Tanya Maslak, MPH
Battelle Memorial Institute

Natasha Sadoff, MA
Battelle Memorial Institute

Marine Health Hubs:

Building interdisciplinary regional hubs of excellence to research and address the societal impacts of marine debris across the globe

Ocean Decade: U.S. Launch Meeting | February 3-4, 2021

Introduction:

- Marine debris, defined by NOAA as "any persistent solid material that is manufactured or processed and directly or indirectly, intentionally, or unintentionally, disposed of or abandoned into the marine environment" [1] may originate along beaches or in rivers; be brought indirectly to the sea with rivers, sewage, storm water or winds; or discarded at sea.[2]
- An estimated 80% of marine debris originates as land-based trash, while the remaining 20% is attributed to intentional or unintentional disposal or loss at sea.[3] Furthermore, the current global plastics production rate (>300 million tons produced annually, worldwide), coupled with mismanagement of waste, is a significant contributing factor leading to macro-, micro-, and nano-plastic waste in our oceans and along coastlines. It has been argued that the potential irreversible nature and global reach of marine plastic pollution meets conditions for a planetary boundary threat of chemical pollution.[5]
- Significant efforts to date have focused on understanding and addressing the marine debris challenge based on drivers related to environmental management and economics, such as potential impacts to fisheries and aquaculture, preserving biodiversity, or reducing negative impacts on tourism, recreation and real estate. However, despite increasing evidence of microplastic contamination across a variety of environmental media (e.g., water, land and air), research into better understanding the cumulative human exposures to microplastics are currently lacking, [6,7] resulting in lingering uncertainty[8,9] for what could be the next emerging environmental health challenge.

Photos courtesy of NOAA's Marine Debris Program

Proposed Ocean Shot Concept: Marine Health Hubs

- Our proposed **Marine Health Hubs (MHH)** program will build capacity for and mobilize interdisciplinary teams worldwide to address marine debris across the continuum of research to application *(See Figure 1, Slide 4)*.
- Partnering with academia, research institutes, non-profit and private organizations, and the public sector, we will establish self-sustaining regional hubs of excellence to promote interdisciplinary collaboration to tackle plastic marine waste, from not only an environmental and economic lens, but also through a social lens, to better understand and address potential impacts on human health and social equity.
- Applying principles of a collective impact approach, **MHHs will advance scientific research and technology development, collect and manage data, translate research to inform policy-making across various scales and sectors, and provide public outreach and education efforts.** In addition to better understanding and addressing existing marine debris impacts, MHHs will also focus on mitigating future marine debris through innovative technology development of sustainable alternatives and promotion of a circular economy to prevent plastic waste and pollution of our marine environments and dependent communities.

Relevant Decade Challenges:

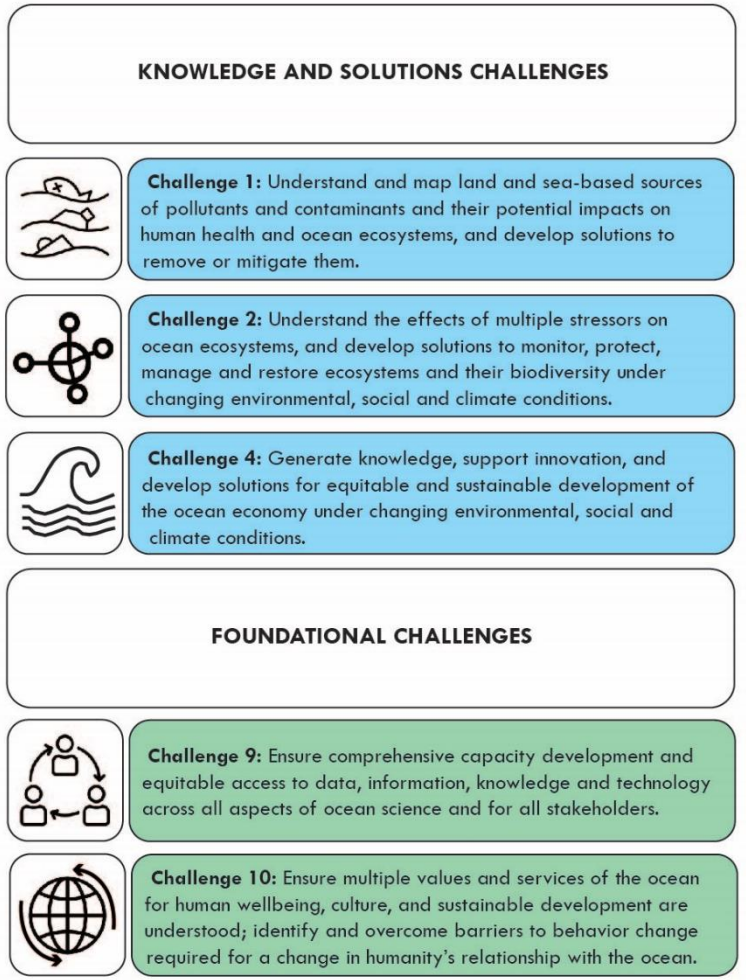
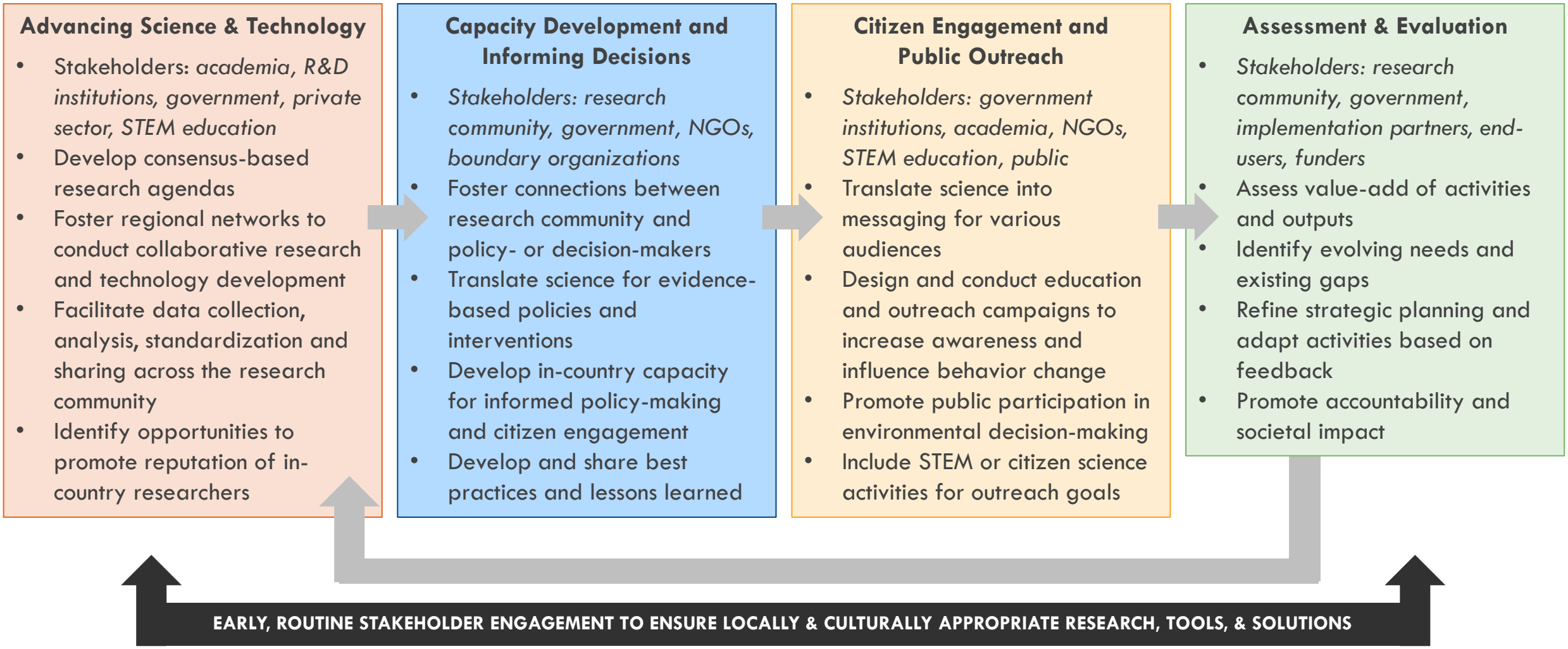


Figure 1: Marine Health Hubs Will Address Topics Across the Continuum of Research to Application



Proposed Methods:

- While MHHs will be expected to address topics across the continuum of research to application, initial scoping and prioritization of each hub's strategic implementation plan will vary, building upon existing infrastructure and capacity assets.
- Utilizing a capacity building framework, MHHs will focus on **consensus-based agenda setting**, **co-development of and co-investment in action plans**, and an **applied learning approach** for knowledge transfer and peer-to-peer information sharing. This will be accomplished through activities such as:
  - Stakeholder mapping, environmental scans, stakeholder needs assessments, or gap analyses to develop situational assessments for each MHH jurisdiction or region
  - Delphi methodology and/or stakeholder dialogue sessions to reach consensus on research agendas and priority setting for themes, topics, and projects
  - Expert consultations, study tours, fellowships, and trainings to develop in-country, cross-sectoral capacity for translational, evidence-based science, policy, and interventions
- Through co-development, co-design, and co-investment of MHH infrastructure, networks, and action plans, the program strives to set the foundation for self-sustaining programs that will stand the test of time and adapt to evolving needs.

Photos courtesy of NOAA's Marine Debris Program and EPA's Trash-Free Waters Program

Anticipated Results & Impact:

The MHHs would provide opportunity to move the needle forward in understanding and addressing the human and ecosystem health impacts of marine debris as demonstrated by anticipated mid- and long-term results and improved collective societal impact, such as:

- Advances in scientific research, datasets, and tools
- Innovative technology development
- New partnerships within and across sectors
- Improved collaboration
- Increased knowledge and skills across various stakeholder groups
- Translation of research to meet the needs of various audiences
- Development of informed, evidence-based policies and interventions
- Increased citizen awareness of environmental issues and engagement in solutions
- More efficient utilization of resources
- Reduced marine debris and plastics pollution
- Reduced impact on human and ecosystem health

Next Steps:

We welcome feedback and engagement to help make our concept a reality.

Our anticipated next steps include:

- Collect feedback on concept and proposed framework for implementation
- Generate and iterate on ideas for potential Marine Health Hub activities
- Connect with interested partners, both in the U.S. and in various regions across the world
- Identify and pursue potential sources of funding
- Continue to engage in Ocean Decade activities and networks

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

For more information:

Tanya Maslak | maslak@battelle.org

Natasha Sadoff | sadoffn@battelle.org

References:

1. NOAA. (2020). What is marine debris? Accessed at: https://oceanservice.noaa.gov/facts/marinedebris.html
2. United Nations Environment Programme. (2020). Coordinating Body on the Seas of East Asia (COBSEA) Marine Litter and Plastic Pollution. Accessed at: https://www.unenvironment.org/cobsea/what-we-do/marine-litter-and-plastic-pollution
3. U.S. Environmental Protection Agency. (2020). Trash-Free Waters. Accessed at: https://www.epa.gov/trash-free-waters/toxicological-threats-plastic
4. World Economic Forum. (2018). The world's plastic problem in numbers. Accessed at: https://www.weforum.org/agenda/2018/08/the-world-of-plastics-in-numbers
5. Villarrubia-Gómez, P., Cornell, SE., & Fabres, J. (2018). Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle. *Marine Policy, 96, 213-220*. https://doi.org/10.1016/j.marpol.2017.11.035
6. Vianello A, Jensen RL, Vollertsen J. (2019). Simulating human exposure to indoor airborne microplastics using a breathing thermal manikin. *Scientific Reports*, 9(8670). https://doi.org/10.1038/s41598-019-45054-w
7. Wright SL, Kelly FJ. (2017). Plastic and human health: A micro issue? *Environmental Science & Technology,* 51(12): 6634-6647. https://doi.org/10.1021/acs.est.7b00423
8. United Nations News. (2020). "Microplastic pollution is everywhere, but not necessarily a risk to human health." Accessed at: https://news.un.org/en/story/2019/08/1044661
9. World Health Organization. (2019). "WHO calls for more research into microplastics and a crackdown on plastic pollution." Accessed at https://www.who.int/news/item/22-08-2019-who-calls-for-more-research-into-microplastics-and-a-crackdown-on-plastic-pollution.