contribution is to OP 1.1.2: *Strategies and bundles of solutions that secure water for productive, domestic and environmental needs under a changing climate*. By linking blue–green water availability to the benefits generated for different users and ecosystems, the valuation will provide an economic and socio-ecological evidence base for assessing alternative strategies and bundles of land and water management solutions. The POD will therefore support a more complete assessment of water-security strategies, including the potential consequences when actions that generate benefits for one location, sector or group reduce benefits elsewhere. It will also contribute to OP 1.1.3: *Strategies and bundles for optimal management and use of common pool resources* by demonstrating the benefits generated through the interaction of water with rangelands, forests, wetlands, fisheries and other ecosystems and by helping to make trade-offs among these resources more explicit.

The POD is closely aligned with the Omo–Gibe Multifunctional Living Landscapes (MFLs) Action Plan and its emphasis on understanding the multiple benefits generated by interconnected landscape components. While Blue–Green Water Accounting provides the foundational biophysical evidence on the Basin’s water balance, the Value Blue–Green Water Services POD will provide the complementary benefit and value dimension needed to understand what that water contributes to people and nature. It will connect green-water processes supporting agriculture and terrestrial ecosystems in the upper and middle basin with the benefits generated by blue-water flows, seasonal flooding and aquatic ecosystems downstream. This will strengthen the Action Plan’s emphasis on understanding upstream–downstream linkages and provide a basis for considering the consequences of alternative land and water management decisions in terms of their effects on multiple landscape functions.

The valuation will support the Action Plan’s implementation pathway by providing evidence that can be incorporated into integrated land and water-use planning, trade-off analysis and scenario development. In particular, valuation will help move from identifying where water is available and how it moves through the Basin to understanding what is at stake when water availability, timing or management changes.

Through these pathways, the activity will contribute most directly to the 2030 Outcome OC1.1, under which Living Landscapes actors apply technological, socio-ecological, policy and/or institutional solutions and innovations that demonstrably improve landscape multifunctionality through sustainable production, restoration, conservation, inclusive livelihoods and healthy diets. The overall pathway is therefore from blue–green water accounting, through identification and valuation of the benefits generated by water, to improved understanding of co-benefits and trade-offs, better-informed landscape solutions and ultimately enhanced multifunctionality, livelihood resilience and sustainable water management across the Omo–Gibe Basin.

2.3 Conceptual and Methodological Framework

2.3.1 Why the need to better value water?

As the GCEW highlights, water is the global economy’s “silent currency” - essential to life, prosperity, and planetary stability, yet largely invisible in how nations measure and govern economic performance (GCEW, 2024). While the monetary value of blue water (rivers, lakes, and aquifers) is partially recognized through irrigation, hydropower, and municipal supply, green water (soil moisture and evapotranspiration) remains almost entirely invisible in national accounts, despite sustaining most of the world’s food production, terrestrial ecosystems, and atmospheric moisture recycling.

This invisibility creates a systemic bias. Blue water is partially recognized but still grossly undervalued, while green water - which underpins the productivity of rainfed agriculture, forests, wetlands, rangelands, and many ecosystem services - is almost entirely ignored in both economic metrics and policy frameworks. Crucially, green water is also a key driver of local and regional water cycling, whereby water evaporated from one location contributes to rainfall and water availability elsewhere. Ignoring these dynamics means that economic and development planning often overlooks how land and water management in one location can generate downstream or downwind benefits, or conversely, propagate water scarcity and hazard risks. Consequently, planning decisions relating to infrastructure, land use, and investment often degrade the hydrological functions that sustain long-term productivity, resilience, and climate stability.

To redress this imbalance, the GCEW calls for revaluing water as an asset - recognizing its role as a connector of the economy, ecosystems, and climate. Making the full spectrum of water visible in economic accounting systems, is a first step toward aligning public policy, finance, and development strategies with hydrological reality considered at the fore. This POD, in combination with the *Blue–Green Water Accounting* POD responds directly to that call by developing and applying an accounting and valuation framework to estimate the economic value of green and blue water services, using the Omo–Gibe basin as a demonstration. It will make explicit how water supports economic production, livelihoods, and ecosystem services in the Omo–Gibe Basin, and how degradation and mismanagement translates into typically unaccounted economic losses - losses that undermine sustainable economic development, threaten social stability, and increase vulnerability, particularly among poor and marginalized groups, thereby reinforcing cycles of poverty.

2.3.2 Water valuation approaches/frameworks

Water valuation has traditionally focused on blue water - surface water and groundwater - and on the economic benefits associated with identifiable uses such as irrigation, domestic supply, industry and hydropower. More recently, there has been growing recognition that this provides an incomplete picture of water's contribution to economies, livelihoods and ecosystems (GCEW, 2024). In particular, greater attention is being given to green water, including water stored in soils and made available to vegetation, and to its critical role in sustaining agricultural production and terrestrial ecosystems, particularly in water-limited environments (Mao et al., 2018; Sabzevari et al., 2026). This has prompted the development of approaches that seek to account for interactions between blue and green water and their contributions to human wellbeing and ecosystem functioning.

This shift has been accompanied by advances in hydrological modelling and water accounting, which make it increasingly possible to characterize the spatial and temporal distribution of different components of the water cycle. Green water represents a substantial component of the terrestrial water cycle, with an estimated 60–80% of precipitation returning to the atmosphere through transpiration and evaporation (Elnashar et al., 2021). Hydrological models such as the Soil and Water Assessment Tool (SWAT) have been applied to assess the spatial and temporal dynamics of green water, while more integrated approaches, including HydroGeoSphere, have been used to explore relationships between hydrological processes and the economic value of ecosystem services (吴洪涛 et al., n.d.; *Comment on HESS-2023-25*, 2023). These developments are important because the value of green water cannot simply be represented by assigning a monetary value to the volume of water stored in soil. Rather, its value is expressed through the agricultural production, ecosystem services and other benefits that depend on soil moisture, evapotranspiration and associated hydrological processes (Mao et al., 2018).

There has also been increasing interest in the economic valuation of water-dependent ecosystem services. Studies have sought to quantify the monetary contribution of green water to agriculture and forestry and to demonstrate its importance in sustaining ecosystem services, including during periods of drought (*Comment on HESS-2023-25*, 2023). However, relatively few studies have explicitly quantified the contribution of water to the production of ecosystem services. This represents an important gap, since water is not simply one input among many: its availability, timing and movement through landscapes are fundamental to the functioning of many ecosystems and to the services they provide.

The System of Environmental-Economic Accounting (SEEA) provides an important complementary framework for connecting information on environmental resources, ecosystems and ecosystem services with economic activity, although it does not directly quantify the contribution of water to the production of these services. SEEA-Water provides a framework for accounting for water stocks and flows, while SEEA-Ecosystem Accounting (SEEA-EA) provides a basis for recognizing ecosystem condition and the services generated by ecosystems. However, the two frameworks have rarely been applied in combination, and SEEA-EA does not directly quantify water consumption associated with ecosystem services. SEEA-EA has been applied to quantify the contribution of green water to agricultural and forestry outputs in England (Bogra, 2024), but its application to the contribution of water to a broader range of ecosystem services remains limited. Together, these developments nevertheless provide a basis for moving towards a more comprehensive assessment of the contribution of both blue and green water to economies and human wellbeing.

A key challenge is that water has multiple and interconnected values, and these values may accrue to different users and at different locations and times. Water that supports crop production may simultaneously sustain soil functions, biodiversity, carbon storage or downstream flows. Conversely, appropriation or management of water for one purpose may reduce the benefits available to other users or ecosystems. Valuation therefore needs to recognize both co-benefits and trade-offs, rather than treating water as a single-use commodity. This is particularly important in water-scarce environments, where increasing human appropriation of water can threaten ecosystem health and the services on which other communities and economic activities depend (Mao et al., 2018).

These considerations are also reflected in international efforts to broaden approaches to water valuation. The Valuing Water Initiative, launched by the World Bank and United Nations, emphasizes the need to recognize the multiple values of water and incorporate these values more effectively into policy and governance (Garrick et al., 2017). Such approaches point towards valuation frameworks that recognize not only direct economic uses of water, but also its contribution to ecosystems, social wellbeing and resilience. For green water, this includes recognizing the importance of land and soil management in determining how precipitation is retained, used by vegetation and returned to the atmosphere. Improved rainwater management and practices that enhance soil-moisture retention can therefore generate benefits for agricultural productivity, food security and resilience, particularly in semi-arid environments (Sabzevari et al., 2026).

Despite these advances, valuing blue and green water remains methodologically challenging. Hydrological processes are spatially and temporally variable, and the relationships between water availability and particular

benefits are often complex. Data on soil moisture, evapotranspiration, ecosystem condition and water-dependent benefits may also be limited at the spatial scales relevant to landscape management. Moreover, green and blue water should not be treated as independent or competing categories: they are interconnected components of the same hydrological system. A robust valuation framework therefore needs to retain this hydrological connectivity while distinguishing the different pathways through which blue and green water generate benefits.

For the Value Blue–Green Water Services POD, these developments provide the basis for an integrated approach in which the physical blue–green water accounts provide the foundation for identifying water-dependent benefits, while appropriate economic and ecosystem-service valuation methods are used to assess their significance. The objective is not to place a monetary value on all water flows, but to identify which benefits are generated by different components of the water cycle, who benefits from them, how those benefits vary across the Omo–Gibe landscape, and how they may change under alternative water and land-management conditions. In this way, the POD builds on emerging approaches to blue–green water valuation while addressing an important gap: explicitly linking the quantity, timing and spatial distribution of water to the ecosystem services and other benefits that water enables in a multifunctional landscape.

2.3.3 Application in this POD

The Value Blue–Green Water Services POD will build on the physical blue–green water accounts developed through the complementary Blue–Green Water Accounting POD and apply an integrated valuation framework to assess the benefits generated by water for people, livelihoods, economic activities and ecosystems across the Omo–Gibe Basin. The approach will be grounded in the System of Environmental-Economic Accounting for Water (SEEA-Water) and the SEEA Ecosystem Accounting (SEEA-EA), while adapting their concepts, classifications and accounting protocols to the particular hydrological, ecological and socio-economic context of the Basin. SEEA-Water provides the basis for consistently recording water stocks and flows and their links to the economy, while SEEA-EA provides a framework for accounting for ecosystem extent and condition and for the physical and monetary flows of ecosystem services.

The application in the Omo–Gibe will therefore not seek to develop a wholly new water valuation methodology. Rather, it will build on established SEEA principles and methods and determine how they can be operationalized at basin and sub-basin scales and extended, where necessary, to better capture the contribution of green water. This will require protocols to be adapted to the characteristics of the Omo–Gibe Basin, including its strong gradients in climate and land use, the importance of rainfed agriculture and soil moisture in the upper and middle basin, and the importance of river flows and seasonal flooding to downstream agriculture, grazing, fisheries and ecosystems. The basin-scale application is consistent with the SEEA approach, which allows ecosystem accounts to be compiled at river-basin and other subnational scales and emphasizes the importance of spatial relationships between ecosystem assets, services and beneficiaries.

Water-benefit-valuation framework

The first step will be to establish a water–benefit–valuation framework that explicitly links the blue–green water accounts to the services and benefits generated by water. The analysis will identify the principal water-dependent services across the Basin and the hydrological pathways through which they are generated. These may include agricultural production supported by green water; irrigated agriculture and other uses supported by surface water and groundwater; hydropower supported by river flows and storage; and ecosystem services associated with wetlands, rivers, floodplains, forests, rangelands and aquatic ecosystems. In the Lower Omo, particular attention will be given to services associated with the seasonal flow and flood pulse, including flood-recession agriculture, floodplain grazing and fisheries. The objective will be to establish the physical relationship between water availability and the production of each service before attempting to assign an economic value.

Data requirements and data acquisition

Implementation will require integration of hydrological, meteorological, remote-sensing, ecological, land-use, agricultural, economic and socio-economic data. The core hydrological and biophysical datasets are expected to include precipitation, evapotranspiration, soil moisture, land cover and land use, surface-water extent and flows, groundwater where available, reservoir storage and operation, irrigation, flooding and other relevant components of the water cycle. These will draw on the outputs of the complementary Blue–Green Water Accounting POD, together with available national monitoring data, meteorological and hydrological observations, existing basin studies and appropriate global or regional datasets. Remote sensing and Earth observation (EO) will be essential for spatially distributed variables such as land cover, crop extent, vegetation condition, surface-water dynamics and evapotranspiration.

Agricultural and livelihood valuation will require data on crop areas and yields, production systems, irrigation and rainfall dependence, input and production costs, prices, livestock and fisheries, household livelihoods and the spatial distribution of beneficiaries. Hydropower assessment will require information on river flows, reservoir storage and operation, generation, installed capacity and, where appropriate, electricity prices and system-level economic values. Ecosystem-service assessment will require information on ecosystem extent and condition, floodplain and wetland dynamics, fisheries, grazing, forest products, biodiversity-related services and other relevant ecosystem

benefits. Existing government statistics, administrative datasets, and past research projects will be used wherever possible, supplemented by targeted expert elicitation where critical information is unavailable.

Addressing data gaps and uncertainty

Significant data gaps are expected, particularly for green-water processes, groundwater, ecosystem condition, seasonal flood dynamics, informal livelihood benefits and the spatial distribution of beneficiaries. These gaps will be explicitly documented rather than obscured through the use of increasingly uncertain proxy data. Where direct observations are unavailable, the POD may use modelled data, remote sensing, benefit transfer, expert knowledge or other proxies, but the source, assumptions and limitations associated with each will be recorded.

The POD will distinguish, where possible, between measurement uncertainty, model uncertainty and uncertainty arising from assumptions about the relationship between water and benefits. Sensitivity or uncertainty analysis will be used to test whether alternative plausible values materially change the valuation results or the comparison of management scenarios. This is particularly important where monetary estimates depend on several uncertain parameters. To the extent possible results will therefore be presented with appropriate ranges or confidence/uncertainty intervals, rather than as a single point estimate that implies greater precision than the underlying data support.

Selection of valuation methods

A key methodological task will be to identify the most appropriate valuation method for each water-dependent service, rather than applying a single valuation technique across the Basin. Depending on the service, available data and the purpose of the analysis, methods may include production-function approaches, market-based valuation, avoided or replacement costs, revealed or stated preferences, benefit transfer, or other approaches consistent with SEEA-EA valuation principles. SEEA-EA recognizes that ecosystem services can be recorded in both physical and monetary terms and that a range of economic valuation techniques may be appropriate depending on the service and context. The choice of method will therefore be guided by the characteristics of each service, the availability and quality of data, the ability to establish a defensible causal relationship with water, and the intended use of the results.

Avoiding double accounting will be a central methodological principle. This is particularly important when combining SEEA-Water, SEEA-EA and conventional economic valuation approaches. The same underlying benefit can otherwise be captured more than once - for example, through the value of water supplied to an economic activity and again through the value of the agricultural land, agricultural output or ecosystem service that depends on that water. Similarly, intermediate ecosystem services should not be valued and then added to the value of final ecosystem services where the intermediate service is already embodied in the final benefit. The SEEA literature explicitly identifies double counting as a major issue in water valuation and highlights the need to distinguish intermediate and final ecosystem services and to recognize that the value of water may already be embedded in other assets or outputs. SEEA-EA similarly requires ecosystem services to be defined and measured so that overlapping services do not result in double counting.

Accordingly, the POD will develop clear valuation protocols and accounting boundaries for each service before monetary aggregation is undertaken. These protocols will specify the water component being valued, the ecosystem or economic activity generating the benefit, the beneficiary, the valuation method, the accounting period and spatial unit, and whether the benefit represents an intermediate or final service. Where the value of water is already captured in the value of an economic output or asset, this will be explicitly recognized rather than added again as a separate water value. The intention is therefore not to produce a simple aggregate monetary estimate of "the value of water" but a defensible set of physical and monetary accounts that show how water contributes to different benefits and where those benefits are generated.

The analysis will also consider co-benefits and trade-offs across sectors, locations and livelihood groups. The same water flow may generate several benefits simultaneously, while a change in water availability or timing may increase one benefit while reducing another. The SEEA-EA's spatial approach is particularly relevant in this context because ecosystem services are generated by ecosystem assets in particular locations and accrue to beneficiaries that may be located elsewhere. In the Omo–Gibe Basin, this provides a basis for examining upstream–downstream relationships and for understanding how changes in land use, water abstraction, irrigation or reservoir operation may affect the distribution of benefits between agricultural systems, hydropower, livelihoods and downstream ecosystems.

Where data and modelling permit, the framework will subsequently be applied to alternative management or development scenarios. Changes in land use, agricultural practices, irrigation, abstraction, reservoir operation or other interventions can alter the quantity, timing or spatial distribution of blue and green water and, consequently, the services generated by that water. The valuation framework will provide a means of translating these hydrological changes into changes in benefits, thereby providing an important economic and ecosystem-service dimension to the complementary Hydropower–Irrigation–Ecosystem Trade-off Assessment Package.

The resulting framework will therefore combine four linked elements: (i) blue–green water accounts; (ii) identification and physical quantification of water-dependent ecosystem services and economic benefits; (iii) appropriately

selected valuation methods; and (iv) explicit accounting rules and data-quality procedures to ensure that values are not double counted and that uncertainty is transparent. The outcome will be a basin-specific application of SEEA-Water and SEEA-EA that makes the contribution of blue and green water to people and nature more visible while retaining the accounting discipline needed to produce robust and comparable results. In this way, the POD will provide a practical basis for incorporating the value of water into multifunctional landscape planning and for assessing how alternative land and water management pathways can sustain multiple benefits across the Omo–Gibe Basin.

3. Workplan

The Value Blue–Green Water Services POD will be implemented from June 2026 to December 2028 as an iterative process of conceptual development, physical assessment, valuation, integration and application. The work will build directly on the blue–green water accounts generated through the complementary Blue–Green Water Accounting POD and progressively establish the links between water, ecosystems, economic activities, livelihoods and the benefits generated by water across the Omo–Gibe Basin.

The workplan is deliberately designed as an adaptive process, recognizing that the identification of priority services, the strength of water–benefit relationships, data availability and the most appropriate valuation methods will become clearer as the work progresses. Stakeholder engagement will therefore be integrated throughout the POD, with regular technical consultations and formal review points providing opportunities to test emerging findings, challenge assumptions, identify information gaps and redirect the analysis where necessary. The September 2026 inception workshop will provide the first major decision point, but will be followed by further stakeholder reviews as the physical accounts, valuation methods, monetary estimates and scenario results emerge.

The following outlines the proposed major phases of the work as also presented in the Gantt chart (Figure 2):

3.1 Phase 1: Initiation, Scoping and Development of the Conceptual Framework (June–December 2026)

The first phase will establish the conceptual and methodological foundations for the POD. The work will begin with a review of SEEA–Water, SEEA–EA and relevant approaches to valuing water-dependent ecosystem services and economic benefits. This will be complemented by a systematic review of existing data, studies, institutional knowledge and valuation evidence relevant to the Omo–Gibe Basin. The emphasis will be on identifying and making use of existing information and understanding its strengths and limitations before determining where additional analysis or data collection are required.

The emerging blue–green water accounts will be reviewed alongside information on land use, agriculture, hydropower, livelihoods and ecosystems to identify the principal services and benefits associated with water across the Basin. The assessment will explicitly encompass the different roles of blue and green water. This will include the contribution of soil moisture and green water to rainfed agriculture in the upper and middle basin, the contribution of surface water and groundwater to irrigated agriculture and other uses, the dependence of hydropower on river flows and storage, and ecosystem services associated with rivers, wetlands, floodplains, forests, rangelands and aquatic ecosystems. In the Lower Omo, particular attention will be given to the seasonal flow regime and flood pulse and their contribution to flood-recession agriculture, grazing, fisheries and ecosystems.

An initial water–benefit–valuation framework will be developed to map the causal pathways through which blue and green water contributes to ecosystem processes, economic activities, services and benefits, and ultimately to different groups of beneficiaries. This framework will also identify the proposed spatial and temporal scales of analysis and the relationships between ecosystem assets, services and beneficiaries.

The phase will culminate in an inception workshop in September 2026, involving relevant national, basin and other stakeholders. The workshop will be used to review and validate the conceptual framework, priority services, proposed accounting boundaries and workplan. Stakeholders will also be invited to identify important benefits, livelihood relationships or spatial and seasonal dynamics that may have been overlooked.

Deliverable 1 — Inception and conceptual framework (December 2026):

A stakeholder-validated conceptual framework identifying priority water-dependent services and benefits, their hydrological pathways and beneficiaries, proposed spatial and temporal accounting scales, available evidence and key information gaps, together with the agreed approach and workplan for the subsequent phases.

3.2 Phase 2: Development of Basin-Specific Valuation and Accounting Protocols (January–June 2027)

Building on the inception phase, the second phase will translate the conceptual framework into operational accounting and valuation protocols. The objective will be to establish the rules for assessing and valuing each priority service before substantial monetary valuation is undertaken.

For each service, the protocols will specify the relevant blue or green water component, the hydrological pathway linking water to the service, the ecosystem or economic activity generating the benefit, the beneficiary, the spatial and temporal accounting unit and the appropriate valuation method. Particular attention will be given to distinguishing intermediate from final ecosystem services, and to recognizing circumstances where the value of water is already embedded in the value of an economic output, ecosystem service or asset.

Avoiding double accounting will be a central part of this work. The protocols will establish clear accounting boundaries to prevent the same benefit from being captured more than once, either through different ecosystem

services or through separate valuation of water and the final economic or ecosystem benefit in which its value is already embodied.

The phase will also include a more detailed assessment of data availability and quality. This will help determine which services can be robustly quantified and valued, where targeted additional analysis may be required, and where physical or qualitative indicators may be more appropriate than monetary estimates.

A stakeholder technical review will provide an opportunity to test the proposed protocols and adjust priorities before implementation. This review will be particularly important for ensuring that the framework reflects basin realities and that the choice of valuation methods is appropriate to the intended uses of the results.

Deliverable 2 - Basin-specific valuation and accounting protocols (June 2027):

A SEEA-Water/SEEA-EA-based framework adapted to the Omo–Gibe Basin, including service definitions, water–benefit relationships, accounting boundaries, criteria for selecting valuation methods, data requirements and explicit protocols for avoiding double accounting.

3.3 Phase 3: Physical Quantification of Water-Dependent Services and Benefits and Application of Valuation Methods (July 2027–March 2028)

This phase will, in conjunction with the Blue-Green Water Accounting POD, focus on establishing the physical relationships between blue and green water and the benefits generated by water, and application of the economic valuation methods.

The analysis will link the blue–green water accounts with information on agricultural production, irrigation, livestock and grazing, hydropower, fisheries, flood-recession agriculture and priority ecosystem services. Spatial analysis will be used to identify where services are generated and where their benefits accrue, recognising that the location of an ecosystem asset or water-dependent activity may differ from the location of its beneficiaries.

The work will seek to quantify, as far as possible, how changes in water availability, timing and spatial distribution affect the generation of services. This will include the contribution of green water and soil moisture to rainfed agricultural production; blue water to irrigated agriculture and other uses; river flows and storage to hydropower; and seasonal flows and flooding to downstream agricultural, grazing, fisheries and ecosystem benefits.

The emerging results will be discussed through targeted stakeholder consultations during the phase, allowing the project to test whether the identified water–benefit relationships are consistent with local knowledge and experience. These consultations will also provide opportunities to identify important seasonal or spatial relationships that are poorly represented in available datasets.

In conjunction with the understanding of the physical accounts appropriate economic valuation methods will be applied to the priority services identified. The POD will not seek to apply a single valuation technique across the Basin. Instead, the method will be selected for each service according to its characteristics, the available evidence, the strength of the causal relationship with water and the intended use of the valuation results.

Potential approaches may include production-function and market-based methods for economic activities, avoided or replacement costs for relevant services, revealed or stated preference methods where appropriate, and benefit transfer where primary valuation is not feasible and transferability can be justified. The application of each method will be documented, including its assumptions, limitations and uncertainty.

Particular attention will be given to ensuring that intermediate services are not valued and added to final benefits where the value of the intermediate service is already embodied in the final output. Similarly, the value of water will not be added separately where it is already reflected in the value of an economic output or asset.

Preliminary monetary estimates will be subjected to sensitivity and uncertainty analysis. A stakeholder review in March 2028 will provide a formal checkpoint for assessing the emerging results and determining whether the valuation methods, assumptions and priorities remain appropriate. The review will also allow stakeholders to identify important benefits or groups that may have been overlooked and to recommend adjustments before the accounts are integrated at basin scale.

Deliverable 3 — Monetary valuation accounts (March 2028):

Preliminary monetary accounts for priority water-dependent services and benefits, supported by service-specific valuation methods, documented assumptions, uncertainty and sensitivity analysis, and explicit application of double-accounting safeguards. The deliverable will also document services for which monetary valuation was not considered sufficiently robust and explain the reasons.

3.4 Phase 4: Integration, Benefit Distribution and Trade-Off Assessment (April–June 2028)

In this phase, the physical and monetary accounts will be integrated to provide a basin-scale assessment of how blue and green water generates and distributes benefits across sectors, locations and beneficiary groups.

The analysis will examine the spatial distribution of benefits and beneficiaries and the relationships between upstream and downstream areas. It will identify situations in which the same water flow generates multiple benefits and examine where changes in the quantity, timing or location of water may create synergies or trade-offs between different uses and ecosystems.

Particular attention will be given to interactions among rainfed and irrigated agriculture, hydropower, livelihoods and downstream ecosystems. The analysis will also consider the distribution of benefits between locations and groups, recognising that changes in water management may generate benefits in one part of the Basin while creating costs or reducing benefits elsewhere.

Where feasible, the integrated framework will be linked to the modelling and analysis undertaken through the complementary Hydropower–Irrigation–Ecosystem Trade-off Assessment Package. This will allow changes in land use, agricultural practices, irrigation, abstraction or reservoir operation to be translated into potential changes in blue and green water and subsequently into changes in water-dependent benefits.

A stakeholder synthesis review during this phase will be used to examine whether the integrated results address the questions most relevant to basin planning and to agree which trade-offs and management pathways warrant further analysis during the final phase.

Deliverable 4 — Integrated benefit and trade-off assessment (June 2028):

An integrated basin-scale assessment combining physical and monetary accounts to show the distribution of water-dependent benefits, beneficiaries, co-benefits and trade-offs across sectors and locations, including upstream–downstream relationships and linkages with the Hydropower–Irrigation–Ecosystem Trade-off Assessment Package.

3.5 Phase 5: Scenario Analysis, Final Validation and Application to Planning (July–December 2028)

The final phase will demonstrate how the valuation framework can be applied to alternative management and development pathways. Where data and modelling permit, scenarios will consider potential changes in land use, agricultural practices, irrigation, abstraction, reservoir operation or other interventions and assess how these changes affect the quantity, timing and spatial distribution of blue and green water.

The analysis will then translate these hydrological changes into changes in water-dependent benefits. The emphasis will be on understanding changes in the distribution of benefits and trade-offs, rather than simply comparing aggregate monetary values. This will provide an economic and ecosystem-service dimension to the wider assessment of alternative development and management pathways in the Omo–Gibe Basin.

The final months will focus on consolidating and validating the physical and monetary accounts and ensuring that the methodology, assumptions, uncertainties and accounting boundaries are transparent. The outputs will be integrated with the complementary Blue–Green Water Accounting POD and the Hydropower–Irrigation–Ecosystem Trade-off Assessment Package.

A final stakeholder validation process in the second half of 2028 will provide an opportunity to review the completed accounts, scenario results and proposed decision-support products. Feedback will be used to refine the final outputs and ensure that they are relevant and accessible to institutions involved in water, agriculture, energy, environment and multifunctional landscape planning.

Deliverable 5 — Scenario and decision-support package (December 2028):

A validated basin-specific application of SEEA-Water and SEEA-EA, incorporating physical and monetary water-dependent service accounts, scenario-based assessment of alternative management pathways, integration with the hydropower–irrigation–ecosystem trade-off assessment, and practical decision-support tools and guidance for incorporating the contribution of blue and green water into multifunctional landscape planning.

3.6 Cross-Cutting Stakeholder Engagement and Adaptive Management

Stakeholder engagement will run throughout all five phases. In addition to the formal workshops and reviews identified above, the project will maintain regular technical engagement with relevant national and basin institutions and other stakeholders. The purpose will be to ensure that stakeholder input is used to shape and redirect the work as evidence emerges, rather than being limited to validation of completed outputs.

This adaptive approach is particularly important because the POD is intended to develop a practical basin-specific application of established SESA principles, rather than impose a predetermined valuation methodology on the Omo–Gibe Basin. Stakeholder feedback, together with the evidence emerging from the physical accounts and valuation analysis, will therefore be used to determine where analytical effort should be concentrated and where particular results are too uncertain to support monetary aggregation or scenario analysis.

The overall outcome will be a defensible and transparent framework showing where blue and green water generates benefits, through which ecological and economic processes, for whom, and how those benefits may change under alternative management pathways. Monetary valuation will be used selectively within this broader accounting framework, with explicit safeguards against double accounting. This will provide a stronger basis for incorporating the contribution of water into multifunctional landscape planning and for understanding the consequences of alternative land and water management pathways across the Omo–Gibe Basin.

Figure 2. Gantt Chart: Valuing Blue-Green Water Services – Workplan (POD commenced July 2026)

Activities and Outputs	2026				2027				2028			
Phase 1: Initiation, scoping and development of the conceptual framework												
• Identify priority blue and green water dependent services and benefits in the basin												
• Review of SEEA-Water, SEEA-EA and relevant approaches to valuing water-dependent services												
• Initial blue-green water–benefit–valuation framework developed												
• Inception workshop												
• Validated conceptual framework												
Phase 2: Development of basin-specific valuation and accounting protocols												
• Develop combined SEEA-Water/SEEA-EA accounting architecture												
• Develop service-specific valuation protocols based on data availability and quality												
• Targeted stakeholder consultation and validation workshop												
• Validated valuation and accounting protocols established for the Omo-Gibe Basin												
Phase 3: Physical quantification of water-dependent services/application of valuation methods												
• Spatial analysis will be used to identify where services are generated and benefits accrue												
• Link between water availability, timing and spatial distribution and the generation of services.												
• Economic valuation methods applied to priority services												
• Stakeholder review - assessing the emerging results and determining whether the valuation methods, assumptions and priorities remain appropriate												
• Preliminary economic valuation for priority blue and green water-dependent services and benefits												
Phase 4: Integration, benefit distribution and trade-off assessment												
• Combining physical and monetary accounts to provide a basin-scale assessment												
• Stakeholder review to examine whether the integrated results address most relevant questions												
• Integrated basin-scale assessment combining physical and monetary accounts												
Phase 5: Scenario analysis, final validation and application to planning												
• Valuation framework applied to alternative management and development pathways												
• Validated basin-specific application of SEEA-Water and SEEA-EA,												
• Final stakeholder review and dissemination workshop												
• Final technical report and recommendations for future updating												

source: authors' creation

Notes: ▲ Stakeholder engagement milestone

4. Conclusion

The Value Blue–Green Water Services POD provides an important opportunity to make the contribution of water to people, livelihoods, economic activities and ecosystems more visible within planning and decision-making in the Omo–Gibe Basin. Rather than seeking to establish a single monetary value for water, the POD will develop a basin-specific accounting and valuation framework that shows how blue and green water flows support different services and benefits, where those benefits are generated, who benefits from them, and how they may change under alternative management pathways.

The approach will build on the established principles of SEEA-Water and SEEA-EA, adapting their concepts, classifications and accounting protocols to the particular hydrological, ecological and socio-economic characteristics of the Omo–Gibe Basin. This includes recognising the importance of green water and soil moisture to rainfed production in the upper and middle basin, the role of surface water and groundwater in irrigated and other economic activities, the dependence of hydropower on river flows and storage, and the importance of seasonal river flows and flooding to agriculture, grazing, fisheries and ecosystems in the Lower Omo. In doing so, the POD will build on the physical blue–green water accounting work.

A central strength of the proposed approach is that physical relationships will be established before monetary values are assigned. The analysis will first identify and quantify the principal water-dependent services and the pathways through which water contributes to them. Appropriate valuation methods will then be selected on a service-by-service basis, taking account of the characteristics of the service, available evidence, data quality, the strength of the water–benefit relationship and the intended application of the results.

The POD will also place particular emphasis on accounting boundaries and avoidance of double accounting. This will ensure that values are not counted more than once when water, ecosystem services, economic outputs and assets are considered together, and that intermediate services are not added to final benefits in ways that inflate estimates. This accounting discipline will be essential if the results are to provide a credible basis for comparing benefits and trade-offs across the Basin.

The work will be undertaken as an iterative and adaptive process. The proposed workplan provides a clear pathway from inception and framework development in 2026, through physical quantification and valuation in 2027, to integrated benefit, trade-off and scenario analysis in 2028. However, the pathway will not be treated as fixed. Regular engagement with national, basin and other stakeholders will provide opportunities to review emerging evidence, challenge assumptions, identify overlooked benefits or beneficiaries, assess the usefulness of results and redirect analytical effort where necessary. The September 2026 inception workshop will be a critical first step in this process, establishing the initial direction, with subsequent technical reviews and stakeholder validation points built into each major stage of the work.

By the end of the POD, the intention is to have moved beyond a conceptual discussion of the value of blue and green water towards a practical, spatially explicit and decision-relevant accounting framework for the Omo–Gibe Basin. The resulting physical and monetary accounts will provide a stronger evidence base for understanding the distribution of benefits and trade-offs among agriculture, hydropower, livelihoods and ecosystems, including the important upstream–downstream relationships that characterise the Basin.

The outputs will also provide an important bridge to the wider Omo–Gibe programme of work. In particular, linking the blue–green water accounts and valuation results with the Hydropower–Irrigation–Ecosystem Trade-off Assessment Package will enable changes in water management to be considered not only in hydrological terms, but also in terms of their implications for people, economic activities and ecosystems. This will strengthen the basis for assessing alternative development and management pathways and for identifying opportunities to sustain multiple benefits simultaneously.

Ultimately, the value of the POD will lie not simply in the monetary estimates it produces, but in its ability to make the multiple contributions of blue and green water visible within a common valuation framework. By connecting water, ecosystems, economic activities and beneficiaries, while maintaining clear accounting boundaries and transparency about uncertainty, the work will provide a practical basis for incorporating water-related benefits into multifunctional landscape planning. It will thereby contribute to a more integrated understanding of how the Omo–Gibe Basin can manage its water resources to support people, livelihoods, economic development and healthy ecosystems over the long term.

References

- Amos, S., Mengistu, S. & Kleinschroth, F. (2021). Three decades of pastoralist settlement dynamics in the Ethiopian Omo Delta based in remote sensing data. *Human Ecology*, <https://doi.org/10.1007/s10745-021-00257-6>.
- Avery, S. (2012). Lake Turkana and the Lower Omo: Hydrological Impacts of Major Dam & Irrigation Development. Report, African Studies Centre, University of Oxford.
- Bogra, S. (2024). *Valuing water provisioning services in England: A regionalized application of the System of Environmental Economic Accounting--Ecosystem Accounting framework in the context of Natural Capital Accounting*. <https://doi.org/10.21203/rs.3.rs-5317757/v1>
- Comment on hess-2023-25. (2023). <https://doi.org/10.5194/hess-2023-25-rc1>
- Elnashar, A., Wang, L., Wu, B., Zhu, W., & Zeng, H. (2021). Synthesis of global actual evapotranspiration from 1982 to 2019. *Earth System Science Data*, 13(2), 447–480. <https://doi.org/10.5194/essd-13-447-2021>
- Garrick, D., Hall, J. W., Dobson, A. P., Damania, R., Grafton, R. Q., Grafton, R. Q., Hope, R., Hepburn, C., Bark, R. H., Boltz, F., De Stefano, L., O'Donnell, E., Matthews, N., & Money, A. (2017). Valuing water for sustainable development. *Science*, 358(6366), 1003–1005. <https://doi.org/10.1126/SCIENCE.AAO4942>
- Kleinschroth, F., Mekuria, W., Schwatke, C., & McCartney, M. (2022). Ecosystem Services in changing social-ecological systems. In: Lautze, J., McCartney, M.P. & Gibson, J. *The Omo-Turkana Basin: Cooperation for Sustainable Water Management*. Routledge Taylor & Francis Group. 178 pp. ISBN 9780367770044.
- Lai, V. M., Tran, T. H., Tran, M. T., Nguyen, N. A., & Mac, T. M. T. (2017). System of environmental - economic accounting for water (SEEA-W):case study of the Nhue - Day river basin. *Vietnam Journal of Science and Technology*, 59(4), 80–88. [https://doi.org/10.31276/VJSTE.59\(4\).80](https://doi.org/10.31276/VJSTE.59(4).80)
- Lautze, J., McCartney, M.P. & Gibson, J. (eds) (2022) Introduction In: Lautze, J., McCartney, M.P. & Gibson, J. *The Omo-Turkana Basin: Cooperation for Sustainable Water Management*. Routledge Taylor & Francis Group. 178 pp. ISBN 9780367770044.
- Mao, G., Mao, G., Liu, J., Han, F., Meng, Y., Tian, Y., Zheng, Y., & Zheng, C. (2018). Assessing Green and Blue Water: Understanding Interactions and Making Balance between Human and Nature. *Hydrology and Earth System Sciences Discussions*, 1–26. <https://doi.org/10.5194/HESS-2018-193>
- Mati, B. & Merrey, D.J. (2022). Agriculture and Food Security. In: Lautze, J., McCartney, M.P. & Gibson, J. *The Omo-Turkana Basin: Cooperation for Sustainable Water Management*. Routledge Taylor & Francis Group. 178 pp. ISBN 9780367770044.
- Sabzevari, Y., Ghanbarpour, M. A., Eslamian, S., & Massoudieh, A. (2026). *Green Water Economic Emphasis on Nexus*. 59–74. <https://doi.org/10.1002/9781394248087.ch5>
- 吴洪涛, 武春友, 郝芳华, & 金英学. (n.d.). *Research on Assessment and Management of Green Water*. <https://doi.org/10.3969/j.issn.1002-2104.2008.06.012>



CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to transforming food, land, and water systems in a climate crisis. Its research is carried out by 13 CGIAR Centers/Alliances in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector. www.cgiar.org

To learn more about the CGIAR Research Portfolio, please visit www.cgiar.org/cgiar-research-portfolio-2025-2030/

Contact

Matthew McCartney, Research Group Leader – Sustainable Water Infrastructure and Ecosystems, IWMI, Colombo, Sri Lanka (M.McCartney@cgiar.org)



CGIAR

MULTIFUNCTIONAL
LANDSCAPES



International Water
Management Institute