

Water and soils: a call for an integrated approach to sustainable management

David Le Maitre & Patrick O'Farrell
Natural Resources and Environment,
CSIR

Introduction

- Many papers on ecosystem services
- Mostly on classifications, single services, valuations
- Little on interdependence of services
- Water, soil & living organisms
 - Support ✓
 - Regulatory ✓
 - Production ✓
 - Life-fulfilling (cultural) ✓



Water, soils, biota & services

- Water & soils play a fundamental role:
 - Global energy balance
 - Water provision for human use
 - Flow & quality regulation
 - Land productivity
 - Ability to capture & retain soil moisture
 - Nutrient and organic matter cycling
 - Carbon capture
 - Living landscapes



The situation

- Water
 - 98% of available yield allocated
 - Many rivers/dams eutrophic - cyanobacteria
 - Lost dilution capacity
- Soils
 - Arable land largely already cultivated or built-up
 - Soil erosion & soil quality
 - Peak energy
 - Peak phosphorus



How we organise science

- Disciplinary silos
 - Agriculture
 - Soils
 - Agronomy
 - Hydrology
 - Botany
 - Zoology
 - Ecology?



How we organise governance

- Sectoral silos
 - Policies – water, agriculture, environment
 - Institutions – ditto
 - DWEA
 - Water
 - Environment
 - Little incentive for cooperative governance
 - No feed backs to drive resource conservation
 - Complexity of national/provincial/local gov't



Economic development strategies

- Ignore natural resource limitations
 - Water
 - Arable land
 - Climate change
- Ignore spatial resource distributions
 - Technology will fix
 - Gauteng



Water resources

- Water for growth & development
 - Water security: people, economy & environment
 - Acknowledges environmental needs & problems
 - What is done on the land affects water
- But little effective progress in IWRM



Agriculture

- Ensuring sustainable livelihoods and food security
- Sustainable use and protection of land, water and genetic resources
 - LandCare ✓
 - Conservation of agricultural resources?
 - Water quality protection?
 - Irrigation water-use efficiency?



How should we respond?

- Ecosystem services are inter-dependent
- Landscapes are interconnected
- Governance (top down)
 - Land resource management
 - Water
 - Soils
 - Living resources
 - Sectoral departments



Bottom up

- Land ecology – how land functions (water, soils, biota → services & benefits)
- Land ethic - stewardship
- Whole landscape management
 - Cultivated, urban, natural
 - River-land interfaces
 - River systems



“Perhaps the most serious obstacle impeding the evolution of a land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land.”

Aldo Leopold – The Land Ethic, Sand County Almanac



