Needs and Recommendations for
Human and Ecosystem Health in Coastal Systems
Coastal Pollutants & Resilient Ecosystems

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Coastal Pollutants & Resilient Ecosystems

This paper was authored by teams of experts from multiple sectors. It presents current information on the dynamics of human and ecosystem health in coastal systems while simultaneously profiling the gaps in knowledge of nearshore physical process interactions with coastal pollutants and resilient ecosystems (e.g., fate and transport, circulation, depositional environment, climate change). It is structured in two parts. First, identifying and mitigating coastal pollutants, including fecal pollution, nutrients, and harmful algal blooms, and microplastics. The second part focuses on resilient coastal ecosystems, highlighting coastal fisheries, shellfish, and natural and nature-based features (NNBF). The paper presents the following recommendations for scientific research, infrastructure needs, community engagement, and policies to guide future research and investment priorities.
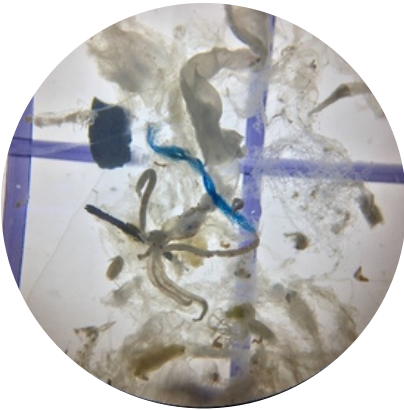
Recommendations:

- Quantify potential threats to human and ecosystem health through accurate risk assessments.

- Quantify the resulting hazard risk reduction of existing and potential NNBF.

- Improve pollutant and ecosystem impacts forecasting by integrating frequent and new data points into existing and novel models.

- Collect environmental data to calibrate and validate models to predict future impacts on coastal ecosystems and their evolution due to anthropogenic stressors (land-based pollution, overfishing, coastal development), climate change, and sea-level rise.

- Conduct mitigation technique analysis and long-term studies to determine success over time, including increased sampling and statistical analysis of routine data.

- Evaluate the ecological performance and adaptive capacity of coastal ecosystems and biological organisms to naturally varying environments.

- Develop lower cost and rapid response tools to help coastal managers better respond to pollutant and ecosystem threats.

- Determine where point and non-point sources of pollution are entering the environment through source identification studies.

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- Establish early warning and event response thresholds based on sound science to protect wildlife and human health.

- Build on successful models of science-based regulations (e.g., federal catch limits).

- Empower users through adaptive co-management approaches (e.g., data collection on private sector vessels or ecosystem management) and effective public awareness campaigns to improve public access to data.

- Make data publicly available when possible and promote discoverability through centralized clearinghouses.

- Educate that restoration of physical habitat and hydrologic conditions can reduce pollutant loading (e.g., removal of dikes).

- Standardize ecosystem and nature-based feature terminology taking into consideration the regional and local perspectives.

- Standardize benefit assessment frameworks to include non-monetary benefits and allow both private sector (e.g., insurance, green bonds, special purpose districts) and public sector (e.g., pre-disaster mitigation funds, post-disaster restoration funds, green climate funds) funds be used for ecosystem recovery and restoration.

- Encourage water treatment facilities improvements, source reduction, low impact development, and agricultural load reduction.

[1] **Elko, N.**, Foster, D., Kleinheinz, G., Raubenheimer, B., Brander, S., Kinzelman, J., Kritzer, J.P., Munroe, D., Storlazzi, C., Sutula, M., Mercer, A., Coffin, S., Fraioli, C., Ginger, L., Morrison, E., Parent-Doliner, G., Akan, C., Canestrelli, A., DiBenedetto, M., Lang, J., and Simm, J., 2021. "Human and Ecosystem Health in Coastal Systems", *Shore & Beach*, 90(1), pg 64-91. http://doi.org/10.34237/1009018

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