

Synergetic management strategy toward sustainable use of ocean resources and enhancing blue economy

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ABSTRACT

As intensified anthropogenic activities and altered global climate systems impose cumulative pressures on marine biodiversity, their potential to provide tangible and intangible benefits to people and the planet might decrease, causing degrading maritime heritage. The marine environment considers a precious heritage of the global community. A healthy marine environment can boost the resilience of marine heritage. On the other side, the blue economy in the ocean context is strongly gaining international importance. Blue economy cooperation at both global and regional levels will develop a common concept of marine ecosystems and protect underwater marine heritage. The worldwide ocean covers 71% of Earth's surface area. It is expected to become the great economic frontier in the coming future, with tremendous potential for resource generation and development across multidirectional segments. As the oceans are vast and particularly sensitive to ocean trades, coastal economics, marine heritage, and ecosystems need to be preserved, and a balance between trade and commerce and the conservation of the marine ecosystems and heritage must be found. Worldwide, 80% of global trade is achieved using the seas, and 40% of the global population lives near coastal zones. It has been estimated that the annual gross revenue from marine products (GMP) is US\$2.5 trillion, and the total value of the ocean resources is at least US\$24 trillion; also, the ocean economy is capable of providing a livelihood for over 3 billion people. Pursuing the blue economy sustainably is essential to optimize mutual benefit for the well-being of people and the planet. To enhance the blue economy, we must focus on achieving SDGs goal 14, conserving the maritime cultural heritage and ocean biodiversity. At the same time, stakeholder initiatives, policy formation, and transboundary cooperation are significant. It requires disruptive approaches to eliminate marine pollution and conserve marine ecosystems and heritage to enhance the blue economy at the global level. This paper discusses the threat to underwater cultural heritage caused by anthropogenic sources. It discusses ocean governance, policies, and the proposal to protect marine ecosystems, conserve maritime heritage, and enhance the blue economy.

Keywords: Anthropogenic Activities, Underwater Cultural Heritage, Ocean Resources, Blue Economy

LIST OF ABBREVIATIONS

GMP	Gross marine product
MCH	Marine Cultural Heritage
R&D	Research and development
SDGs	Sustainable Development Goals
UCH	Underwater cultural heritage
UNESCO	United Nations educational, scientific and cultural organization

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INTRODUCTION

The literature is evident that the ocean economy consists of living resources, renewable energy, minerals, tourism and recreation, carbon sequestration, transport and trade, and overall marine and coastal zone protection (Ebarvia, 2016; Hussain et al. 2018; Karani and Failler 2020; Choudhary et al. 2021). On the other hand, it has been stated that "UCH is defined as all traces of human existence of a cultural, historical or archaeological nature which, for at least 100 years, have been partially or immersed, periodically or permanently, under the oceans and in lakes and rivers" (UNESCO 2001 Convention; Pearson and Thompson 2023). UCH is not officially a blue economy sector, but it is a field where UCH can be used as a resource of economic benefits, in turn enhancing the global blue economy (Nishikawa 2021; Lamont 2022). Worldwide around 40% of the population is mainly connected in coastal zones, and 75% of the world's major cities are situated near the coastal area (Small and Nicholls, 2003; Mimura, 2006; Lane et al., 2015 Vignudelli et al. 2019). Probably the significant legacy of securing a sustainable ocean economy is that developing measurements to usher sustainable ocean development can gleam the way for the measure to a sustainable blue economy (Fenichel et al. 2020). The ocean economy is under multidirectional risks and stressors, ranging from direct biodiversity damage, unmanaged resource extraction, pollution, and climate change (Ryabinin et al. 2019). Achieving effective sustainability of the ocean environment, biodiversity, and ecological systems in a changing era is a great challenge Anthropogenic (Bigagli 2016; Quirk and Hannah 2016; Fox et al. 2021). The ocean strongly contributes to the global society for our well-being but, at the same time, is severely impacted by human activities (Micheli et al. 2013; Halpern et al. 2015). Oceans provide us with essential natural resources, but the management towards governance is a very complex network, and, as a result, ocean ecosystems. The current protocol of management strategy is seen to have failed to utilize the ocean resources sustainably, and also, there needs to be more efficient in managing other ocean ecosystems, which has been highlighted in the various consequences (Curtin and Prellezo 2010; Henderson 2019) Sustainable development of the ocean ecosystem is possible; still, such growth will depend upon the sustained capacity building of coastal and indigenous communities, stakeholder collaboration, and the resource's long-term sustainability. Based on the literature review data, ocean sustainability is linked with the other sustainable development goal (Claudet et al. 2020). The current ocean governance system must be revised to handle the ocean's challenges. A reconfiguration of ocean management and governance orientation should support a healthy and thriving relationship between the human community and the ocean, enhance the blue economy, and improve sustainable development.

UCH (DEFINITIONS)

The UCH defines as "all the material and resource evidence of human activities carried on in the ocean environment, particularly as evidenced on the bottom of the sea." (Smith and Couper 2003). According to the UCH Convention of UNESCO (adopted in 2001), "UCH is defined as all traces of human existence having a cultural, historical, or archaeological character, which has been partially or totally under water, periodically or continuously, for at least 100 years" (UNESCO 2021).

PRESENT THREATS TO THE UCH

Considering the increased interest in ocean heritage in the last few decades, it is vital to emphasize global awareness of the value of UCH and engage stakeholders, leaders, and policy-makers in taking initiatives to protect marine cultural treasures. As per UNESCO, the present threats to UCH are becoming serious and presented in **Table 1**.

Table 1 The present threats to UCH

Threats to the UCH	Effects on UCH
Climate change	Rising sea levels, damaging biodiversity and ecosystems
Pillages	Due to the modern technological advancement, research interest, and hunting of treasure. Extensive pillage is now also taking place underwater.
Commercial and tourist exploitation	Commercial exploitation is the legal recovery of artifacts from a heritage site to put them up for sale.
Trawling and Fishing	Trawling activities are degrading UCH. Its impact on the sea floor is devastating.
Economic activities	Economic activities in the ocean environment are damaging UCH in multiple directions. Such as marine construction works, mineral extraction, and trading of marine species affect the environment by generating pollution, causing erosion, or modifying currents. In turn, they are degrading UCH.
Industrial and commercial work	Shipping and other commercial activities causing significant effects on UCH
Developing the seabed (mineral extraction, pipeline)	Extracting sand, gravel, and minerals in the seabed imposes multidirectional effects on UCH.

Source: UNESCO, UCH, 15 February 2023

SUSTAINABLE OCEAN ECONOMY AND BLUE ECONOMY

According to the World Bank's report, the blue economy is defined as the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean ecosystem."

Blue Economy is an economy that "comprises a range of economic sectors and related policies that determine whether the use of ocean resources is sustainable" (According to the United Nations). **Table 2** presents the definitions of the sustainable ocean economy and blue economy (Sumaila et al. 2020)

Table 2 Definitions of the sustainable ocean economy and blue economy (Sumaila et al. 2020)

Asian Development Bank	"The economic, societal, and environmental derive economic activity from the ocean."
Center for the Blue Economy	"It uses three related but distinct meanings: (i) the overall contribution of the ocean to economies, (ii) the need to address the environmental and ecological sustainability of the oceans, and (iii) the ocean economy as a growth opportunity for both developed and developing countries."
Economist Intelligence Unit	"A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy."
Economic Cooperation and Development	"The ocean economy can be defined as the sum of the economic activities of ocean-based industries and the assets, goods, and services of marine ecosystems."
United Nations Development Program	"Protecting, preserving, and restoring ocean resources while increasing the economic activity derived from the ocean."
World Bank	"The sustainable use of ocean resources for economic growth and improved livelihoods and jobs while preserving the health of the ocean ecosystem."
Worldwide Fund for Nature	"A sustainable blue economy provides social and economic benefits for current and future generations; restores, protects, and maintains diverse, productive, and resilient ecosystems; and is based on clean technologies, renewable energy, and circular material flows."

Ocean economy or sustainable blue economy can be enhanced by regional collaboration in Sustainable Ocean Governance (Sumaila et al. 2020). **Table 3** describes the Regional Collaboration in Sustainable Ocean Governance.

Table 3 Regional Collaboration in Sustainable Ocean Governance (Sumaila et al. 2020)

Region	Sustainable ocean management (Initiative/Strategy)
Africa	“African Union’s Blue Economy Strategy United Nations Economic Commission for Africa’s Blue Economy Regional Action Plan”
Asia	“Asia Development Bank’s Action Plan for Healthy Oceans and Sustainable Blue Economies. Indonesia’s Sustainable Oceans Programme”
Baltic Sea	Baltic Sea Initiative
Europe	EU’s Blue economics initiative g
Indian Ocean	Indian ocean rim association’s blue economy declaration
Pacific Ocean	Pacific Regional of Oceanscape Program

BLUE ECONOMY

Oceans are the most expensive ecosystem and a vast economic system and network - a blue economy. Our oceans cover 97% of the world’s water resources, and globally, the blue economy has enormous potential and is an emerging economy. It includes all commercial and economic activities related to oceans, seas, and coastal zones in a broad perspective, regardless of whether the activities occur on the sea or land. To develop the blue economy, we must address the issue of the significant bottleneck toward the sustainability of the blue economy in the global context. **Table 4** presents the factors influencing the blue economy.

Table 4 Summarizes the factors influencing the blue economy.

Factors Affecting the blue economy	Description
Disasters	The blue economy is negatively impacted yearly by natural disasters. These include Cyclones, hurricanes, Tsunamis, and typhoons. These disasters damage properties and take the lives of thousands of people.
Sea-based terror activities	Terrorism, robbery, piracy, trafficking of drugs and humans, illegal arms trade, illegal trade of crude oil, smuggling of drugs, etc.
Man-made issues	These include problems such as oil spills, war, and aggression, etc.
Climate condition	The impact of present climatic conditions on the marine ecosystem is immense. Increase of acidity in oceans, unnatural changes in sea temperatures, etc. These negatively affect the oceanic habitat, marine resources, and people that are dependent on them.
Marine pollution	This includes dumping untreated sewage, runoff from agriculture, microplastic pollution, solid waste disposal, etc. The excess nutrients from waste lead to problems such as low dissolved oxygen levels in the water. Vulnerable resources, such as corals, fish species, etc., are threatened.
Unsustainable use of marine resources	Use of marine resources in an Unregulated, illegal, and unsustainable manner.

OCEAN GOVERNANCE

Ocean governance includes the policy, rules, regulations, affairs, and actions towards sustainable use of ocean resources and to conserve its ecosystems. (Balgos et al. 2015; Stephenson et al. 2019). Considering these challenges is constitutive to developing proper governance towards developing marine ecosystems and improving sustainability leading to protecting UCH (Alexander and Haward 2019).

Haas et al. (2021) derived from the SDGs three significant risks in the context of ocean governance as follows:

1. The consequence of the unmanaged use of ocean resources (SDG12, SDG14, SDG16)
2. Improper allocations of access to the benefits from the ocean ecosystem e.g., gender inequalities and technology transfer (SDG1, SDG8, SDG10, SDG16)
3. Lack of awareness of adaptation to changing ocean conditions (SDG1, SDG13, SDG11, SDG16).

With the view of the UN SDG goal and for the sake of ocean sustainability, it is rational to jointly work with all nations to protect the ocean environment and biodiversity, leading to sustainable use of ocean resources.

OCEAN POLICY CONTEXT

As the twenty-first century has progressed the cumulative impacts of unmanaged resource consumption and the exponential growth of the global population are the red alert towards the long-term sustainability of marine biodiversity and the sustainable use of their invaluable resources. There has been an international focus on the maritime context over the past few decades, and we must maintain that motivation. The ocean policy provides strength to protect marine biodiversity and resources, improve coastal economies, preserve UCH, and manage sustainable uses and access. Worldwide few major Nationals have adopted the marine policy for the sake of sustainable development of the ocean, presented in **Table 5** (Kaczynski 2011; Włodzimierz 2011).

Table 5 Marine policy directions adopted by major nations (Kaczynski 2011; Włodzimierz 2011)

Country Source	Significant policy directions/measures
USA	Marine education, policy, marine resource, ocean water, and ocean economic
Japan	Ocean resource, Coastal zone management, conservation of remote islands, Ocean environment, Marine transportation, and Marine security, Carrying R&D and survey for better ocean management.
Canada	Marine sustainable development, ocean ecosystems, Ocean science development
China	Ocean-related policy and rights, Conservation of the marine ecosystem, Marine resources, Integrated governance of ocean
Korea	Secure the ocean environment, protection of the ocean environment, and training of the marine specialists

SYNERGETIC MANAGEMENT STRATEGY TO ENHANCE THE OCEAN BLUE ECONOMY

MCH or UCH is closely related to SDG 14, that life below water is a crucial goal of the 2030 global agenda with its stated aim to synergetic management strategy towards sustainable oceans management and sustainable development while, more specifically, a concern with the blue economy in the ocean context. Not only that, but instead, we depend upon ocean ecosystems. Worldwide damaging marine biodiversity and degrading MCH result from sustained human action over millennia. The benefits and advantages provided by the ocean are being eroded rapidly. **Figure 1** presents a typical image of marine ecosystems and the general economic benefits and services they provide to global communities (Barbier 2017).

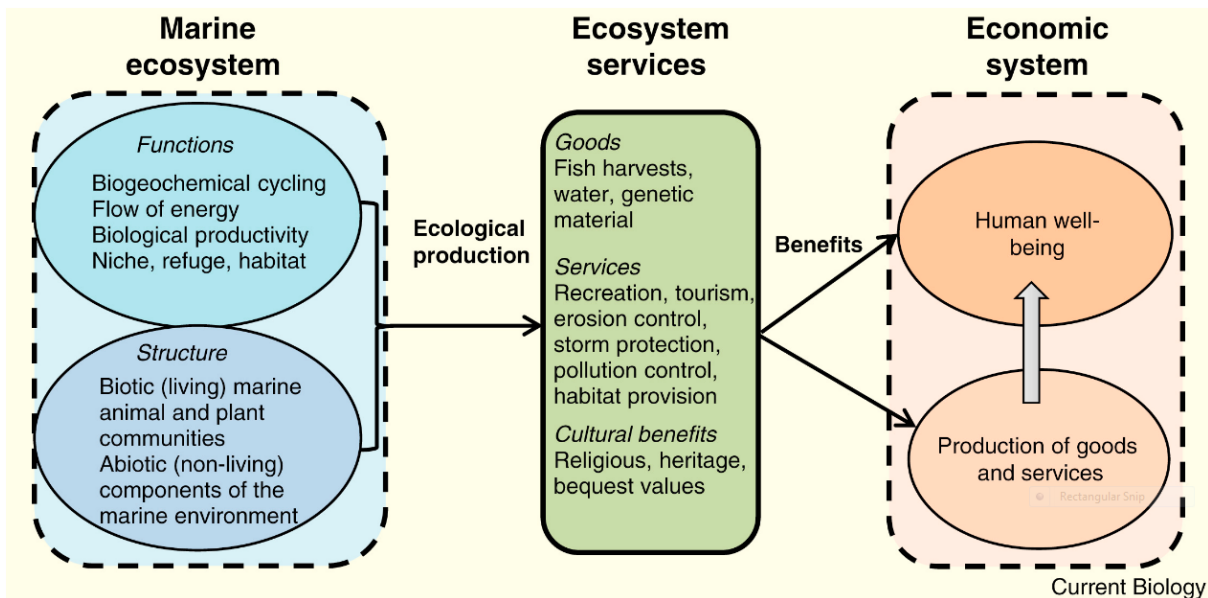


Figure 1 Marine ecosystems and economic benefits (Barbier 2017).

To enhance the blue economy, all the stakeholders must jointly collaborate to implement ocean policy and governance and step forward to protect MCH and ocean ecosystems; these are the significant elements of the blue ocean economy. As per UNESCO, we must address the six measures to protect UCH, such as i) Awareness Raising Material, ii) Practical Measures of Protection, iii) Contribute to the Fund, iv) Model Implementation Law, v) Ratify the 2001 Convention vi) State Cooperation Mechanism.

A synergetic management strategy properly enhances the blue economy to harmonize marine culture development, protect ocean resources, and restore marine biodiversity. (Guilan and Weiwei 2021) Proposed solutions to protect maritime cultural heritage and marine development are presented in **Table 6**.

Table 6 Solutions to be coordinated between MCH protection and marine development (Guilan and Weiwei 2021)

Correlation aspects	MCH Protection		Marine Development
Spatial planning	Where is the potential MCH area and MCH protection area?		How to include MCH areas in marine spatial planning?
Environmental standard	What kind of preserved environment is required for MCH with different materials		Is there any discharge that will pollute or damage MCH?
Management coordination	Preserve in situ or excavation and salvage?		How to coordinate the schedules of a marine development projection?
Laws and policies	Are the impacts on marine development activities taken into account?		Are the MCH protective provisions fully included?

A synergetic management strategy for the ocean environment and economy aims to account for global communities' vast environmental, social, and economic challenges. Unmanaged utilization of ocean resources increases anthropogenic and ecological pressures. This paper highlighted the significant bottleneck towards the development of the blue economy (Table 3). To develop the blue economy, the integration of MCH (MCH) into marine policy has been deemed necessary, and it is part of the blue economy.

CONCLUSION

The Blue economy has enormous potential to encompass and improve social well-being and sustainability in the ocean context. The risks are close if the uncontrolled uses of ocean resources and coasts continue to be used mainly for commercial and trading purposes. The concept of the blue economy should address the issues and give direction on how cultural heritage can be used sustainably in the coastal and marine sectors. On the other hand, the creative economy is not directly concerned with the blue economy but directly linked with the maritime cultural heritage. In turn, the protection of cultural heritage enhances the blue economy. By 2030, ocean protection areas will be expected to expand from 11 per cent to 30 per cent. At the global level, ocean resources and the sustainability of the blue economy are also coming into focus; it would be a significant area with the green deal. Sustainable approaches to ocean management that can address these cumulative pressures have been the focus of considerable research and agency action. To achieve SDGs goal 14 (sustainable use of the oceans) and conservation of marine biodiversity, stakeholder initiatives, policy formation, and transboundary cooperation are extremely important. It requires disruptive approaches to eliminate marine pollution and conserve marine ecosystems and heritage to enhance the blue economy at the global level, in turn leading to improved sustainable development.

ACKNOWLEDGMENT

We would like to extend our sincere thanks and gratitude to the Head, Members, Organizers, and Colleagues of the Asia Pacific Conference on UCH for providing us with an excellent platform to exchange our views and ideas and enhance knowledge through this conference with experts from different locations of the globe. We are also grateful to our university and institutions in India for their generous support, motivation, and contributions to our research. We are delighted to be part of the conference and have aspired to remain attached to the organization of "Asia Pacific Conference on UCH" in the future to conduct collaborative research to improve the sustainability of UCH.



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