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Editorial

Integrated Ecosystem Assessments for Fisheries Management in the Yellow Sea, the East China Sea, and the East/Japan Sea

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Marine environmental conditions are highly distinct in the Yellow Sea, the East China Sea, and the East/Japan Sea, with characteristics such as the shallow and turbid conditions of the Yellow Sea, relatively warm subtropical conditions of the East China Sea, and deep and semi-enclosed nature of the East/Japan Sea. Physico-chemical properties and, subsequently, biological characteristics are different among the three seas. In recent decades, dramatic changes in the physical structure and vertical distribution of chemical properties have been reported in the Yellow Sea, the East China Sea, and the East/Japan Sea. These recent environmental changes have greatly affected the physiological status, community structure, and bloom pattern of phytoplankton and, thus, consequently altered the seasonal distributions and nutritional status of higher trophic levels such as zooplankton, fish, and marine mammals. However, to date, we do not know much about the current status of the marine ecosystems in these three distinct seas. Since 2018, the integrated ecosystem assessment for ecosystem-based fisheries management has been implemented in the Yellow Sea, the East China Sea, and the East/Japan Sea by the National Institute of Fisheries Science, Korea.

This Special Issue will provide basic information for the current status of the aforementioned marine ecosystems and will form an important basis for future monitoring of marine ecosystem response to ongoing climate changes in the Yellow Sea, the East China Sea, and the East/Japan Sea.

In this Special Issue, we present a total of 12 articles covering a wide range of topics for water column dynamics derived by the Kuroshio Current and various ecosystem components in the Yellow Sea, the East China Sea, and the East/Japan Sea. A brief overview of all the articles follows.

Lee et al. (2022a) [1] investigate the water column dynamics of the East Korea Warm Current in the western East Sea responding to spatiotemporal variability in the Kuroshio Current. This article expands our understanding of the potential mechanisms for climate change and its effects on the oceanic environmental conditions and subsequent response of fishery resources in the western East Sea.

Kim et al. (2022a) [2] present morphological characteristics of the brown seaweed *Sargassum thundergii* adapting to local environmental conditions along the Korean Coast. Their results, based on biota-environment matching analysis, prove that geographically different morphological characteristics of the brown seaweed *Sargassum thundergii* result from different local environmental factors, especially tidal condition.

Park et al. (2022) [3] examine the summer phytoplankton community structure as a consequence of recent marine environment changes in the Northern East China Sea, finding a significant change in key dominant species from micro-sized diatoms and dinoflagellates in the 2000s to nano- and pico-sized flagellates in the period 2016–2020. This change in the dominant phytoplankton community structure is likely due to the recent low-nutrient conditions after the construction of the Three Gorges Dam in Changjiang River.

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Kim et al. (2022b) [4] identify size-fractionated phytoplankton communities seasonally in the Yellow Sea based on the HPLC results. This study provides important information on the contribution of seasonal variations in small-sized diatom to the phytoplankton community in the Yellow Sea, which has been overlooked to date.

Jang et al. (2021) [5] report the recent primary productions in the Yellow Sea, the South Sea of Korea, and the East/Japan Sea and potential reasons for the lower current productions relating to major environmental changes in each sea. Moreover, the authors recognize that small-sized phytoplankton have significantly negative impacts on the primary productions, which should be further investigated for their ecological roles under rapid warming condition.

Kang et al. (2022) [6] assess a new algorithm based on a deep learning model suitable for the estimation of phytoplankton size classes (micro, nano, and pico size) in Korean waters. This algorithm is expected to be useful for understanding long-term variations in phytoplankton size structure using satellite ocean color data.

Shin et al. (2022) [7] examine seasonal water mass effects on the spatiotemporal distribution characteristics of copepods in the Northeastern East China Sea. The authors classify major copepod species for different regional water masses based on cluster analysis. These major species can be useful indicators for future environmental changes in the Northeastern East China Sea.

Kim et al. (2022c) [8] present a sound scattering layer distribution and density estimation of *Euphausia pacifica* in the central Yellow Sea Bottom Cold Water by hydroacoustic and net surveys. This article contributes toward improving our understanding of the structure of the marine ecosystems in the Yellow Sea Bottom Cold Water.

Kim et al. (2022d) [9] investigate stable isotopes and fatty acid compositions in four dominant zooplankton in relation to their potential diets in the East/Japan Sea. Given the results from stable isotopes and fatty acid compositions, the authors confirm that the change in the dietary intake of zooplankton is generally dependent on phytoplankton conditions.

Choi et al. (2022) [10] implement a DNA barcoding approach to investigate pelagic marine fish eggs as an indicator of spawning and intrusive species in the Ulleung Basin of the East/Japan Sea. The study discovers the eggs of *Trachipterus trachypterus* and *Trachipterus jacksonensis* for the first time in the Northwestern Pacific Ocean, which broadens their potential spawning ecology and geographical distribution.

Kim et al. (2022e) [11] investigate seasonal dietary changes in wild *Hippcampus haema* inhabiting Geoje Hansan Bay in South Korea using the metabarcoding technique. The authors find a survival strategy of wild *H. haema*, which are adapting to the dynamically changing coastal environment by consuming prey suitable for its mouth size.

Lee et al. (2022b) [12] report the first estimate for the Dokdo sea lion (*Zalophus japonicas*) population reconstructed from a discrete time stage-structured population model, showing a rapid decline in their population number with human hunting pressure and a 70% decline in the initial population after 10 years of hunting. The authors propose that there exists the potential for the extermination of a large local population of marine mammals due to human over-hunting.

This Special Issue covers topics for physical response and various major components in marine ecosystems such as the brown seaweed *Sargassum thundergii*, phytoplankton, zooplankton, fish eggs, wild Korean seahorse (*Hippcampus haema*), and an extinct marine mammal. This volume broadens our existing knowledge on the marine ecosystems in the Yellow Sea, the East China Sea, and the East/Japan Sea. Lastly, we hope that this volume provides a valuable foundation for understanding the current status of marine ecosystems in the Yellow Sea, the East China Sea, and the East/Japan Sea and their future response to ongoing climate change.

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References

1. Lee, C.-I.; Jung, Y.-W.; Jung, H.-K. Response of Spatial and Temporal Variations in the Kuroshio Current to Water Column Structure in the Western Part of the East Sea. *J. Mar. Sci. Eng.* **2022**, *10*, 1703. [CrossRef]
2. Kim, S.; Choi, S.K.; Van, S.; Kim, S.T.; Kang, Y.H.; Park, S.R. Geographic Differentiation of Morphological Characteristics in the Brown Seaweed *Sargassum thunbergii* along the Korean Coast: A Response to Local Environmental Conditions. *J. Mar. Sci. Eng.* **2022**, *10*, 549. [CrossRef]
3. Park, K.-W.; Oh, H.-J.; Moon, S.-Y.; Yoo, M.-H.; Youn, S.-H. Effects of Miniaturization of the Summer Phytoplankton Community on the Marine Ecosystem in the Northern East China Sea. *J. Mar. Sci. Eng.* **2022**, *10*, 315. [CrossRef]
4. Kim, Y.; Youn, S.-H.; Oh, H.-J.; Joo, H.; Jang, H.-K.; Kang, J.-J.; Lee, D.B.; Jo, N.; Kim, K.; Park, S.; et al. Seasonal Compositions of Size-Fractionated Surface Phytoplankton Communities in the Yellow Sea. *J. Mar. Sci. Eng.* **2022**, *10*, 1087. [CrossRef]
5. Jang, H.-K.; Youn, S.-H.; Joo, H.; Kim, Y.; Kang, J.-J.; Lee, D.; Jo, N.; Kim, K.; Kim, M.-J.; Kim, S.; et al. First concurrent measurement of primary production in the Yellow Sea, the South Sea of Korea, and the East/Japan Sea, 2018. *J. Mar. Sci. Eng.* **2021**, *9*, 1237. [CrossRef]
6. Kang, J.J.; Oh, H.J.; Youn, S.-H.; Park, Y.; Kim, E.; Joo, H.T.; Hwang, J.D. Estimation of Phytoplankton Size Classes in the Littoral Sea of Korea Using a New Algorithm Based on Deep Learning. *J. Mar. Sci. Eng.* **2022**, *10*, 1450. [CrossRef]
7. Shin, S.S.; Choi, S.Y.; Seo, M.H.; Lee, S.J.; Soh, H.Y.; Youn, S.H. Spatiotemporal Distribution Characteristics of Copepods in the Water Masses of the Northeastern East China Sea. *J. Mar. Sci. Eng.* **2022**, *10*, 754. [CrossRef]
8. Kim, H.; Kim, G.; Kim, M.; Kang, D. Spatial Distribution of Sound Scattering Layer and Density Estimation of *Euphausia pacifica* in the Center of the Yellow Sea Bottom Cold Water Determined by Hydroacoustic Surveying. *J. Mar. Sci. Eng.* **2022**, *10*, 56. [CrossRef]
9. Kim, J.; Yun, H.-Y.; Won, E.J.; Choi, H.; Youn, S.-H.; Shin, K.-H. Influences of Seasonal Variability and Potential Diets on Stable Isotopes and Fatty Acid Compositions in Dominant Zooplankton in the East Sea, Korea. *J. Mar. Sci. Eng.* **2022**, *10*, 1768. [CrossRef]
10. Choi, H.-Y.; Choi, H.-C.; Kim, S.; Oh, H.-J.; Youn, S.-H. Discovery of pelagic eggs of two species from the rare mesopelagic fish genus *Trachipterus* (Lampriformes: Trachipteridae). *J. Mar. Sci. Eng.* **2022**, *10*, 637. [CrossRef]
11. Kim, M.-J.; Kim, H.-W.; Lee, S.-R.; Kim, N.-Y.; Lee, Y.-J.; Joo, H.-T.; Kwak, S.-N.; Lee, S.-H. Feeding Strategy of the Wild Korean Seahorse (*Hippocampus haema*). *J. Mar. Sci. Eng.* **2022**, *10*, 357. [CrossRef]
12. Lee, Y.-J.; Cho, G.; Kim, S.; Hwang, I.; Im, S.-O.; Park, H.-M.; Kim, N.-Y.; Kim, M.-J.; Lee, D.; Kwak, S.-N.; et al. The First Population Simulation for the *Zalophus japonicus* (Otariidae: Sea Lions) on Dokdo, Korea. *J. Mar. Sci. Eng.* **2022**, *10*, 271. [CrossRef]