TOPIC BOX 10
Estimating Biodiversity

Coral reefs are of immense importance as storehouses of biodiversity. But what is the biodiversity of coral reefs and how do we compare it to the biodiversity of other ecosystems?

The usual way of determining the biodiversity of an area is to count the number of species. This is known as the species diversity *or* species richness. *Coral reefs, much like tropical rainforests, are particularly rich in species because they form structurally complex and motley environments where many species can coexist (see Topic Box 8). So, what exactly is the species diversity of coral reefs? The truth is that we have no idea. Fewer than 100,000 species of coral reef organisms are described and named by science to date, with an incredible number left to be discovered[46]. One of the problems is that closely related species are often grouped under the same species name until genetic analyses indicate otherwise. Some scientists estimate that, ultimately, over a million species are associated with these ecosystems, which – if we think that these estimates can possibly be accurate – suggests that we are currently aware of less than 10 percent. We should ask ourselves therefore the question whether it is meaningful to express the biodiversity of whole ecosystems in species richness. (Just think of the hundreds of thousands of insect species alone that are estimated to occur in tropical rainforests.)*

A better picture of how important coral reefs are in sustaining Earth's biodiversity is given by the phyletic diversity. *Most of the organisms that are associated with coral reefs are animals and all animals in the world (terrestrial, freshwater and marine) fall into a total of 37 or so major groups called* phyla. *Corals, anemones, sea fans, sea pens and jellyfish for instance are all part of the single phylum Cnidaria (also known as phylum Coelenterata). The phyletic diversity of an ecosystem is the count of phyla that are represented here. At coral reefs, over ¾ of the 37 animal phyla are present, which is about three times the phyletic diversity of animals in tropical rainforests![154]*

The reason for the high phyletic diversity of coral reefs is, of course, that most groups of animals evolved in the ocean and never invaded the land. The evolution of coral reef systems started with the first diverse marine communities of the Ordovician Period over 500 million years ago[46]. This is at least 100 million years before the first vertebrates inhabited the land and more than 350 million years before the first flower was seen on Earth.

Like these ancestral reefs hundreds of millions of years ago, the coral reefs of the present are the most diverse marine ecosystems in the world and hotspots for the evolution of new species.

Two schools of fish maintaining a distance despite a constant flux to evade hunting trevallies (Nick's Lump). The fish on the inside are cardinalfish (Family Apogonidae) while the fish on the outside may be Indian anchovy (*Stolephorus Indicus*, Family Engraulidae). (Photo: Blue Office / MIRG Australia)

An itchy green turtle scratching itself on the reef at Labyrinth. (Photo: Blue Office / MIRG Australia)