

A GENERATIONAL SHIFT IN OCEAN STEWARDSHIP

By Alfredo Giron-Nava and Harriet Harden-Davies

The Roger Revelle Commemorative Lecture Series was created by the Ocean Studies Board of the National Academies in honor of Roger Revelle to highlight the important links between ocean sciences and public policy. The twenty-second annual event was a virtual lecture held on May 26, 2021, featuring early career ocean professionals leading the way on the UN Ocean Decade of Science for Sustainable Development.

ABSTRACT. The year 2021 marked the beginning of the United Nations (UN) Decade of Ocean Science for Sustainable Development. The world now has fewer than 10 years to achieve the UN Sustainable Development Goals. In this article, we reflect on some of the challenges and opportunities this presents for Early Career Ocean Professionals (ECOPs) who will be instrumental in designing, delivering, and using ocean knowledge toward a more sustainable and equitable future. How can Ocean Decade programs and partnerships equip ECOPs with the necessary tools, skills, and opportunities to engage meaningfully with policy processes and to develop practical solutions for societal benefit? We propose some key questions for discussion among ocean scientists, ocean-dependent communities, and policymakers.

INTRODUCTION

Receiving an invitation from the Ocean Studies Board of the US National Academy of Sciences to deliver the 2021 Roger Revelle Commemorative Lecture on the role of ocean science in sustainable development was exciting and intimidating. What could we, Early Career Ocean Professionals (ECOPs),¹ share that could be insightful enough for this prestigious event? The invitation gave us the opportunity to reflect on our own experiences and perspectives on the ways in which science can contribute to sustainable development. The event provided a platform for highlighting the utmost importance of intergenerational diversity and how it affects the way in which we

recognize different knowledge systems to inform policymaking and to achieve long-term ocean sustainability.

The ocean faces enormous challenges related to pollution, resource exploitation, loss of habitat and biodiversity, and climate change. While these problems are not new, there is increasing recognition of the importance of addressing them and pursuing ocean sustainability to support the millions of people who rely on the ocean for food, employment, recreation, and culture (Allison et al., 2020). The United Nations Decade of Ocean Science for Sustainable Development (2021–2030; hereafter called the Ocean Decade) constitutes an international commitment to reverse the declining state of the ocean

through design and implementation of science-based, sustainable solutions. It highlights the importance of leaving no one behind, of recognizing that the complex nature of most ocean challenges require multiple perspectives and knowledge systems to identify and address problems (IOC-UNESCO, 2021).

While the Ocean Decade represents an opportunity to bring together multiple ocean actors and align efforts to pursue ambitious goals, it is important to recognize that it is not the first attempt to do so. The international community has previously undertaken decadal efforts to address sustainability challenges—with mixed results that include missed sustainable development targets (Rosen, 2015). Meanwhile, the international conversation about sustainable development becomes more fractious, fueled by repeated failures to scale just and equitable solutions that address global challenges (Bennett et al., 2019) and improve the lives and livelihoods of vulnerable ocean-dependent communities (Giron-Nava et al., 2021). It is little surprise therefore that the Ocean Decade is regarded with both confidence and

¹ According to the UN Decade of Ocean Science for Sustainable Development, ECOPs are self-identified individuals with 10 years or less of professional experience in any field related to the ocean, including academia, government, industry, and civil society.

skepticism (Singh et al., 2021). If the Ocean Decade is going to be any different, the world cannot continue with business as usual or perpetuate problem-solving approaches that are ineffective and inequitable. The call in the Ocean Decade's implementation plan for "transformative approaches" that "leave no one behind" cannot be another empty platitude; the international community must put this principle into action.

So, what can be done in the Ocean Decade to ensure that 2030 is remembered as the year that the Sustainable Development Goals (SDGs) were achieved, and how do we prepare the next generation to lead this shift? Here, we consider three approaches to ensure that the Ocean Decade is not only impactful today but has long-lasting effects beyond 2030. The first approach is to critically reflect on ocean science in policy narratives and develop the governance frameworks needed to design, implement, and scale sustainable solutions. The second approach is to recognize the contributions of diverse perspectives for identifying, studying, and solving problems. The third approach is to train and empower ECOPs to use and design these frameworks and become stewards of the ocean at this critical moment.

The Ocean Decade has opened the door for ECOPs to be at the forefront of the planning and execution of global and local movements to design, develop, and use science to support ocean solutions. As a new generation of leaders is given voice, it is important to ensure that they have the support and resources to solve complex ocean challenges. This will require pathways that lead from insight to impact in the design of science-based solutions, purposeful and appropriate development and use of science, multi-sectoral collaborations, and models that enable the genuine co-design and co-creation of knowledge among relevant stakeholders. There is a need for innovation not only in technology but also in the thinking and narratives that govern the design and use of ocean science

in sustainable development. Our reflections here draw from our 2021 Roger Revelle Commemorative Lecture and the accompanying panel conversation that included Anjali Boyd, a PhD candidate at Duke University's Nicholas School of the Environment, and also go deeper into the challenges and opportunities facing the Ocean Decade. We hope that this article will stimulate further consideration of the relationship between ocean science and policy, equity, and capacity development in the Ocean Decade, and the role ECOPs can play in advancing the Ocean Decade agenda.

NAVIGATING THE SCIENCE-TO-POLICY INTERFACE

The Ocean Decade's "ocean science for sustainable development" theme aims to encourage the use of science by decision-makers in the design and implementation of ocean policy. A phrase often used to capture this concept is "the science-policy interface." But what exactly does that phrase mean? And how are ECOPs to understand their role in shaping and operating at this interface? While individual circumstances will affect the answer to the latter question, we offer our reflections.

Conversations about "science to policy" are often, in our experience, at best simplistic and at worst superficial. As undergraduate ocean science students hearing this phrase for the first time, it conjured an image for us of a mystical portal or "black box" where science goes in one side and policy comes out the other. Of course, the process is seldom, if ever, straightforward. The outcome will depend on the people who influence and use ocean science, the power dynamics and politics that shape their interactions, and the public to which decision-makers are accountable. Ocean science might be used to influence decisions that produce a more sustainable world and more equitable outcomes for marginalized and vulnerable ocean-dependent people. It could, however, also be used, misused, or ignored in ways that perpetuate social

inequities and unsustainable ocean-based activities/outcomes (Singh et al., 2021). Yet, how much exposure do ECOPs have to these challenges and how prepared are we to design meaningful engagement with policymakers?

There is growing pressure on ECOPs, particularly those who are scientists, to ensure that ocean research is directed toward being useful in the development and implementation of ocean policy, toward an end often generalized as "sustainable development." For some, sustainable development might refer to extractive industries, for others to ocean protection, for others to security for ocean-dependent communities. This pressure comes in many forms—signals from national funding agencies, policy measures from governments, and calls in the academic and gray literature for "more science in policy." The widely regarded need for science to inform and implement ocean policy is described in several recent papers (e.g., Charnley et al., 2017; Elliott et al., 2017; Tessnow-von Wysocki and Vadrot, 2020), and is reflected in international legal commitments that human activities on/in or impacting the ocean be "based on the best available science." Yet there are also many challenges inherent in navigating the feedback loops between political and research arenas.

Our experiences suggest that many ECOPs are not as prepared as they could be to engage with policy processes. For example, some ECOPs might have found themselves hastily writing "decision-makers should" or "the policy implications of our research are" in the concluding paragraphs of their research papers. However, how exactly do they engage with policy processes and relevant stakeholders, and how deeply have they thought about the consequences of their work for the policy process, and indeed for their own careers? It is thus important to recognize that research operates within a broader societal context, and recognizing the diversity of actors, interests, and approaches is fundamental to navigating the science-to-policy interface.

EMBRACING DIVERSITY TO IDENTIFY AND SOLVE PROBLEMS

One of the key principles of the Ocean Decade is “leaving no one behind,” but in reality, access to opportunity is far from equal worldwide (Stefanoudis et al., 2021). For example, as noted in the Intergovernmental Oceanographic Commission (IOC) of UNESCO’s *Global Ocean Science Report 2020*, early career scientists’ access to international forums is determined by country of origin, access to technical infrastructure required for ocean science remains unequally distributed, and access to tertiary education is unequal around the world (UNESCO, 2021). It is crucially important to recognize that some ECOPs will face a much higher barrier of entry to ocean science, the Ocean Decade, and the science-to-policy interface than others. Understanding the diverse needs of ECOPs will be critical to co-design meaningful capacity-building approaches to meet their needs. For example, there are growing calls to recognize that some capacity-building activities might both fail to deliver long-term impacts and perpetuate inequities, for example, bullying, discrimination, and harassment during research cruises (Amon et al., 2022).

Equally important is ensuring that diverse voices can be heard in the Ocean Decade to identify problems that otherwise would be invisible and to embrace diverse ways of knowing the ocean. It is essential to understand the many ways that indigenous peoples and local communities relate to the ocean to inform ocean governance in a way that reflects the interconnections between humans and nature (Mulalap et al., 2020; Vierros et al., 2020; Pauwelussen, 2021), as well as the full breadth of cultural, spiritual, and social values of the ocean (Harden-Davies et al., 2020; Claudet et al., 2021). While it is encouraging to note that the Ocean Decade Implementation Plan (IOC-UNESCO, 2021) defined ocean science to include traditional and local knowledge, we must also recognize that there remain many challenges

to achieving this transformative shift (Partelow et al., 2020). It would therefore be useful to identify ways to help the scientific community, and ECOPs in particular, to engage meaningfully with diverse ways of knowing. Establishing an understanding of common practices in order to reflect on one’s own position, and understanding how individual biases can shape one’s own interactions and worldviews, are examples of approaches that can contribute to a more diverse and inclusive ocean community.

EQUIPPING THE NEXT GENERATION OF OCEAN PROFESSIONALS

The Ocean Decade highlights the contributions of ECOPs to science and sustainable development and seeks to empower them to play a leading role. For example, in 2019, during the 1st Global Planning Meeting of the Ocean Decade, when a self-organized group of ECOPs asked the IOC of UNESCO and other attendees to take the Decade as an opportunity to empower the next generation of ocean leaders, the response was unanimously positive. The next question was: How do we make it happen? With support from institutions and individuals worldwide, a group of volunteers stepped up to identify opportunities, create proposals, and build a global community to identify and address regional needs. Yet building new initiatives by and for ECOPs faces many challenges.

The early stages of a new program, particularly for ECOPs without preexisting networks, institutional support, or long-term prospects for financial sustainability, can be not only daunting but also prohibitively resource- and time-consuming. Individuals volunteering their time will be juggling multiple commitments, and volunteering burnout is an ever-present challenge for enthusiastic ECOPs. Not all ECOPs will have the capacity to be able to participate if there are too many prior commitments, and guidance and resources to support ECOPs may not exist or may not be accessible. So, how

do we make sure that ECOPs have the support that they need to develop and deliver needed programs that contribute meaningfully to the Ocean Decade? How do we train ECOPs to create solutions that are context-appropriate and financially sustainable? We offer our reflections on the roles of ECOPs, mentors, and multi-stakeholder partnerships in deploying actionable solutions that empower ECOPs.

ECOPs

We ECOPs have the biggest role to play in ensuring our own successes. Starting with self-reflection on our role in shaping and using science toward sustainable development, it is critical to be intentional about positioning ourselves along the spectrum of science, policy, and society and to recognize the levers at our disposal to influence conversations. Because we will rely on a broad professional network of colleagues and mentors, it is of vital importance that we focus on developing collaborations and learning to listen and adopt new ways of thinking. It takes time to build interdisciplinary collaborations based on trust, common understanding, shared mutual expectations, and the confidence needed to create safe spaces for exploration, ideation, and experimentation. It is thus critical to start cultivating these networks early in our careers.

Another aspect of how ECOPs can support one another is through building support networks for mental health and well-being. As we mentioned earlier, burnout is a real problem (Andrews et al., 2020), as there are increasing professional expectations of what ECOPs in many sectors (e.g., academia, government, industry, civil society) should accomplish to push the boundaries of science and its applications. More often than not, other ECOPs will be our best allies for navigating and balancing personal and professional priorities, and being part of these communities is of vital importance. Finally, we encourage ECOPs to think of creative ways to promote one another and to continuously open doors to incoming

generations. Remember, this is about intergenerational diversity and giving voice to new ideas. Let's lead by example.

Mentors

People in senior positions often have the experience, networks, and resources that can be tapped to facilitate ECOPs' transitions to successful careers. While many senior ocean professionals are admirable mentors, we urge them to consider how best to leverage resources available to them to further support ECOPs. As a start, try asking the following questions: Do I understand my mentees' career objectives and professional paths that they might be considering? How well do their objectives and paths align with my own experience, and do I need to tap into my network to complement the career support that I can provide? Am I helping to grow my mentees' professional networks and access to job/research/development opportunities? It is important for supervisors and mentors to recognize that ECOPs are often juggling multiple personal and professional commitments. Unfortunately, it is also necessary to recognize that mentoring relationships are not always positive—thus, peer-to-peer support is crucial in order to overcome such situations. Ultimately, the most important thing is for senior

professionals to support ECOPs in finding their own voices and using them wisely, while also maintaining their well-being.

International Programs and Multi-Stakeholder Partnerships

International programs such as the Ocean Decade, which organize multi-stakeholder partnerships at international, regional, and national levels, play important roles in setting standards and guidelines for ECOP engagement and promotion. For example, the ECOP Programme of the Ocean Decade (<https://www.ecopdecade.org/>) is developing guidelines for engaging ECOPs in meaningful and genuine ways in all committees, programs, projects, and activities throughout the Ocean Decade. Even further, with the support of funders and mentors, the ECOP Programme is now developing regional nodes to help meet the specific needs of ECOPs in different parts of the world, including capacity development, networking, mentoring, and access to research funds. This illustrates that even the highest-level initiatives can promote the roles of new generations of ocean leaders and empower them to drive the conversation. We urge that this practice become commonplace not only throughout the Ocean Decade but also in all multi-stakeholder partnerships from

local to international levels. Supporting the development of meaningful capacity-building approaches and facilitating safe and respectful working environments in ocean science are two examples of issues whose international frameworks under the Ocean Decade can promote leadership and amplify underrepresented voices (Amon et al., 2022).

Establishing frameworks for monitoring and evaluation is important to the successes of international partnerships and programs such as those operating under the UN Ocean Decade. There is a need for critical evaluation of what success looks like and for ensuring that monitoring and evaluation frameworks do not perpetuate inequities. ECOPs can play significant roles in making the voices of ocean-dependent communities heard in the shaping of sustainable development agendas that will be critical to the outcome of the Decade.

SUMMARY

As we reflected on our own journeys in preparing for the 2021 Roger Revelle Commemorative Lecture, we were keenly aware of how our individual paths gave us access to opportunities, experiences, mentors, and resources. We are both very grateful for these experiences and wanted to capture our thoughts on how

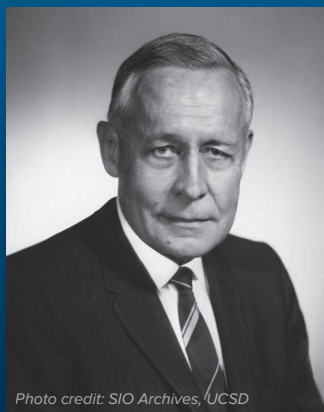



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Roger Revelle

For almost half a century, Roger Revelle was a leader in the field of oceanography. Revelle trained as a geologist at Pomona College and the University of California, Berkeley. In 1936, he received his PhD in oceanography from the Scripps Institution of Oceanography. As a young naval officer, he helped persuade the Navy to create the Office of Naval Research to support basic research in oceanography. He served for 12 years as the Director of Scripps where he built up a fleet of research ships and initiated a decade of expeditions to the deep Pacific that challenged existing geological theory.

Revelle's early work on the carbon cycle suggested that the sea could not absorb all the carbon dioxide released from burning fossil fuels. He organized the first continual measurement of atmospheric carbon dioxide, an effort led by Charles Keeling, resulting in a long-term record that has been essential to current research on global climate change.

In 1957, Revelle became a member of the National Academy of Sciences to which he devoted many hours of volunteer service. He served as a member of the Ocean Studies Board, the Board on Atmospheric Sciences and Climate, and many committees.

others can gain access to such opportunities. The international community through the Ocean Decade has described a vision for a future ocean that is accessible, clean, equitable, healthy and resilient, productive, safe, and inspiring. Will it be? ECOPs will decide as they become leaders of tomorrow. Within the Ocean Decade, there is not only the opportunity but also the need to give ECOPs the tools to address ocean challenges and ensure that they have the capacity to contribute fully and equitably. Every ocean professional has a role to play in this journey. 

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