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Conceptualizing the construct of ocean identity

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The construct of ocean identity provides a valuable lens that can unpack the multiple dimensions of human connections with ocean spaces, and crucially places importance on the integration of cognitive, affective, and behavioral components. The construct of ocean identity is applicable in academic and professional contexts, and is largely unexplored from both qualitative and quantitative research perspectives. This comment article presents a revised definition of ocean identity and posits a useful conceptual framework based on a robust analysis of literature to unveil the multiple dimensions that may explain an individuals' ocean identity. Here we identify a series of attributes that could be considered possible explanatory attributes of the emerging concept of ocean identity. Future research will statistically test the concepts presented here to validate a scale for measuring ocean identity. This piece contributes to the ongoing ocean literacy discourse and deepens our understanding of the multiple conceptual dimensions of ocean identity.

INTRODUCING OCEAN IDENTITY AS AN EMERGING CONSTRUCT

Do you have ocean objects in your home that you adore? Do you vacation on or by the ocean regularly? Do you feel desire to be close to ocean spaces? If so, these may be expressions of your ocean identity. Jaksha[1] defines ocean identity as how people view themselves specifically in relation to an ocean environment. In exploring the construct with K-12 students they explain that ocean identity "takes into account non-traditional variables in education such as how students talk about relationships with non-human species, how values and life goals relate to the environment, and emotions expressed related to environmental fears and threats." (pg. 94). While a valuable introduction to the concept of ocean identity, this early definition focuses primarily on the *how* aspects of ocean identity, within a specific group, and presents little evidence as to *why* people come to have the ocean identities that they maintain.

Our work seeks to develop a deeper understanding of not just *how* individuals express their ocean identities, but what drives their ocean identities and *why*? Therefore, we assert the value of a broader definition of ocean identity defined as "the connection between an individual's self-concept and ocean spaces." Given the growing emphasis on the need to understand the complexities of ocean-human relationships, the construct of ocean identity provides a valuable lens that can be used to unpack the multiple conceptual dimensions that may explain why individuals perceive their connection with the ocean in a particular way. Through this paper, we further explore and conceptualize this emergent construct in order to deepen understanding of human connections with ocean spaces.

The inventory of conceptual attributes developed addresses a number of research gaps[1] and signals a diversity of attributes that may be considered in measuring an individual's ocean identity. This framework goes beyond what has already been explored, as it includes a robust list of aspects of environmental identity and ocean literacy concepts that may explain one's ocean identity across cognitive, affective, and behavioral contexts. A valid and reliable statistical instrument for measuring ocean identity is currently being tested using the conceptual dimensions presented here. Table 1 shown below identifies the cognitive, affective, and behavioral aspects that were identified through our literature review. It serves as a conceptual framework for our revised definition of ocean identity.

ESTABLISHING THE NEED FOR OCEAN IDENTITY RESEARCH

Despite its vastness and seeming never-ending capacity to withstand the pressures placed on it by human society, the global ocean is not limitless[2]. Worldwide, marine and coastal ecosystems are experiencing unprecedented levels of anthropogenic pressure; as efforts to address the challenges facing the global ocean continue, recent years have witnessed a resounding call for greater consideration of the connection between the ocean and society[3,4]. January 2021 marked the beginning of the UN Decade of Ocean Science for Sustainable Development[5] (hereafter the UN Ocean Decade), which sets out an aspiration to transform the "relationship between people and the ocean," calling for improved interdisciplinarity and integration of social and natural sciences, including diverse knowledge and values, to address ocean challenges. This goal is an indication of shifting values at the global scale toward ocean and coastal, or "blue," issues[6].

There is growing acknowledgment that marine environments provide many discernible and indiscernible resources to humankind, and a need to understand the complexity of the interconnections between society and the sea in order to deliver sustainable management and conservation[1,3,4,7]. Efforts to improve ocean connections around the world are aligning with this growing interest in blue issues, with ocean literacy positioned as a key mechanism for delivery of the UN Ocean Decade goals. Related to this, while it is well established in the literature that identity or orientations drive human behavior[8], the notion of ocean identity, and its role in understanding the complex relationships between people and the ocean, has received limited attention to date.

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Table 1. Proposed attributes of the ocean identity construct.

Domain and concept	Description
Affective	
Ocean belonging	The extent to which individuals have a sense of belonging in ocean spaces or feel emotionally connected to ocean spaces
Place connectivity	The extent to which an individual's connections with ocean spaces have been shaped by prior experiences and social interactions
Ocean attraction or affinity/Thalassophilia	The extent to which individuals like or love ocean spaces
Ocean avoidance/Thalassophobia	The extent to which individuals dislike or hate ocean spaces
Emotional responses	Emotional responses (positive, negative, and neutral) to ocean spaces
Ocean ecosystem services values	The extent to which individuals value ocean spaces for their ecosystem services values
Cognitive	
Prior experience	Extent and nature of proper interaction with ocean spaces (physically and digitally/virtually)
Ocean literacy principles	The extent to which individuals understand the United Nations Ocean Literacy Principles
Awareness	Level of exposure to issues related to ocean spaces
Knowledge	Perceived level of knowledge of ocean-related concepts
Concern	Level of concern related to ocean-related topics
Knowledge Source Trust	Level of trust for sources of ocean-related information
Behavioral	
Ocean interaction	Current/regular frequency of ocean exposure
Ocean activities	Extent and nature of ocean recreational activities
Types of ocean space exposure	Extent and nature of experiences in different ocean/coastal ecosystem types
Media/communication factors	Level of regular exposure to ocean-related media
Personal expression	Level of regular expression of ocean affinity through art, fashion, and design
Advocacy orientation	Level of regular advocacy behavior
Social identification factors	Extent to which others influence ocean behavior
Seafood consumption	Extent and nature of seafood consumption
Perceived behavioral barriers	Extent and level of perceived barriers to accessing open spaces

BRIDGING THE GAP BETWEEN OCEAN LITERACY AND ENVIRONMENTAL IDENTITY

Recent years have seen resounding calls for the incorporation of the human component into our assessments of socio-ecological condition and relationships[9,10]—including within ocean literacy, and other parallel concepts and frameworks. Originating in the early 2000s, ocean literacy has historically been defined as having "an understanding of your influence on the ocean and its influence on you"[11]. Until recently, there has been a persistent lack of attention to the multitude of socio-cultural and humanistic aspects of ocean literacy, with the majority of studies framing the concept around knowledge and awareness obtained through formal school education and assessment[12–14]. Further, these efforts rarely take into account informal and free choice learning educational interventions[1,14], or explore how experience and personal connection might influence levels of ocean literacy and related behaviors[15]. Recently, the landscape around the concept and its application has evolved suggesting that contemporary models of ocean literacy lack a thorough understanding of the social factors which may influence connection to the ocean[15–18].

Despite growing recognition of the importance of social and human dimensions, many existing ocean literacy assessments do not yet account for the complex and dynamic facets included within models of marine citizenship[19,20] or environmental citizenship[21], for example. Coupled with a need to expand the previously accepted dimensions of ocean literacy—awareness, knowledge, attitudes, communication, behavior and activism (as outlined by ref. [17], there is also a need to better integrate additional influencers, including emotional connection, adaptive capacity, experiences and social values, in expressions of ocean literacy[16]. However, due to the nascent nature of this interdisciplinary topical area, to date, there has been limited effort to effectively assess the various dimensions of ocean literacy (or other related concepts) across various geographical scales (see, for example, refs. [22,23]).

Like ocean literacy, the construct of environmental identity is not novel, and has been studied for decades[24,25], with studies showing that interactions with nature and the environment facilitate and stimulate environmental identity development[26]. The importance of understanding the whole spectrum of human dimensions has received growing emphasis in recent years, including an increased focus on the role of emotions in the context of societal relationships with nature and the environment[27]. Milton[28] frames emotions, for example, as being integral to a person's ability to relate to, and connect with, an environment and a caring relationship with a nonhuman entity to be created. However, while knowledge, attitudes and other dimensions of societal relationships with the ocean are of growing interest, emotions relating to ocean environments have received relatively limited attention[29] Further, while the existing literature on environmental identity provides a useful framework, there has been limited application of it within an ocean context.

TAKING OCEAN IDENTITY FORWARD

In order to advance the construct of ocean identity, there is a first a need to consider what attributes comprise it. Drawing from existing scholarship on environmental identity and ocean literacy, this paper presents an early description of the concept of ocean identity and highlights key affective, cognitive, and behavioral attributes that can be expected to contribute to an individual's sense of ocean identity.

This framework is currently being used in the validation of a statistically valid and reliable instrument for adequately measuring and furthering the conceptualization of ocean identity. The factors

included here demonstrate the multiplicity of concepts that, in theory, may affect how one's ocean identity presents at a given point in time. Future research will uncover a statistically validated model, though researchers should continue to explore the complexity of human connections with ocean spaces, as illustrated in the conceptual ocean identity framework presented. Additionally, as efforts continue to better understand human–ocean relationships in order to deliver the goals of the UN Ocean Decade, the construct of ocean identity has a valuable role to play as a construct in its own right, but also in enhancing societal ocean literacy.

DATA AVAILABILITY
This work is based on existing literature and is an alignment of multiple areas of research to present a new conceptual framework derived from these multiple fields of research and existing knowledge.

CODE AVAILABILITY
No data coding was conducted in the development of this work.

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COMPETING INTERESTS
The authors declare no competing interests.

ADDITIONAL INFORMATION
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