

Applications and Tools

Chapters 18-23

Molles: Ecology 3RD Ed.



Stable Isotope Analysis

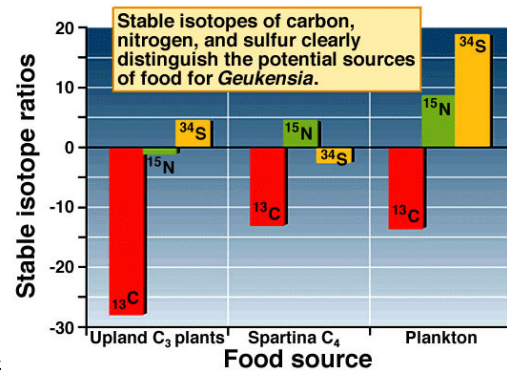
- How to study energy flow?
 - Inventory (identify the organisms)
 - Feeding habits of the organisms
 - Trophic levels
 - Biomass
 - Rate of food (energy) intake
 - Rate of energy assimilation
 - Rate of respiration
 - Rate of energy loss
 - Construct trophic pyramid

Molles: Ecology 3RD Ed.



Stable Isotope

- To trace energy flow through ecosystems
- Identify sources of energy

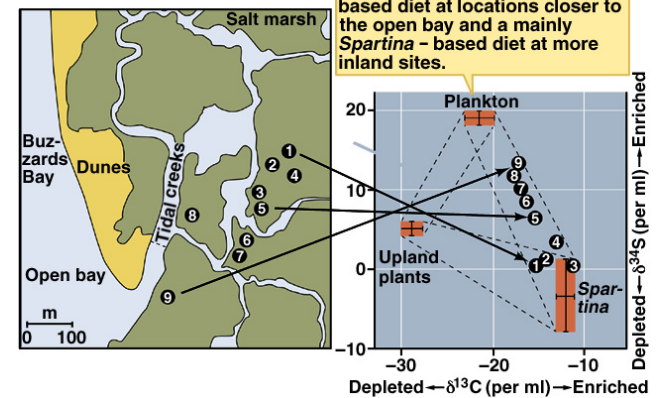


Molles: Ecology .



Stable Isotope Isotopic Variation

The isotopic composition of *Geukensia* indicates a plankton-based diet at locations closer to the open bay and a mainly *Spartina*-based diet at more inland sites.

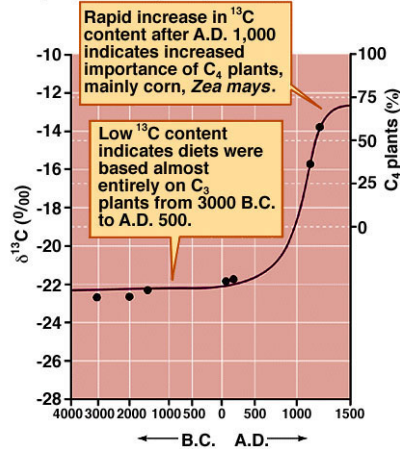


Molles: Ecology 3RD Ed.



Stable Isotope

- Determining feeding habits and trophic position of prehistoric human populations



Molles: Ecology 3rd Ed.



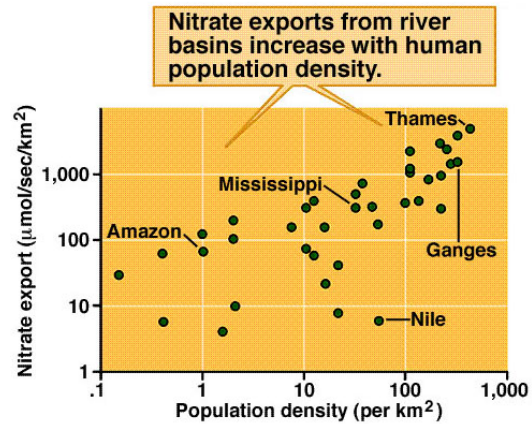
Altering Aquatic & Terrestrial Ecosystems

- Human activity affects the nutrient cycles of ecosystem
- Examples: agriculture and forestry
- Enrichment – e.g. N (air pollution by burning fossil fuel) and P (detergent & fertilizer)

Molles: Ecology 3rd Ed.



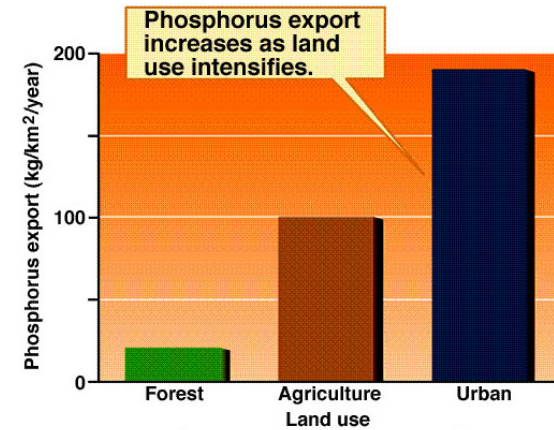
Nitrate Export & Humans



Molles: Ecology 3rd Ed.

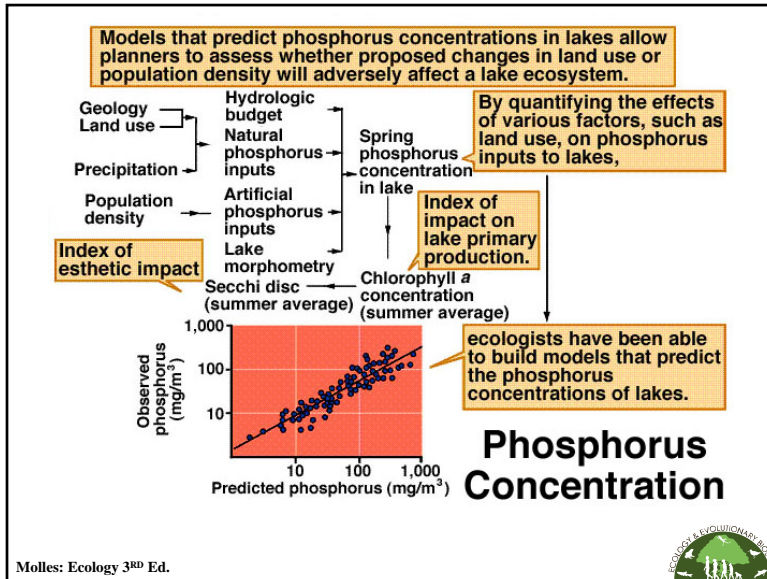


Phosphorus & Land Use



Molles: Ecology 3rd Ed.

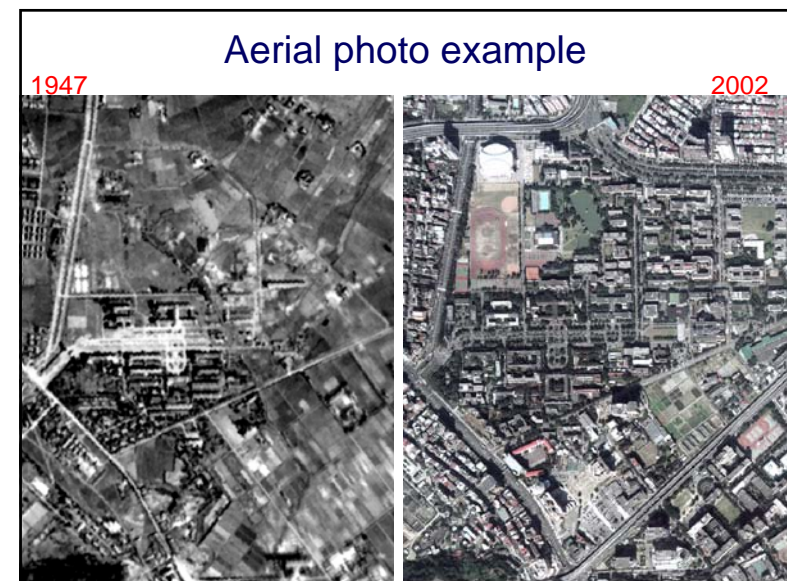
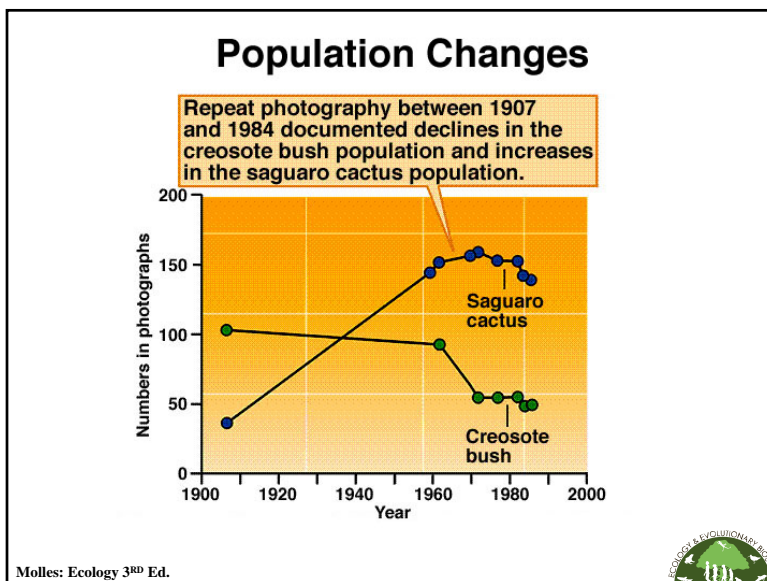




Repeat Photography

- Detect long-term change
- Ground photos taken from the exact spot and angle
- Aerial photos and satellite images

Molles: Ecology 3RD Ed.



Restoring a riverine landscape

- Restoration ecology
- A holistic view approach

Molles: Ecology 3RD Ed.



GPS, Remote sensing, and GIS

- Geographical ecology – the study of patterns that you can put on a map
- New tools revolutionize this field
 - GPS
 - Remote sensing
 - GIS

Molles: Ecology 3RD Ed.



GPS



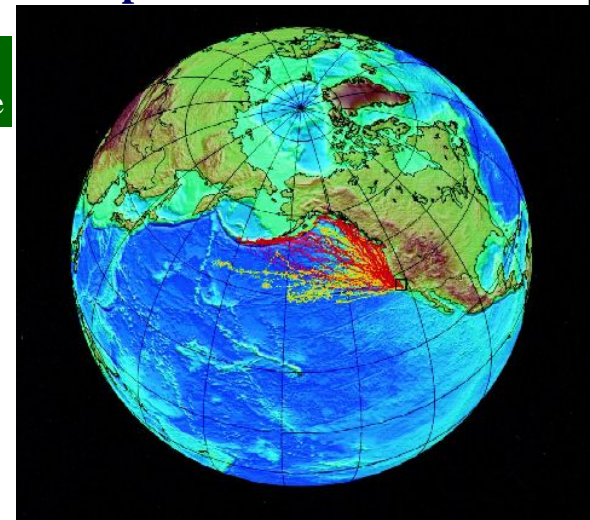
A network of U.S. military satellites is continuously sending signals towards the surface of the earth, which can be captured with a geopositioning system device, or GPS unit, such as the hand-held model shown here. The GPS unit scans the sky and waits to encounter signals from at least three different satellites to triangulate a two-dimensional location on the ground (latitude and longitude).

Molles: Ecology 3RD Ed.

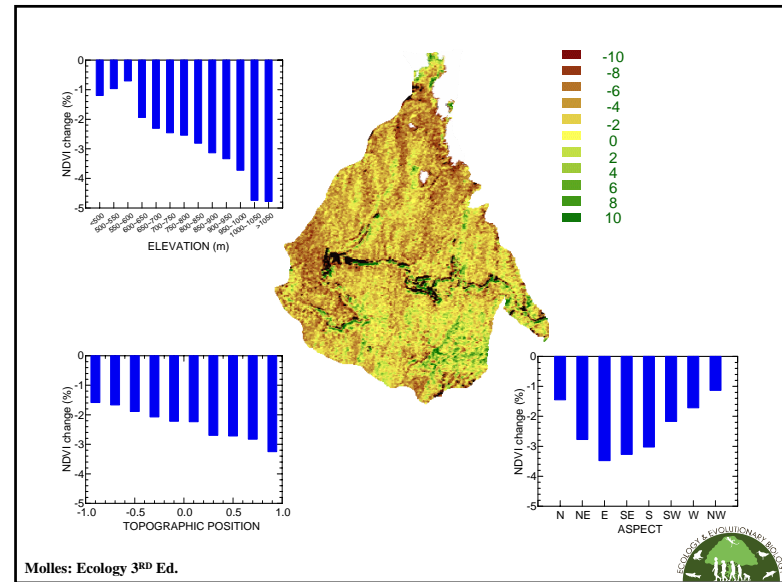
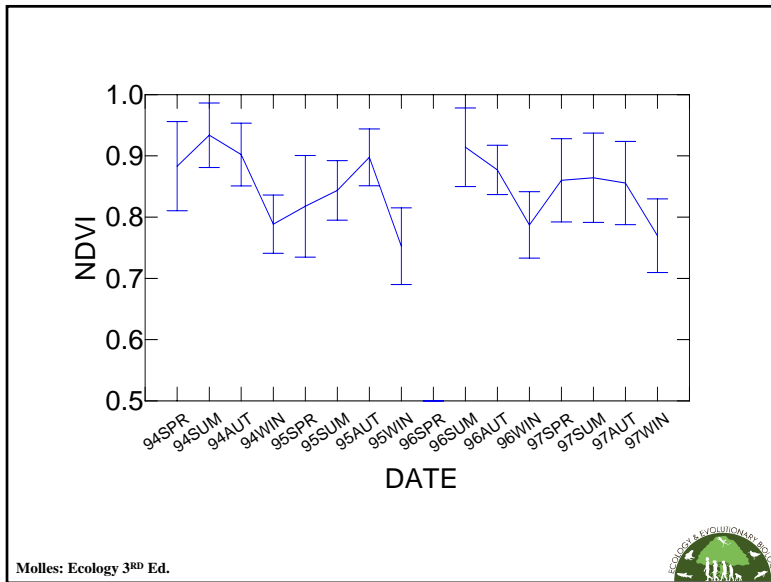
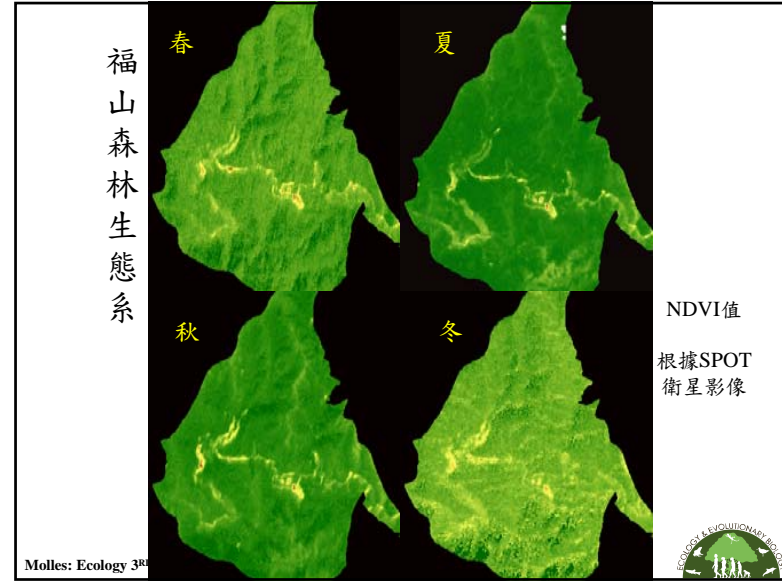
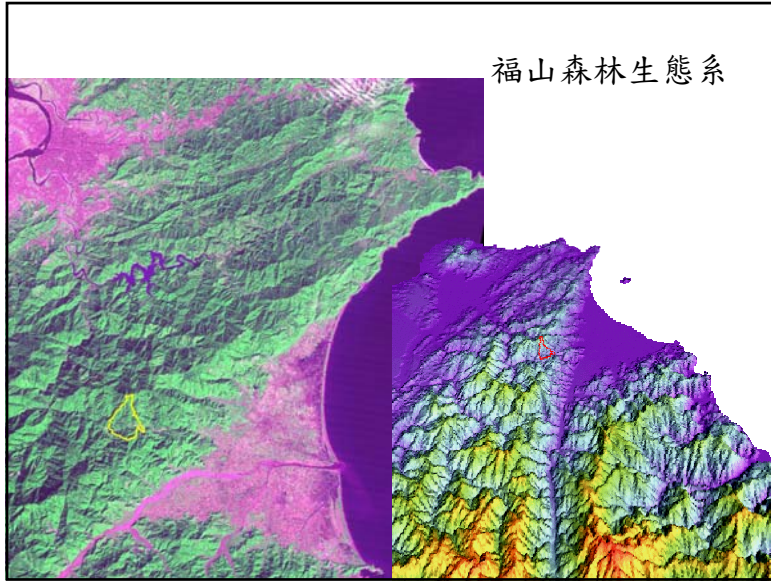


Dispersal of elephant seals

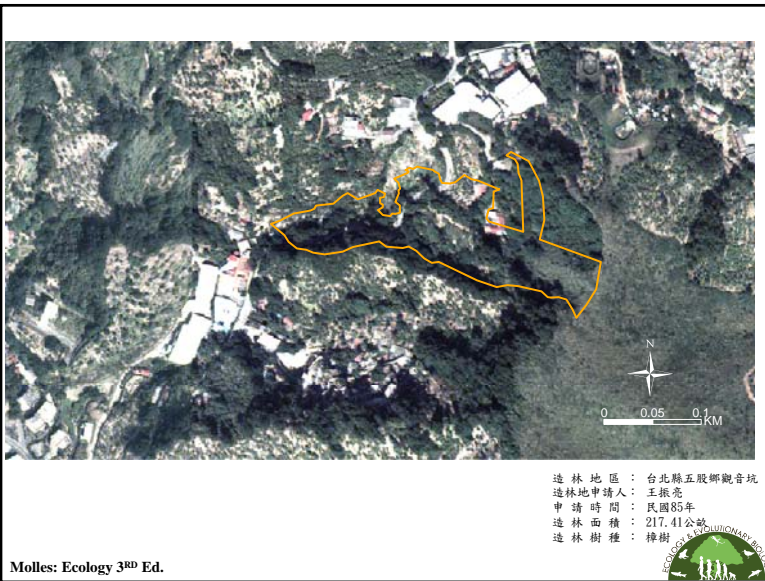
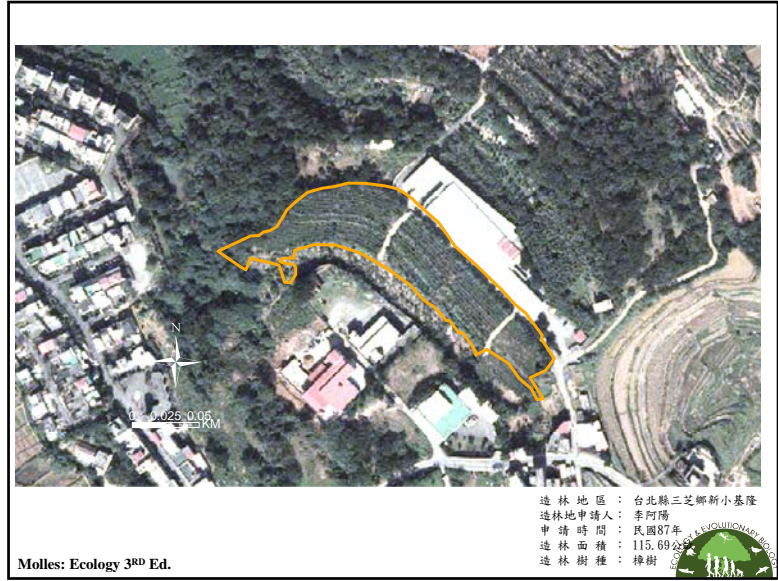
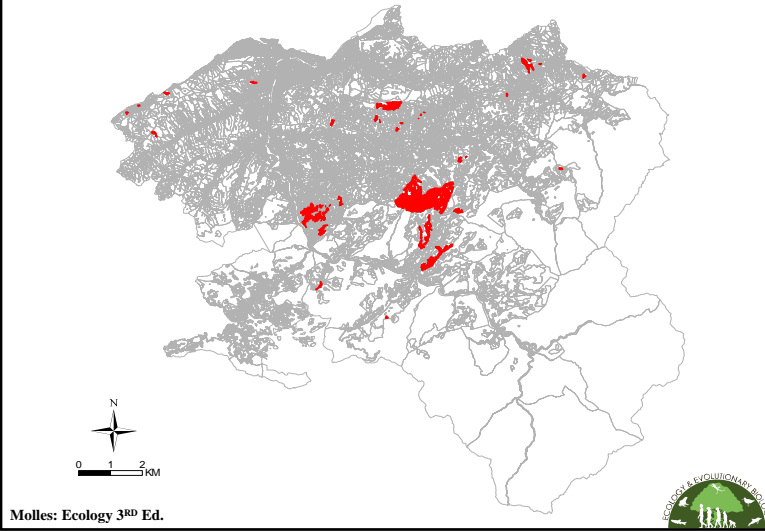
- Male
- Female



Molles: Ecology 3RD Ed.



台北縣三峽鎮造林地位置圖(紅色區域)



Cooperative research networks

- US Long-Term Ecological Research (LTER)
- 24 sites
- Each site encompasses unique ecosystems and research approaches, investigators, students and management systems

Molles: Ecology 3RD Ed.

International Long-Term Ecological Research (iLTER)

Official LTER Networks
(by region)

East Asia Pacific Regional LTER Network

- Australia
- China
- China-Taipei
- Mongolia
- South Korea

North American Regional LTER Network

- Canada
- Mexico
- United States

Central and Eastern European Regional LTER Network

- Czech Republic
- Hungary
- Israel
- Poland
- Romania
- Slovenia
- Slovak Republic
- Ukraine

African Regional LTER Network

- Namibia
- South Africa
- Zambia

Western European Regional LTER Network

- France
- Switzerland
- United Kingdom

Central/South American Regional LTER Network

- Brazil
- Colombia
- Venezuela
- Costa Rica



Countries Considering LTER Networks

- | | | | |
|-----------|-----------|-------------|----------|
| Argentina | Finland | Latvia | Spain |
| Austria | Germany | Lithuania | Sweden |
| Botswana | India | Mozambique | Tanzania |
| Chile | Indonesia | Norway | Vietnam |
| Croatia | Ireland | Portugal | Zimbabwe |
| Ecuador | Italy | Philippines | |
| Estonia | Japan | | |
| | Kenya | | |

Updated October 03



Molles: Ecology 3RD Ed.