

# Defining the Bios: an Objective Basis for Biodiversity Market Systems

The “Tuan Trade-Off”



## Background

Current economic systems reward non-sustainable development because ecosystem services and values are not adequately quantified, captured in commercial markets and "paid for" by the user.

New systems are required to reverse this trend. It is possible to account for carbon and water entities. It is much more difficult to identify and account for, and thus pay for, biodiversity values. Initiatives to put a dollar value on biodiversity have been criticized because they do not reflect the inherent variability therein.

We propose a system which defines and measures biodiversity and its variability as an entity in itself.

# Aims

- To provide an objective definition of biodiversity units;
- To formulate an explicit and comprehensive equation to express the natural values which comprise biodiversity;
- To develop this equation in a functional manner that delivers units or measures (the Bios) upon which management and market systems can be based;
- To give worked examples as to how these units or values might be deployed.
- To present clients and buyers for biodiversity values
- To present managers and vendors for biodiversity values

# Defining the Bios

- **Bios:** a universal biological unit that reflects the diversity, biological productivity, uniqueness, vulnerability, connectivity, and condition of an area. These values can be represented by an equation:

- **Bios = [(EC\*BP) + (EC\*U) + (EC\*V)] + A(1/D)(CO)**

# Where:

- **EC:** Represents the food web and regional ecosystems. EC is a count of food web entities (producers, consumers, predators, detritivores), given context by WWF Ecoregions of the World.
- **BP:** Biological productivity (kilograms per species).
- **U:** U is a rank of the taxonomic status and evolutionary uniqueness of the biological entities in EC.
- **V:** Ranking that reflects conservation status.
- **A:** Area - this can be any value, but 1000ha has relevance to the scale of human development and measurement of biodiversity in functional ecosystems.
- **D:** Distance to another patch of similar habitat.
- **CO:** Condition - a factor that takes into account the original and present condition of the area concerned.

# The Bios: Useful Tool or Holy Grail?

- The Bios may not be useful or easily calculated for real land areas, in much the same manner that solving the equation  $E=mc^2$  is not very useful for constructing a nuclear power plant. However, using surrogates and real biological principles allows the relevant parts of the unit to be calculated and manipulated. The Bios unit can then be used in many different economic and political contexts to achieve conservation action and create wealth.

# Buyers for Biodiversity

- Compulsory: Regulations require purchase
- Business Advantage: Investment
- Business Advantage: Labelling
- Business Advantage: Tax incentive
- Government: Required conservation action
- Conservation NGO's: Core business
- Philanthropy: General
- Philanthropy: Personal

# Biodiversity Suppliers and Managers

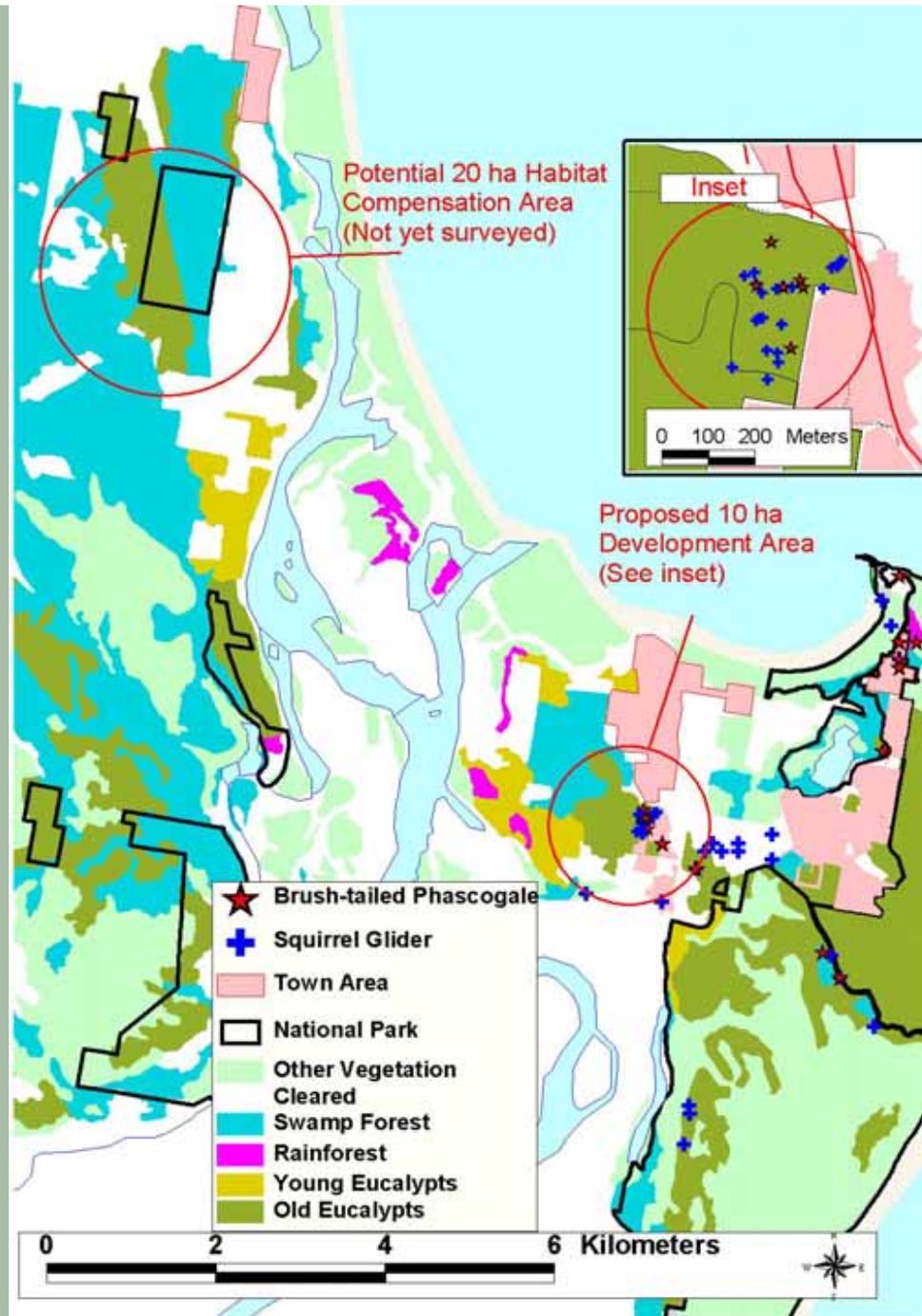
- Extensive land use business/agency
- Indigenous people
- Entrepreneurs
- Individual land holders: hobby farms to Ted Turner

## Application of the Bios: The “Tuan Trade-Off”

- Let us examine a hypothetical situation:
- A proposed housing development will consume 10ha of prime forest habitat zoned for housing on the East coast of Australia. Impact assessment has identified habitats (**EC**) and threatened species (**V**) which are protected by a *Threatened Species Conservation Act*.
- Developers need to meet regulations which require protection of **EC** and **V**. Total real estate development profit is about A\$2 million.



- A local landholder has development rights for 40ha of nearby forest and the land use proposal is to clear for cultivation of market flowers. Habitat assessment has identified **EC** and **V** values similar to those in the development proposal.
- Current scenario: 50 ha habitat developed.



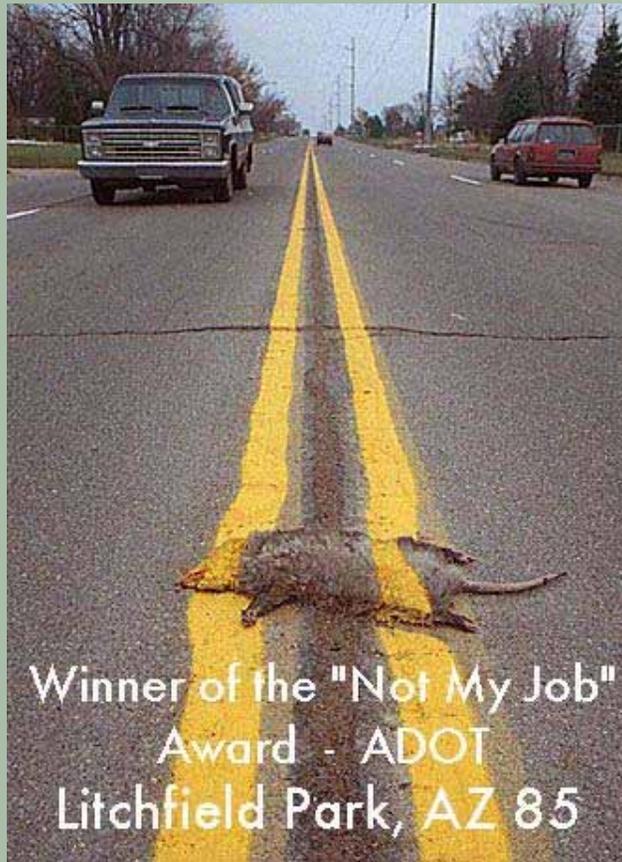
# Bios Solution

- How can we use our Bios units to achieve conservation action that better protects natural values and rewards sustainable development?
- To maintain biodiversity values, a trade proposal has been developed to secure double the amount of habitat (20ha) than contained by the proposed housing development (10ha).
- We now apply the Bios equation to achieve a better, measured outcome in biodiversity values by Before-After comparisons of the two areas

# Bios values

- Assumptions: In this case **EC**, **BP**, **U** and **CO** are constant (same forest type and location – see map)
- Regulations specify: **V** = Tuan (*Phascogale tapotafata*) and Squirrel Glider (*Petaurus norfolkensis*)
- Area: **A** = 10ha (development site) and 20ha (secured habitat)
- **D**: Secured habitat= 0, Development site = 2km (see map)
- **Trade-off**
- 300 K total Bios investment, 1.7million in profit
- Bios seller: Local Landholder
- Regulator: State NPWS
- Biodiversity monitoring and management: State natural resource management agency
- **Results**
- 10ha habitat developed.
- 20ha habitat secured and positively managed for biodiversity as part of a larger block of similar habitat. Monitoring and management contract secured.

Buy NOW - Before it's too late



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