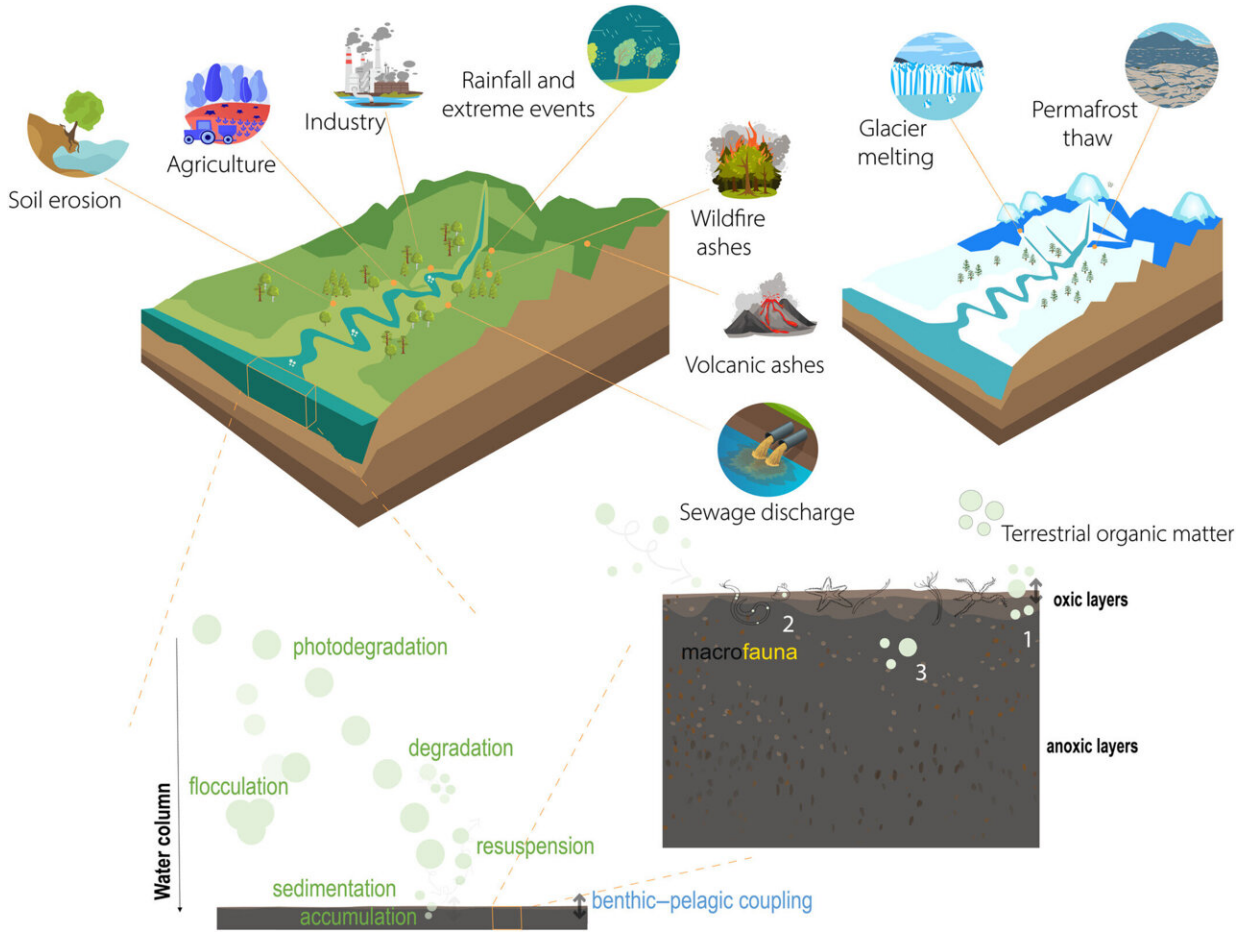
Study shows runoff can be an important source of energy for coastal organisms and animals

July 14 2023, by Sissel Eikeland



Conceptual representation of the land–ocean environmental interface and potential sources of terrestrial organic matter (ter-OM). The material from land has both natural and anthropogenic, or mixed origins. Following the aquatic continuum, a substantial amount of ter-OM reaches the coastal and shelf benthic

compartments. When sedimented, the material can follow three paths: (1) remineralized into dissolved inorganic carbon and nutrients, and remixed with the water, (2) stored in the benthic biomass, or (3) buried in the deeper sediments. Thus, ter-OM influences macrobenthic communities in several forms by being a source of nutrients, refuge, physical stressor smoothing epibenthic groups, and also as an important component of benthic–pelagic dynamics, acting as an energy transfer among trophic levels. Credit: *Ecosphere* (2023). DOI: 10.1002/ecs2.4492

Not everything that flows into the sea is waste. "In the past, we've heard that runoff and drainage from land is bad for the ocean. Now we see that it can also be an important resource," says Juan Pardo, Ph.D. student in the Center for Coastal Research (CCR) at UiA.

The results are part of Pardo's new study "The interplay between terrestrial organic matter and benthic macrofauna: Framework, synthesis, and perspectives," published in *Ecosphere*. There he looks at the relationship between organisms that live at the bottom of the ocean and organic material from land, among other things. "Especially the animals and organisms that live entirely at the bottom of the sea get energy from waste or degradable material such as plants, animals and human activities," he says.

Physical, chemical and biological factors play a decisive role in the formation of ecosystems.

"Organisms on the seabed are important for the marine ecosystem. They play an important role in the carbon cycle. They also contribute to diversity and serve as food for small fish and other prey," says Pardo.

The marine organisms help to bind and store carbon, which is important for the functions of the marine ecosystem.

Juan Pardo is a research fellow in the Faculty of Engineering and Science at UiA. Credit: University of Agder

Climate change threatens coastal ecosystems

The study shows that runoff from land is an important resource for the sea in normal weather conditions. But normal weather is constantly being challenged by extreme weather due to climate change, which can have negative consequences. Drainage from land, in addition to floods, landslides and storms, threatens coastal ecosystems.

"Heavy rainfall and landslides affect the interaction between land and sea," he says.

Pardo highlights how Norway is experiencing darker waters along the coast. This is closely related to climate change which, among other things, results in more drainage from land and runoff to the sea.

Global perspectives and knowledge gaps

The study shows that organic material from land plays an important role in the coastal area, but knowledge in the field is still somewhat limited. Pardo hopes for more research and better monitoring to manage the challenges going forward.

"The study underlines the need to monitor and understand how changes in the supply of organic material affect life in the sea, especially in view of the climate changes we're facing," he says.

The study is based on data from all over the world. However, Pardo would want to see more data from and cooperation with Asia.

"In the global south there are many important natural systems, and it would have been interesting to know more about how communities there are affected by runoff from land and how their way of life changes."

More information: J. C. F. Pardo et al, The interplay between terrestrial organic matter and benthic macrofauna: Framework,

synthesis, and perspectives, *Ecosphere* (2023). DOI: 10.1002/ecs2.4492

Provided by University of Agder