

SPECIAL ISSUE ON AQUATIC SCIENCE AND TECHNOLOGY (i-CoAST): SUPPLEMENT

PREFACE



The special issue on Aquatic Science and Technology (i-CoAST): Supplement was organized with the aim of presenting a wide range of papers submitted through the International Conference on Aquatic Science and Technology (i-CoAST). To this end, this special issue was published as a supplement to Parts 1, 2, and 3 of the special issues on i-CoAST, which appeared in June, July, and August 2026 as Vol. 38 Nos. 6(4), 7(4), and 8(4), respectively. This special issue contains six papers that fall outside the general scope of *Sensors and Materials*.

The three preceding parts traced a path from the breadth of aquatic science, through the confidence and interoperability of sensor-derived information, to the operational deployment of sensing systems, numerical models, and engineered materials at the coast. This supplement turns to the human and societal systems in which those technologies are ultimately funded, adopted, and used. Coastal observation does not take place in a vacuum: the firms that invest in vessel monitoring and port automation, the regions that must sustain the communities living beside the sea, and the institutions that preserve maritime memory all shape the demand for sensing infrastructure and the value it can create. The six reports gathered here examine these conditions from the perspectives of economics, regional studies, business administration, and the digital humanities, and several of them apply data-processing techniques familiar to the sensing community—soft sensing, text vectorization, and machine-learning forecasting—to social and economic signals.

The ocean economy under global uncertainty forms the first thread. Kim et al. analyzed size-based differences in external risk perception among firms in the ocean and fisheries industry using business survey index data from the second quarter of 2025. Combining a chi-square test of independence, adjusted standardized residuals, and correspondence analysis, they found that only employment size was significantly, though modestly, associated with the external factors firms identified as most influential, with the clearest departures concentrated in mid-sized firms, and they framed the implications as cautious, size-aware policy design for an industry whose investment in marine sensing technologies is itself conditioned by perceived risk. O. Yang and Kim compared a pooled ordinary least squares benchmark with random forest, Transformer, and long short-term memory models for forecasting export growth from country–year panel

data. Diebold–Mariano tests confirmed that the machine- and deep-learning models achieved significantly lower forecast errors, yet their negative out-of-sample coefficients of determination led the authors to caution against equating predictive accuracy with statistical reliability.

The second thread addresses coastal communities facing a shrinking society. B. M. Yang proposed a shrinking-society risk index built on a marine soft-sensor framework that treats news big data and municipal policy documents from 2010 to 2025 as input signals. A lexicon spanning six functional domains, constructed with term frequency–inverse document frequency weighting and Word2Vec embedding, was mapped through cosine similarity and sentiment analysis into functional risk levels for 71 coastal municipalities, revealing a structural time lag between demographic decline and the erosion of community functions. Building on this measurement approach, B. M. Yang et al. fused text-derived social innovation and sustainability indices with financial data for 159 fourth-sector firms in coastal regions from 2016 to 2025. They showed that governance-, workforce-, community-, and customer-based social innovation each enhance corporate sustainability and that this effect becomes stronger as shrinking-society risk increases.

Ports, maritime culture, and heritage constitute the final thread. Choi and Jeong examined Yeongil Bay Port in Pohang, whose cargo throughput has persistently fallen short of expectations, and argued that the structural disadvantages of local ports cannot be resolved through cost-based incentives alone. They proposed a dual-track strategy in which maritime cultural tourism grounded in haenyeo traditions, local myths, and food culture revitalizes passenger demand in the short term, and is converted over the long term into cargo demand through industrial upgrading and cold-chain logistics investment. Park surveyed the maritime history archives dispersed across Korean institutions and proposed an integrated platform that combines unified search, optical character recognition and AI translation of classical texts, and the incorporation of sensor-generated data such as underwater sonar scans and 3D imaging, positioning maritime heritage as an underused resource for both scholarship and the cultural content industry.

Taken together, these contributions remind us that the value of aquatic science and technology is realized only when it meets the economic, social, and cultural systems of the regions it serves. We hope that this supplement, alongside the three preceding parts, will encourage dialogue between the engineering and social science communities concerned with the future of coastal regions.

We extend our sincere gratitude to all the authors for their innovative contributions and scholarly dedication. We also offer our deepest appreciation to the reviewers for their

constructive critiques, which have significantly elevated the quality of this special issue. Finally, we would like to express our heartfelt thanks to Ms. Momoko Kawamura of MYU K.K. for her unwavering support and meticulous coordination throughout the editorial and publication process.

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