COMMUNICATING THE AGRO-METEOROLOGICAL IMPLICATIONS OF CLIMATE CHANGE SCENARIOS TO LAND MANAGEMENT STAKEHOLDERS

THE MACAULAY INSTITUTE
research today for land use tomorrow

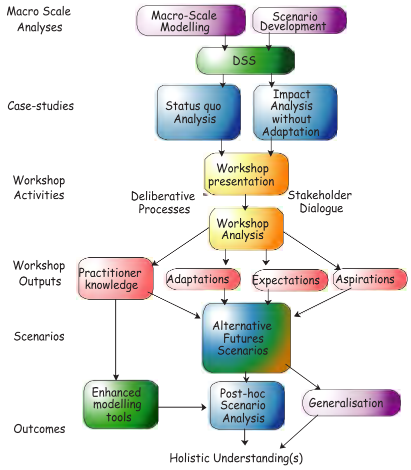
K. Matthews, M. Rivington, K. Buchan, D. Miller and G. Bellocchi
The Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH • Tel: 01224 498200 • email: k.matthews@macaulay.ac.uk

INTRODUCTION:

A shared understanding of specific climate change (CC) challenges on a particular sector is a vital precursor to effective research–based support for adaptation in policy and practice. A social-learning approach to reduce the comprehension gap between research, policy and practice communities is presented. A cooperative assessment was taken with land management stakeholders of preferences for agro-meteorological metrics and co-developing of a framework of climate change indicators. Agro-meteorological metrics are important indicators of conditions that influence farm scale decision making. Metrics derived from projected future climates provide an opportunity to characterise the impacts of CC on agricultural practices.

METHODOLOGY:

- Generate meteorological summaries and candidate agro-metrics with both observed weather data and downscaled Regional Climate model data (A2 2070-2100 scenario)
- Elicit preferences for agro-metrics and their paramaterisation with land-management stakeholders during group interviews and workshops.
- Refine agro-metrics and re-parameterise and present for further stakeholder analysis.
- Use the agro-metrics as mediums for awareness raising and stimulating deliberation on possible adaptation strategies
- Evaluate the benefits and limitations of using social learning approaches for communicating complex, contested issues with significant and irreducible uncertainty.



RESULTS:

- Meteorological summaries could be effective in highlighting the nature of change BUT,
- Agro-metrics were more effective in encouraging stakeholders to consider possible impacts on their land use systems and stimulate thinking on how they might adapt.
- The credibility of the indicators and the case study data was enhanced by interactive processes of explanation where the basis of the indicators can be debated and if necessary customised.
- The specific metrics of greatest interest were those that related to the distribution of growing season and access days, the potential for increased soil moisture deficits, reductions in the period of frost (with implications for pests and disease) and the potential for plant heat stress.

Fig. 1. Mean monthly precipitation (mm)

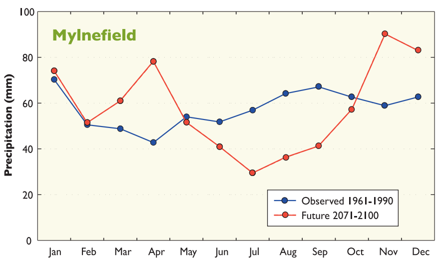


Fig. 2. Start of field operations (Tsum200)

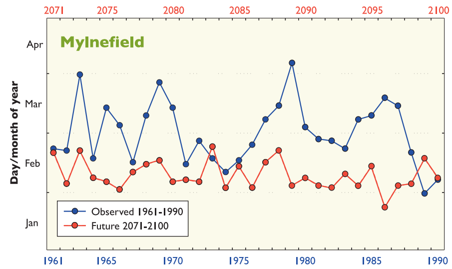


Fig. 3. Beginning and end of field capacity

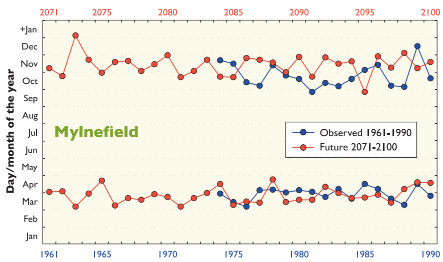


Fig. 4. Growth and Field Access days

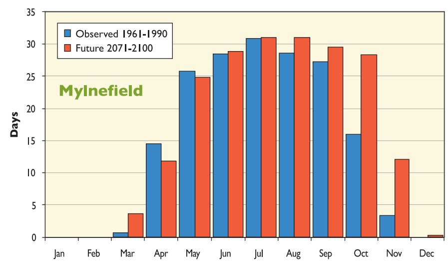
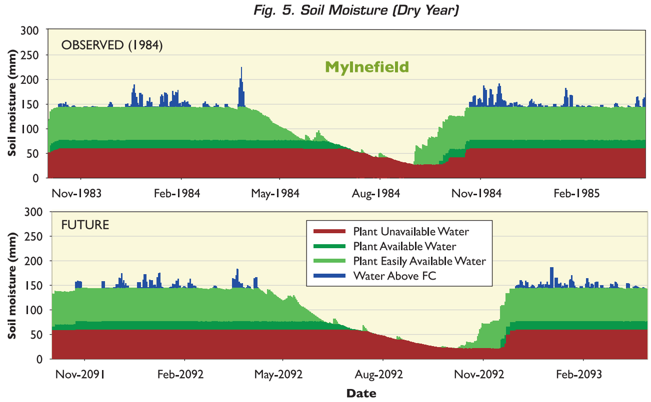


Table 1. Sample summary of Indicators

▶ increase/later ◀ decrease/earlier	Aberdeen	Mylnefield	Carnwath	Dumfries	Eskdalemuir	Auchincruive
Average Daily Temp (°C)	▶ 2.8	▶ 3.1	▶ 2.8	▶ 3.3	▶ 3.0	▶ 2.8
Average Annual Rainfall (mm)	▶ 36	▶ 26	▶ 35	▶ 100	▶ 20	▶ 70
Start of Growing Season (day)	◀ 48	◀ 35	◀ 37	◀ 27	◀ 50	◀ 14
Tsum200 (day)	◀ 22	◀ 22	◀ 21	◀ 22	◀ 26	◀ 16
End of Field Capacity (day)	◀ 3	◀ 2	na	◀ 2	◀ 7	◀ 3
Last Air Frost in Spring (day)	◀ 42	◀ 41	◀ 52	◀ 36	◀ 49	◀ 37
Return to Field Capacity (day)	▶ 14	▶ 18	na	▶ 23	▶ 11	▶ 18
End of Growing Season (day)	▶ 17	▶ 17	▶ 16	▶ 19	▶ 23	▶ 20
Dry Soil (days)	▶ 3	▶ 11	na	▶ 13	▶ 1	◀ 0 ▶
Growing Season Length (days)	▶ 64	▶ 63	▶ 58	▶ 60	▶ 66	▶ 55
Access Period Length (days)	▶ 11	▶ 19	na	▶ 47	▶ 22	▶ 30
Access in Growing Season (days)	▶ 20	▶ 26	na	▶ 51	▶ 30	▶ 33

Fig. 5. Soil Moisture (Dry Year)



CONCLUSIONS:

- Land management stakeholders were open to the use of more complex model-based indicators
- The credibility of the agro-metrics depended partly on the climate models' ability to represent historical periods but mainly on the inclusive nature of the processes of interaction between stakeholders and researchers.
- The authors thus recommend including a strong social learning based component within any climate change research communication strategy.

LADSS
Land Allocation Decision Support System
www.macaulay.ac.uk/LADSS/

The Scottish Government

This research is funded as part of the RERAD Research Programme – 3 Environment, Land Use and Rural Stewardship and by a Scottish Government Science Engagement Grant 2007-08