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# The Sustainability of Global Ecosystems: Re-evaluating the Current Paradigm

by Michael A. Huston, Department of Biology Texas State University, San Marcos, Texas  
and IAS Professor-at-Large 2009

## About this Lecture

Sustainability results when the removal rate of natural resources is less than or equal to the rate at which those resources are renewed by natural processes. Thus, a given rate of removal or harvest may be either sustainable or unsustainable depending on the natural rate of renewal of that resource. Renewal results from growth in population size or biomass, measured as net primary productivity in the case of plants or net secondary productivity for animals. Understanding the global distribution of net primary productivity is the key to understanding the natural constraints on sustainability.

One reason that human activities have so often been unsustainable may be that the global patterns of productivity are not understood correctly. The global distribution of marine productivity, which is highest in the high latitudes, has been well-understood for several centuries, although this has unfortunately not prevented over-fishing. The terrestrial pattern of NPP is currently thought to be the opposite of the marine pattern, being lowest at high latitudes and highest near the equator. This is almost certainly wrong. Reanalysis and reinterpretation of published data on NPP and related plant and animal properties indicates that ecologically relevant NPP, that which is available to plants and animals during the growing season, is low at the equator and increases with latitude to a maximum between 50° and 60° north or south latitude, which is the same as the marine pattern. The actual global pattern of terrestrial NPP, and thus the constraints on sustainable land use, are the opposite of what is currently believed, which will require a major re-evaluation of international development and conservation strategies, as well as a re-evaluation of much of ecological and evolutionary theory.

## About Professor Huston

Professor Huston's work involves processes that influence the structure of ecological communities, particularly the spatial patterns and temporal dynamics of plant communities. His research is an effort to understand and predict patterns of biodiversity, which he addresses primarily from the individual species, and individual organism perspectives up to the scale of global patterns. His work over the past 20 years has involved elements of hydrology, geology, soil science, plant physiology, and forest dynamics.



In the past several years Professor Huston has been increasingly active in efforts to apply ecological principles to issues of land management and sustainable development. He has served as a consultant and written guidelines and recommendations for the UN Commission on Technology and Development (Integrated Land Use Planning), UNESCO (A Research Agenda for Biodiversity), the Electric Power Research Institute (Biodiversity Uncertainty Reduction and Needs Project), the US Forest Service (Ecosystem Management of Species Diversity), and the US Environmental Protection Agency (Patterns and Management of Plant Invasions).

## Lecture Details

**Date:** Wednesday 15 July 2009 | **Time:** 6-7pm

**Venue:** Webb Lecture Theatre, Room G21, Ground Floor  
Geography Building, UWA

This lecture is free and open to the public, no RSVP required

### Institute of Advanced Studies

The University of Western Australia  
M021, 35 Stirling Highway, Crawley WA 6009

Tel +61 8 6488 1340

Fax +61 8 6488 1711

Email [iasuwa@admin.uwa.edu.au](mailto:iasuwa@admin.uwa.edu.au)

Web [www.ias.uwa.edu.au](http://www.ias.uwa.edu.au)

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