

Biodiversity – It's More Than Biological!

By Daniel J. Chure

There is great concern in the life sciences about the biological holocaust currently under way around the globe. While estimates vary, it is clear that a very large number of species may well go extinct in the next few decades. Thus it is not surprising that preserving biodiversity is a major effort, one in which the National Park Service is playing a significant role. NPS-77 (Natural Resources Management Guideline) identifies four components to biological diversity: 1) species, 2) genetic, 3) community/ecosystem, and 4) process. Clearly, these categories are directed toward maintaining the diversity of the living biotic world. Admirable as this is, it is needlessly restrictive in that it ignores the important temporal component to all biotic resources. The current world is the result of billions of years of evolution, adaptation and extinction on a planet where climate, environments, and the very physical surface upon which organisms live are changing due to the drift of the continents. To a paleontologist the pageant of life preserved in the rock record is as important a part of the biodiversity of the planet as the living world.

To exclude the fossil record from the concept of biodiversity is to ignore much of the diversity of our planet. There is no way to know how many specimens of any given fossil species are preserved in the earth's crust, but the loss of a single specimen to erosion, theft, or vandalism may result in a species never being completely known or perhaps never known at all to science. Fossil species are extinct and are not breeding new individuals. Whatever specimens of a given taxa have been fossilized are all there ever will be. Some are buried deep in the earth's crust while others were exposed and are being, or have been, destroyed by erosion. Thus, specimens that are now exposed or endan-

gered must be evaluated for their scientific significance and collected if they are important. Inventorying, monitoring, and collection programs for fossil resources must be implemented in order to avoid the loss of the fossil biodiversity within the NPS.

On a larger scale, the fossil record may well provide an important evolutionary basis for conservation strategies. The NPS needs to look at how paleontological studies can help in conservation and what the record tells us about the immediate origins of our present communities and ecosystems. Few if any modern communities existed in their present form 10,000 years ago. Pliocene-Holocene climate changes (especially post-glacial global warming) have had a profound effect on the evolution of our modern biota. An understanding of these effects has obvious implications for developing conservation strategies in light of predicted future global warming trends. Furthermore, the Pliocene-Holocene record of species responses to environmental changes also provides data that will be important in developing and designing nature reserves.

Even this brief discussion shows that the fossil record provides temporal data for three of the four components listed by NPS-77 as components of biodiversity; species, community/ecosystem, and process. Clearly the NPS needs to bring fossils into its overall planning for preserving biodiversity. This should include not only preserving the fossil record of species diversity but also supporting studies that help us understand the processes that affect community evolution and community response to climate change. Coordinated research of fossil and extant biotas should yield real benefits for understanding, anticipating, and managing the biological changes resulting from development, habitat destruction, and climate change.