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# L'innovation au secours de la biodiversité

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# Innovation et efficacité dans la restauration écologique: acquis, obstacles à surmonter et perspectives

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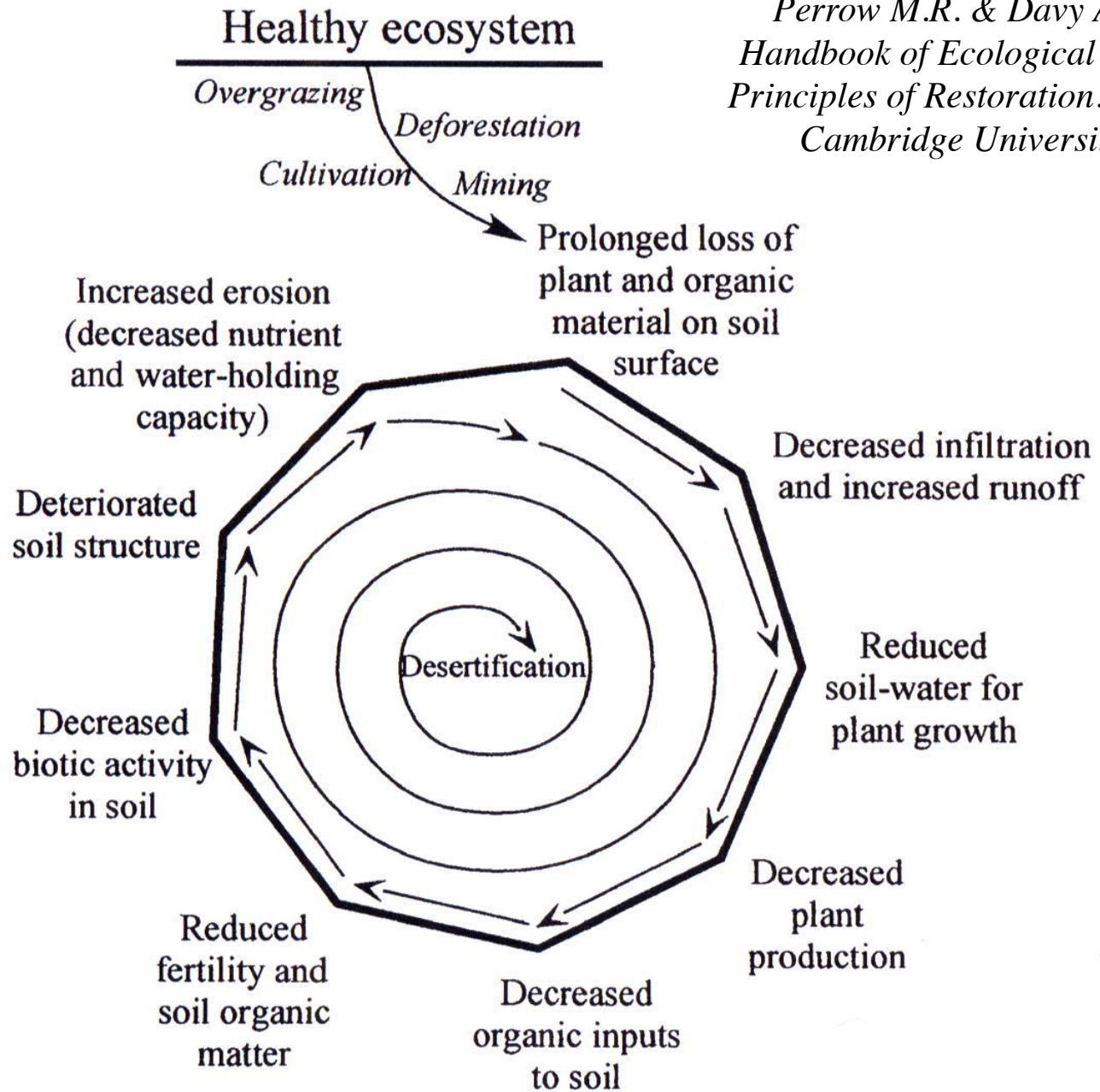
Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (*Society for Ecological Restoration, website, 11/04/2014*).




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Degraded, damaged ?

*Perrow M.R. & Davy A.J. 2002.  
Handbook of Ecological restoration.  
Principles of Restoration. Cambridge,  
Cambridge University Press*





Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed (*Society for Ecological Restoration, website, 11/04/2014*).

Degraded, damaged ?

During degradation, positive feedbacks reinforce and accelerate damaging processes, leading to “irreversible” state (no ability to self repair).

**A degraded ecosystem is no longer a system since most negative feedbacks have disappeared.**

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Recovery ?

What target ?

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Recovery ?

What target ?


**Reference ecosystem:** the return of an ecosystem to a close approximation of its condition prior to disturbance.

**Ecosystem quality:** a self maintained ecosystem, providing sustainable ecosystem services.



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Assist ?



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Assist ?

**Let nature do the job:** facilitating the ability of nature to self-design rather than imposing the “good” design.

**Take inspiration of nature:** playing with ecological rules.

# Ecological restoration goals

Preservation of biodiversity.

Adaptation to climate change.

Sustainable agriculture.

Ecological compensation.



Ecological restoration goals

Preservation of biodiversity.

Adaptation to climate change.

Sustainable agriculture.

Ecological compensation.

Playing with multiple components & processes.

# Ecological restoration: key words to action

System.

Interaction.

Trade-offs.

Heterogeneity.

Time scales.



Ecology as a source of innovation

Ecology: a science of complexity.

Ecology: the science of ecological systems.

# Ecology as a source of innovation

Biological diversity (species, genotypes) matters for productivity and efficiency.

Complexity of interaction networks matters for stability-resistance-resilience.

Heterogeneity and connectivity matter for sustainability.

Organisms shape local and global environments.

# Green roofs and environment

Reduction of runoff: 7 - 90 %.

Reduction of incoming heat flow: up to 90 % (summer) & 30 % (winter).

*Air temperature, air pollution, biodiversity, well-being, urban agriculture...*



# Ecology of green roofs

Runoff: - soil depth & soil porosity;  
- soil organic matter content;  
- diversity of plant physiologies;  
- diversity of plant morphologies (leaf area, root depth).

Heat flow: up to 90 % (summer) & 30 % (winter):  
- plant cover architecture;  
- plant cover & soil colours;  
- evapo-transpiration;  
- soil porosity.

# Ecology as a source of innovation

Organisms as tools for environment and ecosystem services optimization (biodiversity function-relationships, modelling of scenarios).

Biodiversity and complexity of the interactions network as a condition of sustainability.

Ecosystem approach as a way to assess present and potential ecosystem services.



Thank-you for your attention !