AGENDA

Part 1 – Theory (1:00 to 2:45)

1:00 - 1:35 Key Concepts

1:35 - 2:00 Reserve Design Activity

2:00 - 2:45 Case Study & Input Files

Break (2:45 - 3:00)

Part 2 - Hands-on (3:00 to 5:00)

3:00 - 3:15 Simulated Annealing Demo

3:15 - 3:30 Output files & ZC Explanation

3:30 - 4:15 ZC Hands On & Adjusting Marxan Values

4:15 - 5:00 Marxan Calibration (if time permits)

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Marxan Overview:

Marxan in Planning

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Based on materials developed by:

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Systematic Planning

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What is systematic conservation planning?

- **Conservation planning**: guides decisions about the location, configuration and management of conservation areas

- **Conservation areas**: areas (of land or sea) managed for the persistence of biodiversity and other natural values

- **Efficient, repeatable, transparent & equitable** process for making conservation decisions

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Key principles in conservation planning

Comprehensive

- The "ideal" is to sample every kind of biodiversity
- In practice, this is not possible so we should try to include data on:
  - species (and genes) — *composition*
  - habitats — *structure*
  - ecological processes — *function*
  - ecological 'regions' — *biogeography*

Key principles in conservation planning

Adequate

Protecting enough to ensure persistence of biodiversity features

How much is enough? (difficult question!)

- Usually addressed with targets
- Consideration of threats / habitats outside protected areas will influence how much is needed inside

Key principles in conservation planning

Representative

Sampling across the full range of variation of each feature (e.g. species or habitats)

Key principles in conservation planning

Efficient

Achieving objectives for minimal "cost"

Cost can be defined in terms of:

- acquisition cost ($)
- operational costs ($)
- opportunities lost (for users and industries)
- social values (local 'importance')
- political (gain or loss of credibility / votes)
- A combination of the above

Establishing sites in a network brings new considerations:

Existing protected areas usually have to be factored in, even if they are not ideal.

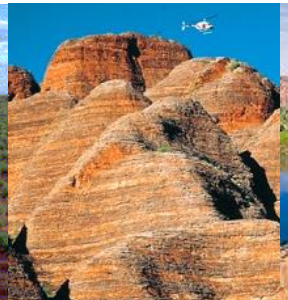
Special places ("jewels") recognised for their unique / irreplaceable ecology.

Threats in some places are more pressing than in others.

Achievable? (financially, legally, mandates)

Broadly supported? (Now and/or in the future?)




Systematic Conservation Planning steps:

1. Scope and cost
2. Identify and involve stakeholders
3. Identify goals
4. Compile data
5. Set conservation targets
6. Assess existing conservation areas
7. Select new conservation areas
8. Implement conservation action
9. Maintain and monitor

⇦ Marxan

Source: Ardron (2010)

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Marxan in Systematic Planning

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Selecting conservation areas

- First, we need to establish this question clearly and as a formal problem.
- Two typical conservation area selection problems are:
  - The ***minimum set problem***; capture a set amount of biodiversity for the least cost
  - The ***maximum coverage problem***; capture as much biodiversity as possible with a fixed budget

Minimum Reserve Set Problem

Objective of *minimum set problem* is:

- Minimise the overall "cost"
- While meeting user-defined biodiversity targets (e.g. 20% of each vegetation type)

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How Marxan scores itself to find the most efficient solution?

Marxan "Score"

||

Combined Planning Unit Cost (efficiency)

+

Combined Boundary Length (clumping)

+

Combined Target Shortfall

(penalty for not achieving conservation targets)

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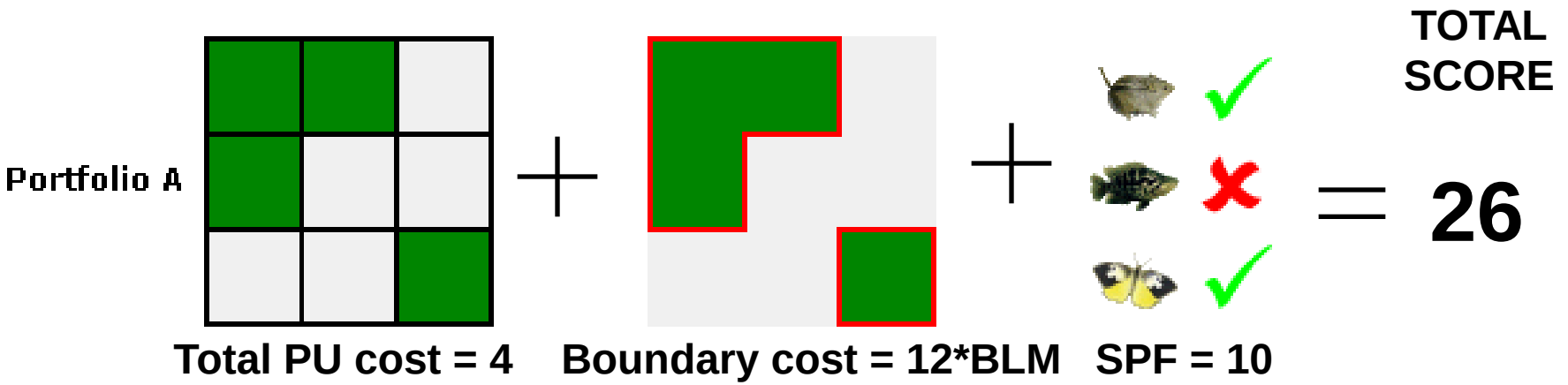
Example of Marxan "Scoring"



*Modified from: Bob Smith (*http://www.kent.ac.uk/dice/cluz/marxan2.html)

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Marxan is a tool that:

- Addresses core '**Systematic Conservation Planning**' principles (representation, cost efficiency, spatial constraints, complementarity, etc.)
- **Identifies multiple good solutions**, even to very large problems
- Selects areas in a **systematic, repeatable and transparent** manner
- It is **free!**

Decision-support tool, not a decision-maker!

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Marxan Practical Considerations:

- Works best with expert & stakeholder input
- Works for a variety of problems not only strict reserves
- Computational capacity or algorithms rarely limit conservation planning – lack of clear objectives do
- Marxan will always produce an "answer", but without clear goals and objectives, it may not be what you need
- Start with a simple problem first. Complexities such as zoning or temporal dynamic can be added later

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Useful Marxan Websites

PacMARA tikiwiki

http://www.pacmara.org/tikiwiki

Available for download:

- Course Materials
- **Good Practices Handbook**
- Selected peer reviews
- **Applied applications**
- Other resources
- **Spanish materials**

(in development)

University of Queensland

www.uq.edu.au/marxan

Available for download:

- Other Course Materials
- Program and Manuals
- Extensions
- Presentations
- Peer Review Literature
- **Listserve**

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Other good decision support tools…

- **C-Plan** (Bob Pressey and Matt Watts)
- **Zonation** (Atte Moilanen)
- **ResNet** (Sahotra Sarkar)
- **SeaSketch** (University of Santa Barbara)

For more visit:

Ecosystem Based Management Tools Network www.ebmtools.org/

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