energy systems and wind turbine systems. Conventional chemical-based pharmaceuticals may be overtaken by biotechnology and big pharma may save small biotech firms by funding them in exchange for products according to their requirements. Provision of clean water will be the slogan the world over as its demand grows every day, both from humans and from industrial and agricultural communities. Development of new manufacturing processes that use less water and the technology for supply of clean water will be in demand. Thus an unique opportunity to innovate, start new businesses, launch disruptive new products and ways to strengthen customer loyalty can be found during the moments of economic turbulence. Innovation, IPR (Intellectual Property Rights) creation and public–private partnerships are expected to play a crucial role in driving new R&D activities in the future.

1. http://www.med.govt.nz/templtes/multipagedocumentpage_23071.aspx
2. Battelle, *R&D Mag.*, December 2008, 27–33.
3. Research and Development Statistics at a Glance 2007–08, Department of Science and Technology, New Delhi, October 2008.
4. http://blogs.harvardbusiness.org/radjoou/2008/11/recessionhit-indian-it-vendors.html

MANJU GERARD

Department of Scientific and Industrial Research (DSIR), Technology Bhawan, New Delhi 110 016, India
e-mail: manju.gerard@nic.in

Whither marine mammal conservation in India?

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the convention's entry into force, its membership has grown steadily to 110 (as of 1 October 2008)[1].

The National Report for the year 2006–08 submitted to the CMS[2] by the Ministry of Environment and Forest (MoEF), New Delhi has misrepresented the status of the research on marine mammals in India. Major entries from the report on marine mammals are summarized in Table 1. There are many ambiguities, for instance: (i) the Ganges River dolphin is a fluvial species and it should be possible to implement stringent measures on hunting/poaching when there is monitoring. According to the report, there is no measure to curb hunting or poaching of the river dolphin. On the contrary, India is controlling hunting/poaching of oceanic species such as blue, sei and humpback whales and common dolphin (Table 1); (ii) the distribution is 'not known' for all the marine mammals except river dolphin (Table 1); (iii) that 'There was no detailed survey and population monitoring programme carried out in India. Status of most of the marine mammals is not known. It is urgently required to carry out a scientific survey on all marine mammals in India'.

There is already a long-term ongoing project entitled, 'Studies on marine mammals of Indian EEZ and the contiguous seas' funded by the Ministry of Earth Sciences, New Delhi and executed by the Central Marine Fisheries Research Institute (CMFRI), Cochin. The project started in 2002 and the first phase was completed in 2007. The second phase is continuing. One of the major objectives is to map the distribution of different species of marine mammals in the Indian EEZ. Apart from this, the project focuses on the accidental bycatch of small cetaceans[3] (different species of dolphins and porpoise), food and feeding[4], DNA analysis[5] and pollution. On 7 April 2008, Kapil Sibal, then the Union Minister for Science and Technology and Earth Sciences, released *Marine Mammal Atlas* in a press conference in New Delhi[6] based on the finding of the project. Even the S&T minister's press meet did not reach MoEF! The only peer-reviewed publication[7] mentioned in the report was published before the actual commencement of the aforementioned project.

The report clearly mentions that the primary responsibility for preparation of

Table 1. Summary of major entries on marine mammals from the CMS Report 2008

Subject	Species					
	Blue whale	Humpback whale	Sei whale	Sperm whale	Ganges River dolphin	Common dolphin
Research	•	•	•	•	•	•
Monitoring					•	
Education/awareness rising	•	•	•	•	•	•
Species protection	•	•	•	•	•	•
Control hunting/poaching	•	•	•			•
Habitat protection	•	•	•	•	•	•
Population size	Not known	Not known	Not known	Not known	Decreasing	Not known
Distribution	Not known	Not known	Not known	Not known	Decreasing	Not known

the document lies with MoEF with inputs from Wildlife Institute of India (WII), Dehradun, Bombay Natural History Society, Mumbai and Zoo Outreach Organization, Coimbatore. None of the above institutions which provided inputs have carried out any long term survey on the marine mammals of India. It is evident from the WII's website[8] that out of 522 research papers published in 21 years (from 1984 to 2005 excluding 1985) and an addition of 22 research publications with unknown dates, only four publications dealt with the Ganges River dolphin. Apart from this, there is no study on the other species reported in the CMS document. Whereas during the same period between 1984 and 2005 (excluding 1985 for uniformity), CMFRI has published 100 papers on 19 species (inclusive of the Ganges River dolphin and dugongs) of marine mammals from all maritime states (including Andaman and Nicobar Islands and Lakshadweep) of India except Goa. Despite this, CMFRI's input was not included. Had they consulted the CMFRI's publications as quoted in the document, they would not have missed the ongoing research on marine mammals. The section on marine mammals has many inconsistencies and raises serious questions about the way CMS document was prepared.

The CMS report on marine mammals clearly illustrates the inherent weakness in our national policy to address the issues concerning the marine biodiversity. The report submitted to CMS by India erodes the credibility of Indian scientists in international forums and questions India's commitment to the convention. It is high time institutions that have no firsthand experience disengage themselves from taking up the cause of marine biodiversity and leave the job to a large body of professional marine scientists in India. After all, having good scientific ethics is as important as having quality data for successful conservation of any species.

1. http://www.cms.int/about/intro.htm
2. Anon., India CMS Report, 2008, p. 62.
3. Yousuf, K. S. S. M. *et al.*, *JMBA2 – Biodiversity Records* (published on-line), 2008, 1–6.
4. Anoop, K. *et al.*, *Estuarine, Coastal and Shelf Sci.*, 2008, **76**, 909–913.
5. Jayasankar, P. *et al.*, *Zootaxa*, 2008, **1853**, 57–67.
6. Anon., Press Information Bureau, Government of India, 7 April 2008.
7. Kumaran, P. L., *Curr. Sci.*, 2002, **82**, 1210–1220.
8. http://www.wii.gov.in/

R. P. KUMARRAN

No. 2239, 1st Street,
Mullai Nagar,
Anna Nagar,
Chennai 600 040, India
e-mail: r.p.kumarran@gmail.com

Species specific association of sea anemones

Mutualism between sea anemone and hermit crab is one of the classic examples of symbiosis. However, symbiotic relationship between sea anemone and marine snail is also known to occur from the bathyal depths[1], but is less reported from the intertidal area. We observed similar association between a species of tiny sea anemone (species not confirmed) and a gastropod species *Nassarius olivaceus* (Bruguière 1789) on Narara reef (lat. 22°25.8′N to 22°28.3′N and long. 69°42.1′E to 69°40.7′E) in the Gulf of Kachchh (Figure 1). Here the stationary anemone lives an epibiont life on the shell of the gastropod and gets the benefit of better foraging by movement of gastropod. On subsequent visits to the reef area, it was observed that this association is specific to a single species of gastropod and sea anemone and it can be found during all seasons. The *N. olivaceus* is a fast moving scavenger in habit with a large shell (20–25 mm) and generally found abundantly on sandy upper intertidal area of Narara; these may be the reasons for the sea anemone's preference for *N. olivaceus*.

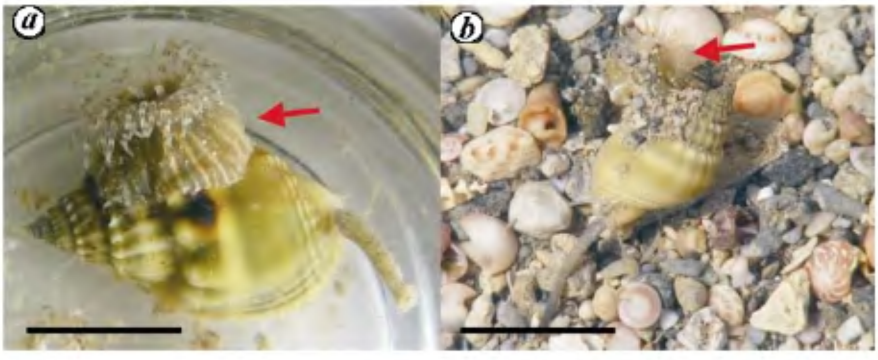

Figure 1. Symbiotic sea anemone (indicated by arrow) with *N. olivaceus*. Scale 10 mm.

1. Mercier, A. and Hamel, J.-F., *J. Exp. Mar. Biol. Ecol.*, 2008, **358**, 57–69.

CHANDRESH S. DAVE*
PRADEEP C. MANKODI

Division of Fishery and Aquatic Biology,
Department of Zoology,
Faculty of Science,
The M.S. University of Baroda,
Vadodara 390 002, India
**e-mail: dcs_jamnagar@yahoo.com.sg*