

1. Social equity in coastal enclosed seas management: to whom shall the sea belong?

Yoshitaka Ota

Research Assistant Professor, University of Washington (U.S.)

Scholars have developed a sociological perspective for ocean and coastal management in the context of enclosed coastal seas. Yet, these seas does not insulate the environment from external influences. To manage through these environmental changes, scientific knowledge of ocean systems have been promoted. Moreover, “enclosures” must be viewed as landscapes where local residents have historical and cultural attachments as well as economic and livelihood dependence to local marine ecosystems. In Japan, these intricate relationships between enclosed seas and peoples are described as "*satoumi*": a synergetic intersection of the coastal landscape, between peoples and seas.

What is essential for coastal management is to ensure the balance between the interest of peoples and the need for conservation that accommodates both societal and ecological changes. However, worldwide this balance is endangered due to environmental impact, such as climate change, overexploitation of fisheries resources and land-based pollution. To respond those changes, management is called for a long-term and cross-scale perspective and knowledge that would lead us to solve immediate issues regarding the utilization of resource and multiple uses of ocean space.

When we investigate how external influences affect environment of sea under enclosure, it is critical that we approach from an understanding of the local characteristics of the landscape. External impacts interact cumulatively and are non-linear. As we consider coastal activities, our view moves from the water to the society. Notably, management would be given the task to respect the diversity, consensus, and distribution in the practice of responding to the changes.

My presentation will introduce external impacts, both natural and socioeconomic, and the case study of management effort of the State of Washington from the perspective of social equity. Then, I attempt to answer the question: for whom the ocean is beneficial and whose interested we must consider?

2. Coastal Zone Management in Washington State: from Shoreline Management to Marine Spatial Planning

Jennifer Hennessey

Senior Policy Advisor – Ocean Health, Washington State Governor Jay Inslee (U.S.)

In the early 1970s, Washington State became the first state to have a Coastal Zone Management Program (CZMP) approved by the federal government under the newly adopted federal Coastal Zone Management Act. Under this federal law, states with approved CZMPs: 1) receive federal funding to implement their plan and 2) can review federal actions for consistency with state policies. A cornerstone of the state's program and approach was, and continues to be, the Shoreline Management Act (SMA). This state law sets out a framework for developing local plans for shorelines that balance the needs for shoreline use, public access, and environmental protection. Over the years, the SMA has been updated to address various concerns. Marine Spatial Planning is a more recent process and tool that has been used by the state's CZMP to plan for new ocean use on Washington's Pacific Ocean coast, while protecting existing uses and the environment. Marine Spatial Planning provides a way to integrate and analyze disparate ocean and coastal data, involve affected stakeholders, coordinate across government agencies, and ultimately to develop a process for guiding and evaluating future proposed projects and uses more comprehensively. Washington's experience with Marine Spatial Planning offers many lessons for those interested in pursuing this approach in other coastal regions.

3. Collective Impact as a Management Framework for Recovering Puget Sound

Sheida R. Sahandy

Executive Director of the Puget Sound Partnership, State of Washington (U.S.)

Old industrial pollution, rapid increases in human population, toxic storm water runoff, loss of habitat, and the impacts of changing climate and ocean conditions have combined to present a serious threat to the health of the Puget Sound, one of three EMECS-identified enclosed coastal seas on the west coast of North America. The social complexity of the recovery effort, which includes cities, counties, state agencies, federal agencies, non-profit organizations, and 19 sovereign tribal nations contributes to the complexity of the overall problem of recovery and protection of these waters. A broader concept of this enclosed coastal sea as the entire Salish Sea introduces the further complexities of working across an international border with Canada, the province of British Columbia, and the First Nations of those regions. What is the best methodology for managing such a “wicked problem”¹ – one for which there is no defined formula for success, presents incomplete data, involves many parties and environmental pressures that are interdependent, and has no set stopping point? The challenge is increased because the law describes “recovery” very broadly, to include: Healthy Human Populations, Vibrant Human Quality of Life, Thriving Species and Food Web, Protected and Restored Habitat, Abundant Water and Healthy Water Quality. In the Puget Sound, a small state agency tasked with recovering Puget Sound is testing the application of Collective Impact² theory and serving the role of a Backbone Organization³ as the framework within which to manage recovery. This session will describe this on-going experiment in the context of the variety of regional ecosystem challenges.

¹ https://ssir.org/articles/entry/wicked_problems_problems_worth_solving.

² <https://collectiveimpactforum.org/what-collective-impact>

³ https://ssir.org/articles/entry/understanding_the_value_of_backbone_organizations_in_collective_impact_1

4. Environmental Governance of the Seto Inland Sea

Osamu Matsuda

Vice Chair of Board of Directors, International EMECS Center
Professor Emeritus Hiroshima University

Since ancient times, the Seto Inland Sea has been known as a scenic area of white sand beaches and green pines. After the National Park Act was enacted, it became the first place in Japan to be designated a national park in 1934. Following the end of the Second World War, however, the environment of the Seto Inland Sea changed dramatically, primarily during Japan's period of high-level economic growth. Industrial activities expanded, and the significant escalation of water pollution and eutrophication resulting from industrial effluent and household sewage caused it to be known as a "dead sea." Vast shallow sea areas were lost as a result of reclamation and other development activities. In response, a law confined to the Seto Inland Sea, the Law Concerning Special Measures for Conservation of the Environment of the Seto Inland Sea ("Seto Inland Sea Law"), was enacted in 1973, initially as a temporary measure. Although this law concerned the environmental preservation of ocean areas, the fact that its target scope also extended to the watersheds of the rivers flowing into the Seto Inland Sea shows that it reflected the principle of integrated coastal management (ICM). Subsequently, the effects of water pollution and eutrophication were gradually remedied through various measures, and a "beautiful sea" in the sense of water quality (which was the initial objective) was achieved to a considerable degree. In recent years, oligotrophication, in which nutrient salts become insufficient, has started to become a new problem. The enactment of the Basic Act on Ocean Policy in 2007 resulted in the full-fledged introduction of ICM in legislation as well. In 2015, major revisions were made to the Seto Inland Sea Law as well as the national basic plan that is based on this law, and "abundant ocean" was added as a new objective. In terms of environmental management techniques as well, there was a major change in course, from the previous regulatory type management (which involved reducing total inflow loads and so on) to revitalization and creation type management for seaweed beds and tidal flats and so on. With the revision of the Seto Inland Sea Law, specific policies on the prefectural level also changed dramatically. These types of changes to the top-down environmental management system were also accompanied by active "bottom-up" style Satoumi creation efforts, in which local residents became involved with the ocean areas near them in order to achieve an "abundant ocean." In April 2018, the national 5th Basic Environment Plan based on the Basic Environment Law was passed by the Cabinet, and in May the 3rd Basic Ocean Plan based on the Basic Act on Ocean Policy was also passed by the Cabinet. In both of these plans, special emphasis was placed on international frameworks such as the Sustainable Development Goals (SDGs) of the United Nations. In addition, the Basic Environment Plan also proposed the creation of "symbiotic communities for local circulation" and emphasized Satoumi-like connections linking forests, villages, rivers and seas. The Basic Ocean Plan emphasized that "the experiences of the Satoumi" should be utilized in comprehensive management.

The Seto Inland Sea Law has played an important role in the environmental governance of the Seto Inland Sea. From this point on, based on the national Basic Environment Law and Basic Ocean Law, as well as new systems such as the Basic Act on Establishing a Sound Material-Cycle Society, efforts to achieve "multi-tiered environmental governance" should be promoted through cooperation on the part of industry, government, academia and the general public, in which SDGs and other international frameworks are employed while on the local level community-led efforts at Satoumi creation are pursued.

5. Responses to Ocean Acidification on the U.S. West Coast

Terrie Klinger

Professor, University of Washington

Co-Director, Washington Ocean Acidification Center (U.S.)

Waters along the west coast of the U.S. are particularly vulnerable to ocean acidification. Concern over the sustainability of the shellfish aquaculture industry in Washington led to legislative action to address the issue. At the same time, growing concerns over coast-wide ocean acidification and the associated stressor hypoxia motivated legislative action in California. Rapid increases in scientific understanding of ocean acidification provide the basis for experimentation and innovation in marine resource management. For example, along the U.S. west coast, ecosystem-based fisheries management, spatial protections, coastal ecosystem management, vegetation management, and pollution reduction all have been proposed as means of supporting ecological resilience under conditions of ocean acidification. These innovations are likely to have general applicability in coastal regions exposed to ocean acidification.

6. Nutrient Management in the Seto Inland Sea

Tetsuo Yanagi

Principal Researcher, International EMECS Center

Professor Emeritus, Kyushu University (Japan)

In 2014 - 2018, research for the “Development of Coastal Management Method to Realize the Sustainable Coastal Sea” project (Head Researcher: Tetsuo Yanagi) was conducted under the S-13 Environment Research and Technology Development Fund. This paper reports on methods for managing nutrient concentrations in the Seto Inland Sea based on the results of this research project (<https://www.emecs.or.jp/s-13/>).

The goal of the project was to develop effective coastal zone management techniques to achieve “a sustainable coastal sea that is beautiful, productive and prosperous.” First, a study was conducted to define what type of ocean environment constituted “a beautiful and productive coastal sea.” The study determined that, in the case of the Seto Inland Sea, this corresponded to an average transparency of 6m and a chlorophyll-a concentration of 4.5 $\mu\text{g/L}$. It was also determined that, in the past, the Seto Inland Sea with these qualities had an average TN concentration of 0.28 mg/L and an average TP concentration of 0.027mg/L. At present, the average TN concentration in the Seto Inland Sea is 0.22 mg/L and the average TP concentration is 0.024 mg/L. However, even if the TN and TP load from land is increased in order to increase the TN and TP concentrations, it is not known what load quantity will achieve the target values for transparency and TN/TP concentrations. This is because the transparency and TN/TP concentrations are determined by material circulation which is dependent on the ecosystem structure in the Seto Inland Sea. Further research is needed into the past, present and future ecosystem structure of the Seto Inland Sea and the material circulation in the Seto Inland Sea.

In reality, water quality management is not being conducted throughout the entire Seto Inland Sea. Since 2000, water quality management has been conducted in individual bays and nadas regions. In the S-13 project, research was conducted for Hiroshima Bay, and researchers found that, rather than water quality management for the entire bay, separate water quality management was needed for individual coastal zones and offshore areas. They also found that the most effective way to achieve target transparency and TN/TP concentration values would be management to revitalize *Zostera* beds rather than load quantity management.

7. Towards An Inclusive Blue Economy

Edward H. Allison

Professor, School of Marine and Environmental Affairs

University of Washington

The Blue Economy, Blue Growth and the Blue Revolution have become popular slogans to galvanize the potential of the oceans in contributing to human prosperity and food security. This wave of ‘blue enthusiasm’ aims to attract new investors into the maritime economy and improve governance of the oceans. But it also risks sweeping away those with less capital to invest, including the small scale fishers and farmers that are the largest group of ocean resource users, globally. Supporters of the blue economy idea claim it can help to reduce global economic inequalities by providing new opportunities for poverty reduction, nutrition security and improved wellbeing, while sustaining the productive capacity of ocean and coastal ecosystems. Can it? Will it? How? Drawing on plans for Washington State’s ‘Maritime Blue’ project and experiences from around the world, I set out an agenda for policy-relevant research to support an inclusive blue economy.

8. Economic Valuation of Ecosystem Services in the Seto Inland Sea

Ken'ichi Nakagami

Specially Appointed Professor, Ritsumeikan University (Japan)

The meaning of economic valuation of ecosystem services is not so much ensuring the rigorosity of numerical values as it is helping to formulate policy scenarios. Deploying ecosystem services in policy is an effective means not only of preserving biodiversity in coastal seas and stimulating the local economy but also of embodying the concept of regional revitalization in Satoumi. Economic valuation that considers only the potential value of ecosystem services is still not an approach that is practical enough to achieve policy goals. As examples of economic valuation of the ecosystem services in the Seto Inland Sea, this paper presents (1) an economic valuation of the beautiful and abundant Satoumi in Hiroshima Bay and (2) the long-term changes in the economic valuation of the environmental value of the Seto Inland Sea (from 1998 to 2015).

(1) The total benefit value of the beautiful and abundant ocean in the northeast part of Hiroshima Bay, assuming a payment period of 10 years, is JPY 3.6 billion on a median value basis and JPY 3.8 billion on a mean value basis. Based on the results of this economic valuation, achieving a beautiful and abundant Satoumi in the Seto Inland Sea will require study and implementation of appropriate coastal sea preservation methods through changes to sewage treatment methods, sewage treatment fees and so on.

(2) From 1998 to 2015, the economic valuation of the environmental value of the Seto Inland Sea changed from JPY 594 trillion in 1998 to 2.334 quadrillion in 2015 (on a median basis). The increase is thought to be the result of two factors. The first is the increase in the area of reclaimed land in specified ocean areas (areas that should be preserved) for which there is a high willingness to pay (WTP), as compared to 1998. The other factor is that the WTP on the part of residents in areas that do not border the Seto Inland Sea has increased considerably as compared to areas that border the Seto Inland Sea. This is thought to be the result of a widespread awareness of the importance of the Seto Inland Sea.

The author has proposed a formula for estimating the Actual Ecosystem Services of Coastal Zones (AESCZ) as a way to enable realistic use of economic valuations of coastal sea ecosystem services in policy development. Provisioning services are defined as food (marine fisheries and marine products, marine aquaculture and aquaculture) and fishing catches are used as a representative value. Cultural services are defined as recreation and tourist industry revenue is used as a representative value. Hinase Bay, Shizugawa Bay and Nanao Bay are presented as examples of the valuation of ecosystem services in the use of coastal seas. To evaluate the sustainability of coastal seas, a dynamic sustainability assessment method was developed based on the three Satoumi elements of “beautiful, abundant and vibrant,” and this method was applied to Hinase Bay, Shizugawa Bay and Nanao Bay. The deployment of economic valuation of ecosystem services in the Seto Inland Sea in policy is one technique for conducting “blue economy” assessments, as well as being a pioneering model for achieving integrated coastal zone management through the discovery and creation of new value provided by Satoumi.