

establish whether a muon collider is feasible and, if so, at what cost, and who can contribute expertise and facilities. If it works out, particle physicists all over the world might gain an exciting – and potentially more affordable – way of probing nature.

Norway's approval of sea-bed mining undermines efforts to protect the ocean

The country's decision to permit deep-sea extraction of valuable minerals could do irreparable harm.

When Norway and Palau announced in 2018 that they were co-chairing the High Level Panel for a Sustainable Ocean Economy (now called the Ocean Panel), many researchers were hopeful. Fourteen governments, collectively responsible for 40% of the world's coastlines, pledged to sustainably manage 100% of their exclusive economic zones (national waters) by 2025. They explicitly looked to scientists to guide them in how to achieve their goals. In 2020, the panel's leaders backed five priorities proposed by its science advisers that included ways to decarbonize the shipping industry and to manage seafood production sustainably. "Rarely has scientific research been so keenly sought by political leaders, or so readily accepted as the basis for policy," said Norway's then-prime minister Erna Solberg.

To support the initiative, the Nature Portfolio journals collaborated with the Ocean Panel and published a collection of articles in December 2020. *Nature* recommended that independent measures should be included to hold the members of the panel, which now includes 18 nations, accountable for their pledges. Such indicators were needed because "governments change", we noted in an editorial (see *Nature* 588, 7–8; 2020). "The panel's members know that, one day, they will need to pass on their responsibilities. In some cases, their successors will want to continue their policies, but in others, they won't – as we know all too well."

An independent system of accountability never materialized. In 2021, Norway elected a new government. And last week, its parliament voted to allow the controversial practice of sea-bed mining (see page 435). This decision goes against the advice of the Norwegian Environment Agency, the Ocean Panel's scientific advisers and other researchers. The scientists all say that too little is known about the deep-sea ecosystem – such as its biodiversity and its

interactions with other ecosystems – to safely mine the sea floor. Researchers also question Norway's suggestion that sea-bed mining will strengthen the country's economy and that terrestrial supplies of metals such as manganese and cobalt, which are used in batteries and other electronics, are insufficient to support the transition to a low-carbon economy. Researchers are both baffled and deflated by the decision. Norway's about-face isn't just a setback for the country's sustainability efforts; it undermines the progress and the credibility of the Ocean Panel.

The vote allows companies to explore whether critical minerals, such as sulfide and manganese, on the sea floor could be extracted profitably. Commercial-scale mining will require another parliamentary vote – a compromise the government agreed on to gain support from other political parties. Astrid Bergmål, the secretary of state for the Ministry of Petroleum and Energy, told *Nature* that the vote "does not mean extraction starts" immediately. Bergmål added that Norway will ensure that its sea-bed activity is in line with its international obligations, including the 1982 United Nations Convention on the Law of the Sea and the 1992 UN Convention on Biological Diversity.

Researchers are not naive. They don't expect politicians to take all their advice on board. But the political energy and enthusiasm for the panel gave scientists a real sense that this time, things would be different. In hindsight, signs to the contrary were already there by 2021. In January that year, the Norwegian government first announced its intention to mine minerals on the sea floor. And it continues to issue permits for offshore oil and gas drilling.

This vote has made some of the panel's current and former scientific advisers wonder whether other nations might be better placed to take over Norway's leadership position. The initiative does not, however, have a publicly accessible system for choosing its chairs. The panel's secretariat did not respond to *Nature's* questions about its governance arrangements, nor did it clarify whether other members could sanction Norway and, if this was the case, whether they planned to do so.

All members have made progress in some areas, according to the Ocean Panel's 2022 report (see go.nature.com/3u3r3be). For example, Chile has assigned some protection to 43% of its waters and, last year, it began a more ambitious programme to sustainably manage all its marine resources. Kenya has set up what the panel says is the world's first community-led project to protect and restore mangrove forests, an effort that will be supported by the sale of carbon credits.

Overall, the panel's secretariat reports that its member countries made 652 commitments towards their shared goal of sustainably managing the ocean resources in their national waters by 2025. Of the 345 analysed in the report, 54% have been accomplished and 40% are showing progress. Norway's Prime Minister Jonas Gahr Støre jointly wrote in the progress report: "The Ocean Panel was established to lead the way, and we need to live up to this ambition." That is why Norway's parliament must reverse its decision. If it is unable to do so, the government should acknowledge that the country has lost any claim to be an ocean-protection leader.

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