Ocean Decade

Vision 2030

White Papers

Challenge 10:
Restoring society's relationship with the ocean

The United Nations
Decade of Ocean Science
for Sustainable Development
(2021-2030)

2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development

For bibliographic purposes, this publication should be cited as follows:

Glithero, L. D., Bridge, N., Hart, N., Mann-Lang, J., McPhie, R., Paul, K., Peebler, A., Wiener, C., Yen, C., Kelly, R., McRuer, J., Hodgins, D., & Curtin, F. (2024). *Ocean Decade Vision 2030 White Papers - Challenge 10: Restoring Society's Relationship with the Ocean*. Paris, UNESCO-IOC. (The Ocean Decade Series, 51.10.). https://doi.org/10.25607/ekwn-wh61

Graphic design: UNESCO

(IOC/2024/ODS/51.10)

Ocean Decade Vision 2030 White Papers

Challenge 10: Restoring society's relationship with the ocean

Ensure that the multiple values and services of the ocean for human wellbeing, culture, and sustainable development are widely understood, that society-ocean connections are strengthened, and that there is increased motivation, capability, and opportunity for people across all sectors of society, to make decisions and behave in ways that ensure a healthy ocean.

"We are at a crucial turning point in the history of our relationship with the ocean. We know more about it than ever before, and we also know that without significant change its future, and ours, looks bleak."
Asha de Vos, Marine biologist, Sri Lanka

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Acknowledgements

Contents

Acronyms

AMEA	Asia Marine Educators Association
CaNOE	Canadian Network for Ocean Education
COLC	Canadian Ocean Literacy Coalition
DCO	Decade Coordinating Office
DCU	Decade Coordinating Unit
ECOP	Early Career Ocean Professionals
EMSEA	European Marine Science Educators Association
GOOS	Global Ocean Observing Platform
IPMEN	International Pacific Marine Educators Network
MCEN	Marine and Coastal Educators Network
NGO	Non-Governmental Organization
NMEA	National Marine Educators Association
OLRC	Ocean Literacy Research Community
RELATO	Latin-American Marine Educators Network for the Ocean
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
UN	United Nations
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNOD	United Nations Ocean Decade

1. EXECUTIVE SUMMARY

1.1   Introduction and Scope of the White Papers

This draft White Paper has been prepared as part of the Vision 2030 process being undertaken in the framework of the UN Decade of Ocean Science for Sustainable Development. The Vision 2030 process aims to achieve a common and tangible measure of success for each of the 10 Ocean Decade Challenges by 2030. From a starting point of existing initiatives underway in the Ocean Decade and beyond, and through a lens of priority user needs, the process determines priority datasets, critical gaps in science and knowledge, and needs in capacity development, infrastructure, and technology required for each Challenge to ensure that it can be fulfilled by the end of the Ocean Decade in 2030.

The results of the process will contribute to the scoping of future Decade Actions, identification of resource mobilization priorities, and ensuring the ongoing relevance of the Challenges over time. The process identifies achievable recommendations that can be implemented in the context of the Decade, or more broadly before 2030 to achieve the identified strategic ambition and indicators that will be used to measure progress. This White Paper is one of a series of 10 White Papers all of which have been authored by an expert Working Group and accompanied by a synthesis report authored by the Decade Coordination Unit.

1.2   Strategic Ambition of Ocean Decade Challenge No. 10

By 2030, success for Ocean Decade Challenge No. 10 will be evidenced through a culture shift in the ocean community[1] leading to implicit understanding that ocean threats are an outcome of human behaviour. This will require a shift in the way that ocean science, in the broad sense as defined in the Decade, is formulated, practiced, and communicated to ensure that all sectors of society have strengthened emotional connections with the ocean, and understand the vital role that the ocean plays in human and planetary well-being, including climate stability. All members of society across regions, sectors, and scales will have increased motivation, capability, and opportunity to make decisions and behave in ways that ensure a healthy ocean.

By 2030, success for Ocean Decade Challenge No. 10 will include fulfilment of critical science and knowledge gaps:

- Increased priority and practice of science that embraces multiple knowledge systems and transdisciplinary collaboration

- Increased priority of Indigenous-led research, consistent with the supporting articles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), inherent rights, and signed treaty obligations with Indigenous Nations

- Increased priority of marine social sciences, particularly:
    - public perceptions ocean research
    - marine citizenship and identity research
    - behavioural science research linked to ocean-climate education and communications
    - research on how ocean literacy can be measured and monitored over time, and the impacts of an ocean literate society on ocean health
    - research on ocean literacy as a policy tool
    - science communication through multiple approaches including immersive technology, storytelling, and the arts

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[1] *We define the ocean community as all and any of us working and connecting - both directly as part of Ocean Decade actions and initiatives, and/or indirectly in parallel and complementary activities - to envision and achieve a more sustainable ocean future - 'the ocean we want'.*

Success will also depend on the generation, sharing, and use of the following priority datasets:

- human-ocean connection/human-ocean values dataset(s)

- pro-ocean behaviour change methodologies, case studies, and effective practices

- impact mapping of regional and key global ocean literacy initiatives

- ocean culture mapping that includes a global body of evidence (contextual, local knowledge) that demonstrates and supports cultural engagement as an enabler of ocean-human health.

It will include the development of:

- a co-designed theory of change to action key drivers of Challenge 10, in which regional expertise helps guide the initial and ongoing strategic direction of the newly launched Decade Coordinating Office (DCO), *Connecting People and Ocean*

- a guiding portfolio of best practices on research co-design, co-production, co-implementation, and co-evaluation, respectfully bridging different forms of knowledge, ensuring mutual recognition and benefits, and nurturing long-term relationships with each other and nature

- a collaborative global, multi-dimensional ocean literacy survey tool (i.e., Ocean & Society Survey) to measure ocean connection and values, as well as motivators, enablers, barriers to action and behaviour change

- a global network of ocean communications experts and regional ocean communications communities of practice to support training, accreditation, upskilling, knowledge exchange, and impact measurement

- a global network of ocean-climate education experts (formal, informal, and non-formal) to support teacher training, certification programmes, and knowledge exchange

- a Global Blue Schools Network, building off the All-Atlantic and European Blue Schools Networks, to bridge practitioner best practices with research and training

- a global framework for sharing successful community projects that demonstrate practices and solutions specific to cultural connections, heritage, language, and place-based innovations for ocean-human health.

1.3 Key Recommendations to Achieve the Strategic Ambition

The following recommendations have been identified to ensure that the strategic ambition is fulfilled, and success achieved for Ocean Decade Challenge No. 10:

Recommendation #1:
It is recommended to the Decade Coordination Unit (DCU) that by May 2024 Challenge 10 is reworded from "Change Humanity's Relationship with the Ocean" to "**Restore Society's Relationship with the Ocean**" and the aim to: "Ensure that the multiple values and services of the ocean for human well-being, culture, and sustainable development are widely understood, that society-ocean connections are strengthened, and that there is increased motivation, capability, and opportunity for people across all sectors of society, to make decisions and behave in ways that ensure a healthy ocean."

Recommendation #2:
It is recommended to the DCU and the newly launched DCO, *Connecting People and Ocean*, that by December 2024 a co-designed theory of change to action the key drivers of Challenge 10 are developed, in which regional expertise, informed by multiple knowledge systems, guide the initial and ongoing strategic direction of the DCO, ensuring collaboration, inclusion, and transparency.

Recommendation #3:

It is recommended to the DCU, funding agencies, philanthropic foundations, private sector entities, and international organisations that by June 2025 there is targeted resource mobilisation and a dedicated Decade call for transdisciplinary social science research on society-ocean connections, behaviour change, metrics and approaches for measuring individual and societal-level ocean literacy, as well as policy change linked to ocean literacy drivers (knowledge systems, communications, education, cultural connections). This collective research will directly inform the creation of a human-ocean connection/values data set to be integrated into the Global Ocean Observing System (GOOS) platform and digital ocean infrastructure.

2. INTRODUCTION

The mission of the United Nations Decade of Ocean Science for Sustainable Development (hereafter, Ocean Decade) is "transformative ocean science solutions for sustainable development, connecting people and our ocean." Challenge 10 is foundational to strengthening societal connections with the ocean and an understanding of the vital role the ocean plays for human and planetary well-being. Challenge 10 requires clear recognition that current ocean "threats" are an outcome of human behaviour. The ocean community needs to inspire and generate the motivation, capability, and opportunity for people across society to make decisions and behave in ways that ensure a healthy ocean, to sustain all life–current and future.

2.1 Background and context of the Challenge

Ocean Decade Challenge 10 was initially framed as, "**change humanity's relationship with the ocean**" with the aim to "ensure that the multiple values and services of the ocean for human well-being, culture, and sustainable development are widely understood, and identify and overcome barriers to behaviour change required for a step change in humanity's relationship with the ocean." Such a Challenge is not only epic and complex in scope, but it also begs many questions. For example: In what ways can we be in a relationship with a non-human entity? How are relationships with the ocean cultivated and transformed? Whose relationships with the ocean should change? In what ways does the Ocean Decade community and science need to change? Although it is beyond the scope of this paper to answer each of these (and other) questions, or to address Challenge 10 through specific regional and sectoral lenses, some foundational context was identified by the working group that guided the strategic ambition setting process and recommendations outlined herein.

Existing relationships with the ocean are varied, shaped by our unique experiences that are rooted in history, culture, place, and livelihoods. Building from this, many people around the world feel a strong bond with the ocean and the broader natural world; they are part of it, and it is part of them. The singular, shared global ocean is not a separate entity, but an indispensable extension of ourselves and society. The ocean (*inclusive of all water bodies and waterways, as all water is connected*) must become inextricably linked with our sense of self, our sense of place, and our collective well-being. Indigenous peoples emphasize our relationship with the ocean in reciprocity–the practice of exchange for mutual benefit. There is also an emphasis on building toward (or restoring) abundance, moving beyond "sustainability." Reciprocity and abundance are essential to ensure the "*ocean we need for the future we want.*"

The Ocean Decade has a core focus to generate knowledge and data to support sustainable development. However, conventional scientific methods, knowledge generation, and additional data alone are not sufficient to catalyse the scale of societal transformations needed to ensure ocean sustainability and equity (Pecl et al., 2022). It is not enough for us to focus only on obtaining more data to understand/demonstrate just how bad the problem is, without shifting our lens towards how to address it. The sustainable management and use of the ocean's resources must also be understood

(or reframed) as our collective responsibility to manage our behaviours in ways that are in the best interest of the ocean; by doing so, the ocean will provide for humanity and all life for generations to come. Shifting to an ocean-centred lens, and recognizing the ocean as a living ecosystem, with its own rights, is imperative.

Behaviour change requires personal, emotional, and cultural connections with the ocean. Community engaged science is essential. People need to see themselves as being part of the solutions. We are not starting from scratch. All around the world, there exist bright spots upon which to collaboratively build; place-based innovations and communities practicing conservation-based economies that model the actions, behaviour, and solutions of well-balanced human-ocean relationships.

2.1.1 Integration, synergies, and interdependencies with other Challenges

White papers 1 through to 9 clearly articulate the causal link between human behaviour and the future health of the ocean: If we continue to behave as we do at a global scale, there will be catastrophic consequences. Challenge 10 is fundamental to operationalizing the changes and scale of global action needed across society to avoid this fate. Challenge 10 bridges the transformative science solutions (Challenges 1–6), and the technology, data, and capacity infrastructure and resources (Challenges 7–9) with society, amplifying relevance and building meaningful pathways for engagement. Challenge 10 emphasizes the need for all other challenges to place people at the centre of their approaches.

Through four key drivers that are foundational to "***restoring society's relationship with the ocean***"– multiple knowledge systems, communications, education, and cultural connections (see section 3) – societal-ocean connections and pro-ocean behaviours are strengthened. Such outcomes are interdependent with increased political will, policies and laws, and economic and governance structures (i.e., local municipalities, national governments, intergovernmental) that support ocean health, human health, and community and planetary well-being. Figure 1 below provides a conceptual framework for Challenge 10 in relation to the other Challenges.
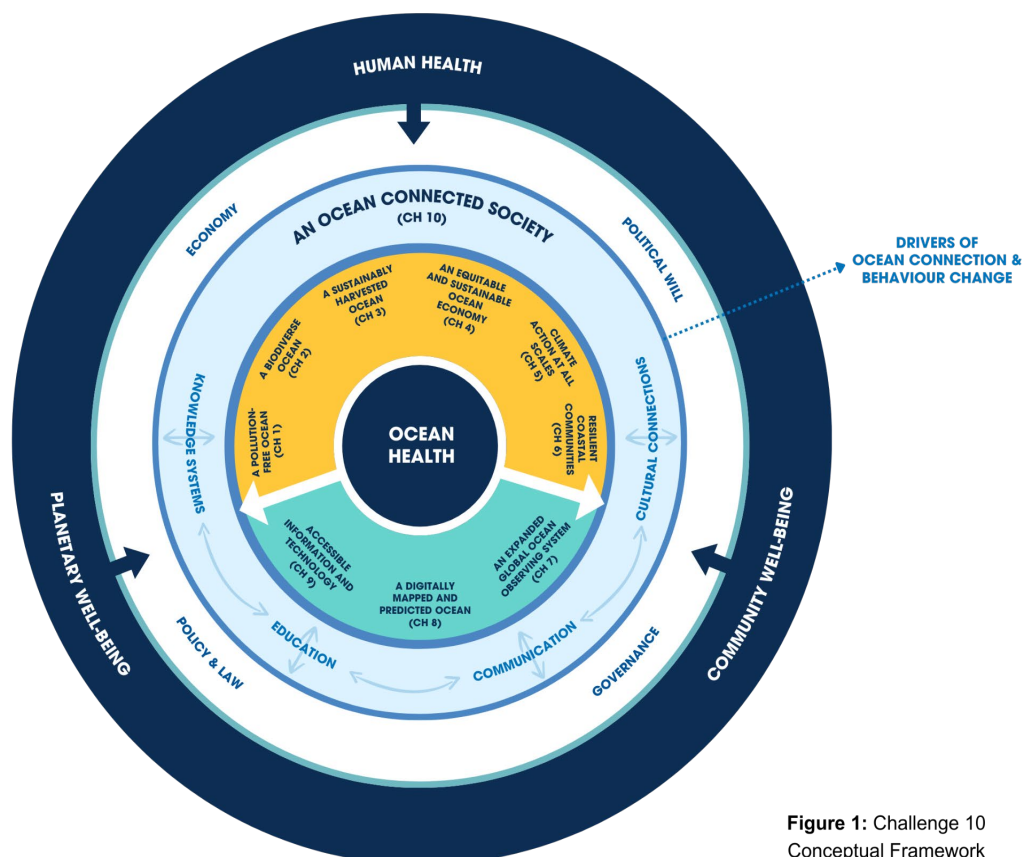

Figure 1: Challenge 10 Conceptual Framework

Achieving the strategic ambitions outlined in the Vision 2030 set of white papers hinges upon a culture shift in the way that science is formulated, practiced, and communicated, and an implicit understanding by both the ocean community and society at large that ocean threats are an outcome of human behaviour. Each white paper has identified critical changes required within science and the ocean community, as well as the desired societal-level change (see Appendix A). In actualizing these changes, our collective efforts will enable all sectors of society to strengthen connections with the ocean; understand the vital role that the ocean plays in human and planetary well-being; and have increased motivation, capability, and opportunity to make decisions and behave in ways that ensure a healthy ocean.

2.2   Overview of current work

The rapidly growing field of ocean literacy is central to operationalizing Challenge 10, and to the Ocean Decade's legacy. **Ocean literacy is an outcome – a society that understands, values, and cares for the ocean**. There are multiple ways to achieve this outcome, as outlined by the drivers in this paper (co-designed research using multiple knowledge systems, communications, education, cultural connections).

A recent global systematic review of ocean literacy (Shellock et al., forthcoming) affirms that ocean literacy research to date has focused on i) definitions and concepts; ii) ocean education design and programming; iii) evaluating people's ocean literacy; and iv) approaches to increasing ocean literacy levels. Parallel to this work, the global Ocean Literacy Research Community (OLRC)–launched at the initial Ocean Decade laboratory in July 2021–points to an increasing research emphasis on public perceptions ocean research (e.g. Gelcich et al., 2014; Jefferson et al., 2021; McRuer et al., 2024 (in prep)), marine citizenship and identity (e.g., Buchan, 2021), expanding dimensions of ocean literacy (e.g. Brennan at al., 2019; McKinley et al., 2023), emotive science communications through immersive technology (e.g., Breves & Schramm, 2021; Calil et al., 2021), social-ecological participatory action research (e.g., Eelderink et al., 2021; Perz et al., 2021; Reed et al., 2018), and ocean literacy as a policy tool (e.g., the impact of ocean policy interventions on ocean literacy, and how ocean literacy can be effectively incorporated into decision-making processes) (e.g., Paredes-Coral et al., 2021).

Foundational work has been done over the past five years to generate strategies for media and users to help create a sense of collective public responsibility for ocean health (e.g., "We Are Ocean Report"; "Heartwired to Love the Ocean"; and "Turning the Tide"). In addition, literature reviews (e.g., Stoll-Kleemann, 2019) on behavioural sciences such as social, environmental, and emotional psychology, that help inform sustainable ocean-related incentives and behaviour are critical to better understanding and operationalizing Challenge 10. Equally vital are the collective outputs and recommendations outlined by recent large-scale, multi-institutional, and transdisciplinary ambition-setting research initiatives (e.g., Future Seas, ResponSEAble, Sea Change, etc). These expanding areas of research illuminate the dynamic intersection of ocean literacy with natural ocean sciences, marine social sciences, behavioural science, environmental psychology, science communications, and social-based marketing, amongst other fields.

2.3   Importance and relevance of the Challenge for sustainable development

Today's existing tools of science, technology, and communications allow us to understand the ocean in finer detail than ever before and to share that understanding widely. However, information sharing alone is not enough to drive the societal transformations required at scale. Across geographies, generations, and sectors, and at local, national, regional, and international scales, we need to commit to specific actions that provide opportunities for society to discover meaningful connections with the ocean, build knowledge and understanding of its impact on our lives, and mobilize pro-ocean behaviour. Challenge 10's central focus on deepening connection, understanding, and action is key to achieving ocean sustainability. As earlier noted, our collective responsibility must extend beyond "sustainable

ocean management" to managing our behaviours in ways that support the health of the ocean, recognizing the ocean as a living ecosystem with its own rights (Bender et al., 2022). The challenge we face is not how to manage the ocean, but how to manage ourselves.

The multifaceted nature of varying relationships with the ocean also needs to be considered within the constantly shifting political, economic, societal, and cultural environments and conditions. Addressing the capacity gaps in developing countries and the multiple barriers to opportunities faced by marginalised communities and vulnerable societies need to be prioritized.

2.4   Methodology for strategic ambition setting

To set our strategic ambition, Working Group 10 began by examining the concept "Etuaptmumk" (two-eyed seeing), a concept developed by Mi'kmaq Elders Albert and Murdena Marshall (Bartlett et al., 2012; Iwama et al., 2009), as a basis toward integrative science that enables us to see the strengths of Indigenous knowledge systems alongside the strengths of academic science; to learn to use both eyes together for the benefit of humanity and the planet. From this basis, the importance of including multiple perspectives and knowledge holders across all regions, cultures, and communities that form the expanding global ocean community was recognized. Figure 2 illustrates one Indigenous framework that emphasizes societal balance, adapted for Ocean Decade Challenge 10; in particular, the need for the ocean community to avoid over focusing on one element (i.e., "mental"–the intellectualizing of knowledge/data) to the detriment of another (e.g., "emotional"–community well-being; "spiritual" – cultural connections, values).

Figure 2: Societal Balance Framework for Challenge 10. Adapted from Indigenous knowledge holder, Ken Paul (2024).

Next, Working Group 10 examined key barriers, enablers, and motivators with the potential to have the most impact on "restoring society's relationship with the ocean," shown in table 1.

Table 1: *Pro-ocean Behaviour: Barriers, Enablers, and Motivators*

Barriers	Anthropocentrism; Short-term thinking at political and corporate levels; Cognitive biases; Disconnect from nature; Materialism and consumerism; Competing priorities at all scales (e.g. SDGs, consuming less vs economic growth, etc.); Misinformation
Enablers	Community engagement; Indigenous knowledge systems and UNDRIP; Future-oriented policies; Environmental education; Economic incentives; Intergenerational collaboration, partnerships, knowledge and resource sharing; Media and entertainment; Empowering female leadership, and youth voice
Motivators	Marine citizenship; Empathy and altruism; Collectivism; Communication and storytelling; Cultural and societal norms; Ethics; Accessing the ocean for all; Valuing ecosystem services

Additional factors to consider included:

- Themes – poverty, political instability, regional conflicts, lack or inequitable distribution of or access to resources;

- Drivers (as explored in more detail below) – large-scale societal drivers of change (e.g. governance, laws, economy);

- Scale – individual behaviour versus organizational/institutional versus societal/systemic;

- Timescale – will the ambition be achievable by 2030? Will it be as relevant in 2030? How does the ambition position us (an ocean connected society) in 2030, and beyond?

Working Group 10 members then created "2030 imaginative sketches," which were consolidated into a shortlist of interrelated strategic ambitions and frameworks to help shape the underpinnings of Challenge 10. From there, an initial curated list of users alongside their needs/priorities was developed (see Appendix B). The Working Group then examined relevant research across diverse fields (see Appendix C). This work was synthesized to refine our preliminary report. Finally, a six-week socializing process was conducted with respective networks and other target groups to gather input and feedback, including 14 "peer workshops" involving over 600 individuals (see Appendix D). From this effort, an initial draft of this paper was generated.

3. STRATEGIC AMBITION SETTING

3.1 Definition of the strategic ambition for the Challenge

By 2030, success for Ocean Decade Challenge 10 will be evidenced through a shift in the way that science is formulated, practiced, and communicated, embracing multiple knowledge systems and transdisciplinary collaboration. It will also be evidenced through a culture shift in the ocean community leading to implicit understanding that ocean threats are an outcome of human behaviour. Together, these shifts will ensure that all sectors of society have strengthened connections with the ocean, understand the vital role that the ocean plays in human and planetary well-being, and have increased motivation, capability, and opportunity to make decisions and behave in ways that ensure a healthy ocean.

Key Drivers

In recognizing different barriers, enablers, and motivators to pro-ocean behaviour (Table 1 above), Working Group 10 identified four key "*drivers*" that "*users*" can influence to restore society's relationship with the ocean: (1) Multiple Knowledge Systems, (2) Communications, (3) Education, and (4) Cultural Connections. "**Drivers**" are key factors that have a major influence on a desired outcome;

and "**users**" are individuals/groups actively engaged in generating the motivation, capabilities, and opportunities to support pro-ocean behaviour.

In this section, we propose **key recommendations** to support each driver's priority outcome and ask: Who will enable these key recommendations? What resources, tools, or infrastructure will ensure these actions are achieved? And how will we measure progress?

Progressing toward our strategic ambition requires a shared commitment to recognize existing collective resources, utilize regional hubs for culturally appropriate actions, and incorporate regular assessments, including goal-oriented S.M.A.R.T.–Specific, Measurable, Achievable, Relevant, and Time-bound– decision-making. Working Group 10 recognises that there is no "one size fits all" approach; this paper attempts to set an overarching way forward, but each recommendation can be adapted or reimagined. Implementing the activities and recommendations outlined in this paper will require each region, sector, and organizational/partner stakeholder to determine locally and culturally relevant paths forward, while contributing to global transdisciplinary collaboration.

3.2 Driver #1: Knowledge Systems

Descriptor: The need to leverage different ways of knowing about the ocean, and enable this knowledge to be used across society, has been recognized for decades. However, prioritizing multiple knowledge systems and practicing transdisciplinary collaborative science has yet to be widely realized. Science generally seeks to apply results and theories universally. Indigenous knowledge systems are localized and culturally based. It is vital to address this tension, as practices undertaken for millennia contain valuable ways of knowing that can aid collaborative solutions to today's ocean challenges. [Note: 'traditional' knowledge is intentionally not used in this paper.] Additionally, to truly remove barriers to participation and collaboration, existing inequalities in power dynamics will need to be addressed. Strengthened understanding and widespread uptake of purposely planned co-designed research that allows for respected and negotiated roles of multiple knowledge systems (e.g., moving from rhetoric to action) is required (see Appendix E for types of co-design). When done with intention, co-designed research can facilitate the expression of context-specific, complementary ocean knowledges that lead to responsive action, address complex challenges, and forego (often unintended) disrespect or unequal treatment of Indigenous knowledge and/or local knowledge that can delegitimize the co-design process. In so doing, decision-making rights are respected, multi-directional transformation is prioritized, and reciprocal participatory benefits are delivered.

Priority Outcome: The ocean community recognizes and enables the co-design, co-development, and co-production of knowledge for pro-ocean behaviour change.

Users: Natural scientists, social scientists, Indigenous and local knowledge holders, local communities, policymakers, science communicators, educators, artists–across generations, genders, and geographies.

Key Recommendations and Operational Activities: See Table 2

Table 2: Driver #1: Knowledge Systems–Key Recommendations and Operational Activities

Key Recommendations	Operational Activities
1. Fund and support Indigenous-led research toward effective co-designed and integrative science	• Acknowledge and respect different ways of knowing by holding researchers, policymakers, educators, communicators accountable for the meaningful integration into ocean agendas and policies; • Fund proposals that include a deliverable of intentionally creating and facilitating space for Indigenous researchers, local

		communities, academia, government agencies, industry, etc. to dialogue, co-develop, co-design; • Ensure that approaches are consistent with UNDRIP, unless Indigenous groups have established protocols and processes for engagement with their membership.
2.	A call for funding around the multidisciplinary nature of social science; dedicated funding toward ocean specific behaviour change research and application	• Continue to expand the growing field of marine social science and ocean literacy research to ascertain place-based and peer-reviewed research on attitudes, motivations, and barriers to pro-ocean behaviour; • Publish results of the studies as open-access (where possible) and in transparent ways that effectively share information and encourage uptake of best practices; • Use research results to inform ocean management, communication campaigns, pedagogical best practices, organizational cultures, industry/private business agendas, etc.
3.	Develop "Knowledge to Action" co-design/co-production best practices, including guidance on how to bridge sectors (science, management, policy, rights-holders, stakeholders) and different forms of knowledge	• Ensure that United Nations Ocean Decade (UNOD) calls and funding opportunities require evidence of transdisciplinary and co-design approaches; • Make opportunities for co-design, co-development, and co-production more compelling through tiered funding approaches and models; • Co-develop accessible curricula (post-secondary to professional) with diverse knowledge holders, to both exemplify and emphasize best practices in co-design/co-development/co-production; circulate curricula through benefit schemes, so users are rewarded for their uptake. • Develop UNOD community of practice to facilitate shared learning and innovation on multi- and transdisciplinary research and practice (e.g., including action research).

Progress Indicators:

- Increased investment in and uptake of outputs specific to Indigenous-led research, marine social sciences, and ocean literacy research, as well as broader transdisciplinary co-designed research focused on societal-ocean connections and behaviour change;

- Increased integration of marine social science, communications, and outreach approaches into natural science initiatives;

- Increase in diversity of voices and audiences engaged in ocean issues;

- Diverse ways to collect and present ocean-related data are accepted;

- Ocean-related attitudes, behaviours, and perceptions measurements show improvements, as measured by best practice metrics and approaches for conducting national and global ocean literacy surveys (e.g., Ocean & Society Survey).

3.3 Driver #2: Communications

Descriptor: Strategic communication has the power to change perceptions, attitudes, and behaviours. Used in sectors from public health to peacebuilding, it is a proven path to addressing both barriers and motivations. While some communication focuses on specific campaigns or policy issues, broader ongoing public communications can generate a "surround sound" effect. It can keep an issue top of mind, creating a fertile ground for more direct messaging or activation by maintaining issue salience.

Training and upskilling global ocean communicators will increase the volume and the quality of ocean stories reaching more diverse and mainstream audiences.

Priority Outcome: People from different user groups are equipped with the tools, skills, and knowledge needed to communicate effectively about the values/services of the ocean to human well-being, and to create/recover emotional connections to the ocean. People recognize that there are multiple worldviews and practices in terms of how communications can be shared.

Users: Campaign strategists, professional communicators, policy advocates and specialists, media and social media professionals, storytellers, influencers, photographers, artists, scientists and researchers–across generations, genders, and geographies.

Key Recommendations and Operational Activities: See Table 3

Table 3: Driver #2: Communications–Key Recommendations and Operational Activities

Key Recommendations	Operational Activities
1. Develop a professional (global) network of ocean communications experts	• Develop a shared theory of change for use across communications projects and galvanize the funding community behind communications projects; • Develop a training platform/accreditation for young communication professionals and upskilling mid-career communicators and political advocates working on ocean topics and endorsed actions; • Share communications packages that specifically address barriers to human behaviour change with aquariums, museums, and other public learning and gathering spaces, to distribute key messages and content about ocean science in impactful ways.
2. Develop regional ocean communications communities of practice	• Co-develop and share current best practice resources to increase capacity and confidence in impactful ocean communications; • Secure in-country journalism training to familiarize users with paramount ocean issues, with the goal of increasing local coverage and diversity of ocean science topics; • Work with local speech writers, political campaigners, political advocates and influencers to share ocean messaging and stories and encourage cultural and political leaders to discuss ocean issues.
3. Build an open access body of evidence and insight for the ocean communications community	• Contribute to the growing field of marine social science and ocean literacy research, by helping to inform, guide, and shape regional research through evidence-based insights of the communications community; • Publish results of studies to share information, improve body of knowledge; • Use baseline public perception ocean research results to create evidence-based campaigns and communications strategies; • Share bodies of research and evidence against which to measure impact and progress, with resources on measuring behaviour change, and language translation capabilities for use across multiple countries.

Progress Indicators:

- Increased and sustained volume of ocean-related stories in global media, across a range of geographies, themes, and platforms;

- Increased confidence and capacity of storytellers to take an evidence-based approach to communications, including monitoring and evaluation of impact;
- Increased volume and availability of research and insight to enhance the impact and efficacy of ocean communications.

3.4 Driver #3: Education

Descriptor: Education can be a powerful instrument of and for social change. For decades, education research (e.g., Cajete, 1994; Orr, 2004; Sterling, 2001) regarding the environment has identified the need for ecological learning to be place-based, relational, and experiential. Increasingly, and more urgently, sustainability education, climate education, global citizenship, and reconciliation education are becoming important areas of pedagogical focus. This trend needs to be prioritized in national curricula with place-based foundations and include ocean citizenship and learning. Education is a long-term, generational driver; learning is also lifelong. We need opportunities for everyone to learn about the ocean through intentional practices across formal, informal, and non-formal avenues. Education and communication efforts must also include direct linkages between inland populations and the ocean (all water is connected).

Priority Outcome: Formal education in schools, colleges, and universities, as well as informal and non-formal experiential learning (e.g., citizen science, museums, aquariums, multimedia, etc.), is used to build connection (physical and emotional), deepen ocean understanding, and motivate individual and community action.

Users: Teachers, curriculum specialists, community educators/practitioners, ocean literacy networks, marine educator networks, zoo/aquarium/science centre networks, environmental education network–across generations, genders, and geographies.

Key Recommendations and Operational Activities: See Table 4

Table 4: Driver #3: Education–Key Recommendations and Operational Activities

Key Recommendations	Operational Activities
1. Develop a professional (global) network of ocean-climate education experts (formal, informal, and non-formal)	Draw and build on the talent pool from existing and emerging regional networks of marine educators (e.g., National Marine Educators Association (NMEA), European Marine Science Educators Association (EMSEA), International Pacific Marine Educators Network (IPMEN), Canadian Ocean Literacy Coalition (COLC) and Canadian Network for Ocean Education (CaNOE), Asia Marine Educators Association (AMEA), Latin-American Marine Educators Network for the Ocean (RELATO), Marine and Coastal Educators Network (MCEN), etc; • Develop international best practices for ocean education to support its integration into broader climate and sustainability education as part of national curricula with place-based foundations (advancing UNESCO circular letter 2951); • Support countries to co-develop teacher training and educator professional development certification programmes; • Galvanize a funding community behind ocean-climate education to support work of regional networks (listed above) and regional/national Blue Schools Networks (see #2 below); • Support educators in informal education (e.g., aquariums, zoos, museums, science centres, water-based recreational activities, etc) to develop the skills and resources necessary to include the ocean across multiple platforms, languages, and places.

		• Support the development of tools that are easy to use and adaptable, to evaluate the impact of education efforts.
2.	Develop a Global Blue Schools Network (building off success of the All-Atlantic and European Blue Schools Networks)	• Co-develop and share resources to increase teacher capacity and confidence in teaching about the ocean-climate with diverse learners in locally relevant, culturally appropriate ways; • Incentivize (through resource access, funding, professional development opportunities, Early Career Ocean Professional (ECOP) fund allocation, etc.) consultation and collaboration among scientists, Indigenous knowledge holders, and local community specialists to co-develop accurate and effective curricula, resources, and experiences; • Understand ocean literacy levels amongst students and educators by co-developing an adaptive longitudinal assessment tool that measures knowledge, values, and behaviours.
3.	Establish a global ocean education information integration platform	• Provide funds for the co-design of an open-access, user friendly platform–by educators, for educators–to support access to live ocean datasets, alongside ocean-based resources for all curriculum subject areas, ages, and abilities.

Progress Indicators:

- Increased number of countries incorporating marine education into national curriculum frameworks;

- Increased number of countries, teachers, and students participating in the global (and national) Blue Schools networks;

- Increased number of individuals in the professional (global) network of marine education/ ocean-climate education experts, and stronger regional networks;

- Increased number of accredited teacher certification/education professional development courses related to ocean literacy, and more teachers/educators certified;

- Increased number and quality of resources, best practices on the open access platform, and users.

3.5 Driver #4: Cultural Connections

Descriptor: Cultural connections with the ocean refer to the knowledge, actions, and relationships people have with the ocean space. Many cultures rely explicitly on the ocean. For Indigenous coastal communities and mariners navigating the sea, the ever-changing weather and sea conditions are fundamental to their survival and identity. Hundreds of years of intergenerational observation and experience means that small-scale fishers feel part of the ecosystem and understand the balance needed for a sustainable future. These examples demonstrate the importance of reciprocity and resilience as cultural connections evolve.

Priority Outcome: Cultural and community leaders engage with and showcase the ocean in a wide range of forms, enhancing the ocean's meaningful presence in mainstream culture. Multiple types of positive ocean connection are understood, celebrated, and respected–and where possible restored and/or replicated–by diverse globalized communities.

Users: Community and cultural leaders, artists, storytellers, ocean change advocates, practitioners, decision-makers-–across generations, genders, and geographies.

Key Recommendations and Operational Activities: See Table 5

Table 5: *Driver #4: Cultural Connections–Key Recommendations and Operational Activities*

Key Recommendations	Operational Activities
1. Compile a global body of evidence (contextual, place-based knowledge) that makes the case for cultural engagement as an enabler of behaviour that supports human-ocean health	• Secure sustained funding to bring together a dedicated working group to begin research and compilation of evidence of cultural connection as a driver of pro-ocean behaviours; • Create a best practices dossier and training materials to showcase how to create opportunities and solutions across education, communications, policy, governance, business etc., that are inclusive of diverse place-based perspectives across all collaboration initiatives (and their stages).
2. Communicate, bridge, and amplify existing (and forthcoming) efforts focused on cultural heritage and connection initiatives, (e.g., Cultural Heritage Framework Programme and endorsed Decade Actions)	• Design a framework for selecting communities and projects that show best practice activities and initiatives regarding cultural connections, heritage, language, and place-based innovations for human-ocean health; • Coordinate a global response from the cultural heritage community to improve the integration of cultural heritage data within ocean science; • Twin communities from different (global) locations to build communities of best practice embedded within the culture of the local community;
3. Develop an engagement strategy that strengthens diversity, equity, and inclusion in the ocean community	• Working group developed to increase participation in ocean literacy initiatives from underrepresented populations (e.g. disabled people, elders, youth voice) and to support involvement by geographically landlocked or vulnerable Member States.

Progress Indicators:

- Cultural approaches are prioritized in actions that address Challenge 10;

- Increased presence of ocean health as a central focus across a range of funding, communications, education, policy, governance, business, industry, and community endeavours;

- Increase in globally relevant and accessible best practice guidance, uptake, and practice.

3.6 Overarching recommendations

In addition to the above key recommendations outlined for each of the four drivers, the following overarching recommendations have been identified to ensure that the strategic ambition is fulfilled, and success achieved for Ocean Decade Challenge 10:

Recommendation #1:

It is recommended to the Decade Coordination Unit (DCU) that by May 2024 Challenge 10 is reworded from "Change Humanity's Relationship with the Ocean" to "**Restore Society's Relationship with the Ocean.**" The aim of Challenge 10 is reworded to read: *Ensure that the multiple values and services of the ocean for human wellbeing, culture, and sustainable development are widely understood, that society-ocean connections are strengthened, and that there is increased motivation, capability, and opportunity for people across all sectors of society, to make decisions and behave in ways that ensure a healthy ocean.*

Recommendation #2:

It is recommended to the DCU and the newly launched *"Connecting People and Ocean,"* that by December 2024 a co-designed theory of change to action the key drivers of Challenge 10 are developed, in which regional expertise, informed by multiple knowledge systems, guide the initial and ongoing strategic direction of the Decade Coordinating Office (DCO), ensuring collaboration, inclusion, and transparency.

Recommendation #3:

It is recommended to the DCU, funding agencies, philanthropic foundations, private sector entities, and international organisations that by June 2025 there is targeted resource mobilisation to support transdisciplinary social science research on society-ocean connections, behaviour change, metrics and approaches for measuring individual and societal-level ocean literacy, as well as policy change linked to ocean literacy drivers (knowledge systems, communications, education, cultural connections). This collective research will directly inform the creation of a human-ocean connection/values data set to be integrated into the Global Ocean Observing System (GOOS) platform and digital ocean infrastructure. This can be partially aided by including strengthened social science and ocean literacy research linkages into the planning for the OceanObs'29 Conference to be hosted in China in 2029.

4. MILESTONES AND INDICATORS: TOWARD OPERATIONALIZING CHALLENGE 10

At their core, all the Ocean Decade Challenges, and in particular Challenge 10, are about human behaviour. The following overarching milestones represent significant developments or events that signal and ensure collective progress is being made on the strategic ambition, drivers, and key actions outlined in this paper.

4.1 Short-term milestones (2024–2025)

Milestone 1: Inclusive Stakeholder Engagement

Indicator 1.1: Challenge 10 Theory of Change. There will be a co-developed theory of change, enabling a collaborative and inclusive operationalization of the drivers and key actions set out in this paper.

Milestone 2: Increased Funding for Decade Actions

Indicator 2.1: Priority Areas for Funding. There will be an exponential increase in funding and sustained support for: (a) Marine social science, ocean literacy research, and Indigenous-led research; (b) Ocean communications projects, training, and tools; (c) Ocean-climate education to support a Global Blue Schools Network, regional networks of marine educators, and teacher training/educator professional development; (d) A dedicated working group to begin research and compilation of evidence of cultural connection as a driver of pro-ocean behaviours. This will be supported by clearly defined value chain/example CSR metrics in respect to supporting ocean literacy initiatives.

Milestone 3: Building Capacity for Ocean Decade Challenges

Indicator 3.1: Behaviour Change Baselines. There will be a baseline established on ocean-related attitudes, values, perceptions, and behaviour measurements through a global (yet regionally, nationally, locally appropriate) ocean literacy survey instrument (i.e., Ocean & Society Survey), co-developed by ocean literacy and strategic ocean communications experts.

Milestone 4: Advancement in Ocean Knowledge Sharing

Indicator 4.1: Co-design, Co-development, and Co-production. The DCU will ensure that calls for co-design, co-development, and co-production (with associated funding opportunities) require evidence of transdisciplinary approaches that include the intentional creation of space for Indigenous and community researchers, science academy, government agencies, industry, etc. to operationalize key recommendations specific to the four drivers.

4.2 Medium-term milestones (2026–2028)

Milestone 5. Toward Societal and Environmental Impact

Indicator 5.1: Behaviour Change Research Continuance: Public ocean perceptions research baselines (e.g., as measured by ocean literacy survey instruments and other measurement tools) are augmented and circulated to capture behaviour change attributed to the key drivers. Behaviour change will be measured both in professional practices (formal users and organizations/institutions) and in individual practice related to:

- awareness/knowledge related to pro-ocean behaviour change(s)
- attitudes/beliefs toward pro-ocean behaviour change(s)
- willingness (motivation, capability, opportunity/accessibility) to engage in action(s) promoting pro-ocean behaviour change(s)
- demonstrating increased engagement in actions promoting pro-ocean behaviour change(s)

Indicator 5.2: Framework development for UNOD Programmes involving cultural connections: A framework is designed for UNOD Programmes that include the selection of communities and projects showing best practice activities and initiatives regarding cultural connections, heritage, language, and place-based innovations for human-ocean health.

4.3 Long-term milestones (2029–2030+)

Milestone 6. Toward Societal and Environmental Impact–Systems Change

Indicator 6.1: Programmes and research: The Ocean Decade community will widely model a culture shift, as demonstrated through ongoing monitoring of the incorporation of multiple knowledge systems, transdisciplinary approaches, and co-design processes across key driver actions, as measured by ongoing social science research.

Indicator 6.2: Funding: The Ocean Decade community will widely model a culture shift, as demonstrated through flows of redirected philanthropic and public funding (with transparent documentation) in support of behaviour change related to the four key drivers.

Indicator 6.3: Cultural Norms: The Ocean Decade community will widely model a culture shift, as demonstrated through the ways social and cultural norms are evolving across the key drivers, in support of reciprocal, sustainable, and restorative ocean-human relationships.

Indicator 6.4: Advocacy and Public Policy: The Ocean Decade community will widely model a culture shift, as demonstrated through advocacy and policy progress toward key recommendations and associated actions.

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Appendix A: "Science and societal behaviours" as identified by each Challenge

CHALLENGE	Science behaviours	Societal behaviours
Challenge 1 Understand and Beat Pollution	Institutions and individuals work together to build strategic partnerships at both national and international levels, to leverage financial mechanisms and expertise.	Behaviours that lead to the reduction of current levels of hazardous substance deposition into the ocean; and increase in adoption and use of less hazardous substances.
Challenge 2 Protect and restore ecosystems and biodiversity	Institutes and individuals prioritise sharing biodiversity data in collaborative, open-access ways. Research shifts to support solutions for the biodiversity crisis, rather than baseline monitoring.	Marine biodiversity is included within national curricula. Communications shift to support deepened connections with our interdependence on marine flora and fauna diversity.
Challenge 3 Sustainably Nourish the Global Population	Shift to prioritise science that supports nutrition-centred approach(es). Institutes and individuals work on embedding marine social science into the Challenge to support consumer behaviour goals.	Consumers have tools which support behaviour regarding sustainable choices and influence on the supply chain. Measurable action is seen.
Challenge 4 Sustainable Blue Economy	Decision-makers work alongside institutions to ensure the right data is provided to inform economic practices and principles.	Supportive, explicit, and timely action for a circular economy. Governance at all scales and regions gives "the ocean a seat at the table."
Challenge 5 Ocean-Climate Nexus	Science shifts to focus on solutions for adaptation and mitigation. Clear efforts are demonstrated to foster collaboration among scientists, policymakers, and stakeholders. Development and implementation of dedicated strategies to improve societal connections to the ocean is prioritized.	Local communities are actively involved in data analysis, public participation, and conflict resolution approaches. Governance frameworks and societal engagement enable society to adapt to/be resilient to anticipated levels of climate change, supported by decision support tools for the assessment of vulnerability and risk to coastal communities and marine industries.
Challenge 6 Coastal Resilience	Programmes specifically engage local communities. Enhanced awareness facilitated by early warnings encourages the required behavioural changes, ensuring that adaptive measures align harmoniously with establishing a sustainable relationship with the ocean.	Local populations are able to use the knowledge and skills required to understand, prepare for, and respond to ocean hazards.
Challenge 7 Expand the Global Ocean Observing System	Expand GOOS approach to include human data components e.g., ocean literacy/public ocean perceptions survey results. Work with local communities and Indigenous partners to further expand observations. Embrace non-purist approaches to evidence.	Active use of GOOS platform. Contribute evidence and observations to support expansion of datasets.
Challenge 8 Digital Representation	The science community works toward a culture where data information and knowledge sharing is automatic, integrated into normal practice - from the science community to wider society.	Society is aware of, has access to, contributes towards and ultimately uses the digital twin.

Challenge 9 Skills, Knowledge and Technology for All	There is equal representation of minority groups (e.g. women, early career ocean professionals, Indigenous communities, and under-resourced countries) in ocean science, communication, management, and policy areas. Constructive, multi-directional partnerships are built and maintained.	A fair and equitable distribution of infrastructure and technology is established. Barriers/restrictions including access and language on the sharing and movement of ocean data, knowledge, and information among different users of the ocean are removed. There is an equitable distribution of funding, and all UN countries invest in ocean science.
Challenge 10 Restore Society's Relationship with the Ocean	There is a culture shift in the way that science is formulated, practiced, and communicated. There is an implicit understanding in the ocean community that ocean threats are an outcome of human behaviour.	Shifts in science and the ocean community ensure that all sectors of society have strengthened connections with the ocean; understand the vital role the ocean plays in human and planetary well-being; and have increased motivation, capability, and opportunity to make decisions and behave in ways that ensure a healthy ocean.

Appendix B: Users, Goals, and Needs

Stage 1 - Long list of users, developed by Working Group:

- Policy makers
- Education
- Agriculture
- Water resources
- Transportation
- Labour and employment
- Health
- Environment
- Arts and culture
- Scientists/ science community
- Religion/spirituality
- Educators–formal and informal
- NGOs
- Funders / philanthropic community
- Institutional / Government (federal/national, provincial//territorial/state, municipalities)
- Indigenous Governance structures, communities and peoples
- Corporates/business community
- Blue economy
- Tourism
- Ocean energy
- Fisheries/aquaculture
- Artisanal livelihoods–fishers, ocean products (e.g. salt)
- Ocean Decade Challenges (all Actions, Working Groups)
- Media, culture & influencers
- Sports
- Zoos and aquariums, science centres, public libraries
- Children/youth = tomorrow's decision-makers

Stage 2 - Refining the list of users:

Q1) Who can make the most impact in overcoming barriers to behaviour change? Who are the real movers/influencers/users?

Q2) What is needed by each of these priority users and influencers to drive behaviour and systems change?

Priority user groups' goals and needs are cross-cutting:

- Clear/consistent understanding and communication of values/services of the ocean;
- Enabling environment for co-design, co-development, and actioning of "science" (where this is the culture shift toward a "new" collaborative and integrative space):
  - Science/Knowledge–all forms
  - "Knowledge to Action" co-design/co-development guidance/best practices;
    - Including how to bridge different forms of Knowledge;
    - How to include all user groups.
- "Spaces" (ample opportunities) for partnering/collaborating (e.g., sharing, storytelling, building);

- Strategies, frameworks, tools (etc.) for communicating (e.g., values/services/barriers; challenges and emerging solutions):
  - Funding for all of the above
- Understanding the true value and role of ocean literacy to meeting desired outcomes (Ocean Decade outcomes).

Stage 3: Co-generating a table on priority user groups' end goals and needs

Priority Users	What is the end goal for this user group by the end of the Decade?	Priority Users / Influencers Needs
Scientists	• Genuine collaboration between natural and social scientists, at the start of, and throughout the life of a project. • Research is intentionally co-designed with communities from the beginning of the process. Research impact is clearly articulated at all stages of the project (to account for changes). • Academia values multiple roles of scientists–journal publications are only one measure of success / impact. • Societal impact is seen as a critical "currency" in science and all scientists embrace a social contract–with humility and transparency. • More expansive definition of "science" and shared data.	• Incentives for scientists need to change • Scientists need to be supported to change their approach to designing research projects with a recognition that researchable questions produced out of a dialogue process with others, including non-scientists, often generates more interesting questions. • Young scientists need to be supported to engage in multi-dimensional / trans-disciplinary research, which values societal impact and communication. • The curriculum for training scientists needs to change to enable the above. • More expansive thinking, connection, and collaboration outside of particular research areas or institutions.
Policymakers	• Policymakers make decisions that take into consideration the vital role of ocean health across a broad spectrum of initiatives. • Policymakers make ocean-positive decisions in response to demonstrative public support for actions that protect the ocean and appeal to the public to garner support • Strength of human connection to the ocean is such that policymakers use ocean action as a campaigning platform at key political moments. • Policymakers understand and value the role of the ocean in human life and recognise the impact of their decisions on the functioning of the ocean. • Understanding of the role of our one-water system– that connects to our everyday lives, as well as issues of intersectionality involving human rights.	• Policymakers have access to the science they require on how ocean health relates to their specific policy issue (e.g., briefing docs). • Up-to-date nationally representative studies demonstrating high levels of support for ocean positive decisions, that can be used as internal advocating data. • Designated "ocean consultants" who can work with governments to "translate ocean science" to show salience of ocean health across a variety of ministries, departments etc. • More effective communication between scientists and policymakers. • Compulsory ocean literacy training for all decision makers in governments around the world. • Ample time "in the field" with youth, scientists, and native/Indigenous peoples. Ample time listening to educators who have successfully applied project-based/progressive education.

Funders	- Funders understand and value the role that ocean literacy, social science, and communication play in achieving global ocean health targets. - There is an increase in the percentage of blue funding directed toward projects based on these disciplines. - There is a commitment to include social science/outreach etc .in all future funding proposal frameworks. - Funders evaluate research proposals through multiple metrics including societal impact. Timeframes for projects include awareness of the increased time required for genuine collaboration with communities. - Invest in more than "ocean science" understanding to shift the paradigm of investment into new, meaningful approaches to educate our children the next generation of leaders.	- Ensure funders have easy access to data and case studies that demonstrate improved human relationship with the ocean having positive impact on ocean health (making a compelling evidence-based case). - Identify what knowledge and data gaps exist in "making the case" at present and provide recommendations for studies to fill this gap. - Ensure funders understand what data (both qualitative and quantitative) can be gathered around future projects to contribute evidence to progress toward global ocean-human health. - Funding agencies need to change the way projects are evaluated and timelines are revised. - Ample time "in the field" with youth and native/Indigenous peoples. Ample time listening to educators who have successfully applied project-based/progressive education.
Educators	- All educators can incorporate marine / ocean examples into their lessons–across all disciplines and topics. - All formal education systems include elements of ocean literacy (as appropriate) in the curriculum. - At all levels–from administrators to teachers: (1) Prioritize, as core curriculum, necessary skill-building for the next generation of decision-makers, including and especially empathetic leadership; (2) Holistic curricula prioritizing the connection of all on planet Earth–all life and elements– as well as causal connections tying in humanitarian issues and collaborating with Indigenous communities teaching traditional ecological knowledge; (3) Reconnect youth with their natural environment, moving away from book learning within four walls; (4) Project-based learning with core issue to resolve being a thematic real-world issue; (5) and more children who connect with nature and come to love it, growing to protect it.	- A foundational "ocean literacy" component is included in all educator training–pre-service and in-service. - Ocean topics need to be included in the design of curriculums and textbooks. - High level interventions are needed with leaders in education throughout the world. - Time, space, and money–the government's true commitment–to instead utilize project-based, collaborative learning models and teach the science behind human impact on our ocean, waterways and climate. Support to prioritize teaching empathetic leadership skills and issues of intersectionality, including training.
Media, Communication Experts	- Ocean health has a sustained presence in the media landscape that links the ocean to a range of other salient issues (climate, wellbeing, food security, culture etc). - Ocean communications campaigns are "professionalised" – i.e., use data to target specific audiences, with tested products/messages/messengers and measurable impact. - Through a diversity of platforms and formats, ocean stories become a part of mainstream culture. - The media report accurately and effectively on marine / ocean issues. - Communication experts share their knowledge, skills, and resources. This will save on duplication of efforts and increase support especially in countries with fewer resources. - Movement-building and awareness-raising are protecting our one-water system including ocean, collaborating in goal globally; commitment to sharing accurate information including issues of intersectionality.	- Ensure communicators understand how ocean stories connect to a range of other issues (using studies on how to connect with different audiences). - Need for baseline data to track attitudes, perceptions, and ocean-related attitudes across representative samples, to monitor progress and identify strategic target audiences for campaigns, which can be shared across ocean communications community. - Ensure communications budgets have adequate monitoring, evaluation, and testing resources allocated to build an (open access) body of evidence and insight for ocean community. - Communication experts need to use research and best practice guidelines in communication. - Relationships of trust are established between the media, scientists, and other ocean knowledge holders. - Government support of media and communication other than current media monopolies that value meaningless distraction, exploitation, and money. This can change with investment in the next generation of decision-makers.

10

CHANGE HUMANITY'S RELATIONSHIP WITH THE OCEAN

Culture, Arts, Religion/ Spirituality	• Ocean issues have a meaningful presence in mainstream culture, connecting with large audiences. • Artists, cultural influencers, spiritual leaders etc. engage with the ocean in a wide range of forms that showcase a breadth of understanding of the ways in which we connect with the sea. • Writers, artists, musicians etc. engage with the ocean to generate positive impact among audiences (and are aware of risks of repeating damaging ocean tropes, spreading "blue fear" etc). • Religious leaders can articulate the value of ocean care. • An Ocean Manifesto for all religions. • Cultural values of the ocean are recognised and appreciated / celebrated. • Build into community an understanding we are all connected to each other and our shared one-water system and adopt said understanding as core philosophy extending to all mantras, expressions, convenings.	• Generate a user guide for cultural influencers on how they can meaningfully engage for the ocean, including social science and behavioural studies that show impacts of different narratives/representations of ocean. • Generate art-science co-creation and ensure adequate funding for the science side of art-science collaborations (often missed out). • Develop a body of evidence that makes the case for cultural engagement as a vehicle for generating ocean-friendly behaviours (and ultimately positive ocean health). • Creative ways to reach religious leaders are needed. • We need to recognise people's spiritual connection to nature and the ocean, in ocean literacy work. • A system that fosters matriarchal values and supports this shift. What our children/youth absorb becomes the community of the future. Educators, policy makers, and funders hold responsibility here.
Industry & Businesses	• Industry and business understand and make decisions that value ocean health. • Industry and business understand that consumers value a healthy ocean, and engage in and publicise their "blue" behaviour in the same way they do as "green." • Industry and business engage their consumer base in ocean positive action/campaigns, etc. • Industry leaders realise the financial impact of overexploitation of marine resources and other human impacts on ocean health. • Encourage shareholders to take collective action against businesses abusing the ocean. • Adopt a new and different definition of success, moving away from short-term profit focus at all costs–including exploitation and destruction–toward a long-term plan involving less exploitation and sustainable development.	• Scientific framework to understand what "good ocean action" looks like from business/industry perspectives. • Identify and engage with leaders whose businesses use / abuse the ocean. • Government regulates for the people, not against the people, by ensuring industries and businesses do not benefit from activities(or lack thereof) that harm our ocean, waterways, and climate and the humanitarian issues that arise therefrom. Government should provide incentives to truly protect and operate sustainably.
Non-Government Organisations	• There is a growing number of ocean-focused, not-for-profit knowledge / conservation / education institutions outside universities and research institutes. These are not constrained by academia and have more flexibility in research and impact. • All NGOs operating in the marine space work together, pool resources and expertise for collective impact, and have wide and broad reach.	• Decrease competition for limited resources and call for greater collaboration. NGOS in the ocean space need to communicate with each other more effectively, determine areas of expertise, and share. This will enable greater reach and impact.
Children/ Youth/Next Gen Decision Makers	• Understand: (1) that all water is connected on Earth; (2) the world's water problems they are inheriting; (3) how the world's water challenges affect climate, food growing, and humans; and (4) that there are solutions and that they can connect in purpose and effectively collaborate in solving the issues they are inheriting.	• Needs for inclusion, investment in all forms, active listening, and actual care. Young people are consistently left out of the equation while our leaders prioritize monetary success and demonstrate ignorance related to the importance of caring for our environment. With empathetic and informed leaders, connected to nature in their own learning, we would likely see more leaders today acting for the protection of our natural environment, not individual gain. We must listen to youth and include them so as not to be demoralizing, and to encourage them to achieve something different and better.

Appendix C: Relevant Research Across Diverse Fields of Study

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Appendix D: Peer Workshops – Socializing Challenge 10

A total of 14 "peer workshops" were held that included over 600 individuals as outlined by table below.

| WG Member	Date	Conference/ Event/Network/ Community	Location	# of Participants	Description of Participants
DG, NB	Oct 31	IOC-UNESCO Ocean Literacy Group of Experts	Virtual	20	Group is composed of 20 experts from diverse and relevant disciplines and interested parties reflecting the multi-stakeholder nature of ocean literacy
DG, NB	Oct 31	Ocean Literacy With All (Decade programme)	Virtual	16	
DG, J	Nov 2	Vision 2030 Public Webinar (hosted by DCU)	Virtual	470	
CW, DG	Nov 15	Ocean Decade Strategic Communications Group	Virtual	12	
NB	Nov 16	Ocean Conservation Trust Engagement team	Virtual	10	Ocean literacy practitioners
JM	Nov 22	South African and East African Ocean Literacy practitioners	Virtual	16	Presentation for people interested in South and East Africa
DG, NB	Nov 22-24	Decade endorsed activities associated with OLWA	Virtual	10	
NB	Nov 24	EMSEA Advisory Board	Virtual	10	OL experts delivering OL initiatives across Europe
RK	Nov 27	UN Decade ECOP ocean literacy task team	Virtual		UN Decade ECOPs = defined as early-career professionals working in ocean related fields. Several task teams focused on different Decade Challenges. We connected with the Ocean Literacy task team.
NB	Nov 29	Protect Blue	Virtual	15	Ocean activists/ advocates/ B-corps
RM	Nov 30	Northeast Pacific Ocean Region - Ocean Literacy Community	Virtual	10 + 3 staff	30-35 participants invited; 11 confirmed attendees and 4-5 tentative (so far); ENGAGEMENT SESSION HELD with 10 participants in attendance;
NH	Dec 5	COP28 OceanX Ocean Decade - Session on Ocean Comms/OL	In-person		
AP	Monthly	United States Youth Advisory Council for UNOD + H2OO's Global Youth Leaders	Virtual	9	United States YAC for UNOD is made up of 53 youth from around the United States and Territories (including Tinian Island in CNMI/Micronesia) including youth on the frontlines and traditionally marginalized; H2OO's GYL is a global council (United States, Uganda, Brazil, Marshall Islands, Germany...)
RY	Dec 27	Asian Marine Educators Association (AMEA)	Virtual		Seminar with marine educators and youth participants from countries such as Japan, the Philippines, Bangladesh, Mexico, China, and more. https://www.facebook.com/groups/AMEA2015/posts/3618719778365441/

Collated feedback from Peer Workshops:

Along with notes taken by workshop leads, additional input was gathered via an online form and analysed by the Working Group. Results were as follows:
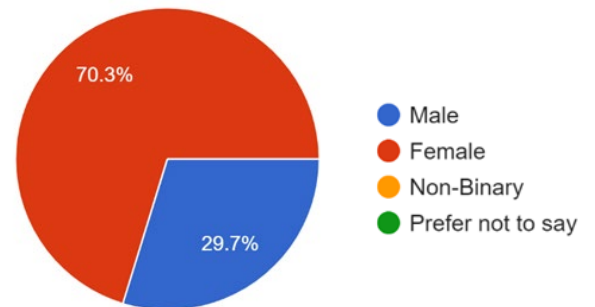
Number of responses: 37

Location of responders: 18 countries–Bangladesh, Cote D'Ivoire, Canada, China, France, Germany, Ghana, India, Ireland, Italy, Jersey, Philippines, Portugal, Spain, China, Uganda, United Kingdom, United State

Age range

Gender

16-18
19-25
26-35
36-50
51-70
71+

Male
Female
Non-Binary
Prefer not to say
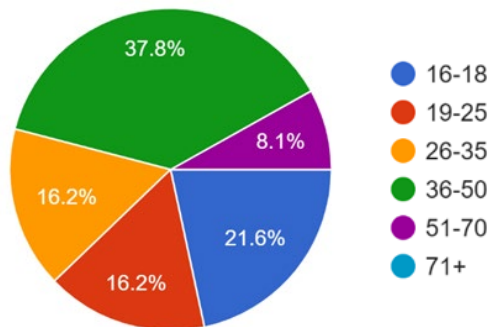
Appendix E: Co-Design - Definition, Core Concepts, and Types

Of direct benefit to the Challenge 10 white paper, the Canadian Commission for UNESCO's Ocean Decade Working Group* (see bottom for list of members) has reviewed and assessed different case studies and guidance documents to build a typology of co-design. The insights shared in this Appendix are a summary from a forthcoming publication[2] that was presented at the Ocean Decade 2024 Conference in Barcelona.

What is Co-Design?
Co-Design (CD) is an oft-touted model of community-engaged research that has gained popularity in UNESCO discourse in recent years. Its definitions vary by discipline, but generally coalesce around "a participatory approach to the development of interventions that brings together technical expertise and lived experience from users" (Gilbert et al., 2020). It aims to center active recognition of ontological and epistemological differences to comprehend how people think differently about issues and concepts, destabilizing a conventional scientific binary relationship between the subjects and objects of knowledge (Parsons et al., 2016).

Core concepts:
- equalizing power relations (eg. self-location, procedural justice);
- designing situation-based actions;
- practicing mutual learning;
- exploring alternative visioning;
- upholding democratic principles (eg. polycentric governance);
- genuine participation (mutual respect/humility);
- and facilitating transdisciplinary knowledge-sharing (Luck, 2018).

Co-design is well-suited to understand and address complex coastal issues with a variety of competing actors and values, unclear spatial boundaries, fragmented responsibilities and resources, and complex interactions between natural and social systems (Floortje, 2020). When done with intention, it can facilitate the expression of context-specific, complementary ocean knowledges and illicit responsive action to address the complex challenges of coastal system management – which are most comprehensively understood from multiple angles (IOC-UNESCO, 2021). Furthermore, true co-design processes should prioritize multi-directional transformation (Buchanan and Ahmed, 2023), delivering reciprocal participatory benefits to:
- communities (eg. upskilling, capacity-building, equitable governance);
- ecosystems (eg. ecosystem-based co-management, attuned and embodied local knowledge);
- and research bodies (eg. opportunity for trust-building and accountability, ontological expansion, introducing new methods).
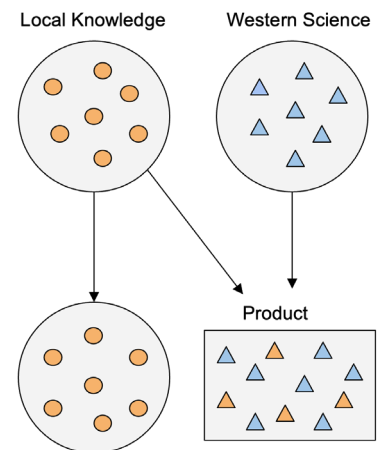
Problem: Co-design has a generally-accepted set of principles and tools for application, but its context-specificity lends to a definitional vagueness and malleability that may simultaneously inform and invisibilize structural and methodological decisions that continue to uphold a power imbalance between researchers and communities. While co-design is intended to establish equitable partnerships with users as local experts in the research process, the design process may still be led by researchers who uphold a level of authority by managing the instances and methods of user involvement. Power imbalances uphold inequity and therefore limit the transformative potential of the work.

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[2] Hodgins, D., Glithero, L.D., Ramachandran, A., Paul, K., Noisette, F., Maggs, D., Compton, Z., White, A., Singh, G.G. (forthcoming). Activating Co-design's pluralist potential: A review and assessment of different forms of co-design for transformative equity in ocean science. Canadian Commission for UNESCO.

Types of Co-Design
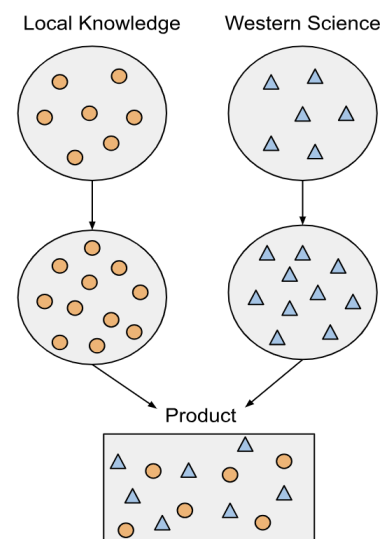
1. Integrative Co-Design

Integrative co-design aims to engage local stakeholders for the purpose of gathering relevant information to incorporate into an existing body of knowledge (Reid et al., 2020). These models forward a process of knowledge integration whereby local expert knowledge is assessed and selectively chosen to include as data addressing the research question based on its complementarity with Western scientific knowledge, values, and legitimation points (Nadasdy, 1999) These approaches place emphasis on consultative data utility rather than on considering or preserving cultural interpretations of knowledge claims or their embeddedness within local value systems.

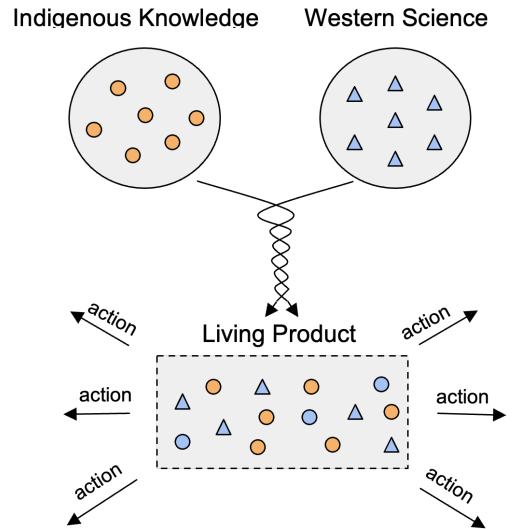| Benefits	Risks
- less time and resource-intensive - more conventional-leaning structure that is legible and familiar - strengthen an existing knowledge base from a specific lens	- strengthen Western Science for its own ends - concentrate power in administrative centres rather than in communities (Reid et al., 2020) - sidelines local cultural interpretations of knowledge claims and forefronts external ones - may negatively impact a research community's trust and/or openness to future research/relationships - externally-controlled documentation and use of local knowledge undermines the advancement of knowledge-holding community's rights to self-determination

2. Parallel Co-Design

Parallel co-design forwards knowledge co-evolution, wherein both the research body's knowledge system and the research subject's knowledge system expand independently instead of forcing a merge that extracts knowledge from holder (Chapman and Schott, 2020). Under this model, local expert knowledge is held in integrity and intrinsic value alongside scientific knowledge, and both contribute without privilege towards answering the research question. The aim is to generate meaningful information for self-determined local (or distinctly Indigenous) decision-making and governance; putting formal focus on mutual capacity-building. This model may use multiple evidence base approaches to capitalize on the complementarity of knowledge systems in context-honouring dialogue when assessed by internal rather than external criteria.

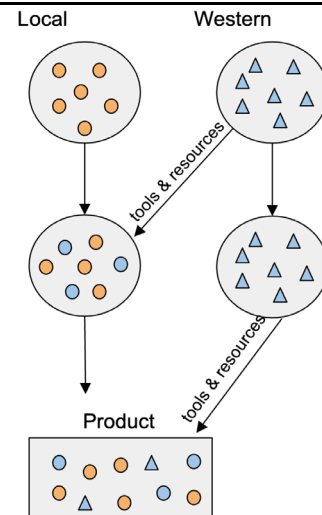| Benefits	Risks
- formalizes strategic objectives of capacity-building and self-determination - aims to strengthen both knowledge systems - potential for trust-building and long-term partnerships	- complementarity of knowledge dependent on ontological flexibility - more time- and resource-intensive - relationship-dependent - potential for harm if not approached with integrity and humility

3. Indigenous Co-Design

There are many different long-practiced Indigenous approaches to what we might call "co-design" that have distinct cultural protocols and purpose emerging out of relational practice in place (Reid et al., 2020). Some resemble the previous model's parallel lines of inquiry, but forefront indigenous sovereignty and add a reciprocal imperative to act on the knowledge produced through two or more worldviews working together. The aim is not to pit Indigenous and western systems of knowing against the other, but to highlight their distinctiveness given that both frameworks have individual strengths in specific contexts or in addressing aspects of a shared problem in different ways (Bartlett et al., 2012). The other models might learn from the positioning of First Nations as rightful partners and leaders in design rather than stakeholders simply requiring a morally or legislatively determined level of consultation. Indigenous co-design projects are often initiated by Indigenous communities themselves, flowing from a self-identified need whose addressing may benefit from collaboration with external partners (Reid et al., 2020).

Benefits	Risks
- respects multiple realities and embodied knowledges - embraces relational accountability - situated research process - centers Indigenous self-determination	- transferring distinct cultural models to other Indigenous contexts rather than grounding in local cultural models - must be paired with investments in community

4. User-led Co-Design

Under user-led co-design, local experts get to shape the research process and determine which questions are asked and how. Science and design experts may act as facilitators and resource points, but do not take the steering wheel. Projects may be proposed by professional researchers in response to documented or observed user need, but are reliant on user interest and involvement, which also might include revision of the project mission and reorientation. The explicit aim is to transfer power to users and increase their problem-solving capacity through the neutral and autonomy-supportive provision of design resources, training, and opportunities for unbounded expression and leadership (Peters et al., 2018).

Benefits	Risks
- empower communities - rapid trust-building - inherent reciprocity - flexibility - process attends to users' realities	- intensive recruitment/pre-research - time- and resource-intensive - tokenistic if pressured into predetermined plan - reliant on user-leader competence or trainability - challenge of relinquishing control - unpredictability - must be open to failure

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United Nations Decade of Ocean Science for Sustainable Development (2021-2030)

Proclaimed in 2017 by the United Nations General Assembly, the UN Decade of Ocean Science for Sustainable Development(2021-2030), provides a convening framework to develop the scientific knowledge and partnerships needed to catalyse transformative ocean science solutions for sustainable development, connecting people and our ocean. The Ocean Decade is coordinated by UNESCO's Intergovernmental Oceanographic Commission (IOC).

Established during the Preparatory Phase and to continue throughout implementation until 2030, the IOC's Ocean Decade Series will provide key documentation about this global initiative and aims to serve as a primary resource for stakeholders seeking to consult,monitor and assess progress towards thevision and mission of the Ocean Decade.

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