The Role of Conservation Biology in Managing Biodiversity

Daniel Simberloff
Florida State University, U.S.A.

One aspect of current conservation biology - the study of habitat requirements of various species - has a long history. Many other facets, such as consideration of population genetics, demographic stochasticity, and landscape ecology, are much newer. Generally, this is a new science which has few, if any, tenets that provide direct guidance on issues of reserve design and biodiversity management. In other words, conservation biology cannot tell a manager categorically what sort of design and management will generate what sort of protection. However, conservation biology has inspired a plethora of recent theoretical and empirical studies that force one to consider numerous factors and that point to information gaps that will have to be filled in order for intelligent choices to be made.

With respect to enclosed coastal systems, perhaps the key factor of concern is the extent to which multiple use of the system is truly compatible with maintenance of biodiversity. Such compatibility is almost an article of faith among many conservation planners, but there is, as yet, little empirical justification for this belief. Even if it should turn out to be true, much research would be needed to make it operational, because there will always be limits to the degree of other uses. Exploitation beyond those limits will inevitably lead to loss of species. The concepts of minimum viable population size and metapopulation structure, for example, may constrain harvest or habitat conversion.

Among recent developments in conservation biology that may be particularly relevant to enclosed coastal systems are an explosion of studies on the myriad, often subtle effects of introduced species and the potential importance of metapopulation structure to species persistence. Species are often deliberately introduced for harvest or inadvertently released through the normal activities of boats. These introductions are virtually irreversible and the potential risks are extremely difficult to assess. The extent to which species are maintained by occasional movement between more or less isolated populations is known for very few species but may be key to persistence. In theory, the loss of a certain number of populations or reduction in the rate of movements among populations can cause an abrupt decline in a species and even generate regional extinction.