



Environmental Programmes

Evidence-based restoration of riparian zones in South Africa

The case of the *E. camaldulensis* invaded Berg river

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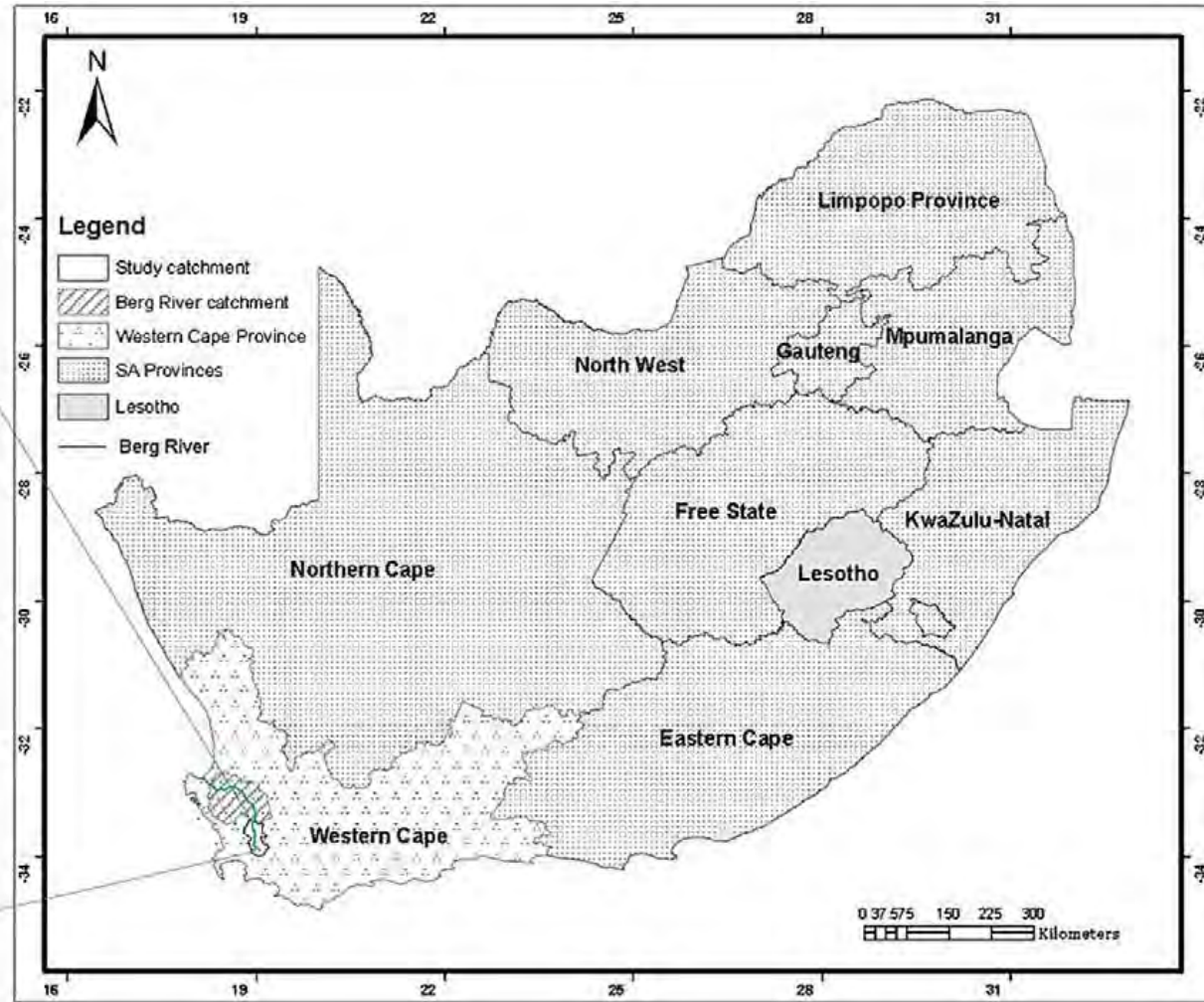
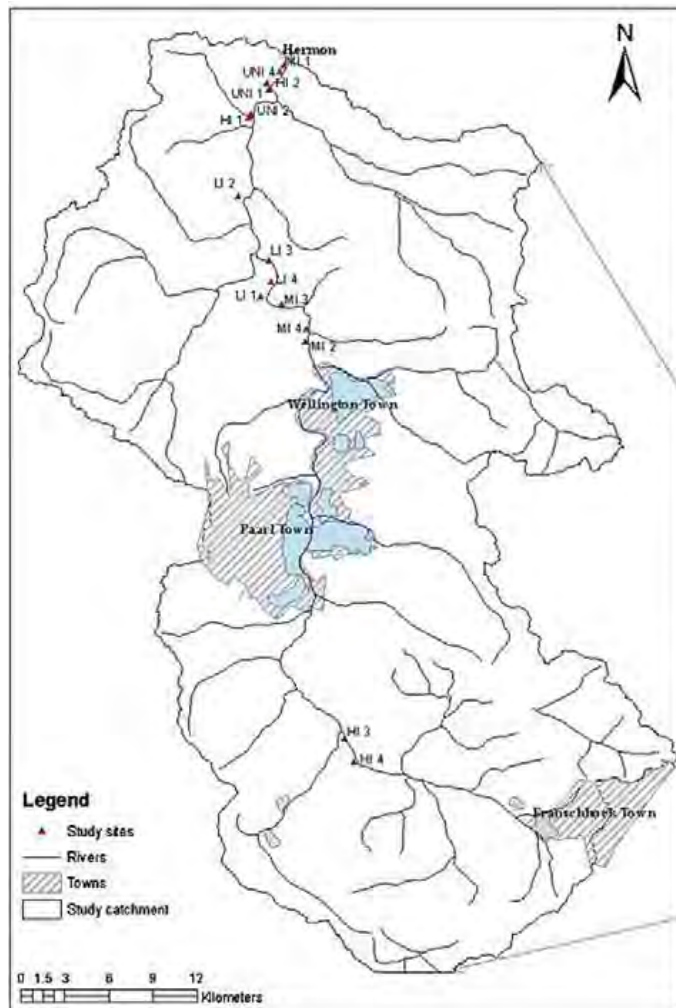


EXPANDED PUBLIC WORKS PROGRAMME



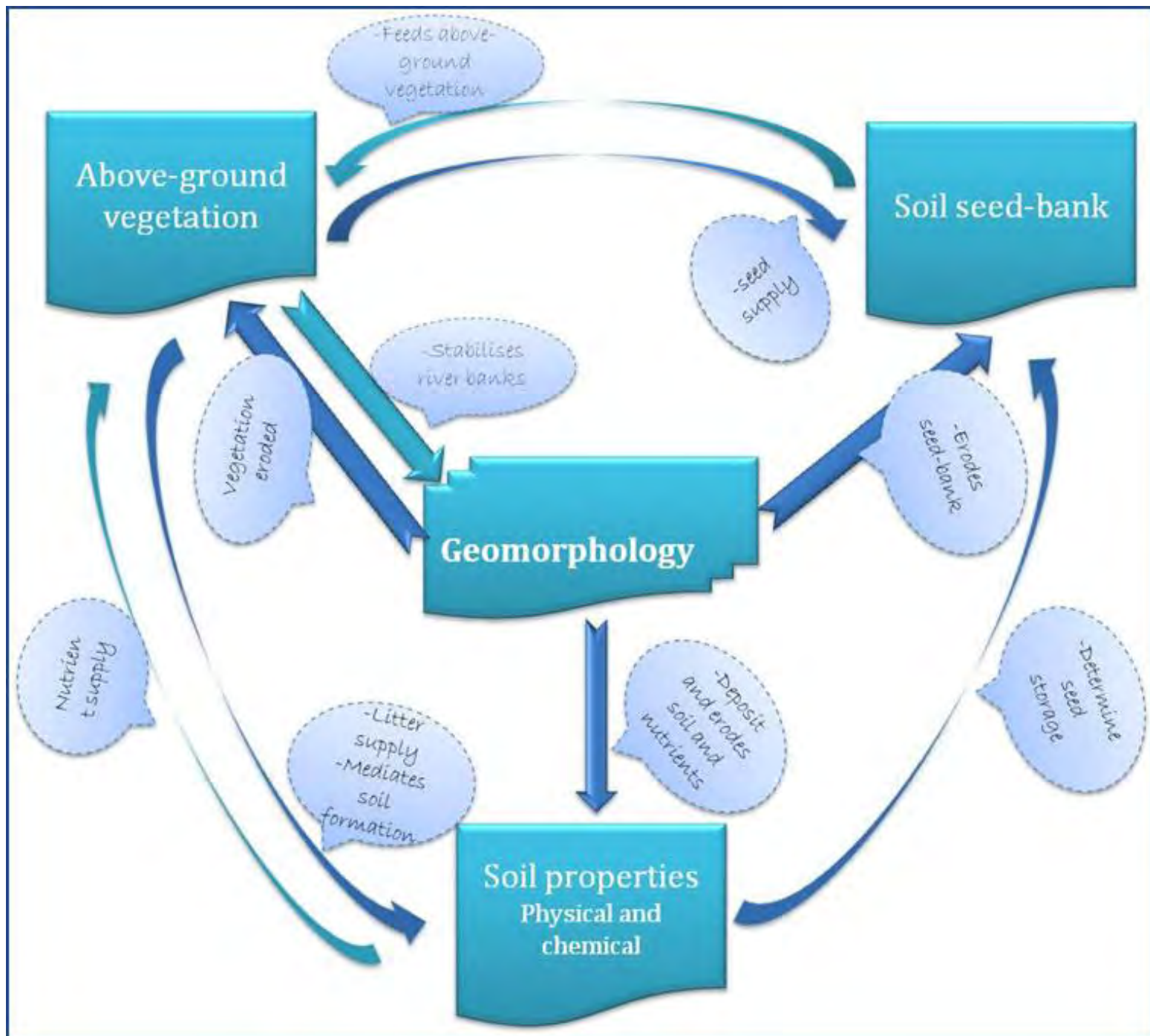
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- Berg R. = 294km; <8000km² catchment – 65% agriculture; perennial flow
 - Whole River invaded – with mainly eucs (c.50yrs), interspaced with *Populus spp.*, *A. mearnsii*
 - Invasion intensity - >75%
 - Disturbance agents – hydrology, IAP clearing, seldom fire

Berg River catchment



Restoration questions


- What are the impacts of eucalyptus invasions in riparian zones?
 - Geomorphology
 - Above-ground vegetation
 - Soil-seedbank
 - Soil physico-chemical properties (allelopathy, water repellency, etc)
- What are the best clearing methods?
 - At what stage of invasion do you intervene
- What are the best restoration methods?
 - Active vs passive
- Monitoring and evaluation framework





What are the impacts of *E. camaldulensis* invasions

Transformers – Native veg. to monocultures,
native seedbank depletion



Geomorphology & Soil legacy effects e.g.
erosion & bank collapse, allelopathy, water
repellency



Chapter 2: Effects of *Eucalyptus* invasion on riparian geomorphology: implications for native vegetation recovery

This chapter is intended for publication in the journal *Geomorphology*.

Reference: Tererai, F., Gaertner, M., Jacobs S.M., Richardson, D.M. 2012. Effects of *Eucalyptus* invasion on riparian geomorphology: implications for native vegetation recovery. *Geomorphology*.

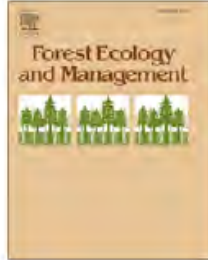




Contents lists available at SciVerse ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco



Eucalyptus invasions in riparian forests: Effects on native vegetation community diversity, stand structure and composition

Farai Tererai^{a,*}, Mirijam Gaertner^a, Shayne M. Jacobs^{b,c}, David M. Richardson^a

- Native vegetation diversity, composition and structure changed

Resilience of Invaded Riparian Landscapes: The Potential Role of Soil-Stored Seed Banks

Farai Tererai · Mirijam Gaertner · Shayne M. Jacobs ·
David M. Richardson

- To what extent do native soil-stored seedbanks provide reliable sources for autogenic recovery

EUCALYPTUS CAMALDULENSIS INVASION IN RIPARIAN ZONES REVEALS FEW SIGNIFICANT EFFECTS ON SOIL PHYSICO-CHEMICAL PROPERTIES

F. TERERA^{a,b,*†}, M. GAERTNER^a, S. M. JACOBS^{c,d} AND D. M. RICHARDSON^a



Southern Forests: a Journal of Forest Science

ISSN: 2070-2620 (Print) 2070-2639 (Online) Journal homepage: <http://www.tandfonline.com/loi/tsfs20>

Allelopathic effects of invasive *Eucalyptus camaldulensis* on germination and early growth of four native species in the Western Cape, South Africa

Sheunesu Ruwanza, Mirijam Gaertner, Karen J Esler & David M Richardson



Geoderma 2002-201 (2013) 9-17

Contents lists available at [SciVerse ScienceDirect](http://www.sciencedirect.com)

Geoderma

journal homepage: www.elsevier.com/locate/geoderma

Soil water repellency in riparian systems invaded by *Eucalyptus camaldulensis*: A restoration perspective from the Western Cape Province, South Africa

Sheunesu Ruwanza^{a,*}, Mirijam Gaertner^a, David M. Richardson^a, Karen J. Esler^b





Both complete clearing and thinning of invasive trees lead to short-term recovery of native riparian vegetation in the Western Cape, South Africa

Sheunesu Ruwanza, Mirijam Gaertner, Karen J. Esler & David M. Richardson



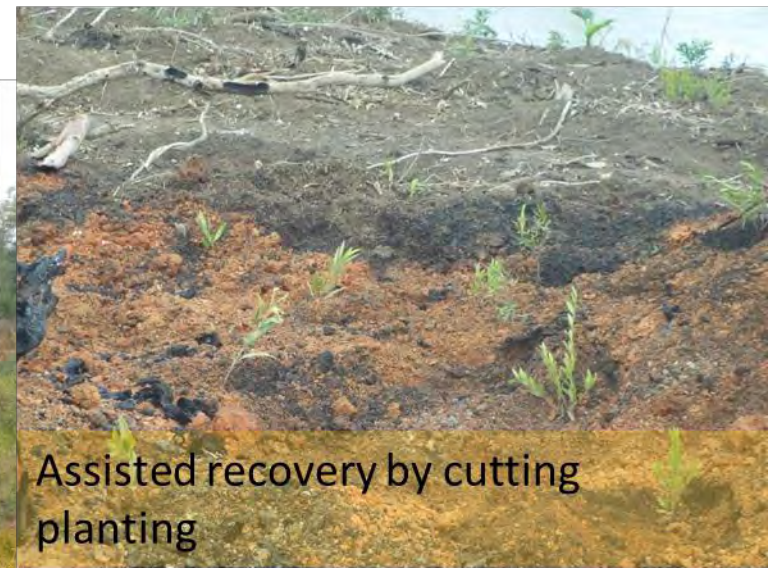
The effectiveness of active and passive restoration on recovery of indigenous vegetation in riparian zones in the Western Cape, South Africa: A preliminary assessment

S. Ruwanza ^{a,*}, M. Gaertner ^a, K.J. Esler ^{a,b}, D.M. Richardson ^a

Model two: Alternative-state models



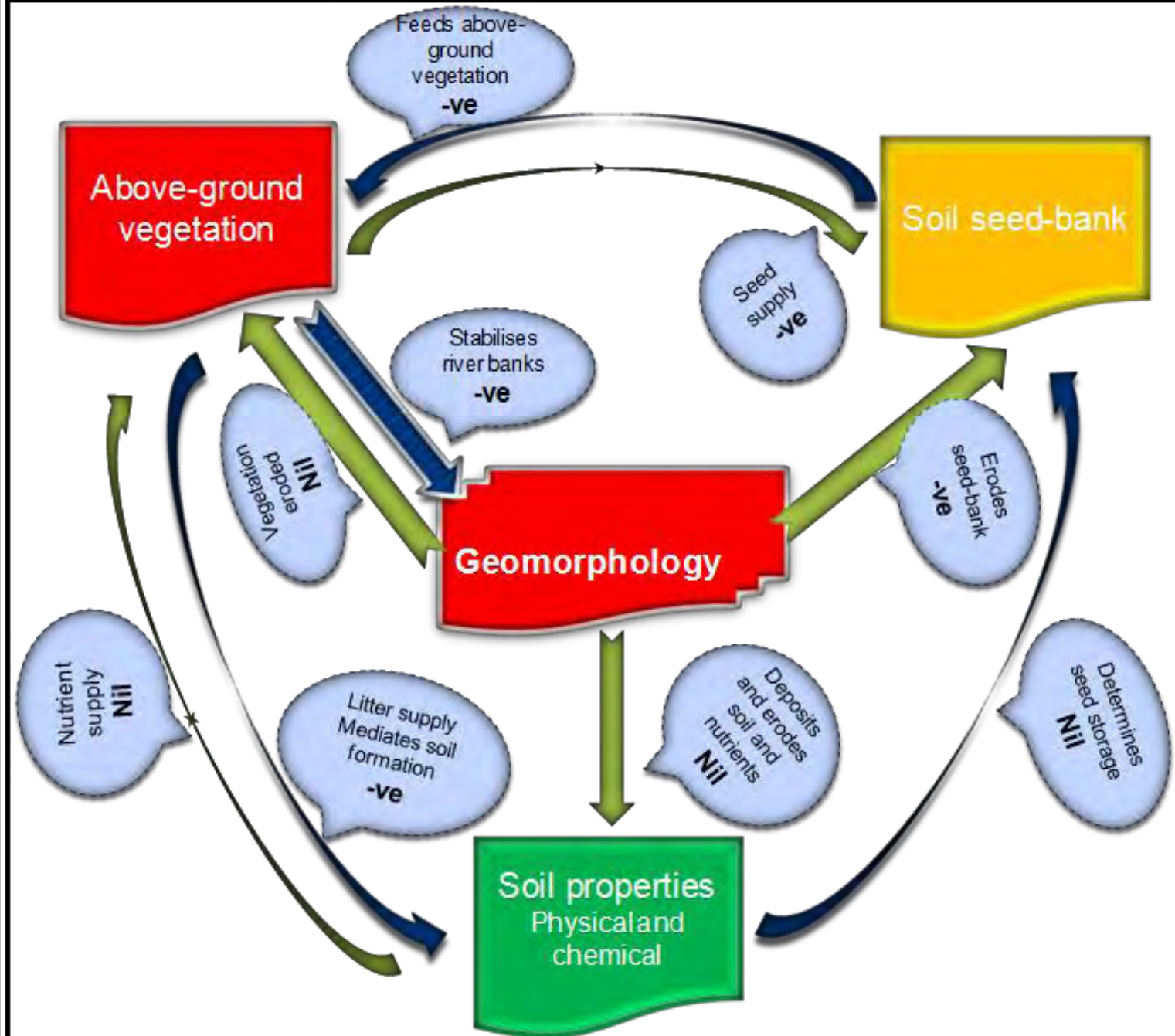
Assisted recovery by seeding



Assisted recovery by cutting
planting

Unassisted recovery after complete
clearing

Unassisted recovery after thinning



Restoration challenges of previously invaded riparian zones



Implications for management and restoration

- Restoration to pre-invasion condition is often untenable – rather target restoration of function
- Target to reduce the influence of invasions to levels where natural disturbance drive change
- Secondary invasions are a real threat to cleared areas
- You cannot be absolute about causation – so apply these results with caution

Thank You

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