DIVERSITAS
an international programme
of biodiversity science

Twenty-first Century Ecosystems: Systematic Risk and the Public Good

Biodiversity, Ecosystems and Global Decision Making

Hal Mooney

February 11, 2009

DIVERSITAS
an international programme
of biodiversity science

"After having passed over so many miles of an uninhabited useless country, the sudden appearance of an English farm-house, and its well-dressed fields, placed there as if by an enchanter's wand, was exceedingly pleasant……"

Darwin, Voyage of the Beagle

“But I cannot attempt to describe all I saw; there were large gardens, with every fruit and vegetable which England produces; and many belonging to a warmer clime. I may instance asparagus, kidney beans, cucumbers, rhubarb, apples, pears, figs, peaches, apricots, grapes, olives, gooseberries, currants, hops, gorse for fences, and English oaks; also many kinds of flowers”

Darwin, Voyage of the Beagle


www.teara.govt.nz

“One new (plant) species (has been added to the New Zealand flora) every 39 days since Capt. James Cook first sighted land in 1769”

Williams and Cameron, 2006

DIVERSITAS Projects & Networks

Biodiversity changes

Drivers
-land/sea use
-biological invasions
-pollution
-climate change
-socio-economic

Mountain BD (GMBA)
FreshwaterBIODIVERSITY
AgroBIODIVERSITY
ecoHEALTH, oceanLIFE
Invasive species (GISP)

Ecosystem goods & services

Human activities
Social, legal, economic, political motivators

↓ ?

bioGENESIS

a core project of DIVERSITAS

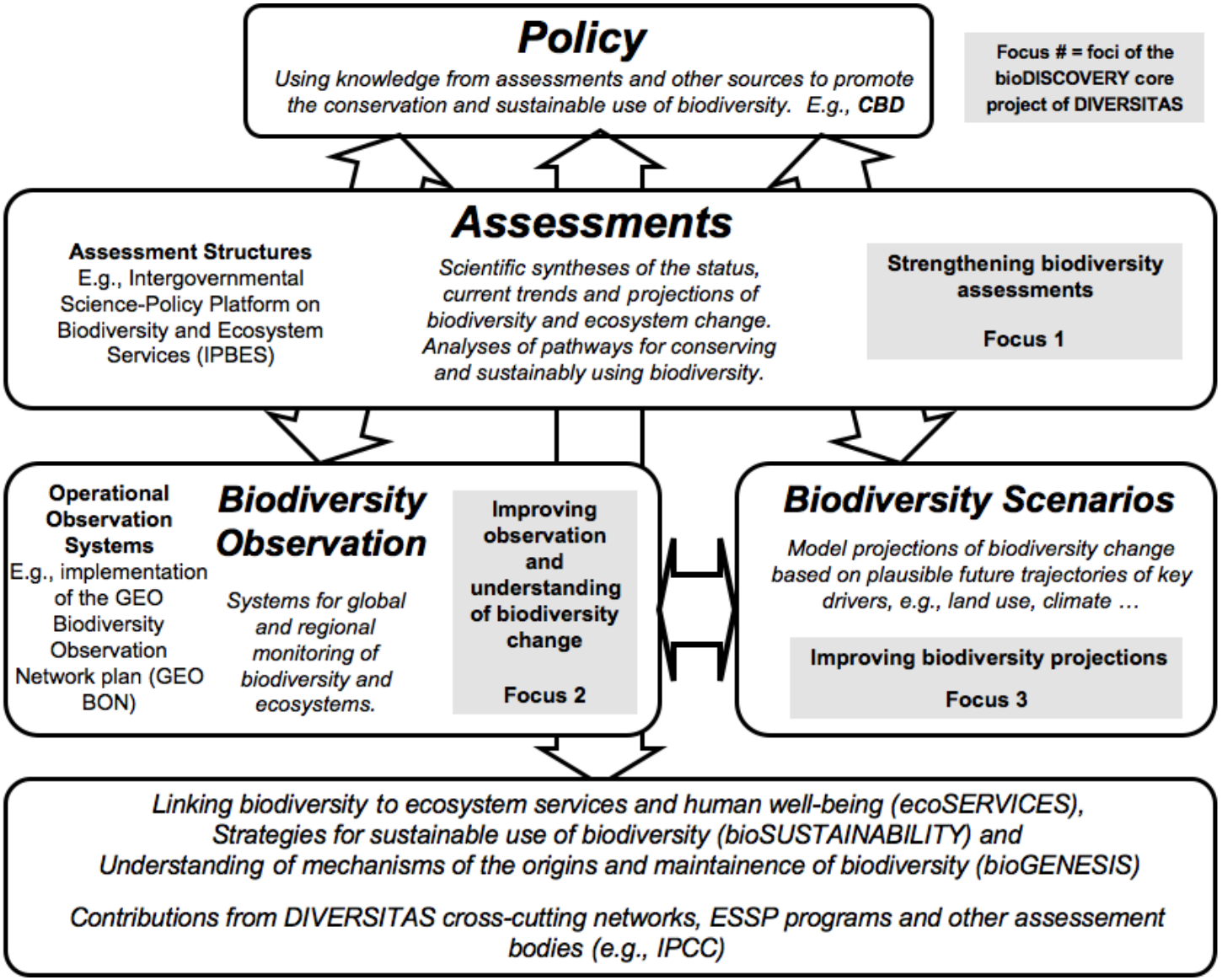
Providing an Evolutionary Framework for Biodiversity Science

DIVERSITAS

an international programme of biodiversity science

Laboratoire d'Ecologie, Systématique et Evolution
SC DIVERSITAS, Washington DC, Feb 2009

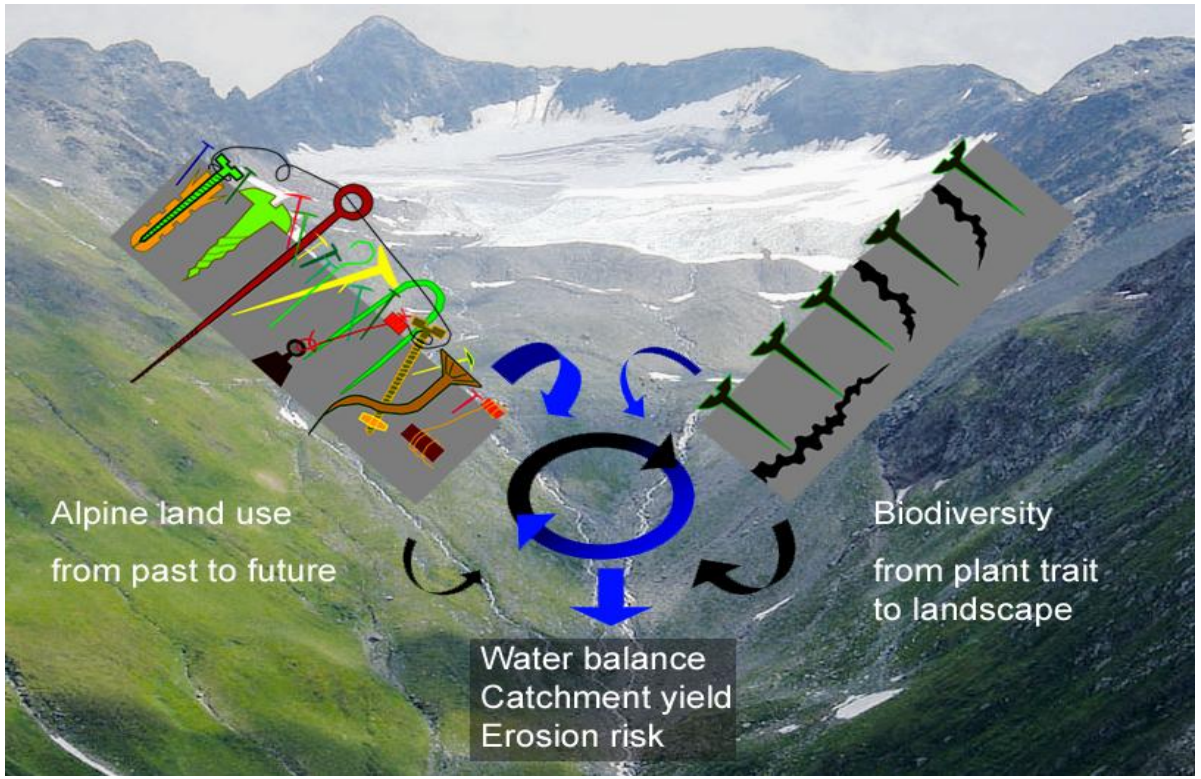
bioDISCOVERY Science Plan



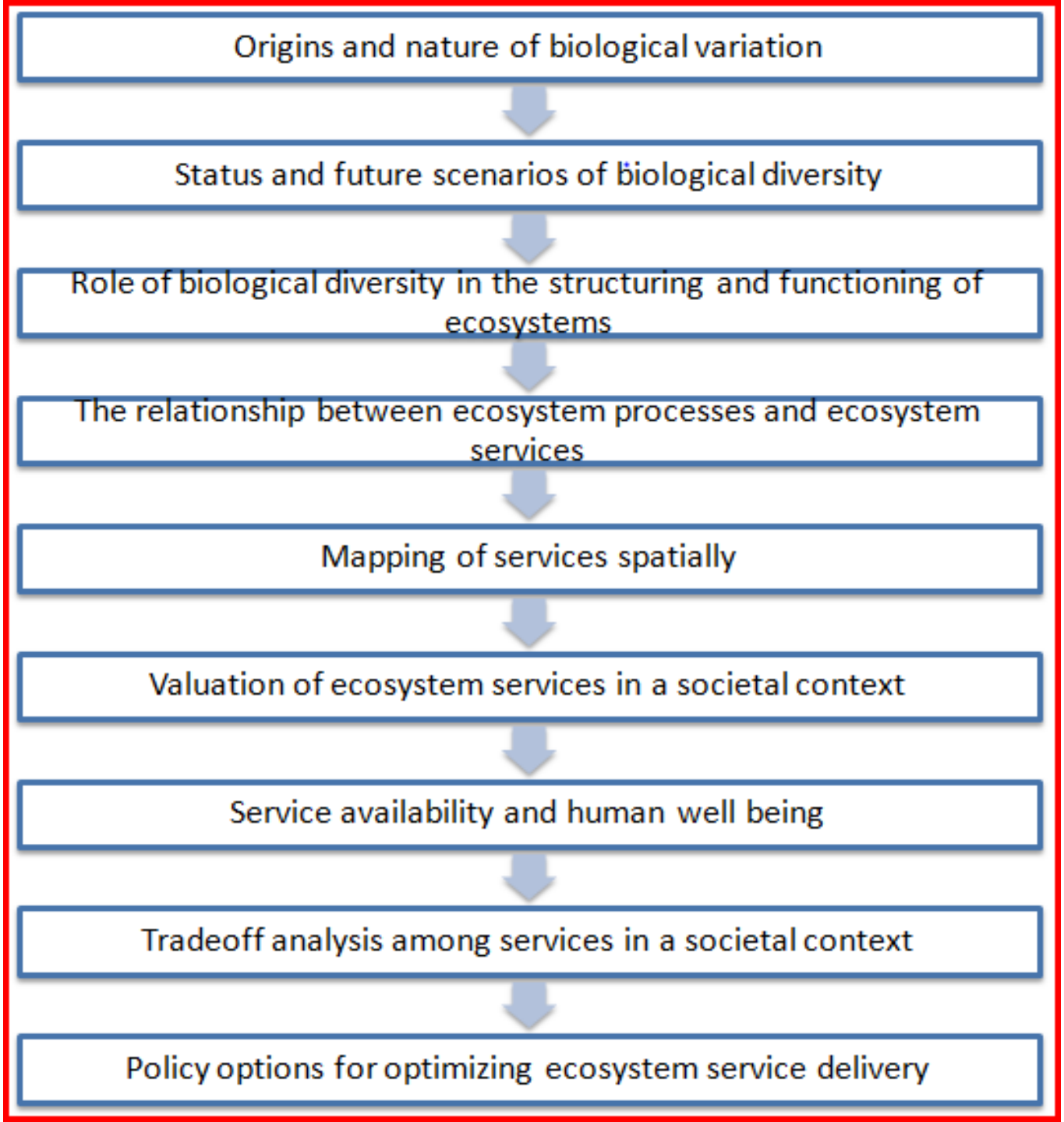
DIVERSITAS
an international programme
of biodiversity science

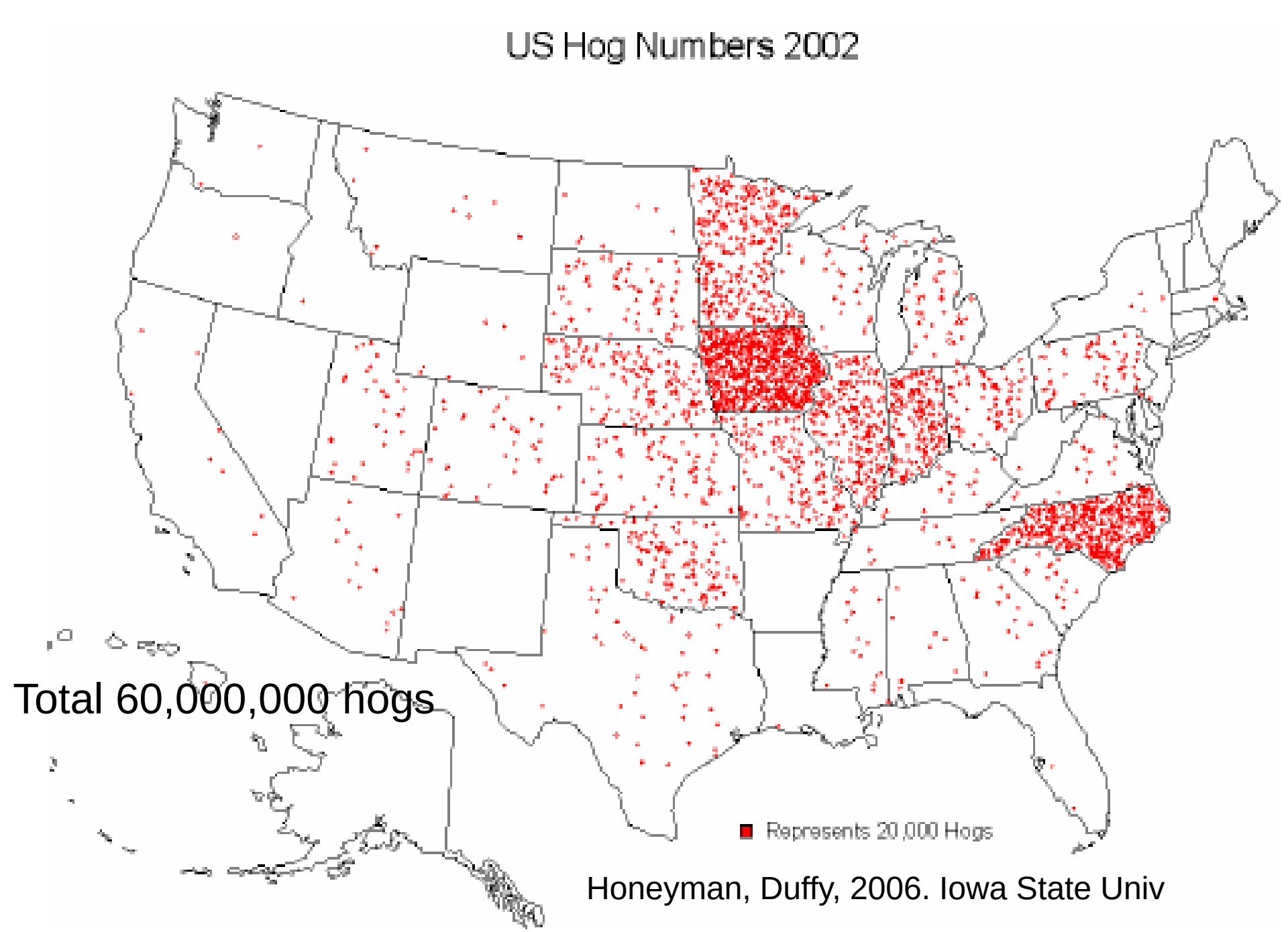
Joint Research Projects

on land use and biodiversity effects on catchment value in mountains



European Alps (Switzerland, Austria, and France), Caucasus (Georgia), Andes (Altiplano/Bolivia) & Himalayas (Tibet/China, starting in 2009)

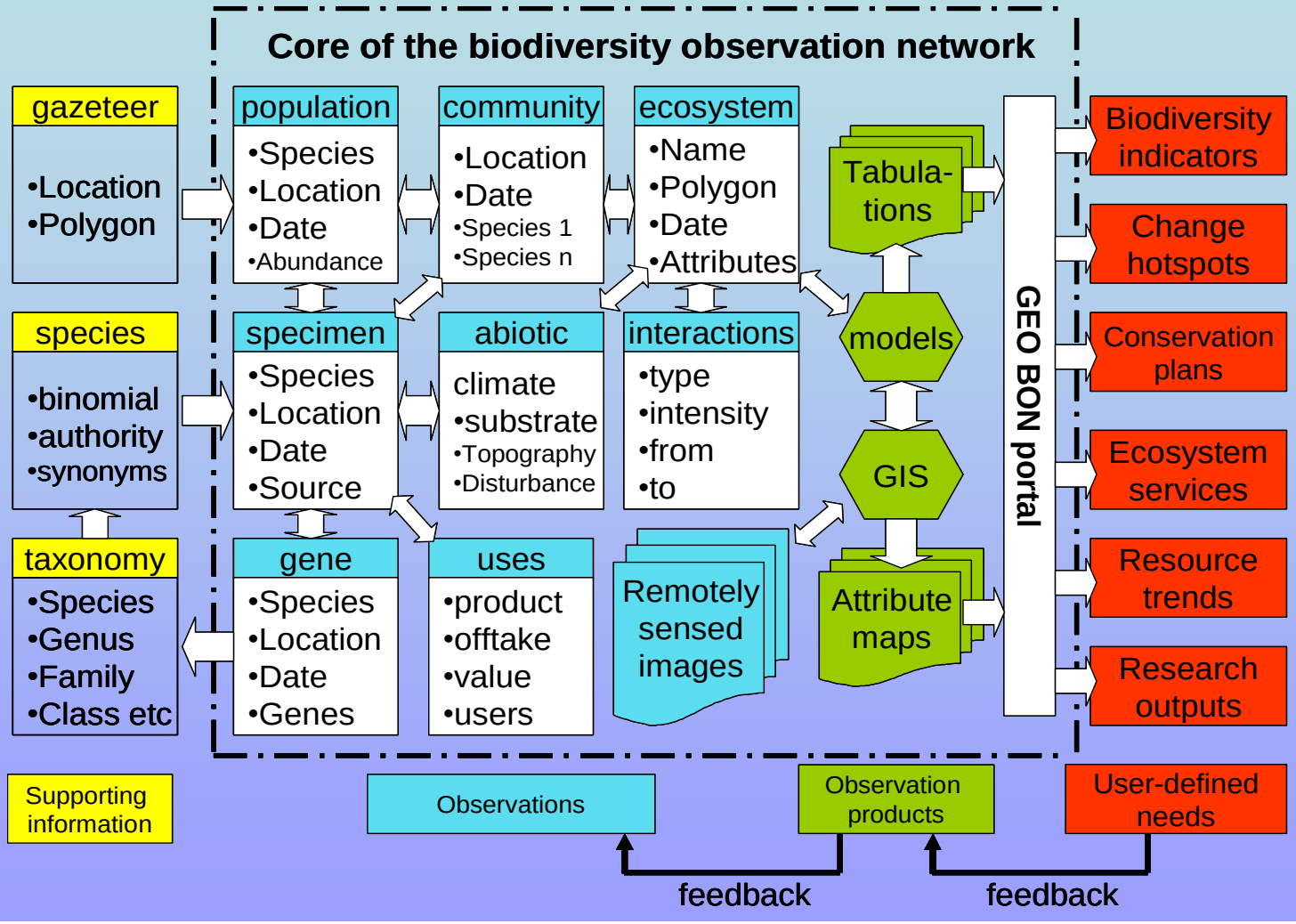

Origins and nature of biological variation
Status and future scenarios of biological diversity
Role of biological diversity in the structuring and functioning of ecosystems
The relationship between ecosystem processes and ecosystem services
Mapping of services spatially
Valuation of ecosystem services in a societal context
Service availability and human well being
Tradeoff analysis among services in a societal context
Policy options for optimizing ecosystem service delivery



Total 60,000,000 hogs

Honeyman, Duffy, 2006. Iowa State Univ

An integrated biodiversity observation system



GROUP ON EARTH OBSERVATIONS

Biodiversity Observation Network

Energy, Agriculture, Forest Service, NPS,BLM, Smithsonian, EPA, USGS, NOAA, NSF (eg LTER, NEON), Defense, NIH, NASA, Fish and Wildlife Service plus a plethora of state and private groups all hold or sponsor data acquisition on biodiversity (and I am sure there are more)

Depletion of natural capital stocks represents loss of a capital asset

- Loss of wealth associated with declining ecosystem services is not reflected in economic accounts
  - Ecosystems are capital assets – part of national wealth
  - National accounts do not include measures of the depletion or degradation of such assets

ecoSERVICES
a core project of DIVERSITAS

Prepare for an uncertain future

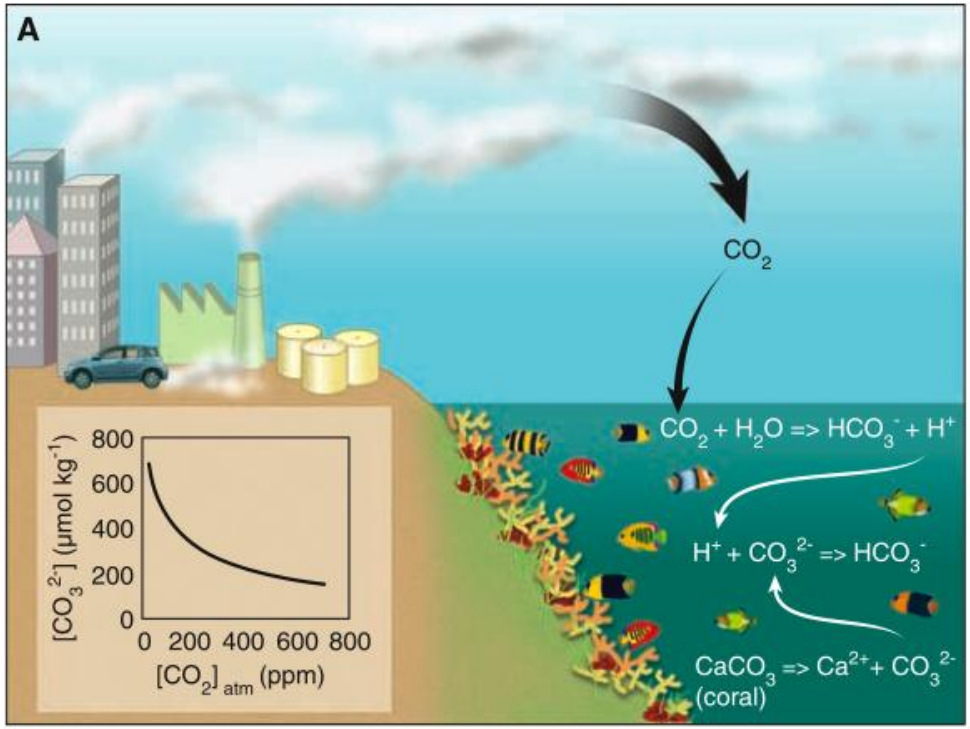
- A world of rapid change in climate and vegetation with unique combinations arising
- A world of increasing extreme events
- A world of weeds and diseases
- A world of regime shifts
- A world of rising seas and acidifying oceans
- A world that has been diced and replumbed
- A world of increasing nitrogen and phosphorus redistribution
- A world of venture capital moving quickly among nations to places of investment “opportunity” and often environmental sensitivity (shrimp farms, biofuels, etc)

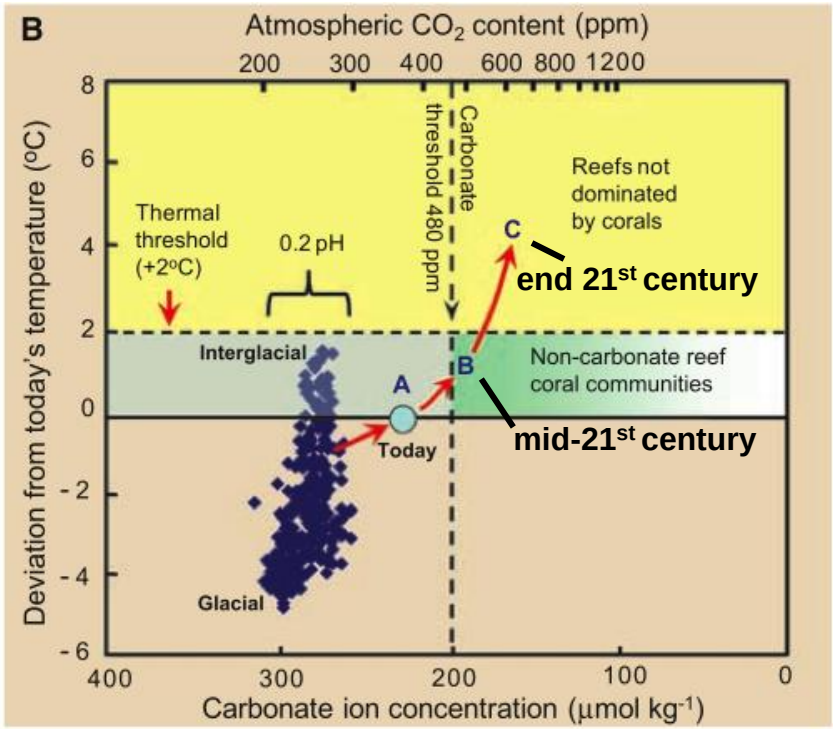
Tipping points: rising CO_2 and climate change impacts on coral reefs

1) Rising CO_2 concentrations increase ocean acidity. This reduces the capacity of hard corals to build reefs

2) High temperatures cause reef polyps to loose their symbiotic relationship with algae ("bleaching").

1) + 2) = very bad news for coral reefs





Hoegh-Guldberg et al. 2007 Science

bioDISCOVERY
a core project of DIVERSITAS

CBD: Article 3. Principle

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, **and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction**.

13-16 October 2009
Cape Town, S-Africa

2ND DIVERSITAS
OPEN SCIENCE CONFERENCE
BIODIVERSITY AND SOCIETY
"UNDERSTANDING CONNECTIONS, ADAPTING TO CHANGE"