



The potential health benefits of protecting marine biodiversity

New Zealand is one of 12 countries responsible for 96% of the world's high seas bottom trawling.¹ The damage by bottom trawling to marine ecosystems is causing mounting international condemnation.² There are calls for an immediate international moratorium on such trawling while governance to protect marine biodiversity is negotiated. The New Zealand Government has rejected an immediate international moratorium but agrees on the need for progress.

The damage wrought by trawling should concern health professionals given the health-related reasons for conserving marine biodiversity:

- **Supplying pharmaceuticals**—The oceans are relatively unexplored for new pharmaceuticals but high levels of endemism on seamounts and deepwater vents suggest large potential. One review for novel compounds described in the literature in the year 2000 detailed 124 marine chemicals with potentially promising *in vitro* cytotoxicity for murine and human tumour cell lines.³ Six such compounds were from New Zealand marine species (five sponge species and a tunicate). Another review covering 2001-2002 reported studies of eight marine compounds from New Zealand with anti-tumour properties.⁴ One compound from a Pelorus Sound sponge inhibits human myeloid leukaemic cells⁵ and may be more effective than existing anticancer agents.⁶ New Zealand workers have also studied compounds from marine bryozoans, some of which have potent anti-tumour activity and antimicrobial activity *in vitro*.⁷

A key drug for treating leukaemia in children and adults (cytarabine or Ara-C) has already been developed based on studies of substances from a Caribbean sponge.⁸ One recent review observed that: “the marine environment has proven to be a very rich source of extremely potent compounds that have demonstrated significant activities in anti-tumour, anti-inflammatory, analgesia, immunomodulation, allergy, and anti-viral assays.”⁹

- **Fish as a food source**—Given evidence for fish consumption protecting against cardiovascular disease in at-risk populations,¹⁰ there are potential benefits in maintaining adequate supplies (along with alternative plant-based sources of omega-3 fatty acids such as flaxseed). To ensure the sustained productivity of fish biomass, it is necessary that the marine food chain is protected from disruption caused by trawling (ie, from damage to seafloor biota and physical structure along with damage from stirred up silt). There also appear to be productivity benefits of marine reserves on adjacent fisheries.

In summary, there are important health-related reasons why marine biodiversity needs better protection. The New Zealand Government can facilitate this by leading moves for an international moratorium on high seas bottom trawling, and by substantially expanding marine reserves in our waters and on the high seas including in the Southern Ocean.

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References:

1. Gianni M. High Seas Bottom Trawl Fisheries and their Impacts on the Biodiversity of Vulnerable Deep-Sea Ecosystems: Options for International Action. IUCN/the World Conservation Union, Natural Resources Defense Council, WWF International, Conservation International, 2004.
2. IUCN/the World Conservation Union. Third IUCN-World Conservation Congress 2004 Resolution 051, Recommendation 018. Bangkok, 17-25 November 2004.
3. Mayer AMS, Gustafson KR. Marine pharmacology in 2000: Antitumor and cytotoxic compounds. *Int J Cancer*. 2003;105:291–9.
4. Mayer AMS, Gustafson KR. Marine pharmacology in 2001-2: antitumor and cytotoxic compounds. *Eur J Cancer*. 2004;40:2676–2704.
5. Miller JH, Rouwe B, Gaitanos TN, et al. Peloruside A enhances apoptosis in H-ras-transformed cells and is cytotoxic to proliferating T cells. *Apoptosis*. 2004;9:785–96.
6. Gaitanos TN, Buey RM, Diaz JF, et al. Peloruside A does not bind to the taxoid site on beta-tubulin and retains its activity in multidrug-resistant cell lines. *Cancer Res*. 2004;64:5063–7.
7. Yao B, Prinsep MR, Nicholson BK, Gordon DP. The pterocellins, novel bioactive alkaloids from the marine bryozoan *Pterocella vesiculosa*. *J Nat Prod*. 2003;66:1074–7.
8. Grifo F, Rosenthal J. Biodiversity and human health. Washington DC: Island Press; 1997:22.
9. Newman DJ, Cragg GM. Marine natural products and related compounds in clinical and advanced preclinical trials. *J Nat Prod*. 2004;67:1216–38.
10. He K, Song Y, Daviglus ML, Liu K, et al. Accumulated evidence on fish consumption and coronary heart disease mortality: a meta-analysis of cohort studies. *Circulation*. 2004;109:2705–11.
11. Roberts CM, Bohnsack JA, Gell F, Hawkins JP, Goodridge R. Effects of marine reserves on adjacent fisheries. *Science*. 2001;294:1920–3.