

# Indonesia declares marine reserves in a biodiversity hotspot

Indonesia's Minister of Marine Affairs and Fisheries, Mr Freddy Numberi, announced in May the establishment of a marine reserve encompassing 900 000 hectares of the Indonesian archipelago of Raja Ampat off the north-western tip of West Papua.

The network of seven marine protected areas (MPAs) is home to some of the world's most biologically diverse coral reefs, mangrove forests and other coastal ecosystems.

The announcement brings the Indonesian Government significantly closer to its goal of protecting 10 million hectares of coastal marine ecosystems by 2010.

Raja Ampat's marine environment has been



**Rich in reef life – part of the Raja Ampat archipelago off West Papua.**  
CI/Sterling Zumbrunn

threatened as traditional fishing methods have been replaced by the use of explosives and poisons, resulting in reduced fish stocks and damaged reefs.

In 2003, representatives of Raja Ampat's 88 traditional communities began working with environment groups Conservation International (CI)

and The Nature Conservancy (TNC) to address these environmental problems.

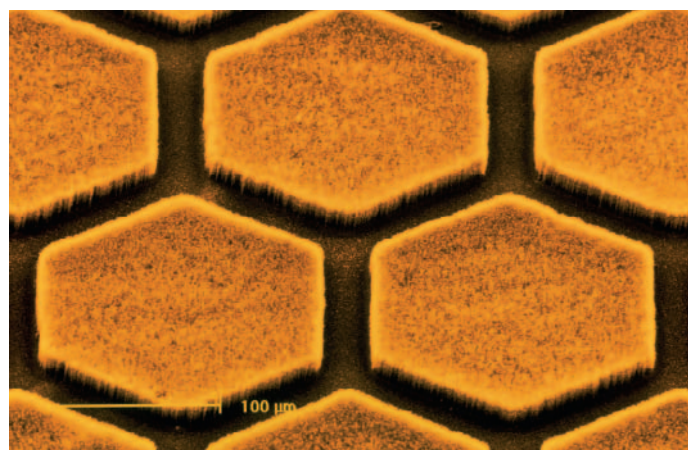
This helped local people understand how restrictions on commercial and destructive fishing could improve human welfare and conserve biodiversity.

Under the new regime, communities will co-manage the MPAs and will also help patrol the area and curb practices like bomb and cyanide fishing.

Biological surveys led by CI and TNC have revealed that the region is home to nearly 1300 species of coral reef fishes and 600 species of hard coral – the highest marine biodiversity level recorded for a region this size anywhere on the planet.

CI also reports that the leader, or Bupati, of Raja Ampat has signed two Memoranda of Understanding with neighbouring regencies to develop marine tourism and work cooperatively to eliminate bad fishing practices in the region.

# Nanotube membranes for energy efficient desalination



**Carbon nanotubes arranged in a hexagonal configuration.**

CSIRO Molecular & Health Technologies

New membrane technology that would halve the amount of energy required to desalinate seawater is the goal of the latest Water for

a Healthy Country Flagship initiative involving CSIRO and nine Australian universities.

The Advanced Membrane Technologies for Water

Treatment Research Cluster, led by Professor Stephen Gray of Victoria University, will investigate carbon nanotube technologies in developing the new energy efficient membranes.

'Many desalination and recycling programs rely on reverse osmosis, where the water is forced through a semi-permeable membrane, removing salts and any other contaminants,' Professor Gray says.

'These membranes need regular replacement and cleaning, but they also require a large amount of energy to force water through the nano-sized pores.

'We aim to improve membrane design to increase energy efficiency and reliability.

'We also aim to improve membrane anti-fouling properties. When contaminants are removed from water, some adhere to the surface. These build up, increasing the pressure and energy required.'

Alan Gregory, Urban Water Research Leader at CSIRO, says the new membrane technology could also be used to treat wastewater.

Carbon nanotubes are sheets of carbon atoms tightly rolled into tubes the diameter of only a few water molecules.

The smooth inner walls of these nanotubes allow liquid to flow through, while the ultra-tiny pore size keeps out larger molecules. This reduces pressure requirements and saves energy and costs compared to reverse osmosis.

Apart from Victoria, the other universities involved are NSW, Monash, Melbourne, RMIT, Queensland, Deakin, Murdoch and the Curtin University of Technology.

**More information:**  
 CSIRO nanotechnology research,  
[www.csiro.au/science/ps321.htm](http://www.csiro.au/science/ps321.htm)