The Importance of Science in the Development of Environmental Safeguards for REDD+

Ian Thompson

Canadian Forest Service

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Why do we need environmental safeguards?

- other ecosystem services are considered as “co-benefits” to carbon storage – but they are not
- enhance and protect the many ecosystem services obtained from forests
- help planners choose best locations for projects
- prevent single objective projects and the exporting of environmental consequences

For REDD we could plant some **trees** and store some carbon….

Or, with good environmental safeguards, we could restore and maintain **forest ecosystems** with multiple ecosystem services… and store even more carbon

Value of environmental safeguards with MRV

- enables a results-based incremental funding scheme
- promotes sustainable development
- can promote science-based policies for forest recovery
- promotes consideration of more than just carbon

Various standards and systems for safeguards

- often high level statements, e.g., ‘no harm to biodiversity’
- monitoring is a key issue, but little guidance available
- few standards propose indicators
- most indicators are process-, rather than outcome-oriented
- clear need to interpret safeguards individually by country and by forest type – an important role for science

What is and is not science?

It is not, for example:

- Mapping
- Counting things – trees, animals, etc.
- So-called ‘grey literature’
- Expert opinion

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It is:

- Asking questions and testing hypotheses
- Detailed analysis of data – indicating probabilities

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What is the need for science?

Science is needed to answer some key questions:

1. For reforesting or restoring degraded forests, what tree species and silviculture will work best?

2. Understanding the local relationships between biodiversity and ecosystem functioning and services

3. What indicators to chose, how do we establish a baseline, and how to monitor and how often?

4. What are the likely trade-offs and associated probabilities?

Science reduces uncertainty

- There is high **uncertainty** in environmental sciences, yet we see high **certainty** in reporting:

  - e.g., this forest type stores 63 tonnes carbon/ha and represents 6% of the carbon in Africa

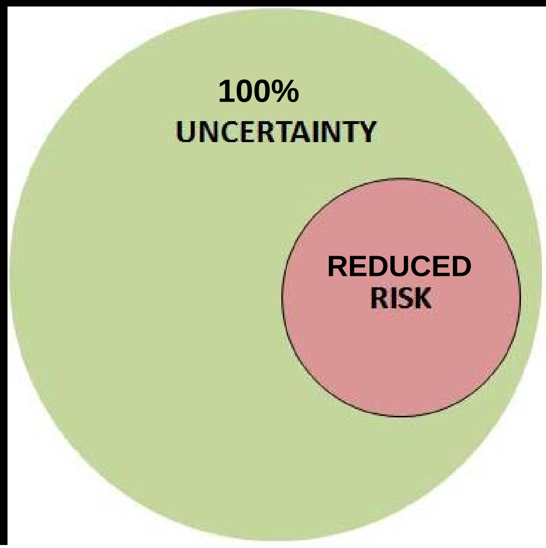
- Many sources of uncertainty in forest science:

  - complexity in ecosystems
  - novel forest types
  - unexpected interactions and collinearity
  - unexpected consequences of change
  - stochastic effects (weather, insect outbreaks, etc)
  - imprecise estimation (amounts or populations)

How can science reduce uncertainty?

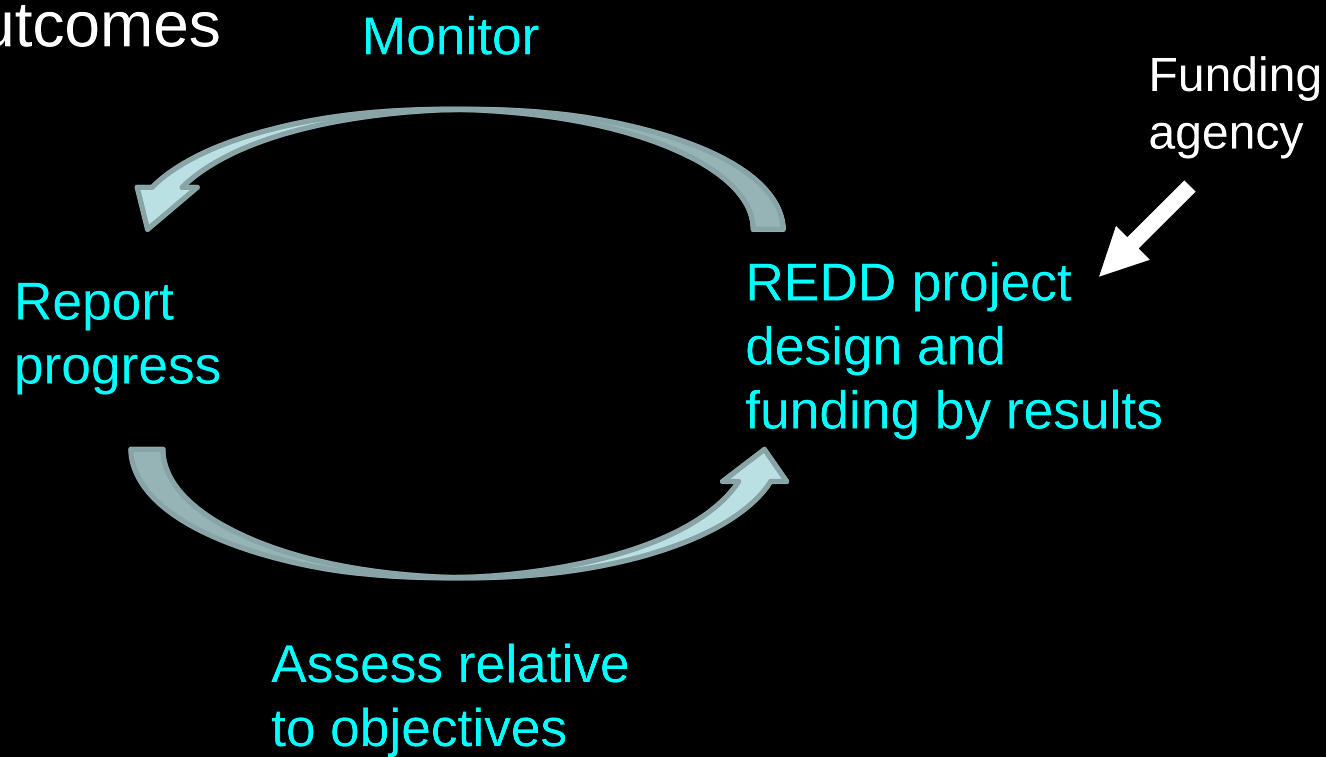
- Learning from doing (adaptive management and decision analysis)
- Meta-analysis: quantitative assessment of key factors
- Modelling of scenarios – testing alternatives
- Experimental and mensurational ecology
- Provide / improve the assessment tools

Express probability and error limits



MRV – treat safeguards as hypotheses

- need effective information systems (including indicators)
- project scale and national scale
- assess progress (outcomes) relative to ***objectives*** which are the ***safeguards***
- environmental safeguards allow hypothesis testing for expected outcomes



Key current research needs

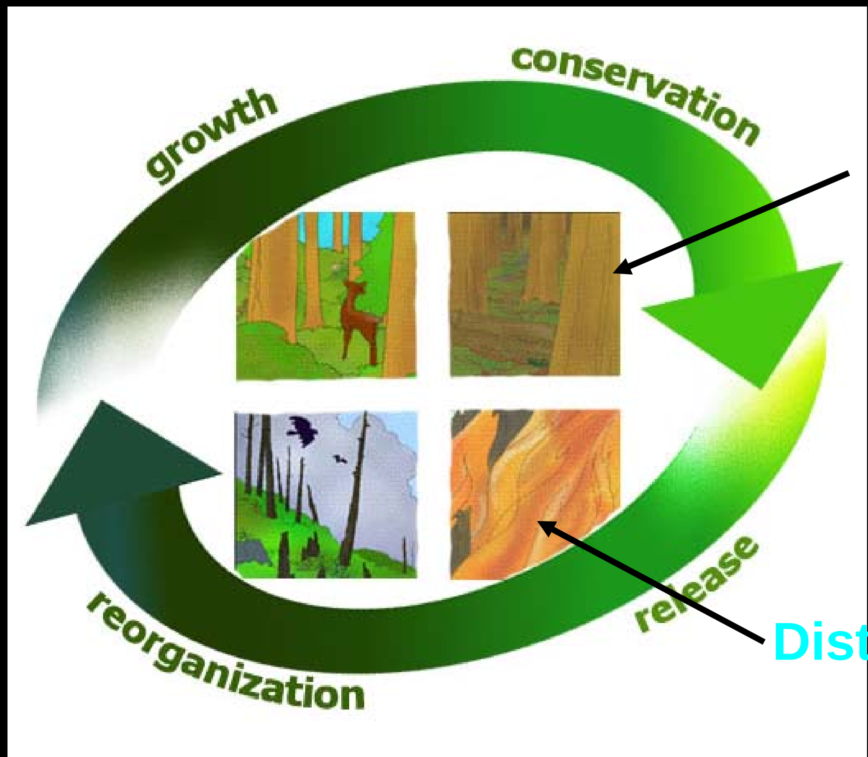
- relationship between species richness, scale, and ecosystem resistance and stability
- understanding how species deliver ecosystem processes, at scales
- novel ecosystems – need to predict how these will function
- understanding recovery processes from degraded states
- improved estimates of carbon and fluxes
- understanding and determining threshold responses

Functional species and ecosystem processes

- not all species are equally functional in ecosystems
- some have disproportionately high effects, e.g., abundant pollinator species
- loss of these species sometimes results in large changes
- lose enough functional species and the system will have low functioning and provide few goods or services
- important in REDD projects to ensure highly functional species are selected, monitored and maintained

Long-term carbon storage is related to ecosystem resilience

• resilience is the capacity of a forest to recover from a major disturbance



C.S. Holling 1978

Resilience is an emergent ecosystem property

- most primary forest ecosystems are resistant and resilient to natural disturbances
- a result of biodiversity at multiple scales: genes, species, and regional diversity among forest types
- loss of biodiversity can alter the forest resilience
- loss of resilience means increased uncertainty about future forest condition….and carbon storage

Mechanisms for the linkage between biodiversity and ecosystem stability and resilience

• biodiversity provides functional connectivity in the system: e.g., pollinators adapted to plants

• redundancy among species: a previously less important species may fill a vacated role

• genetic composition within species enables adaptation to environmental changes

• landscape heterogeneity enables movement and conservation of species

Key messages:

A scientific basis for environmental safeguards are necessary for REDD+, not to “save biodiversity”, but rather to:

1. ensure and enhance ecosystem functioning,
2. increase understanding of the probability of success
3. increase carbon in the system as a co-benefit to maintaining / enhancing biodiversity, and
4. Increase the longevity of carbon storage through developing resilient ecosystems.

The End