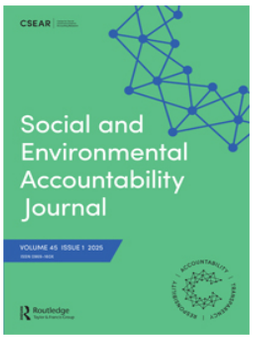

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Social and Environmental Accountability Journal

ISSN: 0969-160X (Print) 2156-2245 (Online) Journal homepage: www.tandfonline.com/journals/reaj20

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To cite this article: Stephanie Perkiss, Jordan Gacutan, Lee Moerman, Rachel Nichols, Michelle Voyer, Jennifer Atchison, Chris Brennan-Horley & Shanaka Herath (2025) Exploring Accounting for the Ocean: Utilisation of the Sociology of Worth to Assess Current Practice and Develop Propositions for Holistic Accounting, Social and Environmental Accountability Journal, 45:1, 14-41, DOI: 10.1080/0969160X.2024.2419913

To link to this article: https://doi.org/10.1080/0969160X.2024.2419913

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SOCIAL AND ENVIRONMENTAL ACCOUNTABILITY JOURNAL
2025, VOL. 45, NO. 1, 14–41
https://doi.org/10.1080/0969160X.2024.2419913

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Exploring Accounting for the Ocean: Utilisation of the Sociology of Worth to Assess Current Practice and Develop Propositions for Holistic Accounting

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ABSTRACT

The world's oceans are vital for planetary health as well as food and energy security. Recently though, they have been increasingly considered as a solution to stagnating economic growth, with ocean resources and ocean spaces being used for both public and private benefit. This puts pressure on the sustainability of ocean ecosystems. These complex challenges have meant a need for an integrated understanding of and a more holistic approach to ocean accounting and governance. We adopt the Sociology of Worth to evaluate the application of the Ocean Accounts framework according to a range of competing and compromising perspectives on the concept of the common good within a contested case study. We find that Ocean Accounts fall short on key social and cultural aspects. However, there is scope to draw on alternative accounts to better inform the use of oceans. While the accounting literature presents a plethora of studies on environmental sustainability, studies on accounting for our ocean are limited. This is the first paper in accounting to focus on the Ocean Accounts framework.

ARTICLE HISTORY
Received 19 March 2024
Accepted 18 October 2024

KEYWORDS
Ecosystem services; ocean accounting; Ocean Accounts framework; Sociology of Worth

1. Introduction

The turn of the twenty-first Century was marked by a growing optimism for oceans as a panacea for food and energy security (Stuchtey et al. 2020), and a solution to stagnating economic growth (OECD 2016). Sustainable Development Goal (SDG) 14 calls for the

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conservation and sustainable use of our oceans in light of the objectives of other SDGs relating to poverty, food, equality, economic growth, disaster risk, sustainable consumption and production, climate change and terrestrial ecosystems (United Nations (UN) 2015). In response, countries have set ambitious ocean-related economic development[1] strategies (e.g. ocean economy, blue growth, Blue Acceleration (Jouffray et al. 2020)) to increase production and employment from ocean systems. However, in addition to other domestic priorities, strategising national ocean policy is impacted by a range of international agreements and obligations to protect oceans (e.g. Convention on Biological Diversity, SDGs) (Obura 2020). These commitments require national policymakers to consider how the proceeds from production that enable prosperity and wellbeing of communities also contribute to the conservation of ocean ecosystems. Therefore, strategic ocean planning and management is increasingly complicated by multiple layers of policy requirements to align conflicting objectives and provide a coherent vision of the relationship between communities and the ocean. Often these public policy decisions are framed as a trade-off between conflicting values, and in this paper, we explore the potential for developing constructive compromises that incorporate often diverse and conflicting values (Boltanski and Thévenot 1991/2006; Oldenhof, Postma, and Putters 2014).

The ocean is the vast body of saltwater that covers nearly three-quarters of the earth's surface made up of thousands of ocean ecosystems. These ocean ecosystems include plants such as mangroves and seagrass habitats; animals such as crabs and fish species; and other habitat forming organisms such as coral (GOAP 2021). The ocean, like water (Hazelton 2013), has historically been conceived of as a freely accessible space/resource by all and therefore a form of open access resource with no one person or country having dominion or responsibility. With the development of international laws, such as the UN Law of the Sea Convention (UNCLOS 1982) and the introduction of exclusive economic zones (EEZs) and other forms of property rights, the ocean has become 'partitioned' with various property rights attached. Explained as a 'new economic frontier', the ocean is driving investment and economic activities in relation to food, mining, transport, and space (Jouffray et al. 2020, 43). This private use of hitherto public spaces has meant the increasing need for a range of ocean governance regimes to protect the common good aspect of oceans for both human and non-humans. At its heart, this moral sentiment ensures the interests of all as a shared good, in the case of ocean ecosystems (see Lehman 2007).

Given the competing demands for ocean use, ocean sustainability is an issue. Österblom et al. (2017, 9038) argue for the need for ocean stewardship. This is:

> viewed as an adaptive and learning-based, collaborative process of responsibility and ethics, aimed to shepherd and safeguard the resilience and productivity of ocean ecosystems for human well-being. Stewardship of the ocean—as part of the broader biosphere that humanity is embedded in and dependent upon—is essential if sustainability on a human-dominated planet is to be taken seriously.

However, like other common environmental resources stricken by imperfect governance regimes that result in their detriment, the oceans have suffered from actions related to the prioritisation of economic growth (Kubiszewski et al. 2013). Challenges such as marine pollution, ocean acidification and warming, destructive fishing practices, unsustainable

trade and transport, and unplanned coastal urbanisation threaten the health of our oceans and its capacity to nurture sustainable development (UN 2015). Economic activities associated with the development of the ocean economy now pose novel or intensified pressures on ocean ecosystems, which threaten their functioning and survival, impacting livelihoods of coastal communities and broader planetary health (Halpern et al. 2008; White, Halpern, and Kappel 2012).

In the social and environmental accounting (SEA) literature, the impact of accounting systems, including the current tool of ocean accounting, that privilege economic accounts and development often silence non-economic aspects of the common good (Perkiss and Moerman 2020). One alternative is the use of other forms of interdisciplinary accounts that enable a more holistic perspective that encompasses multiple accountabilities (Brown et al. 2015, Thomson, Dey, and Russell 2015; Lehman, Annisette, and Agyemang 2016) or values. How does one account for multiple common goods and how accounts for nature are constructed within the realm of the public interest are questions that have been answered in the SEA literature (Bayerlein and Perkiss 2023; Killian and O'Regan 2020). The question of how to account for non-publics requires a different take on holistic accounting and the willingness to accept responsibility (see Chwastiak and Young 2003; Lehman, Annisette, and Agyemang 2016). This is especially when issues of equity and environmental sustainability are always developing as (1) things become known and (2) commodities become scarce (see Brown 2009; Dillard and Vinnari 2019; Thomson, Dey, and Russell 2015). The compromises to the common good emerging from ocean research and attempts at ocean accounting have, this far, been absent from the SEA literature (see Bebbington et al. 2019 as one exemption).

With this, we explore the current Ocean Accounts framework developed by the Global Ocean Accounting Partnership (GOAP), with further guidance under development by the UN Statistical Division. In aligning with the conceptual design of existing National Accounts (discussed below) produced by most countries, the Ocean Accounts framework depicts the interactions between the ocean economy and the ocean environment. To identify multiple common goods, we adopt the Sociology of Worth (SOW) as a means to explore the ways in which justifications relating to ocean use support various logics, making visible alternative accounts required for a more holistic ocean accounting system. In this paper, we refer to accounting as a social practice; where accounting can act as a force for social change by making things visible and creating a space for dialogue (see Gallhofer and Haslam 1997). This is important, as ocean ecosystems have been increasingly framed as 'natural capital' (see Gray 1994) and an asset to be managed, where society and the economy benefit from the goods and services (henceforth 'ecosystem services') they provide. Assessing the supply, use and impacts on ecosystem services have become central in accounting for, and communicating the consequences of ecosystem change on human and societal wellbeing (Luisetti et al. 2014). As well as ensuring the continued persistence of natural capital and flow of services informs sustainable development pathways (Dunford et al. 2018).

Perkiss et al. (2022a, 9) called for future research into accountings role in informing ocean accounting. For example, exploring 'how ocean accounting engages with diverse stakeholder groups and creates space for their views to be "accounted for"'. In responding to this call, the aim of this paper is to evaluate the application of Ocean Accounts according to a range of competing and compromising perspectives on the concept of the

common good within a contested case study – Lake Illawarra's mangrove ecosystem. Additionally, this study seeks to use SOW to prescribe or diagnose other expressions of worth that are in society but currently outside of the Ocean Accounts framework.[2]

We contribute to the SEA literature in several ways. First, we introduce ocean accounting to critically evaluate the current Ocean Accounts framework by providing an example of its use in a case study of mangrove management in New South Wales (NSW), Australia. Second, we draw on the accounts of a diverse range of publics and their concepts of the common good. Third, we demonstrate how they can evaluate situational 'disputes', such as competing common goods that occur in a specific context (Boltanski and Thévenot 1991/2006). And finally, how such an evaluation can guide a more holistic valuation system for ocean accounting.

The paper begins with an outline of ocean accounting and the Ocean Accounts Framework, followed by the Sociology of Worth. The methodology is presented next, which details the case study and data collection and analysis. We then present the findings according to two distinct stages of research. The discussion follows. We conclude by offering some practical suggestions on how accounting for diverse common good may be achieved.

2. Ocean Accounting

Accounting for the ocean is complex. In terms of accounting for water, several national jurisdictions have developed standards for groundwater and tradable rights to trace and measure the allocation of water as a resource (Chalmers, Godfrey, and Lynch 2012; Tello, Hazelton, and Cummings 2016; Tello and Hazelton 2018). However, when it comes to accounting for oceans and its natural resources (e.g. fish stocks, various ecosystems), accounting crosses multiple national and international interests and jurisdictions and involves more than questions of allocation. Loureiro et al. (2023) discuss several challenges to ocean accounting. First, given the opaque ownership structure of the ocean, private, public, locally managed, the challenges of accounting and accountability and balancing shareholder priorities arises. Other challenges regarding the paucity of data, the dynamic flows of the ocean, and then the compilation of a wide variety of data – especially given ocean accounting's transdisciplinary nature – have also raised (Loureiro et al. 2023).

Macro-scale social and economic decision-making protocols with respect to the ocean are traditionally dominated by indicators, such as Gross Domestic Product (GDP), that are found in the 'national accounts' maintained by National Statistical Offices or Ministries of Economics (Herath et al. 2023; Lynch and Bent 2017). Like the International Financial Reporting Standards (IFRS), these indicators generally adhere to the international guidelines which measure goods and services as they enter the economy but omit details on the extent and condition of these goods and services. For example, most countries record the monetary value of fish caught and landed, although few account for the health of the underlying stock (Fenichel et al. 2020). In financial accounting, we might compare this to the reporting of revenue from chicken or beef production, without accounting for the animal's wellbeing, the water used throughout the process (see Chwastiak and Young 2003), and the assets that enable the production (e.g. built infrastructure). Going back to the ocean example, current decision-making metrics favour

increased production, leading to unsustainable exploitation (Kubiszewski et al. 2013). Therefore, national accounts, like traditional financial accounting, are criticised for their limited environmental scope and the widespread misuse of the System of National Accounts (SNA) indicators when considering environmental issues (Dasgupta 2021; Rockström et al. 2009).

While most countries now account for ocean-related resources, such as fisheries and aquaculture, very few countries explicitly identify and quantify the contribution of ocean ecosystems (Hooper et al. 2019). With the release of the UN System of Environmental Economic Accounting (SEEA), further efforts have been made to address the ocean space, including the Experimental Environmental-Economic Accounts for the Great Barrier Reef and Geographe Bay, both in Australia (ABS 2017). Designing a framework to account for ocean ecosystems is difficult because they are complex, three-dimensional flows with limited data often aggregated within large, non-marine sectors such as tourism and transport (Jolliffe, Jolly, and Stevens 2021). Despite these challenges, in 2018, the High Level Panel for a Sustainable Ocean Economy (Ocean Panel) was established as a unique global initiative 'to build momentum towards a sustainable ocean economy in which effective protection, sustainable production and equitable prosperity go hand-in-hand' (Ocean Panel 2024). The Ocean Panel is made up of 18 country members, including Australia, Canada, USA, and the United Kingdom to name a few (Ocean Panel 2024). All country members have identified the need to establish multiple indicators to improve an understanding of the ocean system and develop an ocean accounting framework (Fenichel et al. 2020).

Since then, building on earlier work by the UN Economic and Social Commission for Asia and the Pacific (UN-ESCAP) (Perkiss et al. 2022a), the global, multi-institutional partnership, the Global Ocean Accounting Partnership (GOAP)[3] has been established. The GOAP, co-chaired by the Ministry of Marine Affairs and Fisheries, Indonesia, and Charles Darwin Foundation for the Galapagos Islands, brings together a range of stakeholders including governments, research institutions and international organisations 'to build a global community of practice for ocean accounting' (GOAP 2024).[4] Its aim is to enable countries and other stakeholders to 'go beyond GDP to measure and manage progress toward ocean sustainable development' by developing the technical guidance to produce Ocean Accounts[5] (GOAP 2024). Currently, the GOAP coordinates actions in over 18 countries in Ocean Accounts, with 29 members of national line ministries, many of which are Ocean Panel countries. All stakeholders, including the private sector, higher education institutions, NGOs, and civil society have a role to play in collaboration on gathering the data needed for ocean accounting (GOAP 2024).

The Ocean Accounts framework is 'a conceptual framework designed to enhance the consistency, comparability and coherence of ocean-related maps, data, statistics, and indicators across social, environmental and economic domains' (GOAP 2024). As presented in Figure 1, Ocean Accounts include context, methodology and methods of data collection, lists of accounts, for example, environmental assets (that include plants such as mangroves and seagrass), flows to the economy through ecosystem services accounts, ocean economy (e.g. coastal and marine tourism employment and expenditure), and data assessment.[6] They also include the level of economic activity

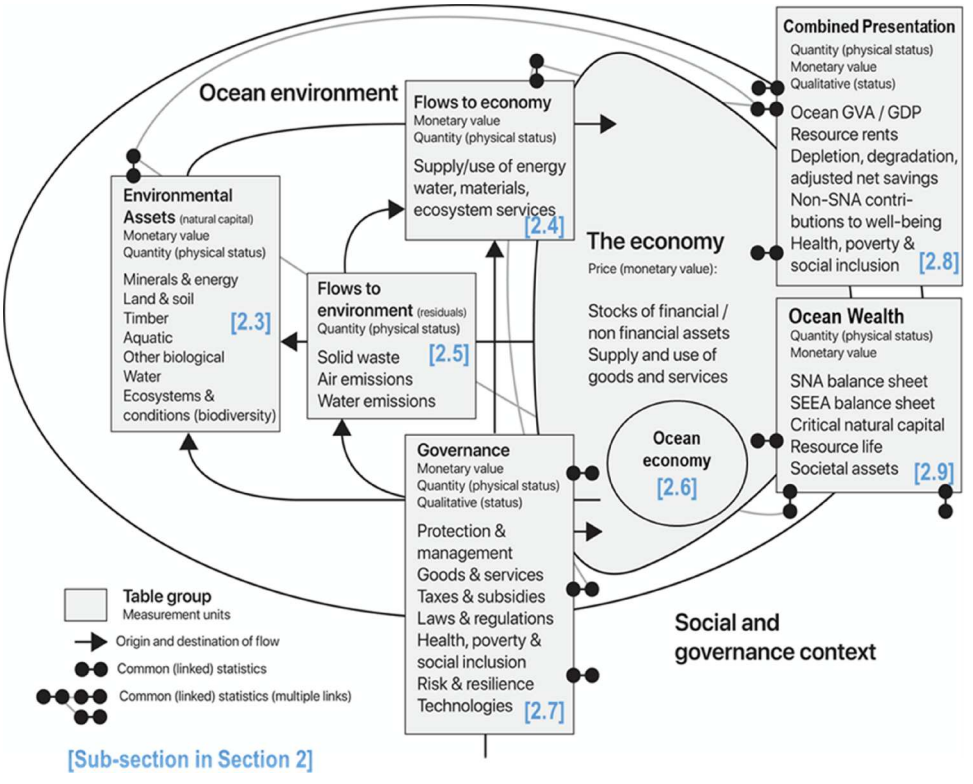

Figure 1. Detailed structure of the Ocean Accounts framework. Source: GOAP (2021, 40).

such as the sale of fish, and a range of social conditions such as coastal employment (GOAP 2024).

Ocean Accounts integrate four key components:

- Macro-economic accounts from which economic measures such as GDP are derived, and from which legal, illegal, unreported, and unregulated activities can be accounted for.
- Environmental-economic accounts that explain assets and flows, wastes, expenditures, taxes, and subsidies.
- Ecosystem accounts which agree on a spatial framework or the extent, condition, biodiversity, services, and value of ecosystems.
- Structured data on ocean beneficiaries, technology, governance, and management (GOAP 2024).

Although they are maintained to enable coherent measurement of the extent and condition of ecosystems toward the goal of sustainable development of the ocean, they retain a similar structure to the existing national accounts maintained by National Statistical Offices or Finance Ministries by recording flows to the economy (GOAP 2024). Several dimensions are measured such as the pressures posed by the economy through by-products of production and consumption (e.g. solid wastes and air emissions). The framework also allows for the presentation of stocks and flows in both physical and monetary units,

for example, ocean assets are often reported in hectares that is subsequently translated into a monetary value.

The piloting of Ocean Accounts is conditioned by different entry points, usually driven by policy needs, for example governments' environmental or economic agendas. The development process starts small, demonstrates the use case, and then scales. It requires collaboration between different stakeholders, including government and civil society bringing together a range of evidence from satellite accounts relevant to the ocean to statistical information (Loureiro et al. 2022). In Indonesia, for example, an NGO supported by GOAP Secretariat created the first pilot Ocean Account. It has now scaled nationally, supported by Presidential (in development) and Ministerial decrees, as well as a multi-ministerial task force with coordination across multiple working groups. While this pilot commenced in 2014 with the National Ocean Accounts expected to be finalised by 2024 (Ministry of Marine Affairs and Fisheries (MMAF) 2022), other smaller scale Ocean Accounts have been completed in a much shorter timeframe (e.g. 1–2 years).

A review in 2021 identified 26 pilot studies that align with the Ocean Accounts framework (Gacutan et al. 2022b) and at the time of writing, more than 40 pilots were found to be ongoing at various stages of development. For example, the Australian Government recently commissioned advisory company, IDEEA Group (2020) to provide a set of Ocean Accounts for Geographe Marine Park on the southwestern coast of Australia under the National Strategy and Action Plan for Environmental-Economic Accounting. The detailed environmental and economic report is used for monitoring, evaluating, and improving this specific ocean ecosystem (IDEEA Group 2020). While the pilot Ocean Accounts are supported by UN-ESCAP, GOAP and the scientific community, few have implemented a full set of accounts integrating the full range of measurements (i.e. ecological, social, and economic) (Gacutan et al. 2022b).

Therefore, ocean accounting is an emerging practice for measuring and valuing the ocean and its contribution to society and the economy. It is also a powerful tool for ocean accountability, governance, and decision-making, such that it informs adaptive policy development cycles, the management of ocean space, monitoring of protected areas, and allocation of investments by different stakeholder groups (Loureiro et al. 2022). However, as an extension of international statistical accounting standards, such as the SNA[7] and the SEEA,[8] the valuation logic is inherently economic-focused, quantitative, instrumental, and anthropocentric (see Figure 2). Further, accounts are often compiled in line with policy demands (i.e. use-cases), often focusing on material flows within the environment and their importance to the economy (Gacutan et al. 2022b).

Ocean accounting, as with other systems of accounts with an economic and calculative bias (see Chen et al. 2020; Normyle et al. 2022), is limited in its ability to achieve sustainability, which is understood in this context as efforts to 'include ecological, economic, social/cultural and institutional/governance pillars into ocean, fishery or marine management systems' (Perkiss et al. 2022a, 2). Despite extending beyond SEEA and SNA systems by incorporating qualitative and relational descriptors in the governance accounts (see Figure 1 [2.7]), the focus of Ocean Accounts is limited in reflecting the intangible and non-material values that are important in supporting communities, such as Indigenous perspectives (Normyle et al. 2022). To develop the potential for a more holistic approach (as called for by Foley et al. 2020; Loureiro et al. 2023; Stephenson et al. 2021; World Bank 2021; Young et al. 2018), we draw on the Sociology of Worth (SOW) to explore aspects of

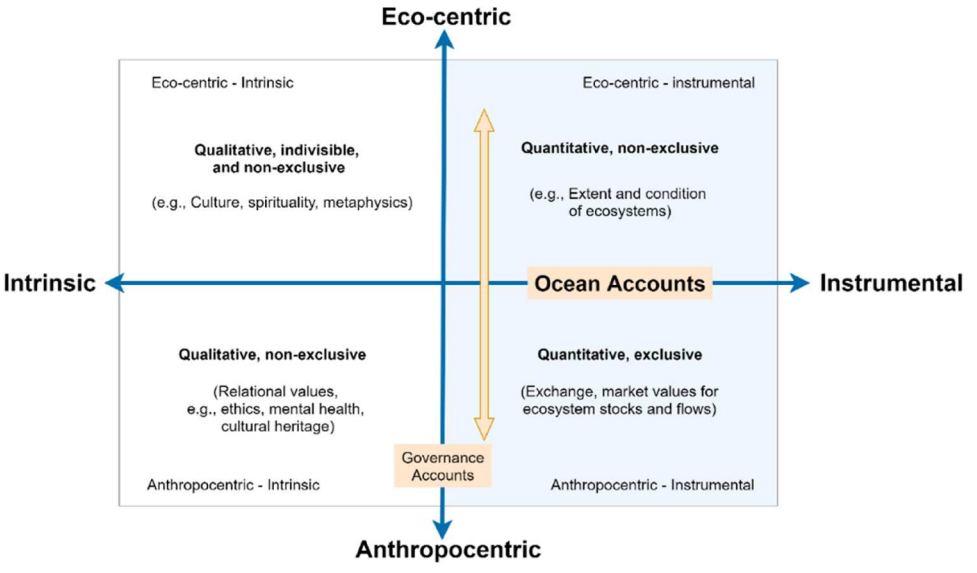

Figure 2. A domain of values of relationships between ecosystems, society, and the economy. The values readily incorporated into Ocean Accounts highlighted in orange, noting that governance accounts contain qualitative, relational values. 'Exclusive' (i.e. rivalrous) refers to a good or service, where consumption by one consumer prevents its use by another. Source: Adapted from Gacutan et al. (2022a).

ocean accounting in relation to social, cultural and governance issues in a case study of a mangrove ecosystem.

3. Sociology of Worth

> Enabling a better evaluation of CES [Cultural Ecosystem Service] requires multidisciplinary integrated frameworks which encompass a set of complimentary mixed methods aiming to capture the complexity of the various links (e.g. physical, intellectual, spiritual, social …) between coastal ecosystems and cultures. (Cabana et al. 2020, 2).[9]

Various frameworks that offer avenues for such holistic approaches to ocean ecosystem accounting exist. For example, Martin et al. (2016) explored the Millennium Ecosystem Assessment framework as a way of balancing economic and non-economic values, such as CES in decision-making around ecosystem services. While this framework included assessment of cultural ocean use – recreation, cultural diversity, aesthetics, education, for examples, the authors argued not all CES values were captured. Along the same line of thinking, Cabana et al. (2020, 1) highlighted 'the effective incorporation of key concepts such as natural capital and ecosystem services into policy and decision-making is becoming more urgent'. They provide analysis of incorporating holistic values associated with CES through the Common International Classification of Ecosystem Services (CICES) framework. The CICES framework values both historical changes and current links between nature and culture and communicates to raise public awareness. It encompasses a range of sociological methodologies, GIS mapping, and stories. While these authors' work is largely around the use of particular methodologies to assess CES, there remains

little discussion of theoretical perspectives that might inform such efforts (like, e.g. Imtiaz Ferdous, Adams, and Boyce's (2019) research in accounting which applies institutional logics to tease out the varying drivers of accountability for water).

The choice to utilise Sociology of Worth (SOW) in this study is motivated by calls for more holistic approaches to accounting for oceans, specifically coastal ecosystems (Perkiss et al. 2022a). Additionally, this study seeks to use SOW to also prescribe or diagnose other expressions of worth that are in society but currently outside of the Ocean Accounts framework.[10] SOW offers an alternative mode of evaluating financial/market and non-financial/non-market goods (or, quantitative vs. non-quantitative) to explore the potential of improved ocean accounting, especially in relation to social, cultural and governance issues. SOW is interdisciplinary in its design and uptake and has proven useful in framing competing rationales and justifying them within a situational 'dispute' (Boltanski and Thévenot 1991/2006). As Annisette and Richardson (2011, 231) outline, disputes 'disclose important insights into the competences and capacities of human beings and the constraints that are brought to bear as they seek to resolve them and coordinate action'. A dispute, as evident in this study, involves the contention over different orders of worth within a situation (see Annisette and Richardson 2011).

SOW consists of seven social arrangements, otherwise identified as 'worlds', 'orders', or 'polities' (hereafter, worlds) that present a negotiated understanding of a collective worth or value (Boltanski and Thévenot 1991/2006). These seven worlds include market and industrial (economic conditions/relations); civic, fame, and domestic (social conditions/relations); and an inspired and green world. Each world defines a distinctive common good for each world as a shared understanding of value in a given dispute (Perkiss and Moerman 2020). Given the inherent conflicts between worlds, considerable constructive compromises occur in practice through open and equitable interaction and evaluation. This process of establishing common goods/worth uses the expression of justifications, enrolment of tool or objects that embed value, and evidence from both subjective and objective realms (Oldenhof, Postma, and Putters 2014). Notwithstanding, each world has characteristic features that influence the justifications and evidence in situations where conflicting values exist. However, rather than a trade-off, SOW provides a constructive means of compromise between worlds.

The market world, for example, is based on a logic of capital, including economic liberalism, the free-market principle and private interest accumulation, and worth is evaluated according to price or cost (Boltanski and Thévenot 1991/2006). The common good in the market world is wealth and competition, the very hallmarks of capital where goods and services, and resources are distributed according to private market interactions (Boltanski and Thévenot 1991/2006). Since market worth is evaluated according to numerical outputs, it is used for reporting purposes and often prioritised in decision-making (Jagd 2011). The other economic perspective is found in the industrial world which encompasses technical progress and efficiency according to rules and regulations. Planning, expertise, and long-term growth are highly esteemed indicators of achieving this common good (Boltanski and Thévenot 1991/2006).

The civic world is about collective interests and principles of democracy and is evaluated according to political communities, collective welfare, civil rights, regulation, and the social contract which relates to justice and equality (Boltanski and Thévenot 1991/2006; Perkiss and Moerman 2018). The common good of the fame world is based on reputation

and is valued according to the extent of public opinion, popularity, and recognition, such as the media attention that encourages information transparency (Boltanski and Thévenot 1991/2006). The domestic world is dependent on hierarchical positions upheld by relations of trust and tradition characterised as relationships among family, friends, and community (Perkiss and Moerman 2018). The domestic common good is thus inherently related to the social and cultural dimensions of an issue or situation, with both personal and/or collective values considered.

Boltanski and Thévenot (1991/2006) established an inspired world to capture passion, inspiration, culture, creativity, emotion, and other unquantifiable experiences or feelings. The inspired world is arguably the hardest to justify, since achieving the common good is attached to the ability to reflect on spiritual and cultural conditions through a range of cultural artefacts or practices such as stories, poems, songs, and images. The green world, as the name suggests, exposes the relevance of biodiversity and the relationship between ecological foundations and current and future generations. Value is in the persistence of ecosystems and their integrity (i.e. 'greenness') (Latour 1998). While emphasising 'strong' sustainability, it does eschew humans and their activities since natural resources found within ecosystems have economic, social, and cultural significance that could (and should) be used to improve human health and wellbeing, albeit, without adversely impacting ecosystems and their functioning (Thévenot, Moody, and Lafaye 2000). There is some debate whether the green world, as a non-public, can 'stand on its own'. However, in this study we consider ocean ecosystems, the maintenance of biodiversity and food webs, species abundance and diversity, habitat quality and conservation of distinct importance.

Graham et al. (2018) argues that successful planning and management requires the avoidance of possible inequalities by understanding local perspectives of equity and fairness. Accordingly, SOW offers a holistic, context-based framework (theoretical tool) to understand and evaluate 'the way actors place value on people and things in ways that appear to be more legitimate than others' (Thévenot 2002, 3). Acknowledging the multiple values placed on, in this case, an ocean ecosystem, and the disputes raised, frequently leads to a compromise (Annisette and Richardson 2011; Boltanski and Thévenot 1991/2006). In their example of an organisation, Boltanski and Thévenot (1991/2006) argue a compromise between the market and industrial worlds is vital for the existence of a business enterprise. In a political setting, compromises are common among the civic and industrial arrangements (Boltanski and Thévenot 1991/2006). The ocean and ocean ecosystems are also rich with compromising arrangements given their various higher common goods. For example, in an ocean ecosystem this may be an actor's privilege to economic growth in ocean use (market worth) or one's justification of the ocean as a spiritual good (inspired). These compromises are analysed in this study.

SOW offers both a methodological framework and theoretical tool to analyse or theorise disputes involving multiple values and draw out or evaluate compromises (Annisette and Richardson 2011). SOW has been used in accounting to study diverse topics such as immigration and professional accountants (Annisette and Trivedi 2013); welfare disputes and water utility (Annisette, Vesty, and Amslem 2017); accountability for displacement due to climate change (Perkiss and Moerman 2018, 2020), and a green agenda by a regional university (Murphy 2023). It has also been used in exploring the issues/controversies around water governance and water sustainability, identifying the competing

demands and moral legitimacy of water as an economic good (Passetti and Rinaldi 2020). In this paper, we explore Ocean Accounts and, in particular, use SOW to analyse a situational dispute involving a local mangrove ecosystem.

Within this ocean ecosystem, many diverse values come into play and highlight the limitations of the Ocean Accounts framework to adequately account for public and non-public interests. As an integrated approach, SOW provides a conceptual understanding of the common good and the means to evaluate a range of interests (see Table 1 below). For example, SOW encompasses aspects of economic sustainability (market and industrial worlds), the social contract or governance (civic world), place, tradition, culture (domestic world), emotion and mental connection to place (inspired world), and environmental health and sustainability (green world). The following section outlines the case study and approach.

4. Methodology

4.1. Case and Context

The Ocean Accounts framework accounts for mangrove habitats (stocks), as important ocean 'ecosystem assets' of coastal estuaries, as well as changes in the extent and condition of mangrove habitats (GOAP 2021). Mangroves are woody, flowering and salt-tolerant plants that live in the intertidal zone and require daily tidal variation to survive. The mangroves along the foreshore of Lake Illawarra (the Lake) are an example of an ocean ecosystem in a barrier estuary located approximately 80 kilometres south of Sydney on Australia's eastern seaboard. The shallow lake (< 3 m) covers 35 km^2 and is an important site for local aquatic and migratory fauna, alongside protected vegetation such as seagrass and mangroves.[11]

The Lake is managed in partnership by the Wollongong and Shellharbour City Councils. The Lake's economic value uses include fishing, recreation, and tourism, as well as ensuring water quality (Wollongong City and Shellharbour City Council 2019). Views or how the Lake looks is also important as it is surrounded by residential areas and some tourist parks and accommodation (Wollongong City and Shellharbour City Council 2019). The Lake also remains a site of continued Indigenous significance (Wollongong City and Shellharbour City Council 2019), with strong cultural ties to the surrounding urban areas and wider regional population. The Lake is a popular community resource which is used by the public for recreation either upon its surface or in one of many foreshore parks and nearby open spaces (Lake Illawarra CMP 2019). The Lake also provides several 'ecosystem services', and benefits to society and the economy, including improvements to water quality and the enhancement of exploited species important to commercial and recreational fisheries. The Lake, however, is experiencing pressures such as pollution, siltation, and eutrophication. The complexity of the Lake – its biodiversity, application for economic and recreational use, nearby development, cultural significance, the threat of climate change, impacts due to pollution, among other things – make it representative of the broader issues effecting 'the ocean'.

Prior to 2007, the Lake was classified as an ICOLL (Intermittently Closed and Open Lakes and Lagoons), with the entrance closing from the ocean during times of drought and opening naturally after sustained rainfall in the surrounding catchment. During the

Table 1. The Sociology of Worth (SOW) worlds and their relationship with Ocean Accounts and a higher common principle.

	Green	Market	Industrial	Civic	Domestic	Inspired
Higher common good/principle	Ecology, green-ness	Wealth, competition	Efficiency, future planning	Collective membership, solidarity, sovereignty	Social positioning, ownership, social status	Spiritual, culture
Ocean Account table group (**Gacutan et al. 2022c**)	Ecosystem Accounts (extent and condition)	Ecosystem Accounts (services), Ocean Economy	Ocean Economy	Lists of policies, laws, and governance	–	–
Stage 1 analysis: Evidence of values, indicators, or statistics within Ocean Accounts (accounts)	Extent of mangroves in hectares per accounting period. See Gacutan et al. (2022c, 12).	Value of fish catch per accounting period. See Gacutan et al. (2022c, 16).	Full-time equivalent employment within ocean-related sectors. See Gacutan et al. (2022c, 16).	For example, NSW Fisheries Management Act, 1994	–	–
Stage 2 analysis: Evidence contained outside Ocean Accounts (accounts)	–	–	–	Consultation and advisory processes. See Wollongong City Council and Shellharbour City Council (2019).	Surveys and interviews of experience. See Nicholson (2020) for published data used in the analysis.	Stories, tradition (reflective/emotive). Detailed in publicly available literature (as cited in text).
Expert/researcher	GOAP employee and developer of national global accounts all around the world.	(1) GOAP employee and developer of national global accounts all around the world. (2) a member of Australian National Centre for Ocean Resources and Security	Economics academic experienced in economics for policy analysis and economics and infrastructure.	Member of Australian National Centre for Ocean Resources and Security	Human Geography academic experienced in human – nature relationships in the face of environmental change.	Indigenous community

Note: An account is a formal or informal narrative that represents evidence of worth (see Perkiss and Moerman 2018).

early 2000s, community campaigns protesting the Lake's declining water quality and odour encouraged managers to open the Lake permanently via dredging and seawall installations (Wollongong City and Shellharbour City Council 2019).[12] While odour and water quality issues abated, other effects emerged including biological (seagrass decline, mangrove establishment and expansion, and loss of prawns), geomorphological (Lake mouth scouring) and civil impacts (bridge instability).

Since the Lake Illawarra is now permanently open and tidal, the mangroves have re-established and increased especially around the lake opening, increasing from less than 0.1 ha pre-opening to over 2 ha in 2020 (Gacutan et al. 2022c). The mangroves are encroaching on saltmarsh and mudflat areas that have been absent of mangroves at least since European settlement.[13] Their relatively rapid expansion has become an issue for the local authorities responsible for the Lake's management and elicit a range of conflicting reactions about their value, worthiness and whether they 'belong' in the Lake. The nature of the dispute around mangrove encroachment in the Lake is not new. In a recent estuary management planning exercise, the Lake Illawarra Coastal Management Program (CMP), the issue of mangrove growth was particularly contentious. A range of stakeholders, including residents, scientists and conservation groups had conflicting ideas on how the issue should be managed, representing a situational dispute – what to do about the mangroves in Lake Illawarra.

The existing Ocean Account/s for the Lake was compiled and published by Gacutan et al. (2022c). These accounts include Ecosystem Extent Accounts, including data on mangrove habitats and carbon sequestration details, Ecosystem Services Accounts, Fisheries production, and Ocean employment. While the Ocean Account considered the Lake, there is a specific focus on accounting for mangroves, including stocks and flows and the impact that the change in stocks (assets) has on the environment and economy (GOAP 2024). GOAP (2023) highlight that the ocean accounting system 'can be adapted for different contexts and governance priorities, tackling everything from the health of mangrove forests to the sale of fish and coastal employment … [including where] such records use monetary and physical metrics'. Therefore, while the Lake and explicit mangrove scenario are context-specific, the critique of Ocean Accounts and the analysis of the dispute over various common goods are general to other ocean contexts. In fact, Ocean Accounts have been complied for a wide range of systems, including blue carbon conservation, the Great Barrier Reef, Australia, as well as for sustainable ocean development in Belize (see GOAP 2024), to name a few.

4.2. Data collection and analysis

This research was the outcome of a university group, Blue Futures,[14] project. The interdisciplinary and interinstitutional group set out to explore ocean accounting and the Ocean Accounts framework. The team consisted of knowledgeable experts in a particular field of ocean research or of a specific worldview and together they had been researching ocean governance for several years. For example, experts included GOAP employees, members of the Australian National Centre for Ocean Resources and Security and human geography researchers (see Table 1: Expert/researcher for each SOW world). Throughout these years, the team studied the development of ocean accounting and its ability to offer accountability to/for all public and non-public stakeholders. All the members of the group recognised

that ocean accounting was complex and wanted to tease out the complexities of the accounting process. All the group members were familiar with the case site – Lake Illawarra, and aware of the issues around the sustainability/management of mangrove forests.

Referring to Perkiss and Moerman's (2018) application of SOW, the researchers collected and collated publicly available material to analyse the dispute. The 'accounts' were associated with specific SOW worlds and included government reports and regulation, for example, NSW Fisheries Management Act 1994; academic research, such as the previously constructed Ocean Account of Lake Illawarra (Gacutan et al. 2022c); and other published data, for example, that which included the voice of Indigenous peoples (see Table 1: Stage 1 / 2 analysis for the specific data – accounts – drawn on for analysis of each SOW world). Each account provided a narrative of the compromise and complexity experienced with accounting for public and non-publics within ocean ecosystems.

The analysis was prompted by a reflective question, based on a real-life issue/scenario (dispute) that was presented to the experts:

> What should be done with the mangrove ocean ecosystem of Lake Illawarra, (1) decrease mangrove ecosystems or (2) conserve and protect mangrove ecosystems?

This question was prompted because of the significance of and changes in mangrove ecosystems in the Lake (see Gacutan et al. 2022c). In presenting evidence of the growing mangrove ecosystem in the Lake, Wiecek et al. (2016, 18) raised the point that 'ongoing monitoring [by the councils] is critical to identify whether management intervention is needed in the future to control mangroves', due to its impact on other ecosystems and ocean uses. Of broader significance, Gacutan et al. (2022c, 4) highlight that 'coastal ecosystems present a prominent, but vulnerable asset to communities and face growing pressures from urbanisation, pollution and over-exploitation'. They further argue that changes to mangrove ecosystems have been linked to food insecurity, exposure to natural hazards and poor human health – making this case, and the broader accountability of ocean use and recourses of significant importance.

The analysis was conducted in two stages. In Stage 1, a SOW analysis was performed using the existing Ocean Account as evidence. Here the researchers presented accounts of the common good relating to the mangrove ecosystem by using objective evidence, for example the numerical and/or financial accounts of the market, industrial and green worlds. The accounts were scrutinised for their accounting of/for various common goods. For example, the green world expert referred to Gacutan et al. (2022c, 12) to account for the number of mangroves (see Figure 1 [2.3]). Simultaneously, the civic world expert utilised state legislation to account for mangrove governance (see Figure 1 [2.7]). The researchers discussed the compromises regarding the management of the mangrove ecosystem relevant only to the SOW worlds and common goods included in the Ocean Accounts framework (see Table 1: Stage 1 analysis (row three)). There was little dispute in this stage given that, in justifying their positions, each expert's assessment on mangrove management was the same.

Following Stage 1, the researchers discussed the findings and engaged in the Stage 2 analysis. The purpose of Stage 2 was to use the SOW framework to identify and prescribe opportunities and possibilities for a more inclusive and holistic understanding of both public and non-public interests (common goods). Therefore, each researcher again

presented accounts of the common good relating to the mangrove ecosystem, but this time, using objective and subjective evidence, for example the non-numerical and/or narrative/personal accounts which were absent in the Stage 1 analysis. Thus, Stage 2 included accounts related to the scenario that were not limited to the accounts of the Ocean Accounts framework, therefore including domestic and inspired world accounts, for example published survey data (see Table 1: Stage 2 analysis (row four)). These responses were then analysed according to the SOW. For example, by considering the alternative accounts (alternative to those included in the current Ocean Accounts framework, Figure 1) in Stage 2, we were able to observe discrepancies that existed with Stage 1's response to the scenario and draw conclusions on the accountability of the Ocean Accounts framework. Only six of the seven worlds were identified, omitting the 'fame' world (sensu – Boltanski and Thévenot 1991/2006), as it has limited applicability within this decision-making scenario.

5. Stage 1 – Critique of Ocean Accounts

The first stage of the research is outlined in Table 1 and includes aspects related to enhancing fish catch, sequestration, and capture of carbon, and also nutrients, nitrogen, and phosphorus, which are clearly identified in relation to economic production and ocean-related employment. Given the quantifiable and calculative basis of Ocean Accounts, the evaluation using SOW is limited to the green, market, industrial and civic worlds.

5.1. Compromise – Green and Market World

In the green world, the mangroves are the locus of evaluation. The evidence is based on the current data on mangroves in the context. In this world, a constructive compromise is required between the eco-centric measures of value that embody the common good of 'greenness' and human populations from an economic market perspective. Mangroves support nature's contribution in providing 'ecosystem services', specifically in (i) providing nurseries and habitat for exploited fish and invertebrate species (e.g. whiting, cockles) that are used for human sustenance, (ii) regulating the local environment, improving water quality by absorbing excess nutrients and mitigating eutrophication and (iii) sequestering and storing carbon to mitigate climate change.

The market world aligns significantly with the values captured within Ocean Accounts, as it draws from economic accounting practices described within the SNA (see Figure 1). Economic valuation is a central component of the Ocean Accounts framework, which consists of disclosures such as 'flows [of goods and services] from the ocean to the economy', the ocean economy, and benefits associated with the ocean and the economy and national ocean wealth as social, environmental, and economic assets (GOAP 2021).

Many of the ecosystem goods and services provided by the physical space of the Lake and its ecosystems are evaluated according to the material goods and services, which are used by ocean-related sectors such as water transport, coastal fisheries, shipbuilding and tourism. For example, mangroves provide habitat and nursery services to important fisheries species such as mullet, crabs, and prawns. As mangroves continue to expand, there may be an increase in the number of commercial species supported within the Lake. Further, tourism and coastal fisheries benefit from improved water quality, where

the economic value of nutrient sequestration (where nutrients are responsible for water quality issues) could be estimated using techniques such as 'avoided cost' methods (Berg, Mineau, and Rogers 2016).

The Ocean Account captures and presents this compromise by measuring and valuing the amount of goods and services mangroves provide to coastal communities (GOAP 2021). This includes an estimation of the volume of commercial species landed (i.e. brought to market) that could be attributed to mangroves. It also identifies the volume of carbon and nutrients (nitrogen and phosphorus) that are sequestered by mangroves, which would otherwise remain in the water column or be released into the atmosphere. Carbon capture reduces the amount of carbon present in the atmosphere, therefore mitigating climate change. Nutrient capture, on the other hand, reduces the likelihood of eutrophication and algal blooms. The Lake was estimated to sequester 2.37 and 0.31 tons of nitrogen and phosphorus, respectively, with an anticipated increase into the future (Gacutan et al. 2022c). Mangroves are also estimated to sequester 263 and 11 times more tons of carbon, relative to the same area of seagrass and tidal marsh respectively (other ecosystems present within the lake), increasing the Lake's capacity to capture carbon and nutrients. Mangroves, by sequestering nutrients, indirectly support the efficient functioning of tourism and recreational activities. Thus, enabling compromise of the common goods of the market and green worlds.

5.2. Compromise – Market and Industrial (Economic Relations) and Green Worlds

The market and industrial world commonly form what is referred to as 'economic relations' since they share the common characteristics of economic growth and value (Boltanski and Thévenot 1991/2006). As explored in the market world, the Lake has several critical ocean-related industries, including tourism, holiday rentals (both formal and informal), recreational activities, water transport and fishing. The ability of the Ocean Account to provide a means to disaggregate and measure economic production and employment for ocean-related industries such as tourism and fisheries, is a common good in the industrial world.

While several aspects of the industrial world were included in the Ocean Accounts, the critical industry of fisheries was an important component from an employment and economic standpoint (higher common goods in SOW's economic worlds). Fisheries supply fish as a commodity, generate income (value) and provide employment and livelihood. For example, the fishing industry employs a significant number to accommodate commercial fish landings with over 150,000 kgs valued at ~AUD$842,260 (Gacutan et al. 2022c). Mangroves are important here to enhance the 'production' of commercial fish and shellfish and therefore compromise with the industrial worth related to efficiency, productive capacity, and employment (Carrasquilla-Henao et al. 2019; Whitfield 2017). Thus, once again, there is a compromise between the green world and economic relations privileging the natural expansion of mangrove ecosystems.

5.3. Compromise – Civic and Green World

In the civic world, the common good encompasses governance processes that legitimate and justify decision-making. The Lake, like many sectors under public administration, is

governed by a plethora of legislative instruments, policies, and guidelines at local, national, and international levels (Wollongong City and Shellharbour City Council 2019). Within Ocean Accounts, the governance account identifies these relevant regulatory components related to the management of the Lake. Of relevance is the NSW Fisheries Management Act 1994. According to this legislation, 'marine vegetation', including mangroves, are protected from harm, where harm is defined as 'gather, cut, pull up, destroy, poison, dig up, remove, injure, prevent light from reaching or otherwise' (NSW Fisheries Management Act 1994). Heavy fines exist for causing damage to mangroves and a permit is required from the NSW Department of Primary Industries (DPI) to undertake any activity that would constitute 'harm'.

Responsibility for the day-to-day management of Lake Illawarra rests primarily with the two neighbouring local councils. In 2019, these councils, with assistance from the NSW Department of Planning, Industry and Environment (DPIE) released the final Lake Illawarra Coastal Management Program (CMP) 'to provide the strategic direction and specific actions to address the threats to the Lake and to maintain the ecological, social and economic values of the Lake' (Wollongong City and Shellharbour City Council 2019, 1). The overall intent of the CMP is to support the common good of the green world and work towards achieving ecological sustainability for the Lake.

In summary, Stage 1 demonstrates that the Ocean Accounts framework supplies evidence of green worth compromises with the market, industrial and civic worlds by considering the importance of sustaining mangroves. While there are potential negative aspects to mangrove expansion, according to green worth, for example, that increased mangrove expansion could cause a potential loss of other biodiversity in the Lake, the net mangrove expansion positives have been accounted for in this case, especially given the regulatory setting that removal is illegal. Therefore, the green world supports the ongoing natural expansion of the mangrove ecosystem, recognising this non-public as having natural value. Notwithstanding, mangrove ecosystems co-exist with humans (i.e. publics), and the value they place on the mangrove ecosystem – market, industrial, civic – is also supported within SOW through the green world common good. For example, an increase in the mangrove ecosystem services also aligns with the attainment of the common good for both the industrial and market worlds, as it supports industrial value and drives economic production and employment. The civic world supports the green worth with its sustainability agenda, albeit justified according to the ongoing benefit to society.

6. Stage 2 – Filling in the Gaps

The Ocean Accounts provide several constructive compromises which are not surprising given the focus on a sustainability narrative aligned with the idea of ensuring prosperity for future generations and protecting nature. When considering the scenario (reflective) question, the market world justification of focussing on an economically 'optimal' action to maximise profits and productivity was emphasised by some of the group's expert researchers. They argued that, from a management perspective, the expansion of mangroves offers economic benefits through the sustaining of mangrove ecosystems, especially those related to water quality, carbon, and nutrient sequestration. This evaluation provides a constructive compromise that combines the conservation, protection,

and even encouragement of the spread of mangroves for the common good of wealth maximisation.

Additionally, according to some of the group's researchers, the expansion of the mangrove ecosystem does not pose significant impacts to the operations of the industrial worth and could indeed boost employment and production. From a civic world position, a governance regime that would ensure the conservation and protection of the mangrove ecosystem could be called for. However, to provide a more holistic understanding and build a more constructive compromise, that is, analysing value and evidence outside of the accounts compiled in line with the Ocean Accounts framework, this Stage 2 analysis draws on the evidence from the domestic and inspired worlds, and also extends our understanding from the civic world.

6.1. Civic World

The account of civic worth provided in Stage 1 was limited to evidence related to the objects of policies and legislation (in line with the Ocean Accounts framework), omitting the important features of worth that include collective membership and solidarity (Boltanski and Thévenot 1991/2006). While the CMP provided a key policy directive for the management of the Lake's mangroves, we use evidence to demonstrate how the CMP was established (Wollongong City Council and Shellharbour City Council 2019). For example, the CMP involved multiple opportunities for community involvement, including public information sessions, meetings, and surveys as well as input from an advisory group made up of elected officials (councillors), public servants, community members and scientific experts (Wollongong City Council and Shellharbour City Council 2019). The issue of mangrove encroachment was a particularly contentious topic in this planning exercise and was one of the many issues specifically addressed within the CMP.

The final CMP included a 'watch and act' recommendation and resolved to develop a monitoring programme to observe how the mangroves were responding to the Lake opening to the ocean with a promise to revisit the issue in future years (Wollongong City Council and Shellharbour City Council 2019). It was indicated in the CMP that if it is determined that there were significant impacts, a further process of public engagement would occur. While the evidence (CMP account) for the civic worth is the same, the process of constructive compromise through consultation is not disclosed in the Ocean Accounts. This aspect further enhances the common good of collective membership and solidarity, albeit limited to certain stakeholder groups.

6.2. Domestic World

Domestic worth is inherently related to the social and cultural dimensions of the Lake. In previous studies of conflict over mangrove restoration in other areas in Australia, particular social constructions of nature contributed to competing values regarding how the shoreline should 'look' (McManus 2006). Published survey and interview data from residents living near the mangroves around the Lake Illawarra (Nicholson 2020) provides evidence of domestic worth. Survey data identified that home-owner residents had more negative views about mangroves than non-owner residents, suggesting a link between lakeside vegetation and property value (Nicholson 2020). Residents living in close

proximity to the largest mangrove patch at the entrance to the Lake repeatedly spoke about mangroves in negative terms, indicating they accorded them of low value to their domestic worth (Nicholson 2020). The domestic accounts, therefore, provide evidence that continued expansion of the mangroves would likely lead to increased social conflict over private and public goods in this area.

In contrast, the researchers also considered data from Lake residents concerning an area without lakeside urban development. They found that these residents held more positive values about mangroves, suggesting that this area was a more acceptable site for mangroves to grow (Nicholson 2020). Such geographical differences in social and cultural values provide scope to enhance community conversations about preservation or conservation in an effort to gain a constructive compromise in the domestic world. Broadly speaking, the differences between domestic world evidence also suggest that efforts to resolve situational disputes need to take account of local communities' perspectives, for example, align with participatory processes for environmental governance (Le Heron et al. 2019).[15] In this case, SOW offers evidence of the risk that an Ocean Account would neglect domestic world accounts/citizens' voice. The risk also extends to the inspired world.

6.3. Inspired World

Australia prides itself on the idea of multiculturalism and supports the rites and spiritual expression of many communities. In this case study, the inspired worth is expressed through evidence of accounts that are more subjective in nature.

The Lake has significance to the local Indigenous peoples, particularly local custodians, the Tharawal and Wadi Wadi peoples as it was a valuable source of food and spirituality. Donaldson, Bursill, and Jacobs (2015, 3) highlight:

> Near Wollongong, the Wodi Wodi clan perhaps the biggest in Illawarra numbering about 250, inhabit the land south from Lake Illawarra to the Shoalhaven River and inland to Mittagong. The clan remained on the coastal plains during the warm seasons, taking advantage of their abundant marine resources. The vast middens there, destroyed in the 1860s to make lime, gave the township of Shellharbour its name. Lake Illawarra was a good source of food throughout the year. According to Yuin Elder, Guboo Ted Thomas, "The Lake is a livelihood. That's where the tribes would come from south and north and everywhere. They can stay here for two or three days. Plenty of mussels, bimballas, oysters, fish and everything. They can have a couple of days here and then move on. Tucker was always plentiful."

This account indicates both the historical and cultural value of the Lake to Indigenous Australians. It was and still is a place for food, memories, and relationships.

From an Indigenous perspective, habitats and non-public goods are highly valued and there is a responsibility between all people for nature, including mangroves. The Australia Government (2016) highlights that, 'mangroves have traditionally been used by Indigenous Australians as sources of food, including mangrove fruit, mud crabs, clams and fish such as barramundi. Mangrove timber has traditionally been used to make canoes, paddles and weapons such as shields, spears and boomerangs'.

Mangroves are also of spiritual value to the Indigenous community. An account from Regeneration (2024) details:

> Indigenous peoples depend on mangrove areas and often have effective methods of stewardship, such as maintaining some areas as sacred and restricting certain uses.

An account from Cultural Survival (2022) builds on the above quote. It is argued that:

> When mangrove forests are destroyed, much more than trees suffer. Many endangered species depend on mangroves for their habitat, and millions of coastal fisher-people and farmers are also negatively impacted. Indigenous communities have developed close relationships with mangroves and have stewarded millennia-old Indigenous Knowledge in their protection, management, and sustainable use. Just as they have done historically, many Indigenous and Afro-descendant communities protect the mangroves by carrying out important projects for them.

These accounts provide evidence in the inspired world as they acknowledge tradition, custom and history. Mangroves (a non-public) are identified as kin (a public) not dissimilar to the domestic world and its focus on hierarchy and familial relations. The inspired world draws consideration that humans need to be on the same level as Country to find balance or equilibrium in the common good. While these accounts offer limited perspective, they are nonetheless of prime significance given Australia's colonial past and the erasing of traditional knowledge.

Both Stages 1 and 2 have provided aspects of a constructive compromise for the management of mangrove ecosystems in the Lake. A broader discussion on these findings follows.

7. Discussion

In this paper, we set out to evaluate the application of Ocean Accounts according to a range of competing and compromising perspectives on the concept of the common good within a contested case study. In doing so, we sought to explore a more holistic system of ocean accounting. We used the example of the management of a mangrove ecosystem to develop a broader understanding of accounting for the ocean. The SOW framework provided us with the tool to analyse the Ocean Accounts of Lake Illawarra to draw out existing compromises, identify gaps in the evidence, and theorise the need to consider the domestic and inspired worlds in ocean valuation. While the accounts complied using the Ocean Accounts framework express a range of common goods, they are limited to market, industrial and civic worths in relation to the green world. These justifications and compromises are consistent with the common narrative of sustainability with an anthropocentric focus on intergenerational equity. Thus, while the mangrove ecosystem may flourish in the Lake, it will also be beholden to economic conditions valued in the Ocean Accounts in a trade-off calculative logic.

While the case study explored in this paper represents a specific context, the findings on the critique of Ocean Accounts are generalisable. As mentioned, the GOAP (2023) highlights that the ocean accounting system can be adapted for different contexts and government priorities, for example mangrove management, fisheries, and employment. Therefore, our findings on the limitations of accounting for social and cultural common goods of ocean ecosystems using the Ocean Accounts framework extend beyond the micro-study of mangroves to the wider ocean context.

Overcoming these limitations of Ocean Accounts to recognise the common goods associated with the social and cultural realm (domestic and inspired worlds) requires

an understanding of collective social bargaining, inspiration, and domestic/familial relations on a range of levels (see Foley et al. 2020; Normyle et al. 2022; Stephenson et al. 2021; Voyer et al. 2021; World Bank 2021; Young et al. 2018). However, accounts and accounting systems can never serve all interests of the wider community, let alone non-publics (Dellaportas and Davenport 2008). As Dillard and Ruchala (2005, 610) argue:

> The community interests and those of its members are not homogenous. Whose interests are privileged and which interests are most important cannot be prespecified but must be determined and continually reevaluated as part of the ongoing dialogue.

While SOW does not bridge every common good it does consider the potential of alternative interests and how we can utilise accounting to satisfy a range of common goods through compromise (Boltanski and Thévenot 1991/2006).

Our discussion also lends itself not just to the accounting for common goods and various values relating to specific interests, but also to the *type* of evidence (accounts) brought forward for consideration. As previously mentioned, Ocean Accounts rely on calculative practices such as market valuation (e.g. price, GDP, national accounts) to value green assets/stocks and flows (see GOAP 2021). Just as financial accounting has a preference (and often a destructive preference) for economic valuation (see Chwastiak and Young 2003), Ocean Accounts can benefit from alternative approaches. For example, Dillard and Vinnari (2019), among others (Brown 2009; Dillard and Brown 2012) have encouraged us to think about what constitutes an 'account' to challenge the dominant economic narrative and enable the 'voice' of other publics and non-publics (non-humans and the environment). Others in the ocean research space have also encouraged the use of participatory processes and elicitation of stakeholder perspectives to provide evidence beyond Ocean Accounts (see Ison et al. 2024; Le Heron et al. 2019). For example, Ison et al. (2024) argue that, given the diverse range of stakeholders now involved and influencing ocean ecosystems, many voices and knowledges are vital in order to conserve. This includes the voice of minority groups, which will enable a more democratic and impactful process of ocean accounting (Ison et al. 2024). There are several approaches from the SEA literature that present such methods of collecting data for accounting (see e.g. Chiapello 2017; Perkiss et al. 2022b; Tanima, Brown, and Dillard 2020) that can be drawn upon, and this list is growing. While ocean accounting is moving towards the more disaggregated indicators and the provision of *some* social and cultural values this work is in its early stages.

8. Conclusion

SDG 14 calls for the conservation and sustainable use of our oceans (UN 2015). How we manage the ocean is also implied in several other SDGs relating to poverty, food, equality, economic growth, disaster risk, sustainable consumption and production, climate change and terrestrial ecosystems. While the accounting literature presents a plethora of studies on environmental sustainability, the studies on accounting for our oceans are limited. Oceans cover over 70% or 361 million square kilometres of the Earth's surface, and it is this vastness – its unexplored areas, diverse aquatic assets and ecosystems – that make it one of the world's most complex common goods (GOAP 2021). Ocean accounting and the Ocean Accounts framework are vital for monitoring the success (or failure) of climate adaptation strategies; tracking policies to reduce GHG emissions from ocean-

activities; resource allocation; and as used in this case, scenario planning to help prepare for climate change and ocean health (GOAP 2023). Thus, while such a novel system supports the sustainability of oceans, especially in the face of climate change (GOAP 2023), establishing a more holistic valuation system will improve management and planning through recognising broader accounts and voices.

There are two possible pathways through which the gaps (as explored in Section 6) in the existing Ocean Accounts framework might be addressed. The first is to adapt or expand the existing Ocean Accounts framework. While there have been attempts to incorporate social values into ocean accounting, particularly in relation to the disaggregation of indicators (e.g. how much income goes to specific demographies), this work is still in its early stages (GOAP 2021). These efforts remain focused on quantitative data and there is a danger that the limited capacity to incorporate more plural values will lead to them being overlooked. In addition, the objective of Ocean Accounts is to standardise and generalise – an objective which is fundamentally at odds with an objective of recognising pluralistic values. An alternative might be to ensure that Ocean accountors 'partner' with other accountants that understand qualitative methodologies, such as the approach we undertook in this case study. However, this approach also carries a risk that the difficulties associated with gathering, interpreting, and reporting on diverse worlds and values will lead to a continuation of ocean accounting in isolation (i.e. where the alternative frameworks and social and cultural accounts are separate from the mainstream Ocean Accounts framework). This demonstrates the importance of continuing to develop and build capacity in interdisciplinary accounting approaches within the community of practice.

This paper makes several contributions to the literature. It introduces ocean accounting to SEA research and explores the limitations and possibilities for accounting for oceans. Second, we privileged a non-exhaustive range of public and non-public interests as a set of diverse common goods according to SOW. In doing so, we found that the current Ocean Accounts framework falls short in its integrated approach to decision-making, and values such as those ascribed to domestic and inspired worth are not visible to decision-makers relying on Ocean Accounts. Third, while these findings reinforce the current literature on ocean, marine and ecosystem management that challenges the valuation of oceans using existing frameworks (see Perkiss et al. 2022a; Voyer et al. 2021), this study has been conducted by an interdisciplinary team that were able to present alternative ways of thinking about the concept of value and the common good.

This research is not without some limitations. The researchers engaged in this project have chosen narratives and accounts for each world based on their own experience/expertise. Many other accounts and evidence could be brought to the scenario that would offer an alternative outcome on mangrove ecosystem's management. For example, we indicate green worth is characterised by the ongoing expansion of mangroves, but this approach has not considered the negative impacts mangrove expansion could have on the ecology of the Lake as a whole and the potential for loss of other biodiversity. The aim of this research, however, was not to *solve* the mangrove dispute in Lake Illawarra, but show how Ocean Accounts can be limiting of some values (Stage 1), and how alternative accounts informed and prescribed by SOW could offer a more comprehensive system useful for accounting for both public and non-public interests (Stage 2).

Future research in this space may consider other frameworks to evaluate oceans, especially those that do not have the public at the heart of the analysis. To this end, traditional knowledges that do not subscribe to the public/non-public divide would provide an interesting perspective on accounting for non-publics.

Notes

1. There are varying definitions for sectors considered within strategies and policies of ocean-based economic development. For example, within the European Union (EU), aquaculture, biotechnology, offshore renewable energy, marine tourism, and seabed mining are prioritised under the EU Blue Growth agenda (COM2012/494/final). In contrast, Norway includes offshore oil and gas, and shipping within their ocean-based economic development agenda (Blue Opportunities, The Norwegian Government's updated ocean strategy, 2019).
2. The authors attribute the input of an anonymous reviewer.
3. A note for the accounting community, we may compare the GOAP to that of the International Accounting Standards Board (IASB) or Australian Accounting Standards Board (AASB), which develop and maintain our financial accounting standards. The GOAP develop and maintain the system (structure) of ocean accounting, Ocean Accounts framework.
4. Members include The World Bank, UN ESCAP, various global universities, ministries of environment, climate change, statistics, foreign affairs and more from six continents, among others. A full list of GOAP members can be found here https://www.oceanaccounts.org/terms-of-reference/.
5. See https://oceanaccounts.atlassian.net/wiki/spaces/DTGOOA/overview?homepageId=20512905
6. As ocean accounting and Ocean Accounts are a new concept in the accounting literature, a detailed description has been provided. For further information, the ocean accounting pilot reports for Geographe Marine Park can be found here: https://eea.environment.gov.au/publications/geographe-marine-park-pilot-account-reports.
7. System of National Accounts (SNA) (see, UN 2008) applies a standardised methodology regarding the treatment of a diverse range of data to produce statistics and indicators which lends to comparability both within and between countries. Ocean accounting required an extension of SNA as the definitions and classifications used within the SNA restrict the scope to account for environmental stocks (assets) and flows (i.e., production boundaries).
8. System of Environmental-Economic Accounting (SEEA) was developed to extend national accounts towards environmental resources and ecosystems that underpin the economy and society, and further measure the impacts of activities on the environment. It provides a means to correlate economic and environmental impacts with policies within an accounting area (Vardon et al. 2018). SEEA, however, is generally more suited to the terrestrial (land) environment, where flows of goods are readily simplified into two-dimensional space.
9. The authors attribute the input of an anonymous reviewer.
10. The authors attribute the input of an anonymous reviewer.
11. Grey mangroves and species of tidal marsh, and seagrass are protected from activities and extraction via *Fisheries Management Act 1994 (NSW)*, *Biodiversity Conservation Act 2016 (NSW)*, the *Environmental Planning and Assessment Act 1979 (NSW)*.
12. Several impacts such as those affecting Lake Illawarra are deemed so substantial that permanent openings are no longer considered a viable ICOLL management option in NSW (Department of Primary Industries 2022). Indeed, Lake Illawarra was NSW's last permanent ICOLL opening.
13. Australia was colonised by the British as a settler colony in 1788.
14. See https://www.uow.edu.au/global-challenges/sustaining-coastal-and-marine-zones/blue-futures/
15. The authors attribute the input of an anonymous reviewer.

Acknowledgements

Acknowledge goes to our Indigenous colleagues who were part of the University of Wollongong Blue Futures project. Thank you for your insight and support.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by University of Wollongong: [Global Challenges Program].

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