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MEOPAR

SCIENCE STRATEGY

MARINE ENVIRONMENTAL OBSERVATION
PREDICTION & RESPONSE NETWORK

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The Marine Environmental Observation, Prediction and Response Network (MEOPAR) is a national network sponsored by the Strategic Science Fund that links top marine researchers and highly qualified personnel across Canada with partner organizations and communities. MEOPAR funds leading-edge research, overcomes barriers to collaborative research and helps to train the next generation of marine professionals.



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OUR VISION

A Coordinated Canadian Approach

A coordinated Canadian approach amongst diverse ocean-connected organizations, sectors, regions, and people to build resilience of coastal and Indigenous communities, enhance opportunities in the Blue Economy and adapt to climate change.

Our Story

MEOPAR is an independent not-for-profit organization with Canada-wide expertise from diverse sectors and regions, focusing on ocean-related research and development (R&D). We have built a strong national presence over the last decade, coordinating large initiatives with federal departments, provincially supported organizations, major not-for-profits, private research foundations, industries, and post-secondary institutions.

Significant new nationwide structures and capacities have been established (e.g., the Canadian Integrated Ocean Observing System (CIOOS), and Modular Ocean Research Infrastructure (MORI)). MEOPAR has also created innovative funding instruments to support collaborative research, knowledge mobilization, and capacity development for ocean professionals.

After a decade of connecting individuals and initiatives in ocean research across multiple sectors, regions, languages, activities, and disciplines, MEOPAR is entering a new phase with expanded capacity to address ocean priorities with a coordinated Canadian approach.

OUR CAPACITY

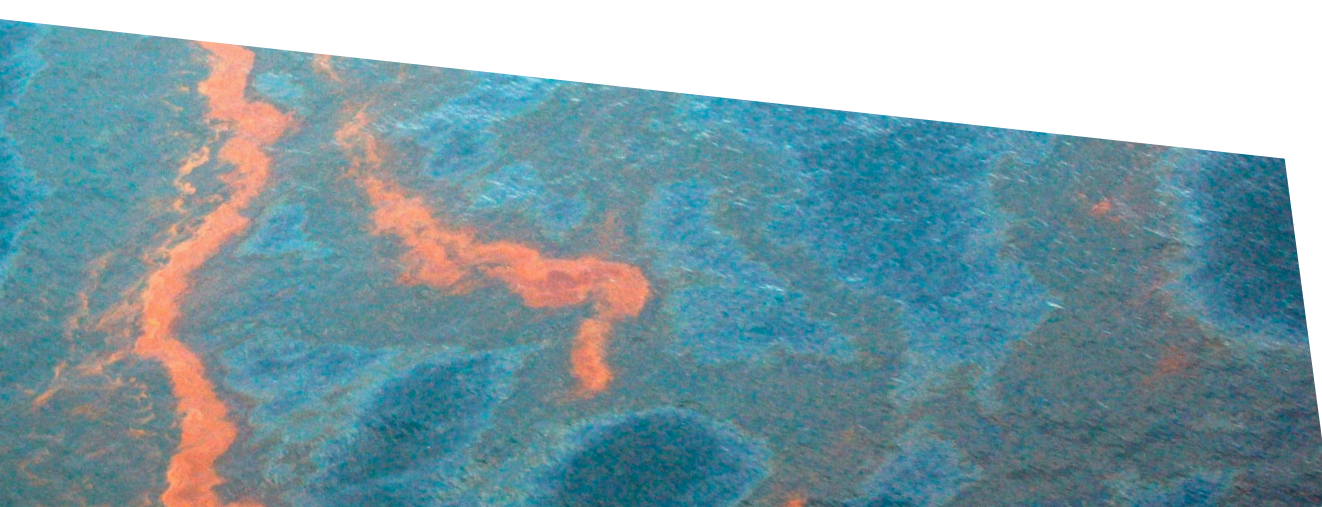
MEOPAR'S New Capacity

Growing beyond its origins as a funding recipient of Canada's Networks of Centres of Excellence programme,

MEOPAR has distributed its leadership across the country, better reflecting our national reach. MEOPAR is a bilingual organization, committed to increasing its capacity in both official languages. While dedicated to Canadian ocean science, MEOPAR has also built significant connections internationally, and is now connecting with similar networks and global initiatives worldwide.

In this new phase, MEOPAR will advance Canada's scientific capacity to anticipate and respond to climate change and technological challenges, enhancing the resilience of ocean-connected communities and expanding the opportunities of a sustainable Blue Economy while protecting marine biodiversity. In close coordination with partners, MEOPAR will generate, strengthen, and mobilize the knowledge, infrastructure, and human capacity required to take action: to mitigate and adapt to climate change and its impacts, grow an economy that benefits everyone as well as the ocean, make sure communities are resilient, safe, healthy, and inclusive, and move forward on the path of reconciliation.

MEOPAR remains strategically well placed and trusted to contribute significantly to a coordinated Canadian approach. MEOPAR's advantages include: a) freedom and flexibility to experiment with new ideas, including testing high-risk high-reward approaches; b) ability to partner with non-academic experts in sectors including marine industry, not-for-profit, Indigenous organizations, and coastal communities; c) nimbleness to respond to emerging priorities; d) a national, trusted ability to support grassroots needs, implement actions, and develop "bottom-up" connections including knowledge mobilization across sectors, organizations, and regions; and e) experience with the management and coordination of ocean related professional development and training. This ability to flexibly combine strengths across sectors as well as the capacity to fund a broad range of organizations is key to Canada's effective response to ocean-related challenges now and into the future.





OUR FOCUS

Cross Cutting Focus

MEOPAR acknowledges that ocean and climate science in Canada is impacted by systemic bias and colonial approaches to research that have prevented Indigenous and underrepresented peoples from setting research agendas, participating in the science, contributing their own knowledge, and benefiting from the outcomes or information collected.

MEOPAR is committed to actively moving forward on the path of reconciliation in response to the United Nations Declaration on the Rights of Indigenous Peoples (2007), the Truth and Reconciliation Commission Reports (2015) as well as the Government of Canada's Arctic and Northern Policy Framework (2019) which together describe how to advance reconciliation and improve relationships between Indigenous and non-Indigenous peoples throughout Canada. MEOPAR is dedicated to creating new opportunities for direct involvement and science leadership with Indigenous partners, from coast to coast to coast, at individual and institutional levels to establish and improve relationships.

MEOPAR acknowledges that increasing representation, inclusiveness, accessibility, diversity and equity in Canada's ocean sectors more generally needs to be a priority, especially considering that racialized groups, women, and 2SLGBTQI+ groups continue to be underrepresented among ocean science practitioners. In line with the Federal 2SLGBTQI+ Action Plan 2022 ... Building our future, with pride from the Canadian government, MEOPAR is committed to support and lead actions to build a more inclusive ocean sector.

MEOPAR has identified four core science priorities for 2025-2030

These are priorities where targeted MEOPAR activities and investments in Research, Knowledge Mobilization, and Networking will produce tangible outcomes aligned with federal priorities.

Core Priority 1

OCEAN PROTECTION AND COASTAL SOCIO-ECOLOGICAL SYSTEM STEWARDSHIP

Efficiently conserving, protecting and/or restoring marine environments is needed to halt and reverse the erosion of marine biodiversity and ecosystem services that ensure the well-being of Canadian society. Transformative changes to the way Canada protects the ocean and coastal socio-ecological systems¹ requires us to: (i) empower on-the-ground actions that reflect local and regional differences, (ii) support capacity development in communities that have histories and/or willingness of sustainable stewardship over marine and coastal areas and (iii) bring together local knowledge, cultural values, and diverse perspectives into scientific approaches for strengthening the resilience and inclusiveness of ocean management. In an era of increasing human pollution and disturbances, ocean protection also requires developing readiness in accident prevention and rapid response capabilities at local and global levels. Canada's extensive coastline requires robust, consistent environmental monitoring to track changes in marine biodiversity, ecosystem health, and human impacts as well as overall changes in socio-ecological systems.

Core Priority 2

CLIMATE CHANGE PREDICTION, ADAPTATION, READINESS, AND INTERVENTION

As the ocean is the most significant regulator of climate change, advanced ocean change projections and predictions are needed to guide robust adaptation strategies that enhance socio-ecological system, community, and ecosystem readiness and resilience. Scientific advances should identify and address both the known long-term impacts of climate change, such as ocean warming, acidification, and deoxygenation, sea level rise and the increasing occurrence of extreme weather and pollution events, which place additional stress on marine socio ecosystems. Adaptation strategies and interventions must ensure that health, food and social systems related to the ocean are better equipped to manage climate risk and support diverse components of well-being, while avoiding maladaptation². Strengthening community resilience by developing local research capacity, empowering participation in science, and integrating local knowledge is central, as communities must be able to adapt to climate change³ and resulting changes in ecosystems that sustain livelihoods and cultural practices.

While it remains essential to reduce greenhouse gas (GHG) emissions, ocean-based climate interventions (including marine carbon dioxide removal⁴ and encompassing nature-based and engineering solutions) can help to mitigate climate change or its impacts. Climate intervention science needs to be independent and ethically guided, accounting for the risks of unintended consequences and externalities. It also needs to address the challenges of scientific uncertainty, social acceptance, and how science can support development of legal and policy frameworks essential for safe, transparent, and effective ocean-based climate interventions.

¹ A socio-ecological system (SES) is an integrated system that encompasses both ecological and social components, which interact dynamically and continuously influence one another. SESs include ecosystems (such as forests, oceans, or wetlands) and the human communities that depend on and interact with them. These systems are complex, adaptive, and governed by feedback loops that arise from the interactions between human behavior, cultural practices, economic activities, and ecological processes.



Core Priority 3

JUST AND EQUITABLE OPPORTUNITIES IN THE BLUE ECONOMY

The Blue Economy⁵ seeks equitable access to resources and opportunities, sustaining marine ecosystems and benefitting the well-being of all Canadians while adjusting to new trade demands at local and global scales. It must ensure that its benefits are distributed fairly and inclusively across Canadian communities, particularly for marginalized and Indigenous populations. This entails supporting the creation of sustainable jobs, fostering local entrepreneurship, and developing training programs that equip communities with skills for emerging ocean-based industries reflecting local values, cultures, knowledge, and needs.

With the longest coastline and access to three ocean basins, Canada possesses a significant opportunity to reduce CO₂ emissions associated with ocean-based activities. Working towards net zero-emissions will be supported by developing marine renewable energies (MRE: tides, currents and offshore winds energy) and sustainable ocean transportation strategies. Developing the Blue Economy while maintaining the health and sustainable management of marine socio ecosystems is a challenge that can be tackled by adopting the concept of Marine Net Gain i.e. ocean-based activities yield a positive ecological impact rather than degrading natural systems. Canada's Blue Economy and transition to clean energy necessitates science and inputs from multiple actors in the ocean sector to inform legislative and regulatory frameworks that enhance resilience and preserve cultural continuity in a just and equitable way.

Core Priority 4

LEADERSHIP IN MARINE RESEARCH INFRASTRUCTURE ACCESS AND TALENT DEVELOPMENT

As the ocean is the most significant regulator of climate change, advanced ocean change projections and predictions are needed to guide robust adaptation strategies that enhance socio-ecological system, community, and ecosystem readiness and resilience. Scientific advances should identify and address both the known long-term impacts of climate change, such as ocean warming, acidification, and deoxygenation, sea level rise and the increasing occurrence of extreme weather and pollution events, which place additional stress on marine socio ecosystems. Adaptation strategies and interventions must ensure that health, food and social systems related to the ocean are better equipped to manage climate risk and support diverse components of well-being, while avoiding maladaptation². Strengthening community resilience by developing local research capacity, empowering participation in science, and integrating local knowledge is central, as communities must be able to adapt to climate change³ and resulting changes in ecosystems that sustain livelihoods and cultural practices.

² Maladaptation: adaptive measures that may unintentionally increase vulnerability or environmental degradation.

³ Marine climate mitigation: range of actions (including social innovation and collaborative structure) aimed at reducing the impact of climate change on the ocean and coastal areas.

⁴ Marine carbon dioxide removal (mCDR) is any ocean-based process or technique designed to remove carbon dioxide from the atmosphere and store it for long periods of time in the ocean. Examples of mCDR techniques include adding alkaline materials to the ocean to increase the amount of carbon stored in ocean waters; adding iron or other nutrients to ocean waters to increase phytoplankton growth and export of carbon to the deep ocean; and sinking organic materials, such as kelp or crop residue, into the deep ocean.

Source: Waterloo climate institute (2024) Marine carbon dioxide removal in Canada: opportunities and challenges

⁵ The Blue Economy encompasses all economic activities connected to the ocean, including fisheries, aquaculture, marine renewable energy, shipping, and coastal tourism, with a focus on balancing economic development, environmental health, and social equity.



Core Priority I

Ocean protection and coastal socio-ecological system stewardship

Efficiently conserving, protecting and/or restoring marine environments is needed to halt and reverse the erosion of marine biodiversity and ecosystem services that ensure the well-being of Canadian society.

I.8

Building the resilience of socio-ecological health in the ocean via holistic approaches and empowering on-the-ground action appropriate for local and regional contexts

I.1

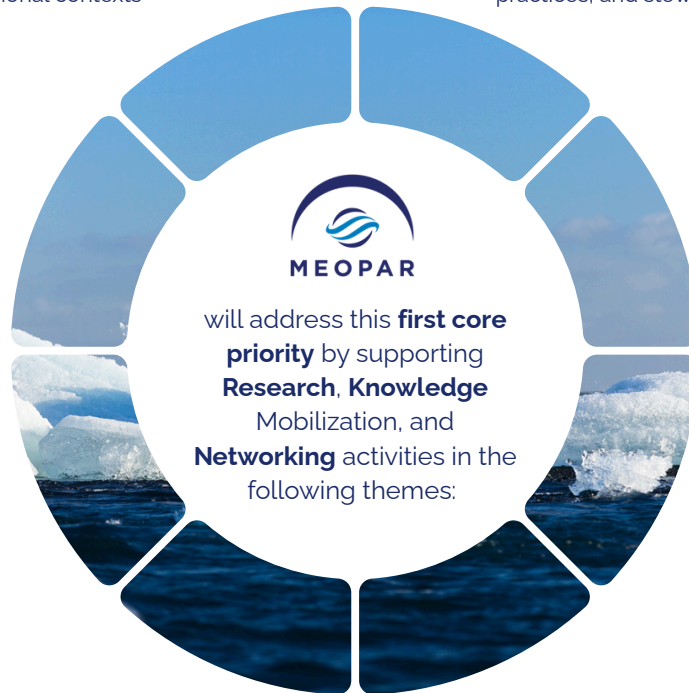
Comprehensive, holistic long-term monitoring strategies that include local knowledge, diverse approaches, research practices, and stewardship

I.7

Accident prevention and rapid response capabilities to reduce the risk of marine accidents (oil spills) and disturbances for marine ecosystems

I.6

Detection, evaluation and mitigation of human disturbances, with a specific focus on shipping traffic and subsea noise



I.2

Technological innovation to improve ocean monitoring

I.3

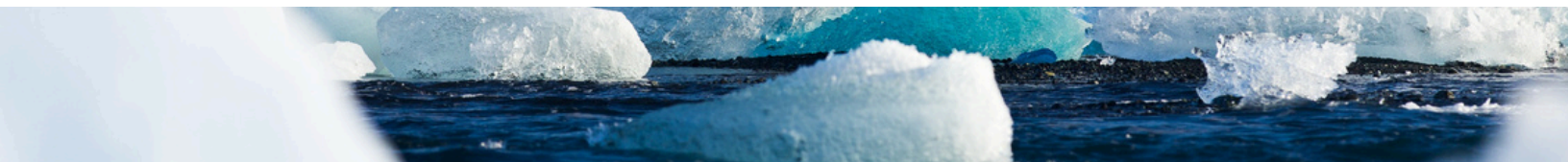
Capacity development and empowerment of communities in ocean protection and management to support their sovereignty

I.5

Science supporting decision making and policies that integrate socio-ecological considerations in ocean protection strategies (including marine protected areas)

I.4

Marine Spatial Planning that integrates biodiversity conservation, safeguards ecosystem resilience, and supports the socio-economic well-being of coastal communities





Core Priority 2

Climate change prediction, adaptation, readiness, and intervention

As the ocean is the most significant regulator of climate change, advanced ocean change projections and predictions are needed to guide robust adaptation strategies that enhance socio-ecological system, community, and ecosystem readiness and resilience.

2.8

Closing the knowledge-to-action gap to improve societal capacity to face and engage climate change problems and take ambitious and collective actions to face climate change

2.1

Climate projections and ocean monitoring to enhance global and local predictive models

2.7

Science to support cohesive policies that facilitate shared research, adaptive capacity, and climate resilience efforts across jurisdictions

2.2

Ocean data acquisition and management, data use optimization including tools development

2.6

Climate intervention science addressing impacts, uncertainties, social acceptance and ethics related to ocean-based climate interventions (including mCDR)

2.3

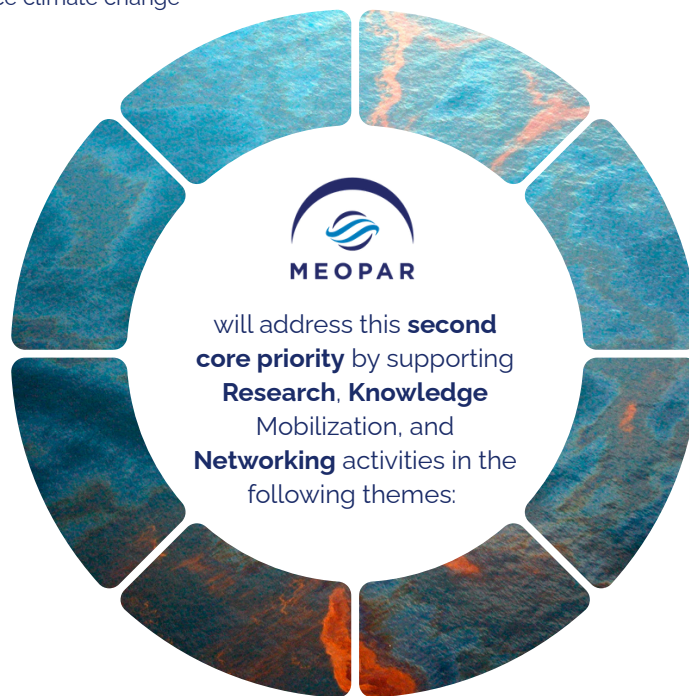
Readiness and early warning systems to reduce risks associated with climate change and extreme events (e.g. storms, floods, marine submersion) and enhance community resilience, adapt/protect infrastructure

2.5

Community resilience and effective climate mitigation and adaptation that are culturally relevant, sustainable, and avoid maladaptation

2.4

Arctic warming and sea ice retreat: consequences for Arctic communities, biodiversity, and global climate dynamics





Core Priority 3

Just and equitable opportunities in the Blue Economy

The Blue Economy seeks equitable access to resources and opportunities, sustaining marine ecosystems and benefitting the well-being of all Canadians while adjusting to new trade demands at local and global scales.

3.8

Interconnectedness of Blue Economy with the efforts to mitigate and adapt to climate change

3.1

Marine Net Gain: developing the Blue Economy while minimizing environmental impacts and maintaining or improving the health of marine ecosystems

3.7

Research to inform how inconsistencies in decision-making among jurisdictions impede development of the Blue Economy

3.2

Critical needs for food security, access to water, sustainable fisheries, and aquaculture practices

3.6

Reducing CO₂ emissions associated with ocean-based activities, including sustainable ocean transportation strategies and low-carbon shipping practices

3.3

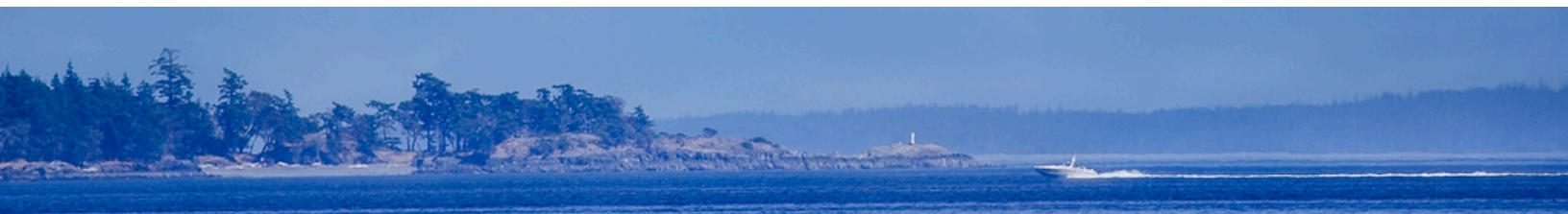
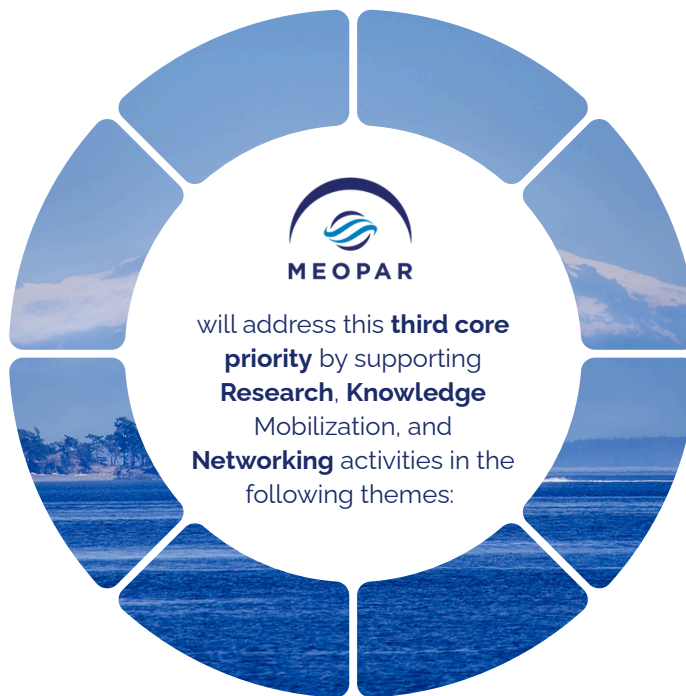
Community-led initiatives enhancing resilience, preserving cultural continuity, and empowering local actors to influence how ocean resources are managed and utilized locally

3.5

Marine renewable energies (tides, currents and offshore wind energy) minimizing environmental impacts while contributing to Canada's transition to clean energy

3.4

Emerging ocean-based industries and ocean technologies (remote sensing, autonomous systems, subsea vehicles, sensor technology, marine biotech, sustainable fishing gear)





Core Priority 4

Leadership in marine research infrastructure access and talent development

This core priority is essential to the success of the three other strategic priorities: Ocean Protection and Coastal Socio-Ecological System Stewardship, Climate Change Prediction, Adaptation, Readiness, and Intervention, and Just and Equitable Opportunities in the Blue Economy.

4.8

Support talents and ocean professionals in becoming leaders in ocean literacy and communication with different actors

4.1

Canadian leadership of major ocean-related research initiatives and expeditions

4.7

Training highly qualified personnel to operate marine research instruments and infrastructure

4.2

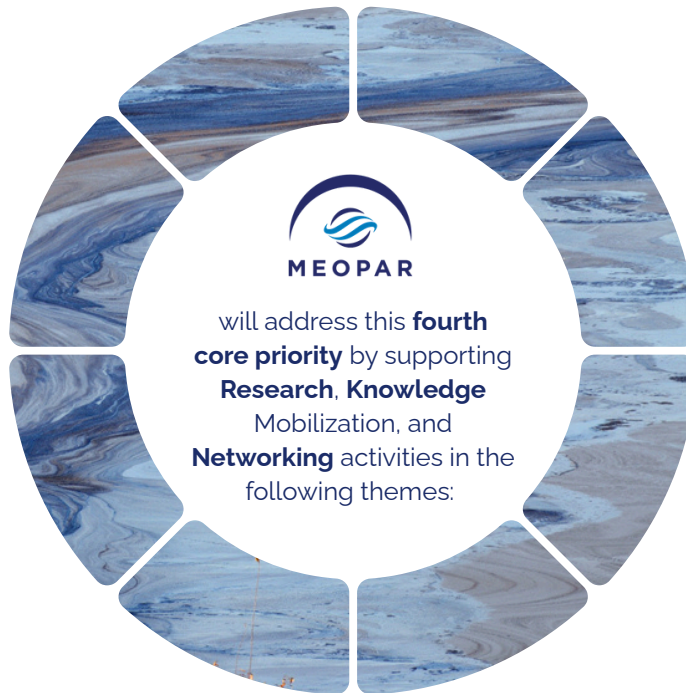
Improving utilization of existing research infrastructure related to the ocean sector (e.g. ships, marine stations, autonomous research vessels, numeric infrastructure for ocean data)

4.6

Leveraging international relationships and opportunities to address transnational ocean challenges and issues.

4.3

Developing novel technologies and infrastructure to support marine research in the Canadian context



4.5

Mitigating potential risk of ocean technologies while maximizing opportunities for Canadian industries

4.4

Support the emergence of new structures (Test sites / Living labs / Knowledge hubs) that support the ethical development of ocean solutions, technologies and ocean-based climate interventions



AREAS OF IMPACT



In the next 5 years, MEOPAR will deliver a knowledge-centered program that is partly developed to advance federal priorities under two Impact Areas

Impact Area A

Advancing Ocean Scientific Capability and Broadening Access to Knowledge

Using targeted funding and coordination structures at national scale, MEOPAR will generate and mobilize new knowledge and strategies, as well as diversify actors' access to research capacity and information. This will address challenges of climate change and changing human activities related to the ocean. Activities will support decision making and operations by governments at all levels, public organizations, coastal communities including Indigenous communities, and industry, to guide adaptation, enhance sustainable use of our oceans, and advance Blue Economy opportunities.

Impact Area B

Advancing Canada's Ocean-Related Research and Innovation Talent and Infrastructure

Key underpinnings of Canada's ocean-related science, whether conducted by government, academia, or other sectors, include HQP and the physical and data infrastructures that support their investigations. MEOPAR will contribute to the strategic development of Canada's Science Technology and Innovation (ST&I) landscape, closing gaps and connecting activities in order to strengthen and broaden access to both human resources and research infrastructures. MEOPAR will provide access to new career opportunities to attract, retain and broaden the impact of ocean experts in Canada.

Through its activities and programming, MEOPAR aims to reach some goals for making the ocean science sector progress in Canada, some of them following Science Strategic Fund objectives:

Research

Increase the quality of internationally competitive, leading-edge ocean research in areas critical to the health, economic and social well-being of all Canadians. Promote and support interdisciplinary and collaborative efforts to tackle challenges related to socio ecological systems and to advance scientific innovation focused on an abundant ocean and sustainable ocean industries.

Talent Development & Attraction

Develop, attract, retain and connect world-class research and innovation talents in areas that build and address relationships between people and the ocean.

Knowledge Mobilization

Accelerate the exchange of ocean research data, results, literacy, and the translation of this knowledge into action in Canada and abroad. Facilitate ocean data access, curation and storage. Synthesis of knowledge and recommendations to inform national policies.

Culture

Strengthen evidence-based decision-making related to the ocean by including different knowledge systems, and help society acknowledge the ocean as part of our shared culture.



