

Sustainability and Conservation of Marine Living Resources

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What causes the biological variability in the ocean and what are the implications of such variability to the scientific, economic and social aspects of sustainability, utilisation, conservation and the long-term global climate change?

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of biota have improved in recent times due to advances in tools and techniques such as ship-board sampling methods, submersible technology, towed and moored instrumentation, automated photographic techniques, satellite sensing and acoustic arrays, etc. However, the mechanisms responsible for the variability, still remain unknown.

Many marine species - directly or indirectly sustaining the food supply of a large section of ever increasing human population - are sensitive to impacts of human activities. In many cases, the natural fluctuations in marine organisms have frequently been ascribed incorrectly to the effects of pollutants. Consequently, it would

be easy for a serious impact on the environment to pass unnoticed through ignorance of variability and instability of natural population. Therefore, the causes and predictability of such a variability are not only of scientific interest, but more importantly of economic and societal concern.

As a matter of fact, the potential scientific and economic significance of biological variability of the ocean is so great, that the understanding of the mechanisms responsible for these processes and developing the capabilities to predict such changes is a singularly important challenge in ocean biology, having immense bearing on resource utilisation, management, conservation and environmental protection.

Forecasting or predicting the biological variability in marine ecosystems, requires a thorough understanding of

- the interrelationship among and between biotic and abiotic components,
- how inorganic and organic materials are transferred into biomass,
- the mechanisms that regulate autotrophic and heterotrophic production and conservation,
- how much is the metabolic loss in trophic transfer or the ecological efficiency,
- how biotic and abiotic components interact to regulate marine biodiversity,
- how environmental and biological variables regulate the expression of genetic potential and
- how gene flow between populations is regulated.



The responsiveness of gene expression to environmental factors is still poorly understood in most marine organisms, and particularly in those of major ecological and economic importance. Were such information available, it would also provide basic insight into the process of evolution, speciation and sustainability in response to changing environmental conditions and as such should provide a framework for understanding the anticipated impact of global change on ma-

rine organisms and biological variability, thereof.

Such data will be essential for coming out with numerical models of predictive and management relevance. In fact, the general dearth of such information for the vast majority of marine organisms is the major impediment for developing appropriate techniques and methodologies to assess sustainability of marine living resources and to get a realistic insight into the ocean trophodynamic processes.

