

Native Grass Seeding and Mulch Effects on Weedy Species: a linkage between weeds and restoration



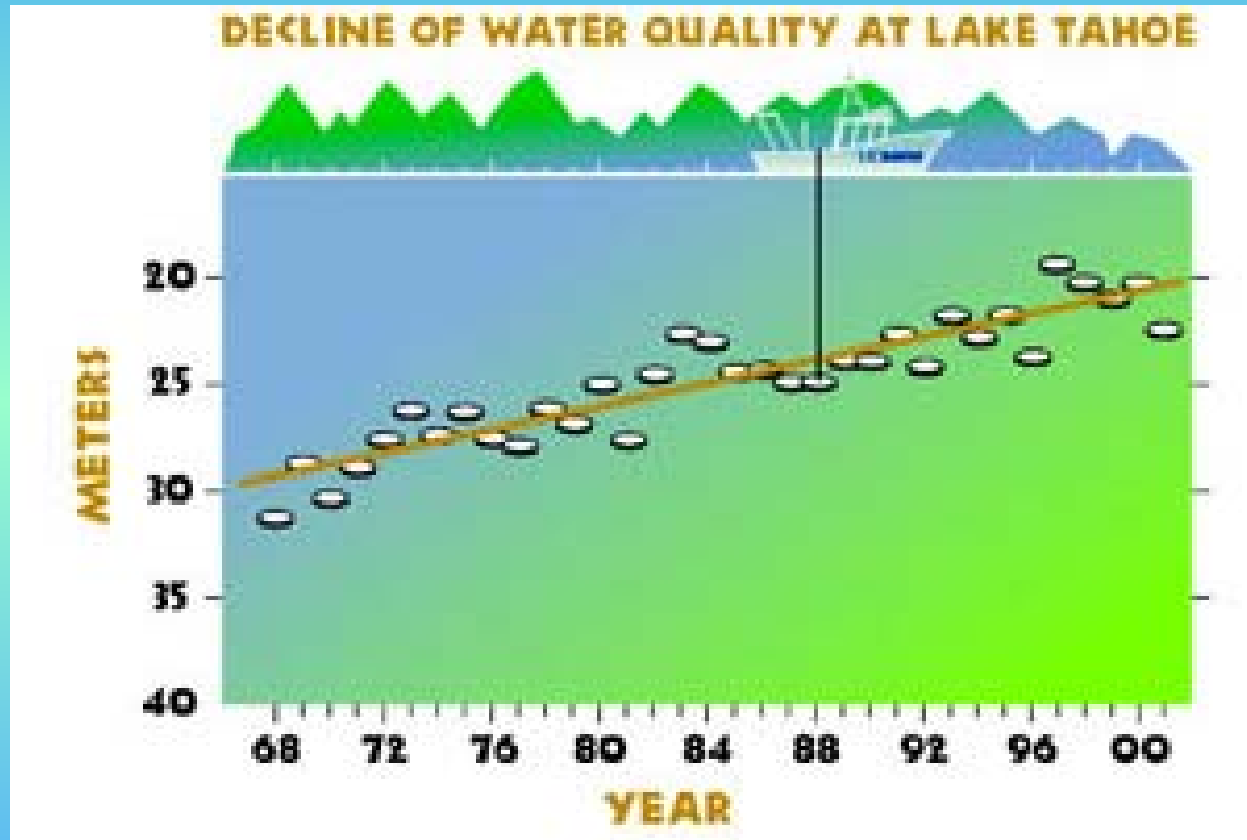
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Lake Tahoe, Microcosm

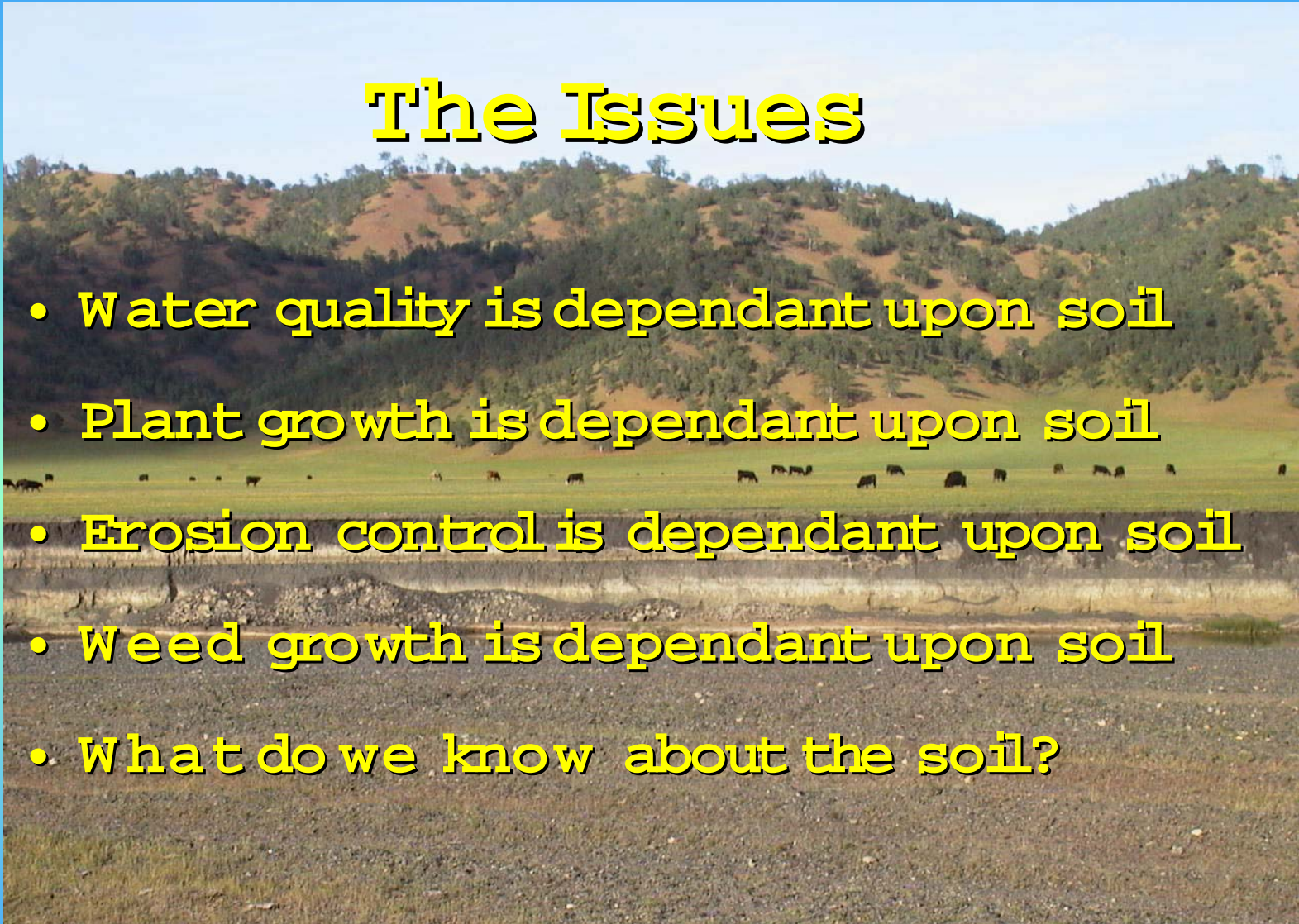






The Issues

- Water quality is dependant upon soil
- Plant growth is dependant upon soil
- Erosion control is dependant upon soil
- Weed growth is dependant upon soil
- What do we know about the soil?



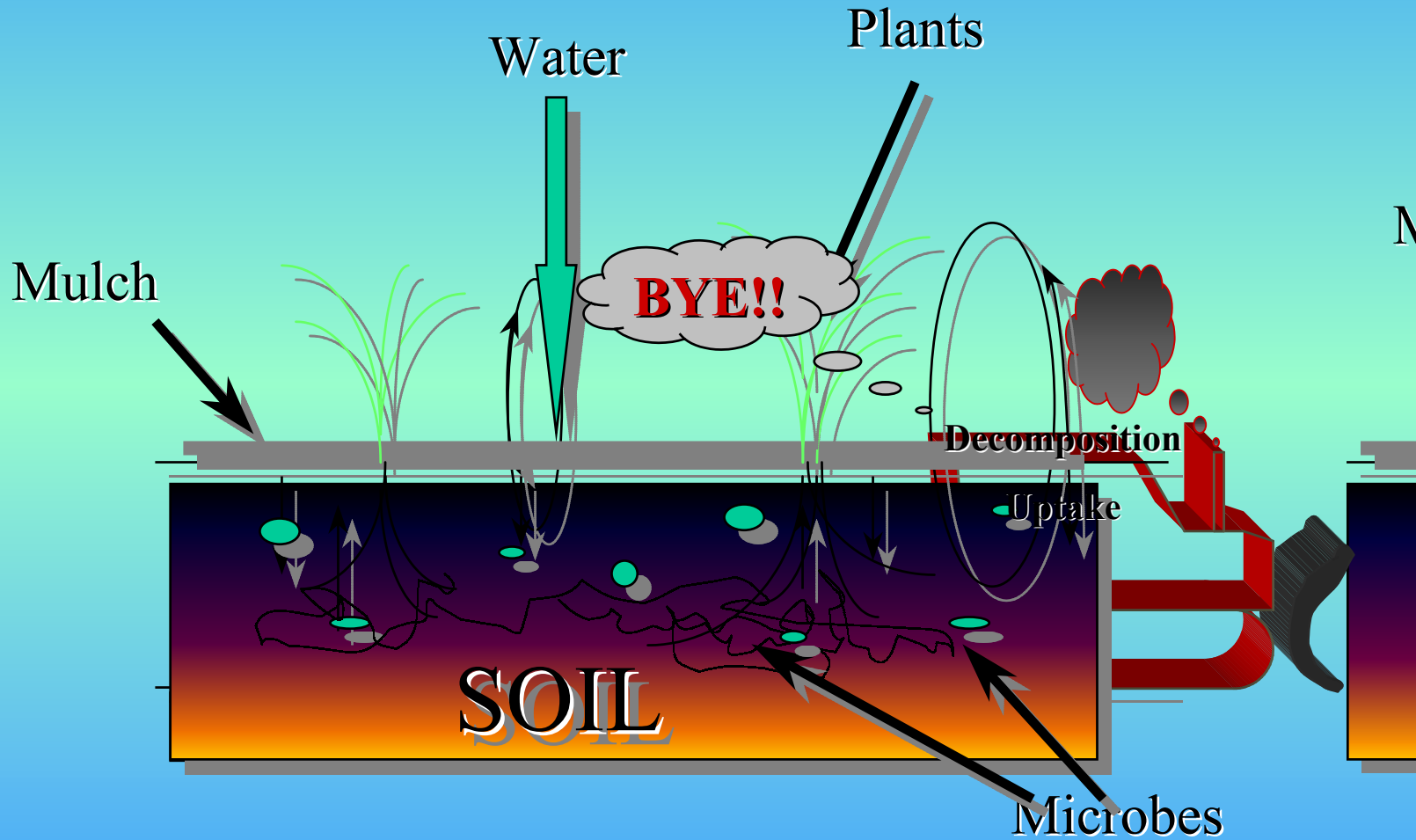


Asking the (soil) Questions

- What's missing? (disturbance)
- How to put it back... (restoration)
- What will grow? (restoration)
- How do we stop the weeds? (restoration)
- Do we 'stop' the weeds? (ecological)

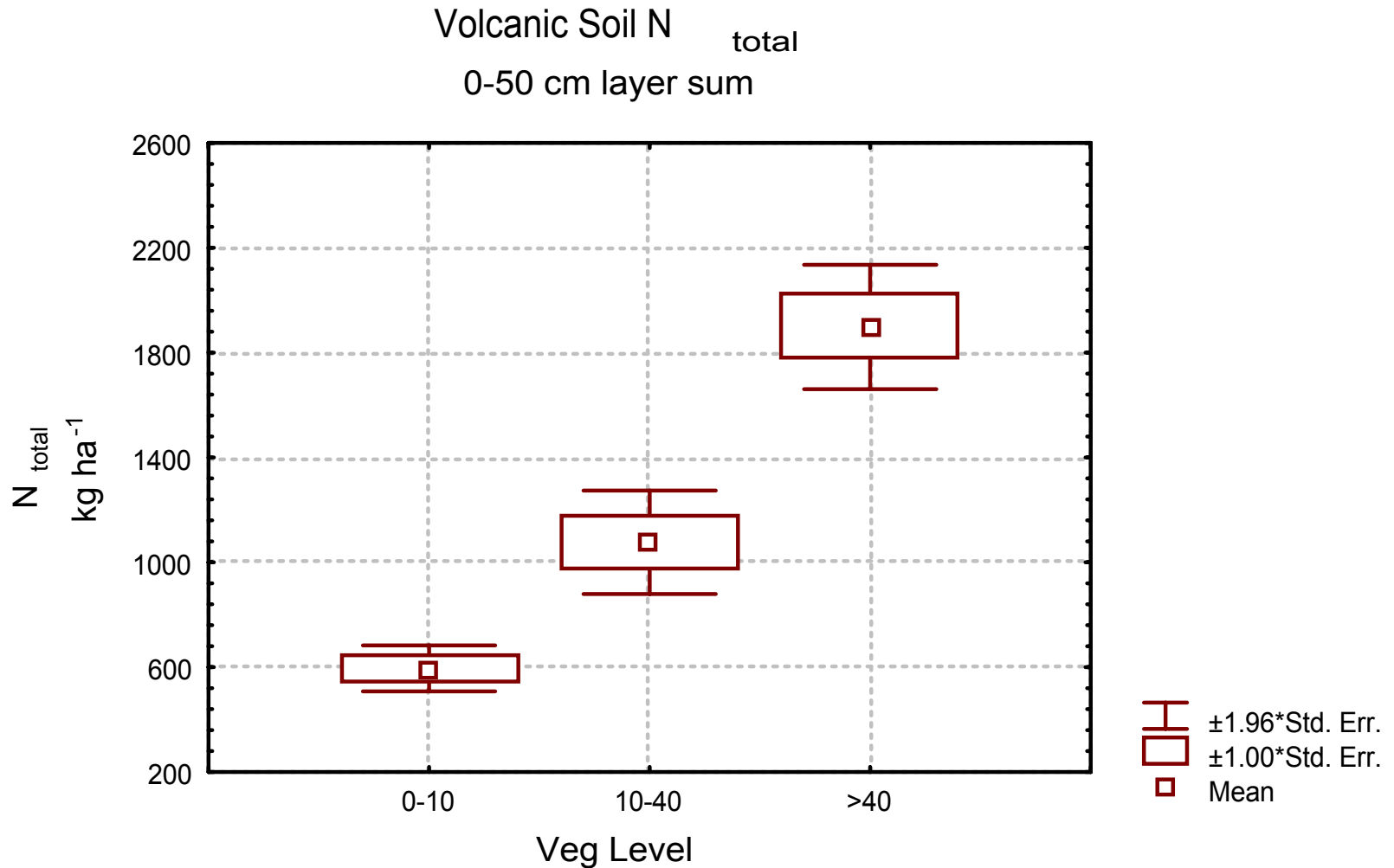
W hat's Missing?

The soil-plant ecosystem

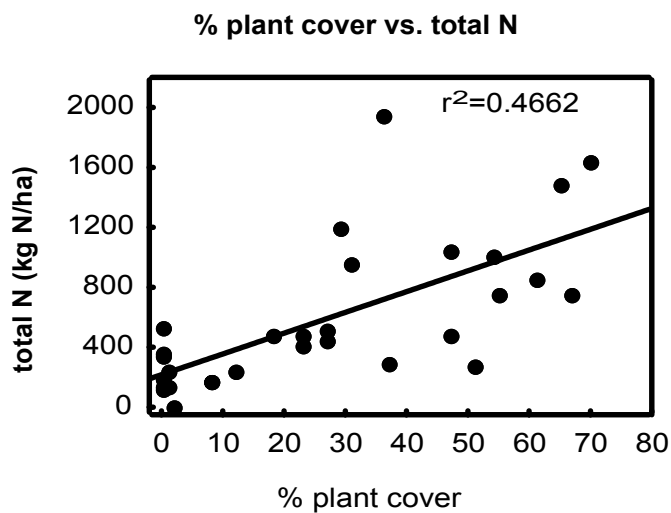
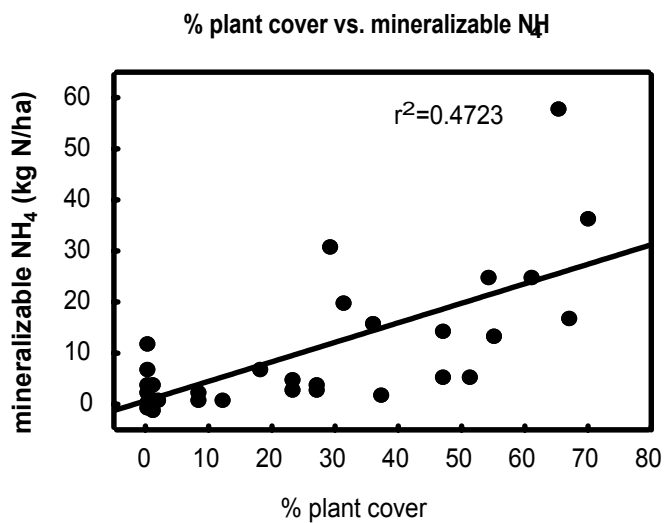
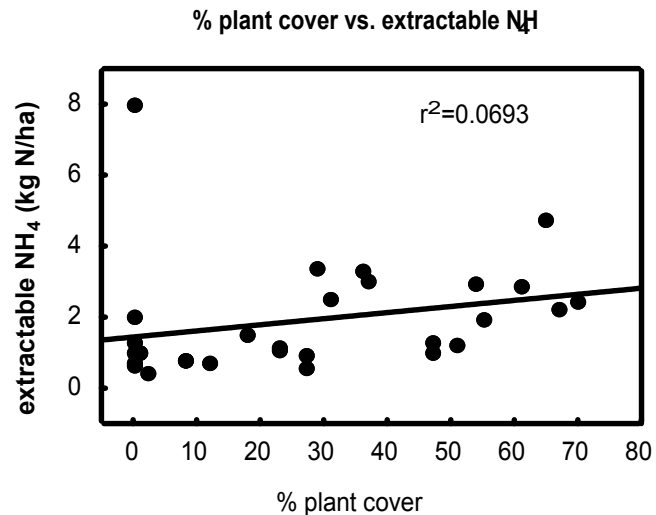
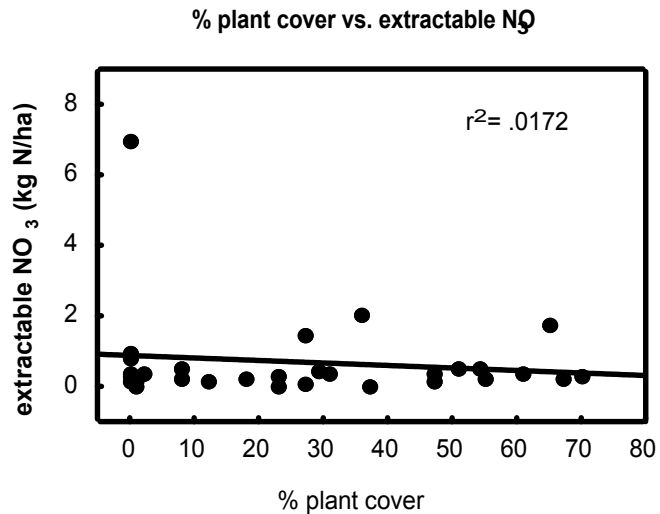


What's Missing?

Total N in Disturbed Tahoe Soils



What's Missing, the rest of the N story



Total N

(mostly organic)

Mineralizable N

Soluble N

NO_3^-
 NH_4^+

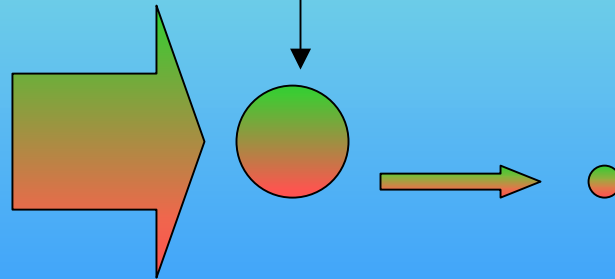
Nitrogen Concepts

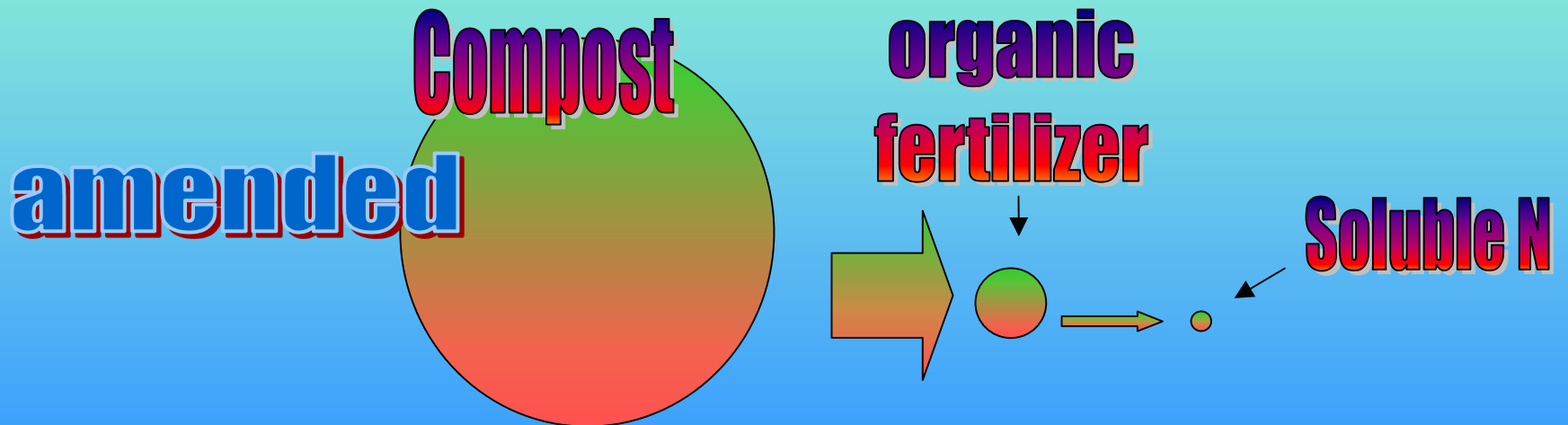
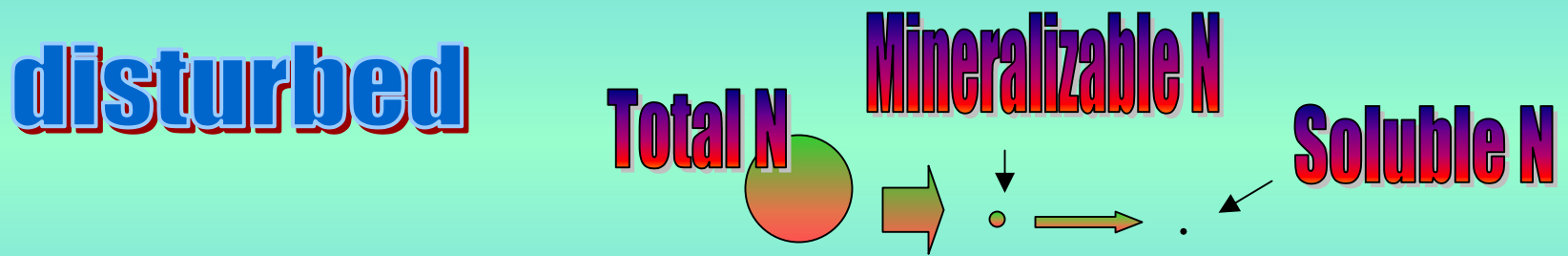
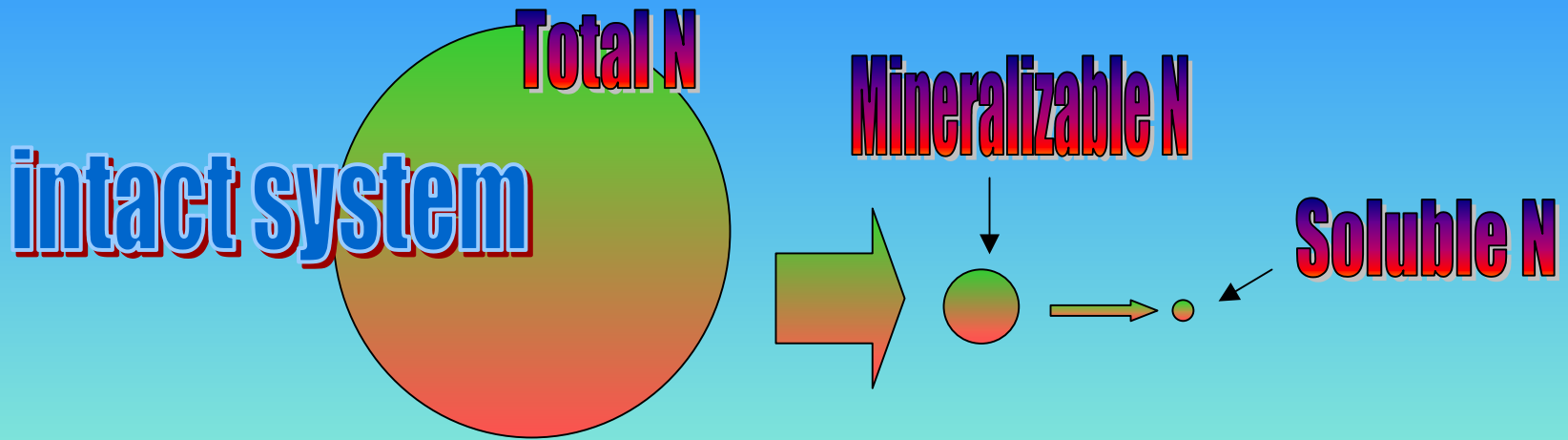
Net worth

(learning power,
investments, etc.)

Earnings/ROI

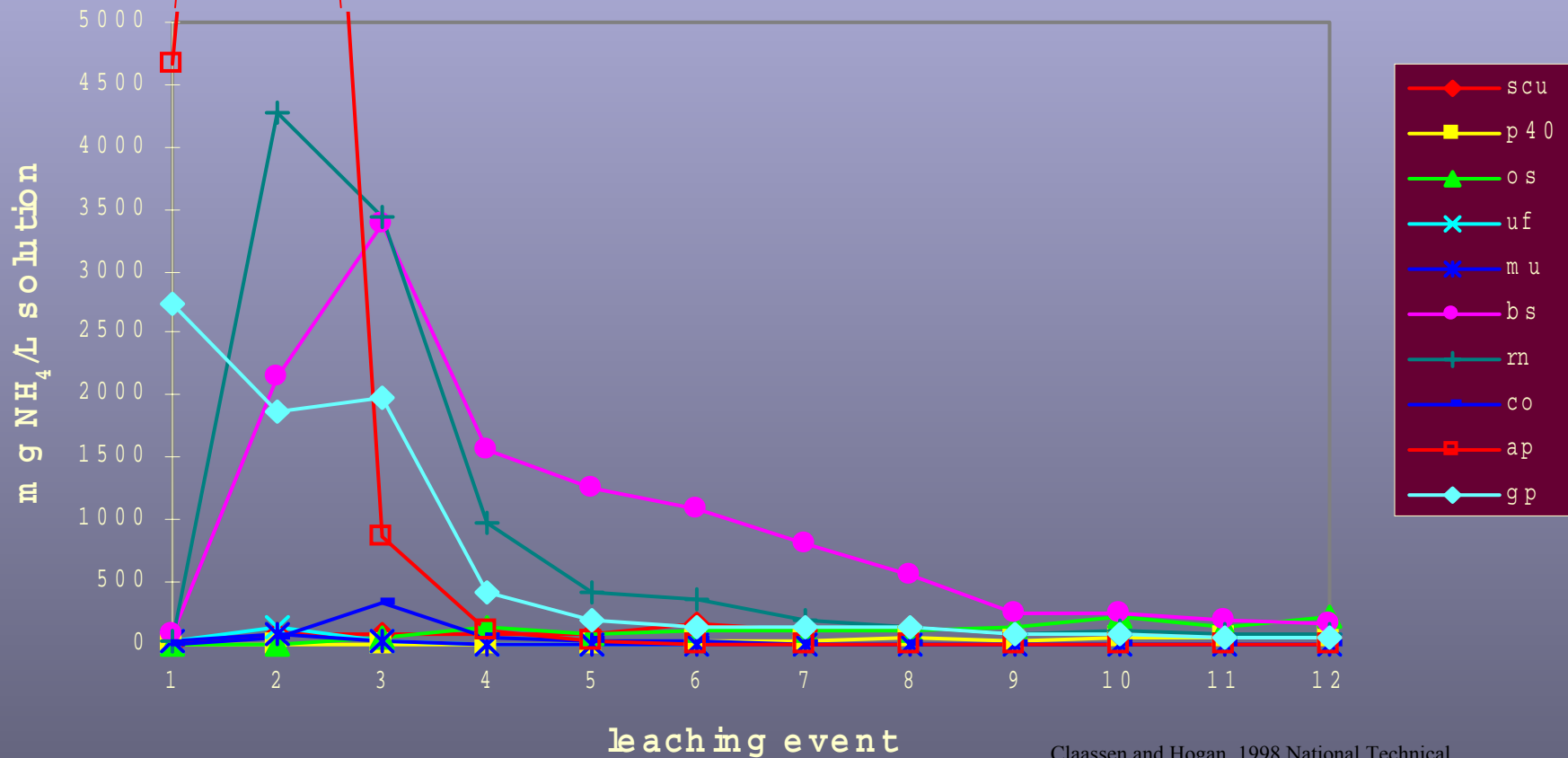
Pocket change



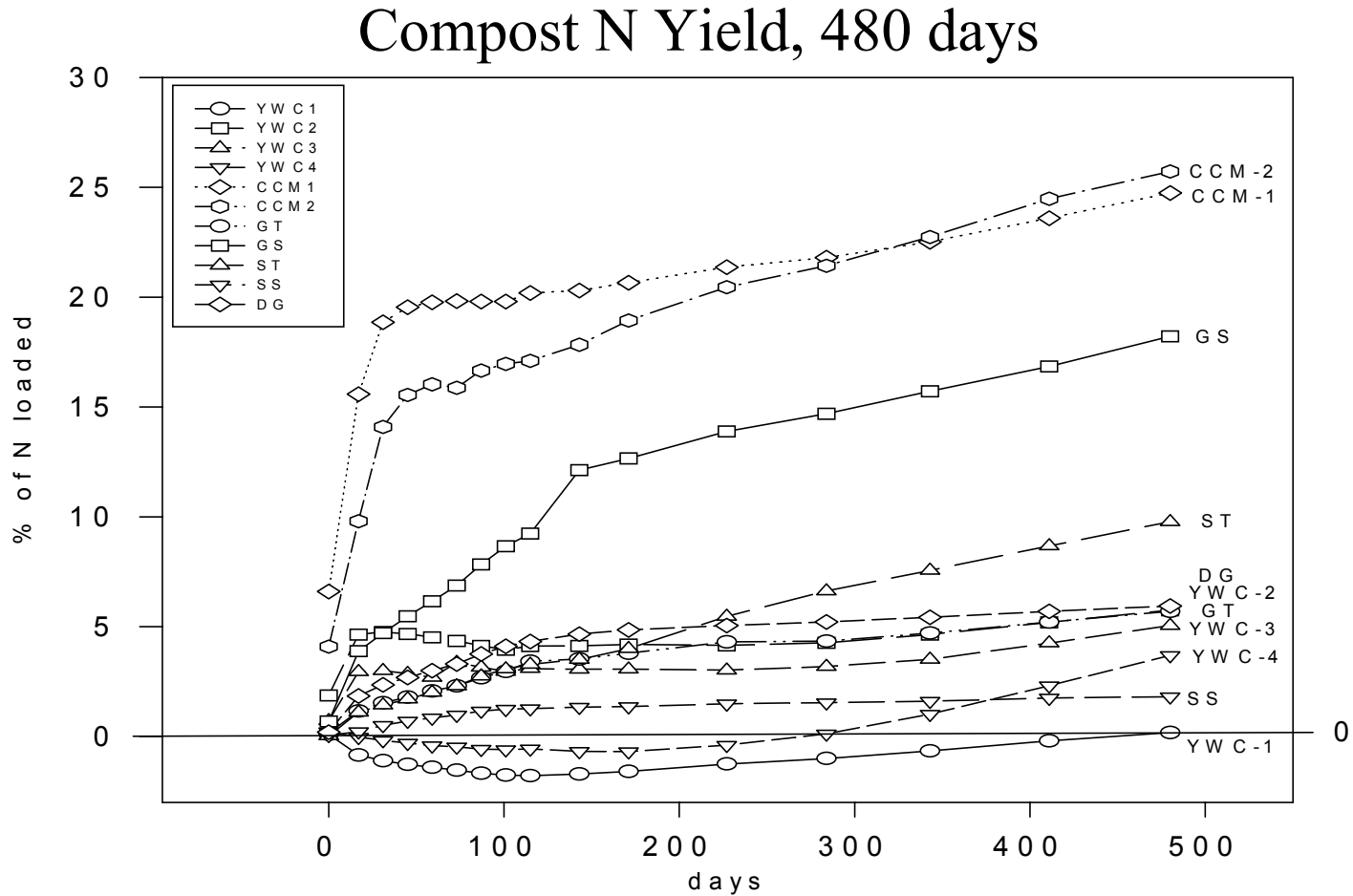


Replacing N: Soil Amendments

UC Davis Soils and Revegetation
Sand Leaching Column Experiment



Replacing N: Com posts



Nitrogen yield (percent of total N loaded) over a 480 day aerobic incubation of soils and amended soils (minus control substrate).



Soil amendments, mulches, weeds...



Where is the Cheatgrass coming from??

- Compost
- Mulch
- Seed bank
- Blowing in?

Succession and competition

High N availability=high early seral weeds

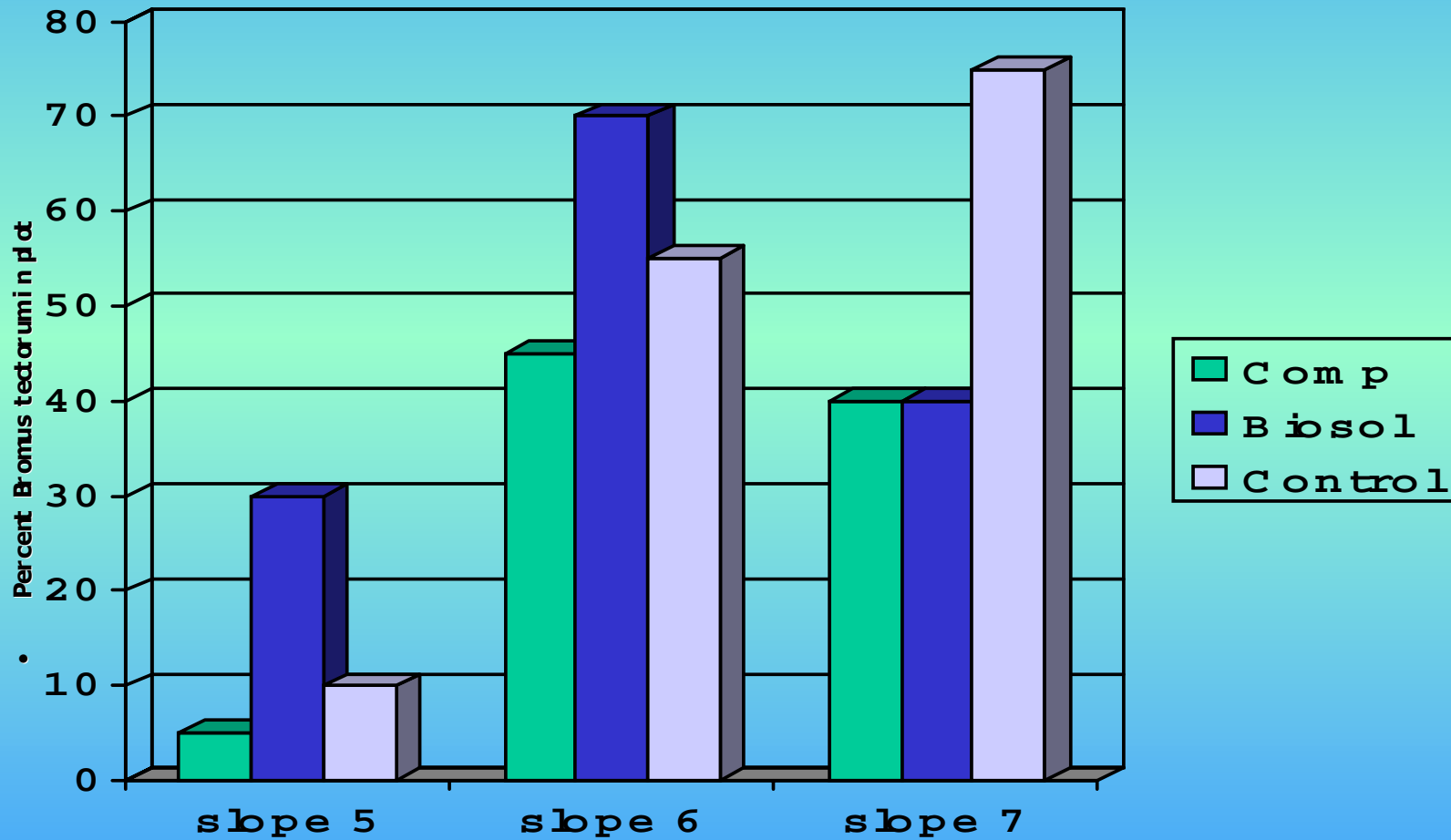
(Bernese & Aerts, 1984; Heil & Bruggink, 1987)



Initial Study Results

- **Treatments**
 - Compost + Biosol
 - Biosol
 - Mulch (no addt'l nutrients)
- **Results:**

Bromus tectorum response to compost mulch and nutrients



Soil Restoration: Other Variables

- Compaction
 - Water
- Water holding capacity
 - Infiltration
 - Water
 - H₂O
 - Microorganisms
- Other nutrients (macro and micro)

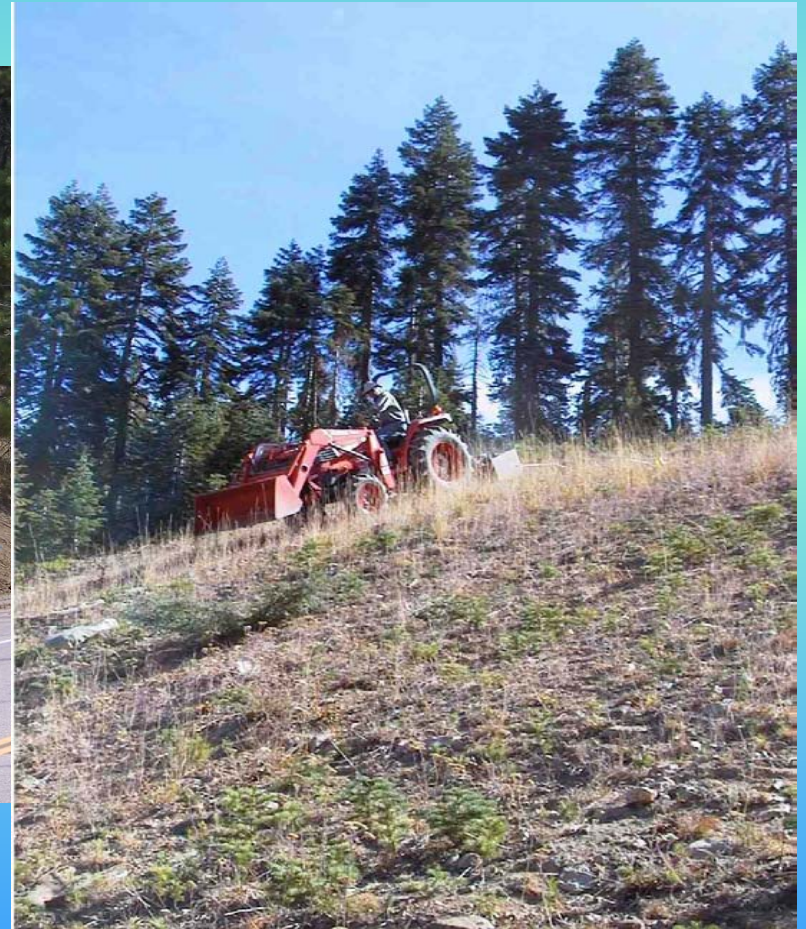
Other Variables

- Competition
- Native Grasses
 - Francis & Pyke 1996
 - Wheatgrass (Norden, Hycrest)
 - 130-520 seeds m²
 - Herron, Sheley, Maxwell & Jacobsen 2001
 - Bluebunch, annual Rye, Squirreltail
 - 3000 seeds m²
 - Northstar Unit 7
 - 3000 seeds m²
 - < 1% *Bromus tectorum*

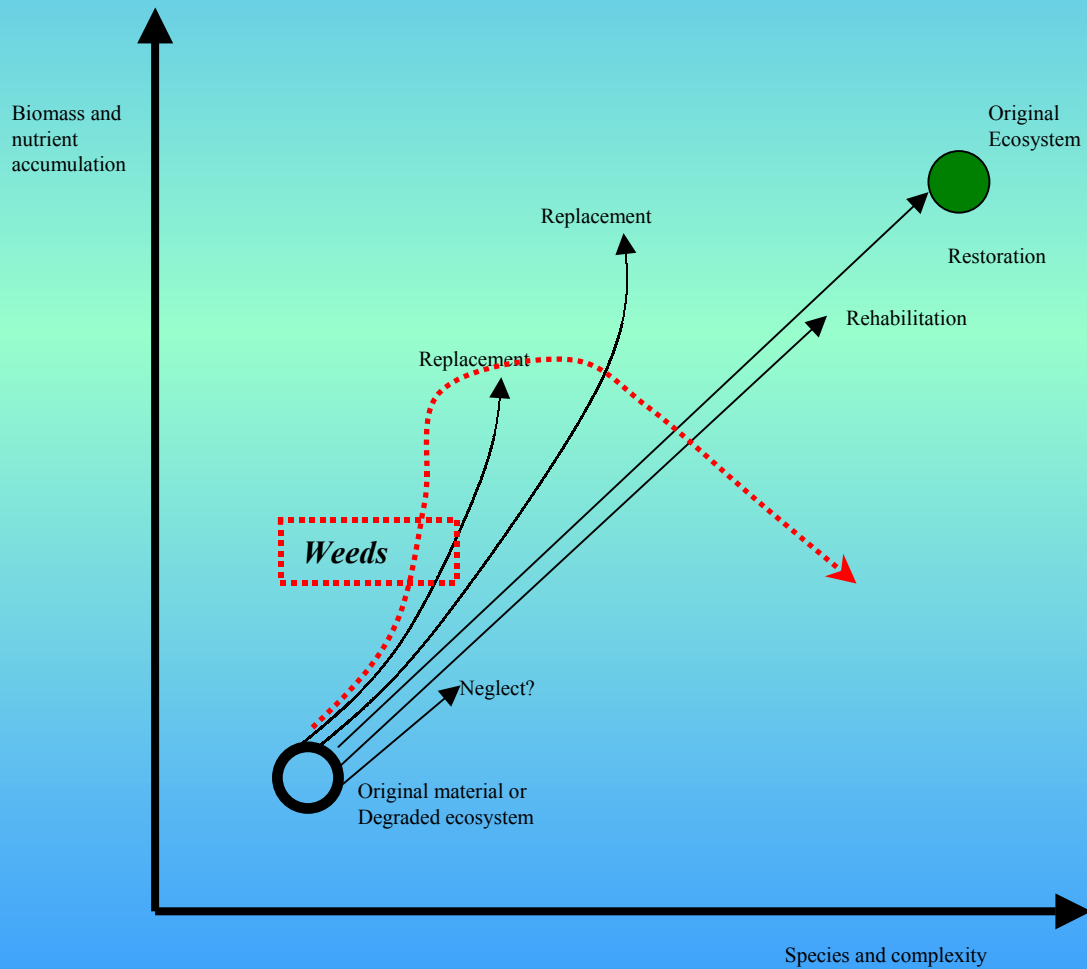


Other Variables II

- Soil Physical Treatment



Ecosystem Trajectories vs Weed Trajectories



*After Bradshaw and Chadwick,
The Restoration of Land 1980*

Weeds and Restoration: Where do we go from here?



•Testing

•Adaptive Management