Research case study: how to understand and manage rural land for multiple benefits?

The James Hutton Institute

Kit Macleod

Roles and functions of agriculture, IAASTD 2008

Andrews *et al*. 2002 USDA Soil Quality Technical Note No.10, 2008

Socio-ecological systems

Geology
Hydrology
Biogeochemistry
Landscape ecology
Community ecology
Population ecology
Behavioural ecology
Genetics
Physiology

Likens 1992

IBSS - International Bibliography of the Social Sciences

47
48
49

SUSTAINABLE SOILS
SUSTAINABLE SOILS

The James Hutton Institute

Mobilization

Solubilization

Detachment

Aberdeen
Aboyne
0 5 10 20 Kilometers
Glendavan House
Heugh
Boat House
FB
Ordie Moss
Homestead Moat
Loch Davan
Monan
44
45

Arable/ Improved grass rotation
Plantation/Woodland
Heather moorland
Rural and urban development
E
D
C
B
8
7
16
20
33
5
10
32
6
30
2
13
15
27
14
31
1
pre 2000
2001
2003
2004
2005
2006
2009/10
0 0.5 1 2 3 4 Kilometers

Sourhope
Catroust
Kelsocleuch
Equipment
ECN water levels and temperature
ECN weather
Water levels and temperature
Water levels, temperature and rainfall
Camera
Other_measures
Other bank protection
Bank protection log jams
Hedgerow
Grade control log jam
Proposed_measures
Existing forest
New tree planting
Apex log jams
SRDP Floodplain mgmt
N
0 0.5 1 2 Kilometers

The James Hutton Institute

2020s

Redline = baseline

Upland sheep

-altitude >350m
-year round stocking
-low input

Key
Detachment ——
Solubilization - - -

Arable

-good quality land
-rotation cropping
-high input e.g. PPP

Lowland dairy

-heavier texture soils
-livestock
-high input e.g. manure/slurry

Macleod *et al.* Advances in Agronomy 2012

Learning through linking theory and practice

Ecological Indicators 21 (2012) 110–122

Contents lists available at SciVerse ScienceDirect

Ecological Indicators

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

The James Hutton Institute

Framework for systematic indicator selection to assess effects of land management on ecosystem services

Alexander P.E. van Oudenhoven[a,*,1], Katalin Petz[a,1], Rob Alkemade[b], Lars Hein[a], Rudolf S. de Groot[a]

Lunan catchment

Habitat Area	Ecosystem Function	Service	Beneficiaries	Scale/location of benefit	Type
Lochs and wetlands upstream	In-stream flows	Reduced peak flows and flooding	Farmers and residents	Lower end of catchment	Regulating

Upstream of lochs loch buffering downstream housing

Integrating ecosystem services and good ecological status of water bodies

The James Hutton Institute