

Watersheds and coral reefs: conservation science, policy and implementation

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Coral reefs throughout the world are being degraded by human-induced disturbances, resulting in ecological, economic and cultural losses. Runoff and sedimentation impacts are among the greatest threats to coastal reefs surrounding high islands and adjacent to continental landmasses. Data were collected from three watersheds and their adjacent coral reefs in Palau, Guam and Pohnpei. Runoff and associated sediments from these watersheds had significant impacts on the diversity, abundance, distribution and physiological functioning of corals, fish and a variety of invertebrate species. Additionally, pollutants were found to affect the life history and cellular biology of exposed corals at both lethal and sublethal levels over large distances from sources. These data demonstrate that marine protected areas (MPA's) alone are insufficient for coral reef protection and that integrated watershed management practices are also needed. Notable gaps in the effectiveness of environmental policy, legislation and regulatory enforcement have resulted in the continued degradation of these Pacific coral reefs. Data demonstrated that efforts for restoration of reefs must focus on restoring those conditions that allow natural recovery to occur. Participating communities involved in this program, with intact resource stewardship and traditional leadership systems, have been able to apply research findings, integrating traditional ecological knowledge and land use practices with coral reef management policies, relatively quickly. Three case histories in the Pacific Islands provide insight on how biophysical data was used to manage human activities and behaviors responsible for coral reef destruction, through the application of the social sciences.