

Scientific publication

A Holistic One Health Assessment Framework for Coastal Areas

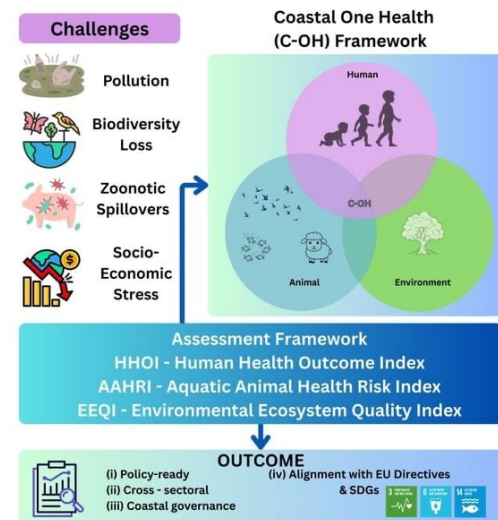
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Coastal health is already monitored in many different ways. Authorities collect information about bathing-water quality, pollution, biodiversity, seafood safety, animal disease and human illness. Yet these data are often gathered and interpreted separately, making it difficult to see how a change in one area may affect the others.

This publication by researchers from the University of Thessaly proposes a way to bring these different signals together. The aim is not simply to add more indicators, but to organise existing and future information within a shared One Health framework designed specifically for coastal areas.

Connecting Information That Is Usually Kept Apart

Current European monitoring instruments provide extensive information about environmental pressures and the condition of coastal waters. However, they do not always make it possible to connect these findings systematically with animal health, human health or the well-being of coastal communities.

A pollution event, for example, may affect water quality, increase contamination risks for fish and shellfish, restrict recreational activities and place local livelihoods under pressure. Each consequence may be recorded by a different institution, using a different dataset and for a different purpose. When the information remains separated, the broader picture can be difficult to interpret.

The researchers therefore propose a Coastal One Health assessment framework organised around three interconnected dimensions:



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- human health and socio-economic well-being;
- animal health risks;
- environmental and ecosystem quality.

Rather than treating these dimensions as independent categories, the framework is designed to examine the pathways connecting them. Environmental pressures may alter ecosystem conditions; these changes may create risks for aquatic animals; and both may affect human health, food safety, access to clean water or local economic activities.

To organise these relationships, the framework expands an existing model known as Drivers–Pressures–State–Impact–Response. In simple terms, this model follows the chain from the forces creating a problem, through the pressures they place on an ecosystem, to the resulting changes and their impacts. It then considers how institutions and communities can respond.

By incorporating human, animal and environmental health into this chain, the proposed framework seeks to make the connections between coastal pressures and their wider consequences more visible.

Turning One Health into Something That Can Be Assessed

The publication identifies a broad set of potential indicators for the three dimensions. For human health and well-being, these include bathing-water bacteria, water-related illnesses, seafood contamination, *Vibrio* risks, shellfish-harvesting closures and saltwater intrusion into drinking-water sources.

Animal health indicators include the presence of pathogens and contaminants in aquatic species, mortality or disease events affecting wild and farmed populations, harmful algal blooms and markers of antimicrobial resistance. Environmental indicators cover areas such as water quality, chemical pollution, microplastics, biodiversity, habitat condition, sea-surface temperature and other climate-related pressures.

Some of these indicators already exist within European monitoring and reporting systems. The proposed framework would bring them into a common structure, allowing users to examine where environmental, animal and human health signals appear to move together and where they do not.



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This could eventually help authorities identify vulnerabilities, compare conditions over time and better understand the possible consequences of environmental shocks. It could also support conversations between institutions that do not usually work with the same data, including environmental agencies, public-health bodies, veterinary services and coastal planners.

However, the framework is not yet an operational assessment tool. The publication establishes its conceptual and methodological foundations and identifies the indicators that could be included. The indicators still need to be developed empirically, weighted and validated using real-world data. The study therefore presents a structured proposal for future application rather than the results of an assessment already carried out.

From Conceptual Framework to Coastal Application

The next planned step is to pilot the framework in the Pagasitikos Gulf in Greece. The area has experienced two destructive flooding events, providing a relevant setting in which to examine how acute environmental shocks can interact with longer-term pressures across human, animal and ecosystem health.

During this pilot phase, the indicators are expected to be tested using field measurements and historical datasets. The researchers also plan to refine how the indicators are weighted and compare the framework with established assessment tools. These steps will be essential for determining whether it can produce robust and useful information in practice.

The authors envisage subsequently exploring its application in other Mediterranean coastal regions and, potentially, in wider coastal and urban contexts. Its transferability cannot yet be assumed: differences in available data, monitoring capacity, environmental conditions and governance will need to be considered.

Developed with support from the ENHANCE project, this work provides a conceptual basis for one of the project's central ambitions: making the connections between human, animal and environmental health more visible and more useful for coastal assessment. Its importance lies not in offering a finished tool, but in defining a structure that can now be tested, refined and adapted.



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