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EDITORIAL

Restoring the health of the oceans

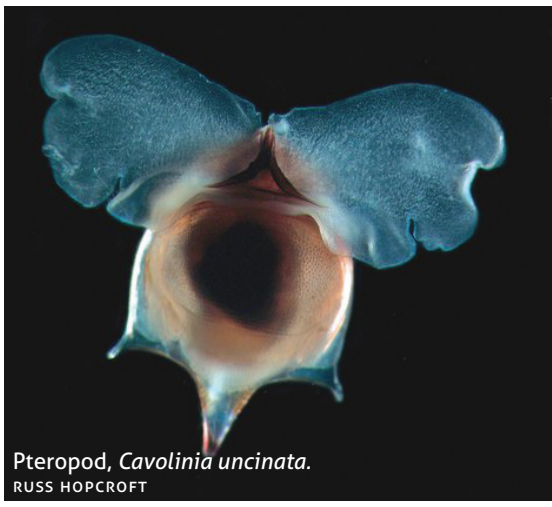
Over the ages people have gone to the seaside to breathe the fresh sea air and enjoy the wide ocean views. We love to take holidays by the sea, to be lulled to sleep by the sound of waves, to swim in the ocean, walk sandy or stony beaches, watch seabirds swoop over the waters or meditate on a rock, and sometimes if we are lucky, the divine sight of dolphins leaping through the sea. Fishing communities in the past have been able to sustain themselves for thousands of years, and fish now feed billions of people. The oceans provide food for body, mind and soul, giving us a sense of connectedness with life beyond ourselves, perhaps because the oceans are, as John Chappell reports, the cradle of life, where life first began (p 4).

Being the largest ecosystem on Earth, containing 80% of life on Earth, the oceans perform many other vital services for us, including mediating the climate, transporting heat around the world, providing moisture and about 50% of the Earth's oxygen. But the oceans are under siege from the relentless increase in human industrial activity from consumer societies driven by fossil fuels and toxic substances which are released to the air, water or land and then to the oceans.

Scientists have discovered, as Robert Dunbar reports, that 80% of the excess heat generated by increased carbon dioxide, CO_2, from human fossil fuel use over the past 150 years has been absorbed by the oceans, most of it in the past 50 years (p 9). As CO_2 emissions increase, the oceans warm and transport heat to polar ice sheets which leads to them melting and raising sea levels. CO_2 not only warms oceans, raises air temperatures and sea level, it also combines with seawater to form carbonic acid, thus changing basic ocean chemistry. More acidic oceans now threaten the great web of life in the oceans which contributes to the food security of 4 billion people (p 13). Key links in fish food chains, including pteropods, sea cucumbers, and starfish are vulnerable to ocean acidification, as are other organisms that make shells and reef systems. Coral reefs, already declining through ocean warming are threatened also by acidification. For them to survive, experts say CO_2 needs to be no more than 350ppm, but it is now at 389ppm and rising about 3ppm annually. The respiration, oxygen uptake and reproduction of many other marine organisms will also be badly affected by ocean acidification (p 12).

The acidification challenges facing marine organisms are unprecedented, Robert Dunbar says, because of the speed at which the changes are occurring, yet little of this is understood at the highest levels. Without education about the role of the oceans in climate change, policy changes and a binding international agreement with clear emission reduction targets, we will be unable to prevent disastrous consequences.

Over-fishing is another crisis facing life in the oceans, caused by the expansion of the voracious global fishing industry and use of destructive technologies. As a result fish stocks have been collapsing for many years on a routine basis, Daniel Pauly reports (p 32). Trawlers now reach several kilometres into the depths of the oceans, catching slow-growing,



Pteropod, *Cavolinia uncinata*.
RUSS HOPCROFT

deep water species which cannot be fished sustainably. Even in the extreme environment of the Antarctic, an international fishing fleet now extracts thousands of tonnes of Antarctic toothfish annually from the Ross Sea, putting at risk possibly the last remaining pristine ocean in the world, David Ainley reports (p 38). Sadly, New Zealand companies take half the total catch. An effort in 2010 by Pacific Island countries to ensure the survival of Pacific tuna stocks was rejected by the EU and Korea which have large fishing fleets in the Pacific, (p 42). Not to be deterred, Pacific Island countries have declared 4.5 million square kilometres of the Pacific off limits to destructive purse seine fishing methods. The problem, Mike McGinnis says, is that few government reports support reducing the economic use of marine life, because increasing economic use remains a sacred cow in marine management circles (p 55). It's hard to believe this can be happening in the name of progress, to be fishing until nothing is left but dead zones.

On page 22 we report on the long-lasting legacy of life-threatening radioactive pollution from the madness of "testing" nuclear weapons during the Cold War era, and the emissions from nuclear power plants, which have all accumulated in the oceans. Authorities airily say the pollution will be dispersed in the vastness of the oceans. Some seas are now considered to be highly radioactive (p 24) and the Riso Laboratory in Sweden says eating fish is the main way people absorb radioactivity. Moruroa and Fangataufa atolls in the South Pacific endured a 30-year nuclear assault as France "tested" nuclear weapons above ground and later for 21 years beneath the atolls, despite the concerns of those living in the region. In 1998 a report by the International Atomic Energy Agency noted there was an extraordinary amount of over 510 kilograms of plutonium, one of the most deadly long-lived compounds known to exist, "sealed" in cavities under the atolls and in the lagoons (p 26). Despite this the IAEA declared there was no need for remedial action or monitoring. Nor were independent studies allowed by France which for over 40 years denied the potential for leakage of radioactive material into the ocean. This year in January 2011 the Ministry of Defence of French Polynesia reported it now recognises that a collapse of the reef cliff of Moruroa is imminent, and would probably cause a wave 10–20 metres high (p 29).

It is grossly irresponsible that France in the name of national security for 40 years obstructed proper research on the effects of its highly damaging activity over decades when severe consequences for the oceans, people in French Polynesia, and millions of people in other countries were quite possible. At the very least they should pay the bill for the necessary research and independent monitoring of Moruroa.

Australian researchers in 2003 published a study on their investigations into the potential for leakage from Moruroa into the ocean (p 26). They found that even 10 years after a catastrophe like an earthquake releasing large quantities of radionuclides from Moruroa into the ocean, contamination of the ocean would be 10,000 times higher than current natural radiation levels. The situation would be worse for nations in French Polynesia if the earthquake occurred during an ENSO year with the pollution staying in the region, as weak local currents would not disperse the pollution. What might such a toxic change in the marine environment mean for marine life and for the people of the region? And within 10 years, the Australian study reports, large quantities of radionuclides with high levels of radioactivity could reach other Pacific Island, South American and Australasian countries. Follow-up studies on the Australian research are urgently needed.

It is strange that human society is destroying something as ancient, vital and essential as the oceans. All the life in the oceans is at risk from our activities. Other persistent pollutants, derivatives from chemical warfare agents developed during World War 2 and "tweaked" by industry for use in agriculture and consumer products have also been transported to the oceans and toxic compounds are accumulating at very high levels in algae and krill. Marine scientists warn that the ocean depths may be the first area to face the dangers of long-term contamination (p 28). There are many stressors on the oceans and little is known about possible synergistic effects. An immediate ban on all polluting activity both military and industrial is surely needed.

Although our "developed" countries are nominally democratic states, we live with the dictatorship of the unrestrained free market. Continually growing economies and profits are now the main arbiters of life. This is as catastrophic and cruel as the dictatorships the brave people of Middle Eastern countries are currently opposing. The tyranny we endure with its demands for ever increasing use of resources regardless of the consequences is destroying nature's irreplaceable ecosystems, without which we cannot survive. We too must vigorously oppose this dictatorship and move away from the cultural war on nature. Let us work toward a life-sustaining culture which includes reverence for all life. Otherwise there will be nothing left but a poisoned world and dead oceans. May this still beautiful ocean planet teach us and show us the way. **– Kay Weir**