



SUSTAINABILITY OF MARINE ECOSYSTEMS THROUGH GLOBAL KNOWLEDGE NETWORKS (SMARTNET): PHASE II (2025-2028) IMPLEMENTATION PLAN

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1. MOTIVATION, PLANNING AND ENDORSEMENT

The UN Decade of Ocean Science for Sustainable Development ([Ocean Decade](#); 2021-2030), sponsored by the Intergovernmental Oceanographic Organization (IOC), provides an unprecedented opportunity to strengthen and expand the collaborative science between ICES and PICES and with other partner organizations. ICES and PICES are scientific organizations that interact and engage with an array of different groups, from academia, policy, civil society, industry, and foundations throughout the Northern Hemisphere, and through partnerships and specific agreements we are also increasing our presence in the Southern Hemisphere. Our two organizations play leading roles in advancing and communicating scientific understanding of marine ecosystems for societal outcomes. Our partnership brings together diverse networks to increase the overall capacity to conduct ocean science in support of sustainable development and to foster the range of skills necessary to support broad and overarching marine science goals. Furthermore, the strategic plans and objectives of both organizations are well-aligned with Ocean Decade objectives, positioning ICES, PICES and their associated networks to play a leading role in addressing Ocean Decade priorities and societal outcomes. With this motivation, an ad-hoc group of ICES and PICES scientists began bilateral discussions in October 2019 to develop a strategic plan to bring about transformational science during the Ocean Decade by building upon our long history of successful partnerships in advancement of marine science.

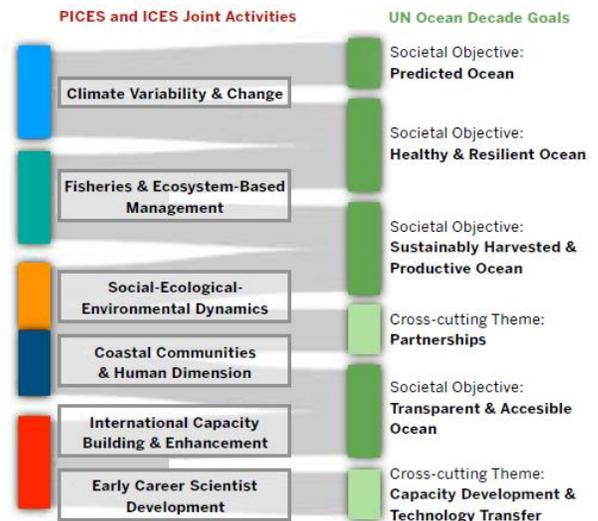


Figure 1: Mapping of ICES and PICES core activities and focus areas onto UN Ocean Decade societal objectives and cross-cutting themes.

Our strategic partnership was formalized in a joint Study Group on the UN Decade of Ocean Science ([SG-UNDOS](#); 2020-2021), which aimed to (a) establish a common strategy for joint activities and provide regional leadership in support of the Ocean Decade; (b) identify and strengthen relationships with partner professional and multilateral organizations to facilitate Ocean Decade engagement; and (c) develop a UN Ocean Decade Programme¹ for endorsement by the IOC. The resulting Programme proposal, titled ‘Sustainability of Marine Ecosystems Through Global Knowledge Networks’ (SMARTNET), was submitted to the first Ocean Decade Call for Actions in January 2021 (see **Supplement A**), and was among the first set of Actions endorsed by the IOC in June 2021 (see **Supplement B**). SMARTNET aims to support, leverage and expand upon ICES, PICES, and member countries’ priorities and initiatives related to the Ocean Decade, by emphasizing areas of mutual research interest and policy needs, including climate change, fisheries and ecosystem-based management, social, ecological and environmental dynamics of marine systems, coastal communities and human dimensions, and communication and capacity development (**Figure 1**). SMARTNET also aims to incorporate strategies to facilitate Ocean Decade cross-cutting inclusivity themes relating to gender equality, early career ocean professional (ECOP) engagement, and significant involvement of indigenous communities and developing nations in the planning and implementation of joint activities.

2. SMARTNET OBJECTIVES AND GOVERNANCE

SMARTNET has two primary objectives: (1) **To convene global partners through knowledge networks to facilitate research, knowledge generation and capacity sharing** in support of sustainable marine ecosystems in a changing climate; and (2) **To leverage and build upon joint ICES-PICES collaborations** to expand our networks and increase resilience of marine & coastal resources and the communities that depend on them. These objectives are closely linked to the Ocean Decade’s ten [Challenges](#) and seven [Desired Outcomes](#), with a particular emphasis on ‘A Productive Ocean’, ‘A Healthy and Resilient Ocean’, ‘A Predicted Ocean’, and ‘An Inspiring and Engaging Ocean’. More broadly, SmartNet objectives are congruent with several of the [UN’s Sustainable Development Goals](#): SDG 14 (‘Life Below Water’), SDG 13 (‘Climate Action’), SDG 2 (‘Zero Hunger’) and SDG 5 (‘Gender Equality’).

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Figure 2: Intersection of SMARTNET activities within ICES/PICES infrastructure: PICES FUTURE Scientific Steering Committee, and Advisory Panels on UN Decade of Ocean Science, Science Communications, and Early Career Ocean Professionals; and ICES Advisory Committee (ACOM).

¹A Decade programme is global or regional in scale and will contribute to the achievement of one or more of the Ocean Decade Challenges. It is long-term (multi-year), interdisciplinary and multi-national. A programme will consist of component projects, and potentially enabling activities

To build upon the ICES-PICES enterprise, SMARTNET requires a joint governance structure within the ICES and PICES infrastructure. This is accomplished through the ICES-PICES Ocean Decade (IPOD), which serves as the joint Steering Committee for SMARTNET. In the first phase of SMARTNET (2021-2024), IPOD members were drawn entirely from the broader ICES and PICES communities (**Supplement C**). IPOD members from PICES also serve on PICES' Advisory Panel on the UN Decade of Ocean Science ([AP-UNDOS](#); 2022-present). The terms of reference of AP-UNDOS (**Supplement D**) include the development and governance of SMARTNET, ensuring active collaborations within the Programme across the PICES member nations. In addition, AP-UNDOS has the broader remit of advising and implementing more comprehensive PICES engagement with the Ocean Decade. Within PICES, SMARTNET will facilitate collaboration across several Expert Groups: FUTURE, the flagship Science Program, and the Advisory Panels on the Ocean Decade, ECOPs and Science Communications, all of whose contributions are required for SMARTNET to succeed. The ICES Advisory Committee will also work closely to facilitate SMARTNET engagement across ICES Expert Groups (**Figure 2**).

The objectives of SMARTNET will be achieved through the development and operation of a Global Knowledge Network (GKN) to generate and share knowledge and capacity. This framework has four functional, intersecting components: knowledge production, knowledge sharing, networking and engagement (**Figure 3**), which provides the strategic guidance to implement SMARTNET activities.

- *Knowledge production* comprises the ICES and PICES scientific enterprise and leverages collective organizational infrastructure to advance key scientific topics in marine science. This is exemplified by joint ICES-PICES Expert Groups such as those focused on climate change effects on marine ecosystems (ICES SICCOME, PICES [S-CCME](#)); impacts of warming on growth rates and fisheries yield (ICES WGGRAFY, [PICES WG-45](#)); and sustainable pelagic forage communities (ICES WGSPF, [PICES WG-53](#)). SMARTNET will facilitate creation of new joint Expert Groups to address emerging challenges and priorities throughout the Ocean Decade (see Section 3).
- *Knowledge sharing* also leverages the organizational and scientific infrastructure of ICES and PICES, with scientific information communicated through sponsored meetings (ICES/PICES Annual Meetings and associated Workshops and Sessions, International Symposia) and publications (peer-reviewed scientific manuscripts, Scientific Reports, Special Publications, and newsletters such as *PICES Press* and *ICES Cooperative Research Reports*). In addition to the dissemination of scientific knowledge and products, SMARTNET works with Expert Groups to facilitate dissemination of data through Findable, Accessible, Interoperable and Reusable (FAIR) principles (e.g. PICES Technical Committee on Data Exchange, [TCODE](#), aims to establish dialogue to support the Ocean Decade, in particular, its societal outcome of a “transparent and accessible ocean”; similarly for the ICES Data Science and Technology Steering Group, [DSTSG](#)).

- *Networking* fulfills the key SMARTNET objective of creating a functioning Global Knowledge Network (GKN) to generate scientific knowledge and share capacity around marine ecosystem sustainability. The long history of ICES and PICES partnerships with national, international and inter-governmental organizations (e.g., [PICES MOUs](#)) provides the foundation for this GKN, which SMARTNET will expand beyond the Convention Areas of the North Atlantic and North Pacific represented by ICES and PICES, respectively (although ICES has links with countries in the Global South). A key objective of SMARTNET is to identify new partners and expand the GKN to the Global South, to least developed countries (LDCs) and to Small Island Developing States (SIDS). The Ocean Decade provides new networking opportunities amongst endorsed Actions (Programmes, Projects) which encompass Communities of Practice around key themes (see Section 3).
- *Engagement* focuses on the cross-cutting Ocean Decade objectives of empowering diverse communities, ensuring geographic and gender equity in knowledge generation and capacity sharing, facilitating the career development of ECOPs, and incorporating local and traditional forms of knowledge. By striving for global equity in the generation and sharing of scientific knowledge and implementation of ocean solutions, this element of the Ocean Decade has the potential to be most transformative. SMARTNET actively pursues these cross-cutting themes through developing and sharing capacity with new partners (see Section 3).

The objectives and governance structure described above have guided the activities of SMARTNET since its Ocean Decade endorsement in 2021, leading to substantial progress in fulfilling its goals.



Figure 3: The strategic framework governing the SMARTNET Global Knowledge Network.

3. SMARTNET PHASE I: 2021-2024

From Ocean Decade endorsement in June 2021 through 2024, SMARTNET has refined its objectives and governing structure, initiated new partnerships, established an identity, and generated and shared new scientific knowledge through a variety of activities:

A. BUILDING THE GKN

SMARTNET has imitated the building of its GKN through three pathways: (1) expanding or developing new relationships with ICES and PICES network partners; (2) developing informal and formal Communities of Practice amongst endorsed Ocean Decade *Programmes* with overlapping interests and objectives; and (3) bringing in new endorsed Ocean Decade *Projects* under the SmartNet umbrella. SMARTNET representatives participated in the joint PICES-Asia Pacific Network (APN) Study Group on Scientific Cooperation in the Pacific Ocean ([SG-PICES-APN](#); Aug 2021-Feb 2023), culminating in an MOU that outlines avenues of collaboration that incorporate many of the goals and activities of SMARTNET and the Ocean Decade more broadly (**Supplement E**). Additionally, SMARTNET representatives provide leadership to [FUTURE](#), the PICES flagship Science Program. The FUTURE Scientific Steering Committee recently completed the [FUTURE Phase III \(2021-2025\) Science Plan Addendum](#) which explicitly links FUTURE and orients its activities towards the UN Ocean Decade, particularly through SMARTNET (see Section 2 and Figure 2). ICES is also completing an updated 2024-2029 Science Plan, which will articulate links to SMARTNET and Ocean Decade activities. In general, ICES and PICES network partners are inherently part of the SMARTNET GKN and receive updates and other communications through the knowledge sharing activities described above.

The Ocean Decade provides a critical global platform to facilitate global communication and cooperation around marine science and ocean sustainability. SMARTNET has taken advantage of this platform to develop close collaborations with several Ocean Decade endorsed Programmes, including Sustainability, Predictability and Resilience of Marine Ecosystems ([SUPREME](#)), [Marine Life 2030](#), Fisheries Strategies for Changing Oceans and Resilient Ecosystems by 2030 ([FishSCORE2030](#)), [Blue Food Futures](#), Global Ecosystem for Ocean Solutions ([GEOS](#)) and Ocean Biomolecular Observations Network ([OBON](#)). These Programmes have formed a Community of Practice around the ‘climate-biodiversity-fisheries’ nexus, with the aim of sharing scientific advances and tips on navigating Ocean Decade logistics, co-designing collaborative activities, and integrating our individual networks. Four of these Programmes (SmartNet, SUPREME, FishSCORE, BFF) have hosted a monthly [webinar series](#) since November 2023 on ‘Topics at the Nexus of Climate Change, Fisheries, and Blue Foods’. These webinars reach a global audience and facilitate the co-design of new Ocean Decade activities amongst the four participating Programmes and their networks.

Several newly endorsed Ocean Decade Projects are sponsored by SMARTNET and are explicitly part of the SMARTNET GKN (**Table 1**). These Projects span broad geographic and disciplinary ranges, but all have a focus on finding solutions to critical regional or global issues,

in line with the Ocean Decade Challenges. These issues include managing for multiple pressures in regional marine ecosystems, reducing and mitigating the effects of bycatch, disseminating marine and climate information to regional stakeholders, and developing methodologies to quantify the effects of plastic ingestion in marine species.

B. KNOWLEDGE GENERATION AND SHARING

SMARTNET has taken advantage of scheduled international fora to gather partners at meetings, workshops and satellite events, using these events as the primary pathway to consolidate the GKN and co-design Ocean Decade activities with partners (Table 2). In addition to the monthly webinar series described above, these events – both virtual and in-person – have been the primary tool to introduce SMARTNET to a global audience and to facilitate the collaborations needed to meet our objectives. The ‘climate-biodiversity-fisheries’ Community of Practice was formed through the planning and implementation of these events. SMARTNET also had a strong presence at the first UN Ocean Decade Conference, held in Barcelona, Spain, in April 2024 – hosting a side event and co-sponsoring two others in collaboration with the [Ocean Decade ECOP Programme](#) (Table 2).

A second avenue to widely share SMARTNET information is through publications. An early article introduced the objectives of SMARTNET in an Ocean Decade-themed special issue of *ECO Magazine* (Trainer et al., 2021), while a more recent publication describes the knowledge- and capacity-sharing strategies of SMARTNET in a special issue of *Oceanography* magazine (Chiba et al., in review). A recent SMARTNET-led publication, with Community of Practice collaborators, describes the collective capacity and key knowledge gaps within the ‘climate-biodiversity-fisheries’ nexus, and provides recommendations for future Ocean Decade Actions (Bograd et al., 2024b). Additionally, several articles in *PICES Press* have described the proceedings and outcomes of several of the SMARTNET-led and -supported events (Bograd et al., 2023a, 2023b, 2024a; Satterthwaite et al., 2023; Jhugroo et al., 2024).

SMARTNET has also contributed to knowledge generation in the Ocean Decade through its global survey on the ‘[What is the Ocean We Want?](#)’. The refrain of the Ocean Decade is ‘The Science We Need for the Ocean We Want’. The SMARTNET-led survey seeks to understand ‘The Ocean We Want’ relative to the 7 Ocean Decade Outcomes, recognizing that there are widely different priorities and



Figure 4: Sketch from the SMARTNET ‘Ocean We Want Survey’ satellite event at the Ocean Decade Conference in Barcelona, Spain, April 2024.

policy needs across cultures and ecosystems. Based on questionnaires designed from the Ocean Decade Implementation Plan, pilot surveys of the general public were conducted in 4 countries (Australia, France, Japan, USA) in 2023, with additional surveys planned in other countries (see Section 4). The expected outcomes from the global survey are threefold: (1) to provide an empirical basis for assessing progress on the Decade Objectives in different regions; (2) to inform SMARTNET’s capacity building strategy to address priority themes for each country, with an emphasis on SIDS and LDCs; and (3) to partner with stakeholders to co-design country-specific ocean advocacy strategies for promoting ocean sustainability. A description of the survey and initial results from the pilot surveys were presented at the SMARTNET-hosted side event at the Ocean Decade Conference in April 2024 (**Figure 4**).

Small Island Developing States (SIDS) have been the focus of SMARTNET’s initial capacity building strategy during *Phase I*. SMARTNET ECOPs from SIDS (Mauritius and Cabo Verde) have led these outreach efforts and developed a list of recommendations to prioritize future activities. These recommendations include inclusion and recognition of SIDS partners; creation of a positive policy environment, with emphasis on empowerment of women and ECOP engagement; improved technical development and science communication to local communities; and financial support from external sources. The initial outreach conducted during *Phase I* will guide SMARTNET capacity-sharing activities in *Phase II* (see Section 4).

C. ECOP DEVELOPMENT

A key objective of SMARTNET from its planning stages was to facilitate active participation by ECOPs in all of its activities. This has arguably been the most successful activity during *Phase I*. ECOPs have contributed leadership to the planning and execution of all of the SMARTNET workshops and events (Table 1), the development of SMARTNET publications, and Programme planning and organization through IPOD, ICES SICCME, and PICES AP-UNDOS and AP-ECOP. PICES ECOPs are members of the IPOD SMARTNET Steering Committee and have taken the lead in SMARTNET’s outreach to SIDS. PICES supported the participation of two PICES ECOPs to the UN Ocean Decade Conference in Barcelona, Spain, in April 2024, where they represented SMARTNET and PICES in several capacities (**Figure 5**). ICES has a Strategic Initiative on Early Career Scientists ([SIECS](#)), and both



Figure 5: PICES delegation at the Ocean Decade Conference in Barcelona, Spain, April 2024. PICES ECOPs Khush Jhugroo (2nd from left), Raphael Roman (3rd from left) and Naya Sena (not shown) represented SMARTNET and PICES in various capacities.

organizations provide significant support for the joint Early Career Scientist Conferences and ECOP/ECS travel support to international fora.

D. ICES-PICES EXPERT GROUPS

SMARTNET leverages the organizational infrastructure of ICES and PICES to advance work around key scientific themes. During *Phase I*, this has taken the form of incorporating objectives of SMARTNET and the Ocean Decade into the goals, terms of reference or anticipated outcomes of relevant Expert Groups. PICES Working Groups 49 (*Climate Extremes and Coastal Impacts in the Pacific*), 50 (*Sub-mesoscale Processes and Marine Ecosystems*), 51 (*Exploring Human Networks to Power Sustainability*), and 52 (*Data Management*) all explicitly mention the Ocean Decade as a motivating influence on their activities. Indeed, the Ocean Decade Challenges and the objectives of SMARTNET were motivating factors in the development of WG-49, which is taking a trans-disciplinary approach to understand, predict and communicate the impacts of climate extremes such as marine heat waves and harmful algal blooms. While some of these Expert Groups have a PICES focus, SMARTNET provides linkages to ICES and other partners of the GKN and will provide the foundation for new joint ICES-PICES Expert Groups (see Section 4).

4. SMARTNET *PHASE II*: 2025-2028

In *Phase I*, SMARTNET built its organizational structure, developed a strategic framework, expanded its Global Knowledge Network, and initiated activities to meet the objectives of the Programme and the UN Ocean Decade. SMARTNET is poised to expand upon these accomplishments during *Phase II*.

A. PROGRAMME OBJECTIVES AND GOVERNANCE

The *Phase I* SMARTNET objectives and governance structure will largely be retained during *Phase II*. The primary objectives remain:

- **To convene global partners through knowledge networks to facilitate research, knowledge generation and capacity sharing** in support of sustainable marine ecosystems in a changing climate;
- **To leverage and build upon joint ICES-PICES collaborations** to expand our networks and increase resilience of marine & coastal resources and the communities that depend on them.

Likewise, the ICES-PICES Ocean Decade (IPOD) will continue to serve as the Steering Committee for SMARTNET. In Fall 2024, updates to IPOD membership will be implemented to ensure a balance between ICES and PICES representation as well as geographic, disciplinary, gender and career-stage diversity.

To facilitate the prioritization and completion of SMARTNET activities, we will fully implement a set of IPOD Task Teams:

- **Writing Team:** Prepare periodic SMARTNET updates for the ICES/PICES communities; Prepare review articles highlighting SMARTNET events; Prepare peer-reviewed publications; Update and revise the SMARTNET Implementation Plan as needed.
- **Survey Team:** Execute the global ‘What is the Ocean We Want?’ surveys; analyze, interpret and disseminate survey results in presentations and publications.
- **Outreach Team:** Plan, organize and execute SMARTNET meetings, workshops, webinars and training sessions; Maintain a responsive and informative SMARTNET web presence.
- **Network Team:** Facilitate communications and engagement with the GKN, including the IOC Decade Coordinating Unit, the Decade Collaborative Centers, and Ocean Decade partner Actions and Communities of Practice.
- **Capacity-Sharing Team:** Facilitate communications and engagement with partners beyond the ICES/PICES convention areas; Develop an engagement strategy with

SIDS; Develop an engagement strategy to incorporate traditional knowledge into SMARTNET activities.

Task Teams will be populated with the revised IPOD membership in Fall 2024.

B. PICES PROGRAM STATUS

We also seek to clarify and solidify SMARTNET's role within PICES with an aim of positioning SMARTNET as a key element of the organization's international scientific enterprise as we transition from the current (FUTURE) to a new flagship Scientific Program. The FUTURE Science Program will phase out over the next few years, initiating a transitional period of strategizing about the future of PICES science that coincides with the Ocean Decade (2021-2030). As articulated in the SMARTNET proposal for IOC endorsement, the Ocean Decade provides a rare and unique opportunity to demonstrate ICES and PICES leadership on the global stage. We advise that ICES and PICES focus their energy and resources into SMARTNET and Ocean Decade activities during this period (SMARTNET *Phase II*, 2025-2028) to ensure success of the Programme and firmly position ICES and PICES as leaders within the Ocean Decade and global marine science. The experiences and lessons learned from the implementation of SMARTNET will inform new Expert Group(s) tasked with planning the next flagship PICES Science Program and will serve as a catalyst to more equitably share our science with the world. With this motivation, we **request to Science Board and Governing Council that SMARTNET be designated a PICES Program with representation on Science Board**. Similarly, ICES could consider evolving SMARTNET into a Strategic Initiative or Operational Group. We note that the plan outlined here is consistent with the recommendations for the future of PICES Science Programs made by the External Review Panel (Hofmann et al., 2024).

C. BUILDING THE GKN

Expansion of the **SMARTNET Global Knowledge Network** is the Programme's primary objective. Our focus in *Phase I* was to entrain partners from within the long-established ICES and PICES Networks. In *Phase II*, we will emphasize expansion of the GKN to include organizations and individuals beyond the ICES and PICES Convention Areas, with a particular focus on the Global South and SIDS. Co-design of activities with the Asia-Pacific Network (APN) will be emphasized as an opportune starting point. Networking with SIDS will follow the recommendations identified in *Phase I* (described in Section 3B) and may include jointly-sponsored workshops at relevant international symposia (e.g. ICES/PICES Annual Meetings) and training sessions focused on relevant themes such as the design of observing systems, data processing and dissemination, and linking science products to policy needs. We anticipate the Network and Capacity Sharing Task Teams will work jointly to expand the GKN and facilitate active participation and will also work closely with the Outreach Task Team to optimize communications about SMARTNET activities and opportunities (see below). Attention to the career development of ECOPs – a *Phase I* emphasis - and diversity and inclusion within the GKN will be paramount.

D. SCIENTIFIC FOCI

The scientific themes identified during *Phase I* included the broadest scientific categories for which ICES and PICES have long had expertise and conducted joint activities. These broad themes included climate effects on fisheries and ecosystem-based management, social-environmental-ecological systems, and human dimensions of coastal systems. During *Phase II*, SMARTNET will leverage existing ICES-PICES joint activities to concentrate on a limited number of specific scientific foci. This concentration will ensure that activities respond to identified priorities, have a defined organizational structure, and are likely to produce useful, tractable outcomes that respond to the Ocean Decade Challenges. Initial scientific foci will include:

- Research on the **effects of climate variability and change** on the dynamics of coastal and **marine ecosystems and their living marine resources**, including both historical analyses and climate projections (*leverage Section/Strategic Initiative on Climate Change and Marine Ecosystems; PICES Advisory Panel on Arctic Ocean and Pacific Gateways*).
- Research and advice on the physical forcing, biological impacts and mitigation/adaptation strategies associated with **climate extremes** such as marine heat waves and HABs (*leverage PICES Working Group on Climate Extremes and Coastal Impacts in the Pacific*).
- Research on the **effects of ocean warming on fish growth** and population dynamics (*leverage joint ICES/PICES Working Group on Impacts of Warming on Growth Rates and Fisheries Yields; Working Group on Sustainable Pelagic Forage Communities*).
- Translation of climate information into **ecosystem management frameworks**, including Ecosystem Status Reports, Integrated Ecosystem Assessments, and Management Strategy Evaluations (*leverage joint ICES/PICES Working Group on Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea*).
- Research on public perceptions of and priorities for the Ocean Decade Outcomes based on the SMARTNET **‘Ocean We Want’ surveys**, which will inform new priority activities.
- **Capacity-sharing** of ICES/PICES science with SIDS and other GKN partners, through scientific fora, scientist exchanges and training sessions (*leverage PICES Working Group on Exploring Human Networks to Power Sustainability*).

The Writing and Survey Task Teams will play key roles in producing and disseminating these scientific activities, with key roles for the other Task Teams as well.

These scientific foci are neither static nor limited, and SMARTNET will retain a nimbleness to pivot to emerging issues as needed. New issues and priorities will be informed through interactions with the GKN. Recommendations and proposals for new joint Expert Groups will be one of the primary tools for SMARTNET to address identified scientific gaps.

E. COMMUNICATIONS AND OUTREACH

SMARTNET will continue to pursue the *Phase I* avenues of communication and outreach established during *Phase II*: the SMARTNET website, informal activity reports (e.g. *PICES Press*), peer-reviewed publications, and network correspondence. An important initial priority will be the expansion of the SMARTNET website to include new content: (a) news and highlights of activities; (b) general Ocean Decade news and updates; (c) descriptions of and links to upcoming meetings, workshops and training sessions; (d) links to reports and publications; and (e) links to Ocean Decade endorsed Projects and other Actions within the GKN, including the ‘climate-biodiversity-fisheries nexus’ Community of Practice. The Outreach Task Team will have primary responsibility for these activities, along with the organization of meetings, workshops and training sessions.

A key element of *Phase II* will be the recruitment of a **Programme Coordinator** to oversee communication and outreach, which will be supported through the Ocean Decade International Cooperation Center, CHINA. Anticipated responsibilities of the Coordinator include:

- Lead and facilitate progress of the Outreach and Networking Task Teams.
- Lead development of a functional SMARTNET website.
- Facilitate communication and engagement with the GKN.
- Connect ICES/PICES Expert Groups with the activities of SMARTNET and other Ocean Decade Actions.
- Organize workshops, webinars and training sessions.
- Liaise with the IOC Decade Coordinating Unit, Decade Collaborative Centers, and the national Decade committees of ICES and PICES member countries.

Dedicated SMARTNET coordination will result in a higher profile for ICES and PICES within the Ocean Decade and more visible leadership. It would provide a mechanism to facilitate access to ICES/PICES infrastructure to deliver Ocean Decade objectives and result in more effective communication of our activities and outputs. A more rapid awareness of relevant Ocean Decade activities will result in a more effective use of our limited resources and more tangible progress toward meeting the Ocean Decade Challenges than would occur without this coordination. In addition, member countries would benefit through a clearly defined connection between national efforts and international Ocean Decade activities.

F. ANTICIPATED OUTCOMES

Our current task is to build from the momentum initiated during SMARTNET *Phase I* and make significant progress towards our Programme and the Ocean Decade objectives. It is important to recognize that the Ocean Decade is meant to transcend ‘business as usual’ and to facilitate ‘transformative’ science with a focus on developing and equitably implementing solutions to the Ocean Decade Challenges (UNESCO-IOC, 2021). With this obligation in mind, SMARTNET during *Phase II* will strive for the following **outcomes**:

- Discernable progress towards addressing the Ocean Decade Challenges and implementing the UN Sustainable Development Goals, represented primarily through scientific products.
- Transformation of ICES/PICES science into a stronger global leadership role, with a new emphasis on strategizing and implementing ocean solutions.
- Successful sharing of knowledge and capacity across the Global Knowledge Network, with an emphasis on the Global South and SIDS.
- Successful career development of a new cadre of ECOPs representing gender, geographic and disciplinary diversity.
- Establishment of a stable and functional Global Knowledge Network with the capacity to contribute to ocean research and sustainability beyond the period of the Ocean Decade.

By implementing this plan, we are confident that SMARTNET will get us closer to a productive, predicted, healthy and resilient ocean, that is, to the ‘Ocean We Want’.

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Table 1: UN Ocean Decade endorsed Projects sponsored by SMARTNET. List as of July 2024.

Endorsement Date	HOST COUNTRY	PROJECT TITLE / DESCRIPTION
March 2023	Germany	<u>sustainMare</u> : Analyses and classifies use of and pressures on marine spaces to provide a scientifically sound basis to create decisions by politics, authorities and the economy.
March 2023	Italy	<u>Cost Action (MAF World)</u> : Provide the scientific basis for understanding and preserving Marine Animal Forests (MAFs), to unify different protocols (e.g. mapping, restoration, ecosystem services) to tackle climate change, natural disasters, & food crisis.
June 2023	USA, Global	<u>Global Plastic Ingestion Bioindicators (GPIB)</u> : Aims to move beyond baseline assessments of plastic pollution to evaluate trends, risks, and effects to species and ecosystems.
July 2024	Norway	<u>Ghost Fishing Solutions (GFS)</u> : Aims to prevent ghost gear, abandoned fishing gear that harms marine life and ecosystems, through innovative technology and practices.
July 2024	Denmark	<u>KlimaAtlas</u> : Conveys climate information about future changes and extremes in temperature, precipitation, wind, evaporation, sea level and storm surges in Denmark and serves as one of the primary sources of climate information on land in Denmark.
July 2024	Brazil	<u>INCT Biodiversity of the Blue Amazon (INCT-BBA)</u> : A vast Brazilian Project that has established a broad national network of researchers with international collaborators from different fields of knowledge to address specific goals, including basic and applied research, training of human resources qualified in Marine Sciences and scientific dissemination and outreach.
July 2024	Spain	<u>SAFETURTLES</u> : Collaborates with governments and fisheries along the Pacific American coast to facilitate the development of a regulated training system of fishers in best handling and release practices of captured turtles.

Table 2: SMARTNET sponsored or co-sponsored events during Phase 1.

DATE	VENUE	EVENT
April 2022, Washington, DC	Consortium for Ocean Leadership Meeting	Workshop to ‘Coordinate Biological Observing Programs in the UN Ocean Decade’
June 2022, Virtual	UN Ocean Decade Satellite Event on ‘A Productive Ocean’	SMARTNET: Establishing Global Knowledge Networks to Achieve ‘A Productive Ocean’ during the UN Decade of Ocean Science for Sustainable Development
September 2022, Busan, Korea	Workshop at PICES-2022 Annual Meeting	SMARTNET: Promoting PICES and ICES Leadership in the UN Decade of Ocean Science for Sustainable Development
April 2023, Atlanta, GA USA	Ocean Visions Biennial Summit	Panelist for ‘Leveraging the UN Ocean Decade Framework for Ocean-Climate Solutions’
April 2023, Bergen, Norway	Workshop at Effects of Climate Change on the World’s Oceans Conference	The Climate-Fisheries Nexus within the UN Decade of Ocean Science for Sustainable Development: Co- Designing Actions and Solutions for a Productive, Healthy and Resilient Ocean
October 2023, Seattle, WA USA	Workshop at PICES-2023 Annual Meeting	Sharing Capacity and Promoting Solutions for Marine Ecosystem Sustainability within the UN Decade of Ocean Science
April 2024, Barcelona, Spain	UN Ocean Decade Conference	Hosted Side Event on ‘What is the Ocean We Want: Global Survey to Understand Perspectives on Ocean Decade Outcomes’
April 2024, Barcelona, Spain	UN Ocean Decade Conference	Co-Sponsored Side Event on ‘The Inclusivity We Need for the Ocean We Want’, with ECOP Programme
April 2024, Barcelona, Spain	UN Ocean Decade Conference	Co-Sponsored Side Event on ‘Building Ocean Leadership: Fostering Networking, Creativity, and Resilience’, with ECOP Programme
October 2024, Honolulu, HI USA	Workshop at PICES-2024 Annual Meeting	Exploring international knowledge co-production: Lessons learned from international marine science organizations at the science-policy interface

SMARTNET sponsored event

SMARTNET co-sponsored event

SMARTNET participation at event

SUPPLEMENT A: SMARTNET Proposal submitted to the Intergovernmental Oceanographic Commission for Ocean Decade endorsement in January 2021.



UN Decade of Ocean Science
ICES/PICES Decade Programme
FINAL

Sustainability of Marine Ecosystems through global knowledge networks
(SMARTNET)

Summary description

SMARTNET will establish a global knowledge network (GKN) for ocean science by strengthening and expanding the collaboration of ICES/PICES and partner organizations. It will support and leverage ICES/PICES member countries' activities related to UNDOS, by emphasizing areas of mutual research interest including climate change, fisheries and ecosystem-based management, social, ecological and environmental dynamics of marine systems, coastal communities and human dimensions, and communication and capacity development. It also incorporates strategies to facilitate UNDOS cross-cutting inclusivity themes relating to gender equality, early career engagement, and involvement of indigenous communities and developing nations in the planning and implementation of joint activities.

Countries in which the Programme will be implemented

ICES and PICES Member Countries*, as well as countries and organizations with which we have formal affiliations (e.g. Australia, New Zealand, Chile, Peru, South Africa, UN, FAO, IOC, Regional Fisheries Management Organizations, and Regional Seas Conventions)

The ICES and PICES international scientific platform and cooperation thus goes far beyond our Member Countries, and with potential for this programme to be implemented in countries in both the Northern and Southern hemisphere. We expect to develop partnerships with countries in Africa (e.g. Angola, Mozambique, Sao Tomé and Príncipe and Cabo Verde), Caribbean and Asia, as well as island nations (e.g., East Timor and Palau), Brazil, and India.

*ICES Member Countries; Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russian Federation, Spain, Sweden, United Kingdom, United States of America

* PICES Member Countries; Canada, China, Japan, Republic of Korea, Russian Federation, United States of America

High-level objectives

Develop and implement a global knowledge network to support knowledge production and dissemination on the status and future of marine social-ecological systems in support of the UN Sustainable Development Goals.

This knowledge will be used to advance and share scientific understanding of marine ecosystems and the services they provide. We will use this knowledge to generate state-of-the-art advice and evidence for meeting conservation, management, and sustainability goals.

The Strategic Plans and Objectives of both organizations are well-aligned with the objectives of the Ocean Decade and our established networks and existing infrastructure will allow us to build on our experience in successfully conducting joint research across our organizations and scientific communities.

During the latter part of 2020, the Governing Councils of ICES and PICES agreed to establish an ICES–PICES Ocean Decade Steering Committee (IPOD SC) to identify activities central to the science objectives of our organizations and the Ocean Decade.

Key expected outcomes

We will increase understanding of the current state and future development of marine social-ecological systems through collaboration of scientists with diverse partners, including under-represented communities, indigenous populations, and early career ocean professionals. We aim to establish a programmatic infrastructure to facilitate transformative scientific research and exchange of information and technical capacity from developed to developing countries as a key outcome. Science will be communicated in a clear, concise manner to achieve solution-based goals for the “ocean we want”.

The ICES–PICES Decade programme – SMARTNET - will identify and facilitate engagement of partner organizations to implement joint UN Ocean Decade activities and enhance communication and outreach to diverse stakeholders. In particular, we acknowledge the

‘Coastal Indigenous Peoples’ Declaration at OceanObs’19’, and similar initiatives, to “establish meaningful partnerships with indigenous communities, organizations, and Nations to learn and respect each other’s ways of knowing; negotiate paths forward to design, develop, and carry out ocean observing initiatives; and share responsibility and resources”. We will engage with organizations that have capacity to bring traditional/indigenous knowledge into our activities. We will also develop partnerships with organizations active in regions outside our formal membership, working in conjunction with the IOC Decade Coordination Unit.

Activities that will be implemented as part of the proposed Decade Programme

There is a long and productive history of collaboration through joint ICES-PICES working groups (see the list below) working on a wide range of topics including climate change impacts on fish and shellfish, biologically-driven ocean carbon sequestration, and regional integrated ecosystem assessments. SMARTNET will leverage the experience and momentum of these joint working groups to expand our work thematically and geographically. Some working groups have also included other organizations, such as the Arctic-oriented Working Groups, and this practice will be extended under the Decade programme to southern hemisphere organizations to deliver the required expansion. We will also coordinate with Global Stakeholder Fora at an early stage to identify and prioritize programme activities. Working group terms of reference are typically updated after 1-5 years to accommodate changing priorities and emerging issues. This iterative process will allow the Decade programme to be dynamic and to evolve as the Decade progresses. Many current joint working groups already have relevance to the planned Decade Outcomes because they were developed with the SDGs in mind. The IPOD Steering committee will develop initial programme priorities and set update Terms of Reference during 2021.

The programme will also leverage ongoing efforts in ICES and PICES to develop a network of Early Career Ocean Professionals (ECOP). We have already jointly-hosted three international Early Career Scientist Symposia to encourage the participation of ECOP in international scientific investigations and to promote their involvement in the management and stewardship of the marine environment. The fourth in the series is scheduled to be held in Canada in May 2022 and will have an Ocean Decade theme. The Scientific Steering Committee, comprising 9 ECOPS from both organizations and the local host, is meeting in January 2021 to develop the programme for this Symposium.

Plans are underway for a first joint ICES/PICES conference in the autumn of 2023, hosted by the USA, in place of separate organizational annual meetings. We propose that this conference be designated as a formal Decade event which will evaluate the early scientific accomplishments and plan further activities that will be conducted during the Decade. Consistent with the goals of the Decade and ICES/PICES shared priorities, the joint conference will also play an important role in furthering development of ECOP, will include representation from indigenous communities and developing nations, and will recognize the importance of gender equality. A second ICES/PICES event is anticipated, likely in the Southern Hemisphere, towards the later stages of the Decade (2028) to review and synthesize accomplishments, and to identify remaining gaps and needed activities.

Ongoing initiatives:

Joint Working Groups:

Joint ICES/PICES Working Group on Small Pelagic Fish

ICES/ PICES Working Group on Ocean Negative Carbon Emission (WG ONCE)

ICES/PICES Working Group on Impacts of Warming on Growth Rates and Fisheries Yields (WG GRAFY)

ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment (IEA) for the Central Arctic Ocean

Joint ICES/PICES Working Group on Integrated Ecosystem Assessment of the Northern Bering Sea-Chukchi Sea

ICES/PICES Strategic Initiative on Climate Change Impacts on Marine Ecosystems

ICES Council Strategic Initiative/PICES Study Group on the UN Decade of Ocean Science

Symposia:

ICES/PICES/NOAA Marine Socio-Ecological Systems Symposium 2021

ICES/PICES Symposium on Small Pelagic Fish: New Frontiers in Science and Sustainable Management 2022.

ICES/PICES Early Career Scientist Conference 2022

Joint ICES/PICES Conference 2023

Joint multiyear programmes:

International Year of the Salmon (ICES (via NASCO)/PICES/NPAFC/other partners)

Please describe the theory of change that underpins your proposed Decade Programme i.e. how will the activities being carried out achieve the outcomes and objectives that you envisage

The Decade of Ocean Science for Sustainable Development offers a unique opportunity to align efforts and link up with partners outside the current constituency. The IPOD Steering Committee will develop and consolidate a strategic plan to bring about transformational science during the Decade by building upon our long history of successful partnerships in advancement of marine science which have included Regional Fisheries Management Organizations (RFMOs), Regional Conventions and member countries. Beyond that, we anticipate close coordination with a range of stakeholders to identify and prioritize programme activities. Establishment of joint working groups provides opportunities to bring together experts and knowledge holders from different organisations, disciplines and backgrounds in a sustained structure that supports the development of joint publications, activities and projects, but is partly dependent on external funding. In addition, we will use and extend our current evaluation processes for these groups to guide the action or project planning, design and implementation, and to monitor and assess activities to identify impact and achievements. Groups report to the steering structures on a yearly basis and produce science reports in open access report series. These evaluation processes have enabled us to be resilient and adapt to change over many years of individual and collaborative endeavors.

How will the proposed Decade Programme enhance the sustainability of ocean science initiatives, including infrastructure or individual / institutional capacity, in light of the current Covid-19 pandemic

SMARTNET will support and encourage establishment of joint working groups, workshops and symposia with partners of ICES and PICES in the Southern Pacific and Southern Atlantic and will extend cooperation in the Arctic. The international programme will embrace new working cultures, with emphasis on remote meetings, aimed at greater accessibility with reduced travel to reduce greenhouse gas emissions. The infrastructure to allow these groups to work remotely is already available, and has been greatly enhanced

through our actions to transfer marine science training, cooperation, and development activities to remote platforms during 2020.

We acknowledge the educational and economic setbacks brought on by the COVID-19 pandemic and will accelerate our efforts to engage programme partners and stakeholders to accomplish our objectives. This includes the development of an international joint graduate education program and extending our training (short-course) programme.

Coordination / management structure for the proposed Decade Programme

ICES and PICES are international scientific organizations that interact and engage with a diverse range of entities, including academia, government agencies, policy-makers, industry, and NGOs throughout the Northern Hemisphere. Our presence in the Southern Hemisphere through partnerships and agreements is already strong and will increase substantially through the SMARTNET Programme. Our organizations play leading roles in advancing and communicating scientific understanding of marine ecosystems for societal outcomes. They are supported by national contracting parties, have established and sustainable infrastructures, and have demonstrated many decades of success in developing and advancing ocean science. Our partnership brings together diverse networks to increase the overall capacity to conduct ocean science in support of sustainable development and to foster the range of skills necessary to support broad and overarching marine science goals.

The IPOD Steering committee will have initial oversight of joint programme activities. Its terms of reference include identifying strategic partners and activities to be carried out within the programme, and establishing a more permanent oversight body after 2021 that will include international partners. The joint oversight expert body will evolve with the Decade, via periodic review of its terms of reference, assessments of where the programme outputs should be better aligned with the Decade as it matures, and the regular rotation of new personnel into the group. Wide geographic representation is assured through the working group membership policies of both organizations. In accordance with ICES and PICES commitments to increase the involvement of Early Career Ocean Professionals (ECOPs) in working groups, ECOPs will form part of the membership of the oversight body which will confer several advantages: mentorship and career development of the ECOPs by senior scientists, ensuring continuity during the Decade and a lasting legacy when the circle is completed as the ECOPs transition into established scientists and new ECOPs begin to participate in the Programme.

To which Sustainable Development Goal(s) (SDG) will your proposed Decade Programme contribute? Please select a

maximum of three SDGs

GOAL 1: No Poverty.

GOAL 2: Zero Hunger

GOAL 3: Good Health and Well-being

GOAL 4: Quality Education

GOAL 5: Gender Equality

GOAL 6: Clean Water and Sanitation

GOAL 7: Affordable and Clean Energy

GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequality

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

GOAL 13: Climate Action

GOAL 14: Life Below Water

GOAL 15: Life on Land

GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal

How will your proposed Decade programme will contribute to the SDGs selected?

All SDGs are intrinsically interlinked. The proposed framework, in collaboration with partner organisations and the financial support of member countries and donors, will develop and support activities, including working groups, workshops and symposia, which produce and synthesize marine scientific and other knowledge which support SDG 13 with

focus on target 13.2 (integrate climate change measures into national policies, strategies and planning), and SDG 14, with focus on 14.2 (sustainably manage and protect marine and coastal ecosystems), 14.4 (effectively regulate harvesting and end overfishing), 14.7 (increase the economic benefits to Small Island Developing States), 14a (increase scientific knowledge, develop research capacity and transfer marine technology). Through this process we will also support targets of other SDGs. The implementation will explicitly focus on gender equality, and more broadly on diversity, equality and inclusion. By extending into regions beyond our traditional regional focus we will enhance knowledge exchange and develop capacity for knowledge production, the SMARTNET Programme will be directly responsive to SDG 17, target 17.6 (Enhance North-South, South-South and triangular regional and international cooperation) and 17.18 (By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States).

How will your proposed Decade Programme contribute to the vision and mission of the Decade?

Both ICES and PICES are uniquely positioned to develop and synthesize science to provide the evidence base to support policy and decision makers to achieve a productive, healthy, safe, and resilient ocean. Their experience in communicating with recipients of advice and extending this expertise in engaging with stakeholders and other ocean actors, will concretely support the identification of both the science we need and the joint objectives for the ocean we want. Both organisations have a commitment and strategies in place to build capacity through engagement with ECOPs and less developed countries which will be expanded and emphasised through the Decade Programme. The joint projects and activities that are already active within the SMARTNET Programme and those to be initiated will produce the knowledge base needed to bring about transformational science and facilitate tractable solutions. Partnering RFMOs and RSCs are already using scientific evidence and advice provided by existing Working Groups. We will also work with international programmes such as Future Earth to facilitate and promote transdisciplinary research and sustainability studies.

In addition, the SMARTNET Programme will be proactive in recommending and seeking resources to improve ocean observing and ecosystem monitoring activities, particularly in regions around least developed and developing countries. Products developed through SMARTNET activities will assist in the identification of key observing gaps and the promotion of emerging technologies.

To which Decade outcome(s) will your proposed Decade Programme contribute?

Outcome 1: A clean ocean where sources of pollution are identified and reduced or removed.

Outcome 2: A healthy and resilient ocean where marine ecosystems are understood, protected, restored and managed.

Outcome 3: A productive ocean supporting sustainable food supply and a sustainable ocean economy.

Outcome 4: A predicted ocean where society understands and can respond to changing ocean conditions.

Outcome 5: A safe ocean where life and livelihoods are protected from ocean-related hazards.

Outcome 6: An accessible ocean with open and equitable access to data, information and technology and innovation.

Outcome 7: An inspiring and engaging ocean where society understands and values the ocean in relation to human wellbeing and sustainable development.

How will your proposed Decade Programme contribute to the Decade outcomes selected?

ICES and PICES Science Plans encompass the goals of UNDOS, with science priorities directly addressing the expected societal outcomes. ICES and PICES have existing capacity and well-developed institutional infrastructures supporting marine science research, responding to societal needs. This is made possible through legally binding conventions and commitments from member countries, recognizing the importance of scientific research and coordination of effort, the importance of relating scientific work to national, regional, and global management objectives, and where possible reconciling resource management and biodiversity conservation objectives. This is evident through the unique and collaborative work of our two organizations, which is further strengthened through cooperation with other partners. This extended network has global reach covering the North Atlantic, North Pacific and Arctic and broad thematic scope within and beyond areas

of national jurisdiction. We have developed and continue to develop science in areas such as climate change effects on marine ecosystems, fisheries and ecosystem-based management, the human dimension, and capacity building to improve understanding, estimation and prediction (Outcomes 4, 5, 6) to provide evidence to support a clean, healthy, safe, productive, and resilient ocean (Outcome 1, 2, 3) and promoting work ensuring an accessible, inspiring and engaging ocean (Outcome 7).

To which Ocean Decade Challenge(s) will your proposed Decade Programme contribute?

Challenge 1: Understand and map land and sea-based sources of pollutants and contaminants and their potential impacts on human health and ocean ecosystems, and develop solutions to remove or mitigate them.

Challenge 2: Understand the effects of multiple stressors on ocean ecosystems, and develop solutions to monitor, protect, manage and restore ecosystems and their biodiversity under changing environmental, social and climate conditions.

Challenge 3: Generate knowledge, support innovation, and develop solutions to optimise the role of the ocean in sustainably feeding the world's population under changing environmental, social and climate conditions.

Challenge 4: Generate knowledge, support innovation, and develop solutions for equitable and sustainable development of the ocean economy under changing environmental, social and climate conditions.

Challenge 5: Enhance understanding of the ocean-climate nexus and generate knowledge and solutions to mitigate, adapt and build resilience to the effects of climate change across all geographies and at all scales, and to improve services including predictions for the ocean, climate and weather.

Challenge 6: Enhance multi-hazard early warning services for all geophysical, ecological, biological, weather, climate and anthropogenic related ocean and coastal hazards, and mainstream community preparedness and resilience.

Challenge 7: Ensure a sustainable ocean observing system across all ocean basins that delivers accessible, timely, and actionable data and information to all users.

Challenge 8: Through multi-stakeholder collaboration, develop a comprehensive digital representation of the ocean, including a dynamic ocean map, which provides

free and open access for exploring, discovering, and visualizing past, current, and future ocean conditions in a manner relevant to diverse stakeholders.

Challenge 9: Ensure comprehensive capacity development and equitable access to data, information, knowledge and technology across all aspects of ocean science and for all stakeholders.

Challenge 10: Ensure that the multiple values and services of the ocean for human wellbeing, 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.

How will your proposed Decade Programme contribute to the Decade Challenges selected?

Sustainability of a healthy and resilient ocean for the benefit of future generations requires evidence-based decision-making. Through an ecosystem-based approach, our Decade programme will facilitate science to develop and implement tools and assessments to support decision-making including the evaluation of cumulative effects and analyses of trade-offs among ocean users (Challenge 1, 2, 3, 4, 10). It will provide ecosystem, fisheries, and aquaculture assessments in new areas (ecosystem description, identification of human pressures, and their effect on key ecosystem components), and will advance good practice in including local, traditional, and stakeholder knowledge (Challenge 2, 3, 5, 10). ICES and PICES already coordinate Northern Hemisphere efforts to understand, estimate and predict the impacts of climate change on marine ecosystems. This work is substantive, diverse and includes themes such as: i) global assessment of the implications of climate change on the spatial distribution of fish and fisheries, and forecasting, ii) seasonal to decadal prediction of marine ecosystems, iii) development and evaluation of socio-economic scenarios, and iv) development of scientific evidence to support decision-making. Current efforts in survey design and technology, data analysis and curation will be extended in cooperation with partners, i.e. regional organisations, stakeholders and member countries (Challenge 6, 7, 8, 9).

To which Decade Objective(s) will your proposed Decade Programme contribute?

Objective 1: Identify required knowledge for sustainable development, and increase the capacity of ocean science to deliver needed ocean data and information

Objective 2: Build capacity and generate comprehensive knowledge and understanding of the ocean including human interactions, and interactions with the atmosphere, cryosphere and the land sea interface.

Objective 3: Increase the use of ocean knowledge and understanding, and develop capacity to contribute to sustainable development solutions.

How will your proposed Decade Programme contribute to the Decade Objective(s) selected?

ICES and PICES have extensive and effective infrastructures and networks of expertise to efficiently develop, synthesize and translate scientific information and products which inform management through a transparent, unbiased, impartial, and independent process, providing the evidence base to inform about status and change of marine ecosystems (Objective 1 and 3). We are already key providers of advice for a broad range of organisations and countries and will expand this expertise in collaboration with existing and new partners (Objective 3). Working groups cover ecosystem science, impacts of human activities, seafood production, conservation and management, emerging technologies and the relationship between sea and society (Objective 2). We will extend these activities to include social and economic information in integrated ecosystem assessments, exploration of tools to evaluate marine socio-ecological systems and develop good practice for the co-creation of the evidence base, including development and evaluation of scenarios and solutions with indigenous people, coastal and local communities, and stakeholders as full partners (Objective 1, 2, 3). Strengthened emphasis on science communication and ocean literacy, as well as ECOP development will be leveraged to disseminate the knowledge and products developed in the programme (Objective 3).

With respect to the Decade Objectives selected above, to which Decade Sub-Objective(s) will your proposed Decade Programme contribute?

1.1: Provide the scientific basis for regular integrated assessments of the state of the ocean and identify priority gaps at different scales and in different geographies to frame efforts in exploration, observations and experimentation.

1.2: Promote new technology development and enhance access to technology to generate ocean data, information and knowledge.

1.3: Enhance and expand existing ocean observing systems across all ocean basins to deliver information on standardized essential ocean variables including social and economic, geological, physical, chemical, bathymetric, biological, ecological parameters, and observations on human interactions with the ocean.

1.4: Develop mechanisms that support community-led science initiatives and the recognition and inclusion of local and indigenous knowledge as a fundamental source of knowledge.

1.5: Undertake regular assessments of the state of ocean science capacity to identify and overcome barriers to generational, gender and geographic diversity, and promote sufficient and sustainable investment.

2.1: Generate a comprehensive inventory, mapping, and understanding of the role and function of ocean components including their human interactions and interactions with the atmosphere, cryosphere and the land sea interface.

2.2: Generate a comprehensive understanding of thresholds and tipping points for ocean components, including human interactions.

2.3: Innovate and expand the use of historical ocean knowledge to support sustainable development solutions.

2.4: Improve existing, and develop new generation ocean models for improved understanding of the past, current and future states of the ocean, including human interactions.

2.4: Improve prediction services and increase predictive capability for oceanic hazards or events including extreme weather and climate.

2.5: Expand cooperation in ocean-related education, training, capacity development and transfer of marine technology.

3.1: Broadly communicate and promote the role of ocean science for sustainable development across diverse stakeholder groups including through formal and information education and an expansion of ocean literacy approaches across stakeholder groups.

3.2: Develop interoperable, open access platforms and applications to share data, information and knowledge in a format that connects knowledge generators and users.

3.3: Undertake interdisciplinary, multi-stakeholder co-design and co-delivery of ocean solutions including policy, decision making, integrated ocean management frameworks, applications and services, and technology and innovation.

3.4: Expand and enhance spatial planning processes to contribute to sustainable development across regions and scales.

3.5: Expand and enhance inclusive and integrated management frameworks and tools, including nature-based solutions, to maintain ecosystem functioning, provide for adaptive processes under changing ocean conditions, and incorporate community values and needs.

3.6: Expand and enhance services, applications and management tools for building and mainstreaming preparedness and adaptive responses to multiple stressors and hazards.

3.7: Expand and enhance tools, applications and services that integrate and facilitate use of data, information, and knowledge on ocean-related natural capital including the social, cultural, environmental, and economic characteristics of the ocean.

How will your proposed Decade Programme contribute to the Decade sub-objectives selected?

ICES and PICES are established intergovernmental platforms for science cooperation with an extended scientific network spanning more than 60 countries, 700 institutes, and a pool of more than 6000 experts (1.1). Science is developed through working groups, annual science meetings and symposia. Activities span across all marine science disciplines, improving the understanding, integrated assessment and prediction of marine socio-ecological systems (2.1, 2.2, 2.3, 2.4). Education and training programmes will be further developed in cooperation with partner organizations to improve capacity development (2.5, 3.1). Mechanisms already allow participation of observers and stakeholders and we will develop a process for including indigenous and local actors (1.4). We will also develop processes to ensure ensuring a diverse, inclusive, and gender balanced working environment and to transfer knowledge and technical capacity from ICES and PICES member countries to least developed and developing countries (1.4, 1.5). ICES and PICES have extensive experience in coordinating joint monitoring programs and developing data and technology science (1.2, 3.2). Our Data Centres already provide data services to a range of organizations, with data, data tools, and data products available online and compliant with commitments to ensure open data access and FAIR principles (1.3, 3.7).

Please check which of the following criteria are relevant to your proposed Decade Programme as far as they are relevant to your proposal:

Accelerate the generation or use of knowledge and understanding of the ocean, with a specific focus on knowledge that will contribute to the achievement of the SDGs and complementary policy frameworks and initiatives.

Is co-designed or co-delivered by knowledge generators and users, and does it facilitate the uptake of science and ocean knowledge for policy, decision making, management and/or innovation.

Will provide all data and resulting knowledge in an open access, shared, discoverable manner and appropriately deposited in recognized data repositories consistent with the IOC Oceanographic Data Exchange Policy[1] or the relevant UN subordinate body data policy. (If you check this criteria, please provide in the question below details of where data will be deposited and where it exists, attach a data management plan.)

Strengthen existing or create new partnerships across nations and/or between diverse ocean actors, including users of ocean science.

Contribute toward capacity development, including, but not limited to, beneficiaries in Small Island Developing States, Least Developed Countries and Land-locked Developing Countries.

Overcome barriers to diversity and equity, including gender, generational, and geographic diversity.

Collaborate with and engage local and indigenous knowledge holders.

How will your proposed Decade Programme contribute to the Decade criteria selected?

Collaborative integrated projects and activities initiated under the SMARTNET Programme will be developed and implemented through partnerships and collaborations in to substantially advance our understanding of processes and phenomena in ocean ecosystems. Access to data will be based on the principle of open data and an adherence to the FAIR principles (Findable, Accessible, Interoperable, Reusable), acknowledging the

need to exclude some data from unrestricted access due to sensitivities, such as sensitive location information (e.g. vulnerable marine ecosystems).

Emerging conservation activities will be addressed, including a focus on marine biodiversity in areas beyond national jurisdiction, microplastic pollution, and further advancing a better understanding on the ocean ecosystem functioning under progressive climate change and human impacts.

This will be accomplished with full participation of the new generation of marine researchers, supporting involvement in large-scale international research projects, by invitations to (co-)author publications. This inclusion and participation will extend across international research communities, in an overall effort to promote career prospects and develop the future leadership. All activities will recognize our commitment to pursue a diverse, inclusive, and gender balanced working environment and to ensure transfer of knowledge and technical capacity from developed countries within ICES and PICES to least developed and developing countries.

Please describe how you plan to communicate about your proposed Decade Programme including the main target audiences and methods of communications.

Science communication and ocean literacy are integral components of the work of ICES and PICES. Developing tailored outputs for target audiences using appropriate media will be an important objective for the programme.

Programme progress will be communicated broadly using available Ocean Decade mechanisms, as well as established and developing ICES and PICES channels.

Programme outputs will pursue peer-reviewed publications. Outputs may also be peer-reviewed and quality assured translation of science into policy and management relevant advice (e.g. ICES Viewpoints, see for example here:

<http://ices.dk/sites/pub/Publication%20Reports/Advice/2020/2020/vp.2020.01.pdf>)

Specific messages resulting from these publications and outputs will be tailored for target audiences at all levels, and across sectors: policymakers; management bodies, scientific community, and the informed public.

Social media will be leveraged to amplify the messages and communicate broadly.

PICES has recently established a Study Group in Science Communications with a specific goal of enhancing the communication of PICES sciences, especially within the context of the Ocean Decade, by broadening the scope of its scientific community to include communication specialists (e.g., designers, journalists, videographers, artists, educators) and policy makers. Specific deliverables include establishing international transdisciplinary opportunities to enhance communication capacity of PICES science, promoting "green" science and highlighting carbon reduction, especially developing a strategy for PICES meetings to become carbon neutral within the next decade.

ICES has a dedicated Communications team that will be engaged to help convey agreed outcomes and messages, using appropriate media including the ICES website and social media channels.

SUPPLEMENT B: SMARTNET Ocean Decade endorsement letter from the Intergovernmental Oceanographic Commission.



**INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
COMMISSION OCÉANOGRAPHIQUE INTERGOUVERNEMENTALE
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ**

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Ref. : IOC/VR/21.134/JB/AC/ic

7 June 2021

Dear Madam, Sir,

It gives me a great pleasure to inform you of the endorsement of the Decade Action entitled "No. 90 - Sustainability of Marine Ecosystems through global knowledge networks", which you submitted in response to the Call for Decade Actions No. 01/2020 as a programme of the UN Decade of Ocean Science for Sustainable Development. Please accept my sincere congratulations on this achievement.

The endorsement of your programme is a milestone in your involvement in the Ocean Decade. I would cordially request you to please undertake the following steps:

- (i) Please review the attached Charter for Endorsed Decade Programmes, which includes further information on their functioning and roles as part of the Ocean Decade.
- (ii) Please review the information on the Ocean Decade Communities of Practice at [this link](#) and sign up to one or more of the Communities of Practice that are relevant to your programme. Via that link you will also be asked to respond if you would be willing to play a lead role in co-organising a virtual "meet and greet" between Community of Practice members in coming months.
- (iii) Please review the [Communications Welcome Pack](#) and provide the name and contact details of a focal point for communications within your team. In coming weeks we will be reaching out to you regarding the official announcement of your Decade Action, and it would be greatly appreciated if you could provide the information requested in the Welcome Pack to allow us to develop social media assets and a factsheet for your programme as soon as possible.
- (iv) Please provide the name and contact details of an Early Career Ocean Professional (ECOP) focal point within your team that can be put in contact with the Ocean Decade ECOP Informal Working Group.
- (v) Finally, please review, print on your institutional letterhead, and then sign and send the attached acknowledgement letter confirming receipt of this letter and the information contained herein.

.../...

International Council for the Exploration of the Sea (ICES)
Copenhagen V, Denmark
The North Pacific Marine Science Organization (PICES)
Sidney, British Columbia, Canada

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Technical Secretary
Navy Hydrographic Service
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Executive Secretary

Dr Vladimir RYABININ
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02, Boulevard Sidi Abderrahmane
Ain Diab
20180 Casablanca
MOROCCO

Due to formal legal reasons, please kindly be aware of the following disclaimer. Endorsement of your programme does not imply endorsement by the IOC/UNESCO of any business type, product or service. Nothing in or relating to this letter and its attachment shall be deemed a waiver of any of the privileges and immunities of UNESCO. All disputes arising out of or in connection with this letter and its attachment and your acceptance thereof shall be settled by mutual understanding. However, if no amicable settlement can be arrived at, any dispute shall be arbitrated according to the rules defined by the United Nations Commission on International Trade Law (UNCITRAL).

In coming weeks we will also be in touch with you to request additional information to aid in the development of a consolidated resource needs assessment for Decade Actions and to discuss the process of identifying and endorsing projects that will form part of your programme. In the meantime, if you have any questions or require any additional information on the above please do not hesitate to contact us at oceandecade@unesco.org.

Again, on behalf of the entire Ocean Decade Team, please accept my heartfelt congratulations on the endorsement of your Decade Action. Together, let us work towards the ocean we want!

Sincerely,



Vladimir Ryabinin
Executive Secretary, IOC



CHARTER FOR ENDORSED DECADE PROGRAMMES

Congratulations! After a thorough review process following the process outlined in the Ocean Decade Implementation Plan, the Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO (IOC) has endorsed your Decade Programme as part of the UN Decade of Ocean Science for Sustainable Development (the Ocean Decade).

This endorsement is a recognition that your programme will play a central role in supporting the Ocean Decade mission to catalyse transformative ocean science solutions for sustainable development, connecting people and the ocean, in order to achieve the Ocean Decade vision of 'the science we need for the ocean we want'.

This Charter document sets out the responsibilities of the partners responsible for implementing the programme, as well as providing other useful information and conditions pertaining to the endorsement.

I. DURATION AND SCOPE OF ENDORSEMENT

1. The endorsement of the programme will be valid for the duration that you identified in your submission. If there is a change in the duration of the implementation period of more than six (6) months, please notify the Decade Coordination Unit in writing so that we can determine whether a subsequent endorsement evaluation is required.
2. The endorsement of the programme is for the scope that was detailed in the submission to the Decade Coordination Unit, any subsequent supplementary information provided to the Decade Coordination Unit during the evaluation process, and any conditions or requirements identified in the endorsement letter from the Executive Secretary of the IOC. If you plan any significant changes to the programme, including its strategy, plan and/or partners, please advise the Decade Coordination Unit as soon as possible so that we can determine whether a subsequent endorsement evaluation is required.

II. RESPONSIBILITIES OF AN ENDORSED DECADE PROGRAMME

3. As a Decade Programme, your programme will play a prominent role in delivering against the ambitions of the Ocean Decade and contributing to one or more Ocean Decade Challenge[s]. Specifically, the endorsed programme will be responsible for:
 - i. Playing an active and lead role in relevant Communities of Practice via the Global Stakeholder Forum to optimise synergies and collaboration with other Decade stakeholders and thus contribute to the collective impact of the Decade.
 - ii. Ensuring close and regular coordination and communication with the relevant Decade coordination structures nominated by the Decade Coordination Unit including Decade Coordination Offices, Decade Collaborative Centres and Decade Implementing Partners. This includes, amongst other issues, provision of information on attached Decade projects, as well as information needed for gap analyses, resources needs assessments, work planning, and annual monitoring and reporting. The Decade Coordination Unit will provide information on the Decade coordination structures relevant to your programme.
 - iii. Ensuring coordination across partners in the endorsed Programme. This will include facilitating co-design and co-delivery of programme initiatives to meet the Programme's stated objectives, as well as coordinating work planning, implementation of activities, collation of information on resource needs and monitoring, and contributing to communications and outreach.
 - iv. Contributing to gap analyses processes led by the Decade coordination structures and coordination of programmatic input to the development of Calls for Decade Actions at the project level. We may also ask you to provide recommendations and advice to the Decade

Coordination Unit in relation to the requests for endorsement for Decade projects that apply to join the endorsed programme.

- v. Working with Decade coordination structures and relevant Network Programmes to catalyse the co-design and co-delivery of new Decade Actions and partnerships that could be attached to the endorsed programme as projects or activities. This will include actively fostering and creating a structure within which new projects can be identified and attached to the endorsed programme once endorsed by the Decade Coordination Unit.
- vi. Coordinating communication and collaboration with leads of attached Decade projects in order to ensure coherence in activities and contribution to overall work planning, implementation and monitoring. This will include supporting Decade projects to deliver required monitoring information, and collecting information to inform resource needs assessments and communications products.
- vii. Consolidating annual monitoring information at the programme level for sharing with the Decade Coordination Unit in line with the requirements of the Decade Monitoring & Evaluation framework that will be provided to the lead partner of the endorsed programme. The Decade Coordination Unit will provide information on the annual monitoring information that you will need to provide.
- viii. Providing regular information on resources needs and gaps for operational and coordination activities. Playing a lead and active role in resource mobilisation efforts for the endorsed programme, and ensuring close and regular coordination and communication with Decade coordination structures in relation to resource mobilisation efforts, achievements and opportunities.
- ix. Contributing to communications and outreach activities to engage new partners and new projects and raise awareness of the impact and achievements of the endorsed programme and its component projects.
- x. Contributing to regular review processes led by the Decade coordination structures that are envisaged in the Implementation Plan.

III. BENEFITS OF AN ENDORSED DECADE PROGRAMME

4. Your programme will be recognized and showcased on the Ocean Decade website (oceandecade.org), included in Ocean Decade communications materials and assets (e.g. social media channels, reports, Ocean Decade events).
5. As a Decade Programme, you will be able to use the Ocean Decade logo in line with the [Ocean Decade Branding Guidelines](#) in relevant materials and assets, including, but not limited to, peer-reviewed papers, reports, programme website, programme materials, press materials and/or social media channels. Please note that you cannot grant or authorise use of the logo by any third party.

IV. SUSPENSION OR TERMINATION OF ENDORSEMENT

6. Please note that the IOC may terminate this endorsement on the basis of advice from the Decade Advisory Board if there is a failure to fulfil the responsibilities outlined in this Charter or if annual resources needs assessments indicate that despite the best efforts of the Programme Lead and the Decade coordination structures the programme has failed after a reasonable period of time to mobilise sufficient resources to operate as a Decade Programme.
7. Should the endorsement be terminated, you will no longer be able to use the Ocean Decade logo and it must be removed from any programme materials and assets.
8. The Programme Lead may also indicate in writing to the IOC at any time that it no longer wishes to be recognised as an endorsed Decade Programme.

Thank you for your engagement in the Ocean Decade and we look forward to creating the ocean we want by 2030!

ACKNOWLEDGEMENT LETTER – PLEASE PRINT ON YOUR INSTITUTIONAL LETTERHEAD AND SEND A SIGNED COPY TO j.barbiere@unesco.org with copy to a.clausen@unesco.org and oceandecade@unesco.org

Dear Executive Secretary,

I confirm receipt of your letter dated [INSERT DATE] advising of the endorsement of [INSERT PROGRAMME NUMBER AND NAME] as an endorsed programme of the UN Decade of Ocean Science for Sustainable Development. I have read and acknowledge my understanding of the information contained in the letter and the Charter for Endorsed Decade Programmes in the attachment.

I am pleased to advise the name and contact details of:

1. Communications Focal Point
 - a. [NAME]
 - b. [EMAIL ADDRESS]

2. Early Career Ocean Professionals Focal Point
 - a. [NAME]
 - b. [EMAIL ADDRESS]

Sincerely,

[SIGNATURE REPRESENTATIVE OF THE LEAD PARTNER OF THE DECADE CONTRIBUTION]

Name: [INSERT NAME]

Title: [INSERT TITLE]

Institution: [INSERT NAME OF LEAD PARTNER INSTITUTION]

Date: [INSERT DATE]

SUPPLEMENT C: ICES-PICES Ocean Decade SMARTNET Steering Committee Membership (July 2024). PICES members serve on the Advisory Panel on the UN Decade of Ocean Science (AP-UNDOS).



Kathryn Berry (BECI, ex-officio)

Steven Bograd (USA, Co-Chair)

Sanae Chiba (SECRETARIAT, Co-Chair)

Emanuele Di Lorenzo (USA)

Kirstin Holsman (USA)

Jennifer Jackson (CANADA)

Khushboo Jhugroo (CANADA)

Sukyung Kang (KOREA, Science Board)

Emily Lemagie (USA)

Li Li (CHINA)

Hyung-Gyu Lim (Korea)

Mitsutaku Makino (JAPAN)

Hanna Na (KOREA)

Fangli Qiao (CHINA)

Raphael Roman (CANADA)

Hiroaki Saito (JAPAN)

Erin Satterthwaite (USA)

Vera Trainer (USA)

Andrea White (Canada)

Sinjae Yoo (Korea)

Silvana Birchenough (UK)

Alan Haynie (SECRETARIAT)

David Reid (SECRETARIAT, Co-Chair)

A. Miguel Santos (PORTUGAL)

Olivier Thibaud (FRANCE)

SUPPLEMENT D: PICES Advisory Panel on the UN Decade of Ocean Science (AP-UNDOS)
Terms of Reference (July 2024).

1. Define and promote the joint scientific activities of PICES and partner organizations (including [ICES](#)) that will contribute to UN Ocean Decade societal outcomes.
2. Implement the SMARTNET Programme (in partnership with ICES), organize its activities and partnerships, monitor its progress, and communicate updates to the PICES community.
3. Implement a strategy that prioritizes engagement with early career ocean professionals, indigenous communities, developing nations, and recognizes the importance of promoting diversity and gender equity in our activities; Coordinate with [FUTURE SSC](#), [AP-ECOP](#) and [AP-SciCom](#) to develop these strategies.
4. Develop recommendations for new UN Ocean Decade activities for endorsement by [UNESCO-IOC](#), with new and existing partners, allowing for participation of additional partners throughout the Decade.
5. Develop recommendations for new and existing PICES Expert Groups to implement and maintain SMARTNET and UN Ocean Decade activities, and encourage and support Expert Group participation in all aspects of the UN Ocean Decade.

SUPPLEMENT E: Memorandum of Understanding between PICES and the Asia Pacific Network.

September 14, 2022

APN-PICES Collaborative Framework for Scientific Cooperation

Executive Summary

The Asia-Pacific Network for Global Change Research (APN) and North Pacific Marine Science Organization (PICES) are Intergovernmental Organizations with shared goals, particularly in terms of supporting international cooperation in research and capacity development, and partly overlapping geographic regions of focus. The joint APN-PICES Study Group for Scientific Cooperation in the Pacific Ocean (SG-PICES-APN) developed a framework that strives to enhance collaboration between the two organizations. This collaborative framework identifies several broad areas of joint interest to PICES and APN on which progress could be made over the next five years. Research areas relating to climate change (for example; sustainable fisheries, ecosystem services and food security, impacts of extreme events on coastal communities and the need for adaptation and disaster risk reduction) as well as marine plastic debris and microplastics, and downscaling of regional climate models are current foci for both organizations. Two common types of activity that spanned these research areas were also identified, one being the capacity development of early career professionals and the second being the engagement of Local and Traditional Ecological Knowledge (LTEK), a cross-cutting theme for the climate change research areas, in particular.

The framework identifies various mechanisms for implementing enhanced collaboration between PICES and APN including workshops and joint working groups, topic sessions at PICES Annual Meetings, representation at each other's meetings and/or workshops. As areas of interest and priorities change over time, the joint areas for collaboration may be updated.

Following approval from both organizations, routine monitoring of the progress of activities will be completed jointly by the Secretariats of PICES and APN and reported to the PICES Science Board annually, and APN's Intergovernmental Meeting (IGM) and Steering Committee (SC) on a regular basis, respectively.

Background

The Asia-Pacific Network for Global Change Research (APN) and North Pacific Marine Science Organization (PICES) are Intergovernmental Organizations with shared goals, particularly in terms of supporting international cooperation in research and capacity development, and partly overlapping geographic regions of focus.

APN was established in 1996 as an intergovernmental network working towards an Asia-Pacific region that is successfully addressing the challenges of global change and sustainability. A list of the member countries of APN can be found [here](#)

APN's mission is to support a cohesive and interactive community of global change researchers, policymakers, practitioners and civil society across the Asia-Pacific region through innovative and transdisciplinary approaches that draw upon the extensive network of science-policy practitioners. An integral part of its mission is to support and promote the scientific investigations of changes in the Earth's life support systems and their implications for sustainable development in the Asia-Pacific region. The APN contributes to the realization of these investigations through:

September 14, 2022

1. Supporting research and science-based response strategies.
2. Effectively linking scientific outcomes with policy mechanisms applicable to all levels of governance and societal sectors in each country.
3. Scientific capacity development within and beyond governments, including affected communities and other members of civil society.

PICES was established in 1992 to:

- I. promote and coordinate marine scientific research in order to advance scientific knowledge of the area concerned and of its living resources, including but not necessarily limited to research with respect to the ocean environment and its interactions with land and atmosphere, its role in and response to global weather and climate change, its flora, fauna and ecosystems, its uses and resources, and impacts upon it from human activities;
- II. promote the collection and exchange of information and data related to marine scientific research in the area concerned.

The Organization receives recommendations on the science program from the Science Board Executive Committee, which is supported by a number of permanent scientific and technical committees, along with an assemblage of “expert groups” with various life-spans. The PICES Convention Area is defined as “the temperate and sub-Arctic region of the North Pacific Ocean and its adjacent seas, especially northward from 30 degrees North Latitude, hereinafter referred to as the “area concerned”. Activities of the Organization, for scientific reasons, may extend farther southward in the North Pacific Ocean.”

The present PICES members are Canada, Japan, People’s Republic of China, Republic of Korea, the Russian Federation, and the United States of America. All PICES countries, except Canada, are currently also members of APN.

Development of Collaboration

Reciprocal participation in annual meetings of both organizations in 2020 prompted the recognition of shared priorities and that closer ties, and planning of joint activities, would be mutually beneficial. A joint Study Group (SG) to develop a Framework for Scientific Cooperation was developed and approved by PICES Governing Council in 2021 [GC Decision 2021/S/3] with a Terms of Reference that can be found here: [study-groups - PICES - North Pacific Marine Science Organization](#) Identification and approval of members was hampered by the COVID-19 pandemic, which prevented any in-person meetings and took some time, however, the Study Group had its first online meeting in February 2022. The SG met virtually three more times through 2022 and corresponded online to draft the present Collaborative Framework which was presented to PICES Science Board and Governing Council at PICES-2022. Representatives of both organizations also met in-person at PICES-2022 to discuss next steps. The present Collaborative Framework will be presented for consideration and approval to the APN Steering Committee either via email or on the occasion of its 51st Meeting in early 2023.

Collaborative Framework

APN Science Priorities

September 14, 2022

Through support of regional and international cooperation in research on inter- and transdisciplinary global change and sustainability issues particularly relevant to the Asia-Pacific region, APN aims to produce policy-relevant scientific knowledge that can contribute to the implementation of international agendas, such as the UNFCCC's Paris Agreement, Sustainable Development Goals, Sendai Framework for Disaster Risk Reduction, Post-2020 Global Biodiversity Framework, UN Decade of Ocean Science (2021-2030), and the accumulation of scientific knowledge in science-policy assessment bodies such as IPCC, IPBES, etc.

Global change affects all countries, and its impacts and the ability to measure and understand these impacts intersects different disciplines. Therefore, APN strives to address global change and sustainability in a holistic manner that involves active participation of all member countries across a broad spectrum of thematic areas under the global environmental change umbrella, including:

- Climate;
- Biodiversity and ecosystems;
- Air, land, coasts and oceans;
- Food, water and energy;
- Risk and resilience; and
- Human dimensions.

Capacity development of early-career scientists and professionals, and members of other societal groups is vital to enable APN member countries to formulate scientific evidence-based policies. Therefore, APN continuously strives to improve its capacity development agenda through:

- Enhancing efforts in providing support to early-career professionals through tailored research activities;
- Enhancing efforts in providing capacity development to early-career professionals that meet their specific needs, for example, by training them in developing high-quality scientific proposals;
- Continuing to strengthen APN's capacity development programme, CAPaBLE.
- Creating holistic and transdisciplinary capacity development activities on topics of relevance in the Asia-Pacific region.

PICES Science Priorities

PICES promotes transdisciplinary, multi-national collaborations to further collective understanding of the North Pacific's natural systems. As part of its vision, PICES aspires to be a leading contributor to global marine science and to be sought as a valued collaborator in addressing current and future management issues. The first goal of the 2016 PICES Strategic Plan is to "*Foster collaboration among scientists within PICES and with other multinational organizations, particularly with those that have common goals*".

PICES activities have been further guided by its current 10+-year integrated research program FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems). FUTURE is an integrative science program with a goal to understand and communicate the future of North Pacific ecosystems and the potential impacts from human use. More specifically, the

September 14, 2022

program seeks to understand how marine ecosystems in the North Pacific respond to climate change and human activities, to forecast ecosystem status based on contemporary understanding of how nature functions, and to communicate new insights to its members, governments, stakeholders, and the public. FUTURE is in its synthesis phase and is due to end in 2024.

In January 2021 the United Nations launched a Decade of Ocean Science for Sustainable Development (UNDOS), which was seen as a valuable opportunity for PICES to expand its horizons, building on FUTURE's achievements and providing a new iteration of integrated activities. A joint program proposal (SmartNet) was submitted with our sister organization, ICES, in the Atlantic, and was endorsed by the Intergovernmental Oceanographic Commission. SmartNet now forms a major focus within PICES which will last until 2031. It will establish a global knowledge network (GKN) for ocean science by strengthening and increasing the collaboration of ICES/PICES and partner organizations. It will support and leverage ICES/PICES member countries' activities related to UNDOS, by emphasizing areas of mutual research interest including climate change and ecological forecasting, fisheries and ecosystem-based management, and the social, ecological and environmental dynamics of marine systems, including coastal communities. It also incorporates strategies to facilitate UNDOS cross-cutting inclusivity themes relating to gender equality, early career engagement, and involvement of indigenous communities and developing nations in the planning and implementation of joint activities. The governance structure and implementation plan for Smartnet is currently being developed and will develop recommendations for new and existing Expert Groups.

Scientific Areas of Joint Interest

The criterion used to determine topics that are of mutual interest and which to focus on in the short-term was a shared relevance to both Organization's objectives or priority areas. Research areas and activities where collaboration would be desirable were identified (**Table 1**) together with the priority for each organization.

Collaboration Mechanisms

Potential mechanisms for enhancing collaboration between APN and PICES include:

1. Workshops or Topic Sessions at PICES annual meetings

Joint sessions at PICES annual meetings, typically held in October, are an excellent potential mechanism for cooperation between PICES and APN. Most past annual meetings include examples of sessions that PICES has co-convened with other organizations, such as CLIVAR (Climate and Ocean: Variability, Predictability and Change), ICES (International Council for the Exploration of the Sea), IMBER (Integrated Marine Biogeochemistry and Ecosystem Research), NOWPAP (Northwest Pacific Action Plan), and SOLAS (Surface Ocean Low Atmosphere Study), among others. The benefits of sharing research findings in a theme session or sharing expertise in workshops have been demonstrated by these examples.

Topic session proposals from PICES scientists and co-sponsoring organizations should be submitted to the PICES website by the deadline, typically September 1 of the calendar year before the Annual Meeting of interest. Proposals should include: a title, duration (full or half day), session description, list

September 14, 2022

of conveners, sponsoring PICES Scientific Committee(s), co-sponsoring organizations (if any), and whether (and where) a publication is intended. At the Committee meetings at the Annual Meeting in the fall (the year before the meeting of interest), recommendations for which session proposals to support are finalized. The Committee Chairs then present the recommendations to the Science Board (SB) who will evaluate and agree on co-sponsoring of sessions. The agreement will consider not just the scientific excellence and appropriateness of the proposals, but also the financial constraints of funding such sessions. The final list is then submitted to PICES Governing Council for final approval.

2. Joint Working Groups

Similar to the current joint APN-PICES Study Group on Scientific Cooperation in the North Pacific Ocean to develop the present Collaboration Framework, there may be a need to form other joint expert groups to address research priorities. Joint working groups represent one of the most effective mechanisms for collaboration and cooperation when there is a need to focus on a specific topic with specific deliverables defined by terms of reference. In general, joint working groups would be formed following one or a series of meetings and/or workshops that are organized on a common theme. Thus, effective planning is a crucial element in successfully establishing a new and productive working group. Typically, in PICES, a working group has a duration of three years. A proposal for a new working group should be submitted by one of the Committees to PICES Science Board for their review.

3. Conferences and Symposia

Normally, PICES organizes one major symposium per year in addition to its annual meeting. Typically, this symposium is jointly sponsored because of the financial commitments required to organize a major symposium. Organizations seeking co-sponsorship of a symposium by PICES should direct a letter of invitation to the Executive Secretary of PICES that describes the scientific rationale, other co-sponsoring organizations and a summary of roles and financial/in-kind contributions expected of PICES. Significant commitments of resources typically require 2–3 years advance planning. A potential example that may be an opportunity for co-sponsorship by APN is the next in the series of Early Career Scientist conferences (these alternate between ICES and PICES leadership), which would be expected to take place in a PICES country in 2027.

4. Representation at meetings and/or workshops

PICES and APN have a history of having representatives from other organizations participate in the annual meeting, including business meetings of relevant expert groups and workshops, where they can report on their organization's activities of interest and so foster collaboration. It is recommended that both organizations consider inviting one or more representatives from the other organization to participate in the meetings of, for example, the Steering Committee and Subregional Committee for the Pacific (for APN) and Science Board (for PICES) to update those bodies on ongoing research activities and research priorities for the future.

While hindered by the COVID pandemic, APN conducts at least one in-person subregional workshop to train early-career professionals on how to develop and submit effective proposals to APN for funding. In its current round of 2021 proposals, early-career professionals are leading 69% of projects funded by APN. This is a good indicator of its success. As APN's Pacific subregional Proposal Development Training Workshop (PDTW) is expected to be held in the coming year or two and as PICES and APN collaboration

September 14, 2022

is engaging Pacific subregional members of APN, there is a potential opportunity to have a joint Proposal Development Training Workshop on one or more of the topics identified in the introduction. A similar opportunity may also be relevant for North Pacific Countries as well as APN and PICES members overlap. This is an area worth exploring further.

Monitoring and Reporting

Following the approval and implementation of this collaborative framework by the respective bodies of PICES and APN (i.e., the Science Board and the Steering Committee), this framework will continue for a period of five years at which time it will be reviewed to assess the progress on the areas identified in Appendix 1, and to identify new areas for collaborations. The review should also assess the collaboration mechanisms by identifying which ones were employed, the utility of those mechanisms in achieving desired results, and identify new mechanisms for future joint collaboration.

On an annual basis, there will be a progress report prepared by the Secretariat of each organization that is available for its members. This progress report should be common for both organizations, be a summary of joint activities between PICES and APN (including status and actions required to make progress on objectives), and be prepared in collaboration by both Secretariats. Further, this progress report will be presented annually at the PICES Science Board and the APN ~~annual~~ Steering Committee meetings as part of a standing item on their agendas. If modifications/alterations are required to joint activities to enable enhanced productivity and success, these recommendations will be approved by both the PICES Science Board and APN Steering Committee (via correspondence if necessary). For any joint activity that is completed, the co-convenors will prepare a summary report of the activity and it will be available for all members of both organizations.

September 14, 2022

Table 1. Recommended joint PICES-APN focus areas with associated rankings and mechanism to achieve progress within 5 years.

Activity or Research Area	PICES Rank	APN Rank	PICES Focus	APN Focus	Mechanism and potential platforms	Priority in next 5 years
Activity: Capacity Development of ECOP. i. UNDOS cross-cutting theme	High	CD of ECPs: high	Major objective of SmartNet (UNDOS program). Major focus area for PICES recently with Advisory Panel on ECOP advisory-panels - PICES - North Pacific Marine Science Organization approved in 2021	One of the goals of APN's 5 th Strategic Plan is capacity development, particularly that of early career professionals (ECPs)	<ol style="list-style-type: none"> 1. APN – Capacity development programme (CAPABLE) is one of the two main pillars of APN's activities; 2. APN's Proposal Developing Training Workshop (PDTW) in the Pacific region may benefit from PICES input if there is a marine theme. 3. Next ICES-PICES ECS Symposium planned for 2027 	High, Relevant to UNDOS
Activity: Engaging Local and Traditional Ecological Knowledge i. UNDOS cross-cutting theme ii. Indigenous knowledge in the context of adaptation and disaster risk reduction iii. Indigenous Knowledge in the context of food and water security	High	High (for the Pacific SRC)	Major objective of SmartNet. Some activity at PICES-2022 (W6 for Bering Sea), Also planned for PICES-2023	"Global and indigenous knowledge" was one of the high priority topic areas of P-SCR for the 2021 call for proposals.	Workshops at upcoming events Will be discussed at PICES-APN side meeting in Busan, Sept 2022	High, relevant to UNDOS
Research area: Climate change; sustainable	High	Climate Change:	Major objective of SmartNet, and several	1. Food security (and habitat value)		High, priority research area

September 14, 2022

fisheries		high	PICES Expert Groups	2. Ecosystem services (non-food related) including cultural services		
Research area: Climate change; impacts of extreme events on coastal communities	High	High	New Working Group (WG49)	Adaptation and disaster risk reduction	Review WG plans as they develop. Look for opportunities to share outputs. Add an APN Ex-officio member	High, priority research area
Research Area: Marine plastic debris and microplastics	High	High	WG42 working-groups - PICES - North Pacific Marine Science Organization will end in 2022 but have indicated there should be a follow-on expert group (possibly a Section) to continue the work and link to Global initiatives	Marine plastic debris and microplastics are one of the focused areas under Goal 1 "Research" of APN's 5 th Strategic Plan.	Include APN members in a new Expert Group? Review WG plans as they develop. Look for opportunities to collaborate and share outputs.	Med-high, awaiting outcome of PICES Science Board recommendation on new EG
Research Area: Regional climate model downscaling in the Pacific	High	High	Active area of research in PICES nations; theme of S-CCME; theme of SUPREME and BECI (UNDOS Program/Project)	"Regional climate downscaling in the Pacific" was one of the high priority topic areas of P-SRC for the 2021 call for proposals.	"Regional climate downscaling in the Pacific" will remain a high priority topic of P-SRC for the APN FY 2022 Call for Proposals	High
Research Area: Circular and Ecological Economy	Med	High	Likely of interest to PICES Human Dimensions Committee.	CEE is one of the focused areas under Goal 1 "Research" of APN's 5 th Strategic Plan. Circular and Ecological Economy (CEE) is an initiative to enhance sustainable socio-economic activities by drawing on locally		Med-high

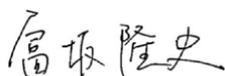
September 14, 2022

				available energies, natural resources, infrastructure, industrial conglomerations, as well as the indigenous culture, particularly in rural areas.		
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The Asia Pacific Network-North Pacific Marine Science Organisation (PICES) Collaborative Framework for Scientific Cooperation

The Collaborative Framework for Scientific Cooperation between the APN and PICES comes into effect when signed below by both parties, and will continue for a period of five years at which time it will be reviewed to assess progress.

The Collaborative Framework may be revised at any point as agreed by both parties, and may be renewed for a further period if approved by both the PICES Science Board and APN Steering Committee.



Signature

17 February 2023

Date

Ryuji Tomisaka, Director, Secretariat
Asia-Pacific Network for Global Change Research (APN)
4F, East Building
1-5-2 Wakinohama Kaigan Dori, Chuo-ku,
Kobe 651-0073, Japan
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Signature

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