

## Conflict between development and the environment

In the pursuit of material comforts and a higher standard of living, human beings have been engaged in an intense and sustained assault on the environment. The earth may echo the sentiments of Yeats, who wrote:

I would spread the cloths under your feet:  
But I, being poor, have only my dreams;  
I have spread my dreams under your feet;  
Tread softly, because you tread on my  
dreams.

Many of the modern developments and gadgets either make life convenient or create aesthetically appealing objects, but harm the environment, often in subtle ways. In some cases, the problem is compounded by a carefree use of resources, without concern for environmental implications. A few examples drawn from life in India are discussed below.

Several decades ago, people used to eat unpolished rice. With the advent of mechanized rice mills, the use of polished (white) rice became the norm in virtually all the house holds. What a folly to expend energy to remove the valuable nutrients that cover the rice grains.

About 50 years ago, all the watches and clocks available were mechanical devices, powered by the energy stored in springs wound by hand. These have now been rendered almost extinct by the

availability of quartz watches powered by batteries. The electronic watches are convenient as the batteries last for a year or two and free us from the chore of winding the spring daily. It is ironic that the availability of accurate watches has not improved our commitment to punctuality – meetings in India rarely start on time. In most of the villages and towns, there is no system for recycling or proper disposal of such batteries. The possible leaching of toxic metals and other substances into the soil and water bodies is not of much concern to most of us.

Another wasteful practice is the use of ballpoint/gel pens instead of fountain pens for writing. Even though many adults are writing less and typing more, millions of children in the higher classes still use pens for taking notes at school and for doing their homework. The ink accounts for only about 25% of the total mass of the refill plus packing material; the plastic and metal that are discarded when the refill is thrown away make up the rest of the mass. For example, consider a refill whose mass (excluding the ink) is about 4.6 g. If a 100 million refills are discarded annually, the amount of waste generated is 460,000 kg. The disposal of such a large amount of waste is not of much concern to both children and adults.

The toothbrush represents another example of poor design. When the brush is discarded after a few months of use, the handle is usually perfectly fine. It is a pity that the handle, which accounts for about 80–85% of the mass of the brush, has to be discarded because of frayed bristles. Analogous to the case of razor blades, it would be desirable to have a brush with detachable heads.

In a country where many states experience chronic shortages of power and many villages have effectively no electricity, is it wise to permit the construction of air-conditioned malls, conference rooms and auditoria? The buildings or rooms are often designed such that air conditioning becomes essential, forcing people to use it even when the weather is pleasant.

The list of examples is endless, but solutions are scarce. Are we 'helpless pieces of the game', as Omar Khayyam had written in a different context, or can we do something to reduce environmental degradation? Can someone show us the way?

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## Mutualism of spider crab, *Doclia ovis* (Herbst, 1790) in Indian waters

There are many proven examples of mutualism in marine organisms. Few of the best examples recorded so far are sea anemone and clownfish, sea anemone and hermit crabs, sea anemone and por-

celain crabs<sup>1</sup>, gastropod and sea anemone<sup>2,3</sup>, as well as sea anemone and sea urchins<sup>4</sup>. During routine collection of live ornamental fauna for display in aquarium tanks in our Centre, a spider crab *Doclia ovis* (Herbst, 1790) with sea anemone (*Metridium* sp.) was encountered in Udaipore, near Digha coast (21°61'N and 87°53'E) along the northern east coast of India (Figure 1). There were two tiny sea anemones found attached on the carapace of the crab. *D. ovis* (Herbst, 1790) is one of the dominant species recorded in the sub-tidal region of this coast and is a scavenger in habit. The specimen was displayed in an aquarium tank for a month and its mutualism was observed. The sea anemone on the carapace of the crab gets free shelter and also an opportunity to feed as the crab moves

from place to place. Further studies on captivity growth and feeding behaviour are being carried out.



**Figure 1.** Symbiotic sea anemone (*Metridium* sp.) with crab (*Doclia ovis*).

1. Ross, D. M., *Can. J. Zool.*, 1970, **48**, 351–357.
2. Mercier, A. and Hamel, J.-F., *J. Exp. Mar. Biol. Ecol.*, 2008, **358**, 57–69.
3. Dave, C. S. and Mankoni, P. C., *Curr. Sci.*, 2009, **97**(11), 1522.
4. Baeza, J. A. and Thiel, M., *J. Mar. Biol. Assoc. UK*, 2000, **80**, 39–45.

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