

Impacts of climate change on irrigated potato production in a humid climate – Case study UK

Dr. Andre Daccache

Cranfield
UNIVERSITY



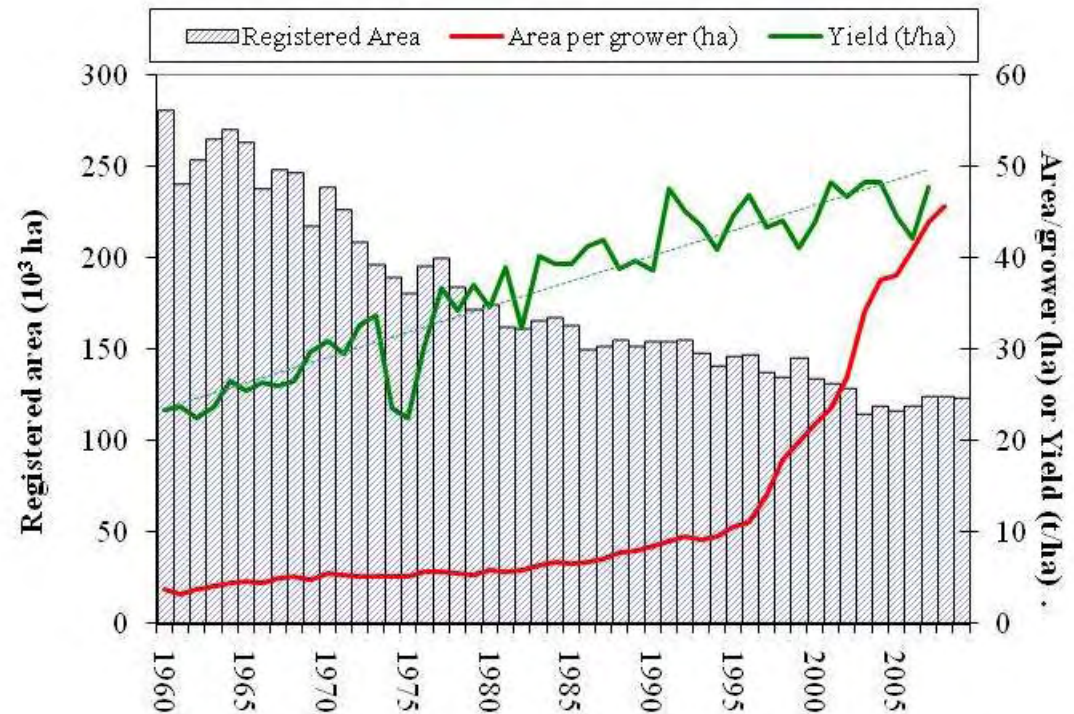
Dr. Andre Daccache

10 Feb 2011, SCRC
(Dundee)

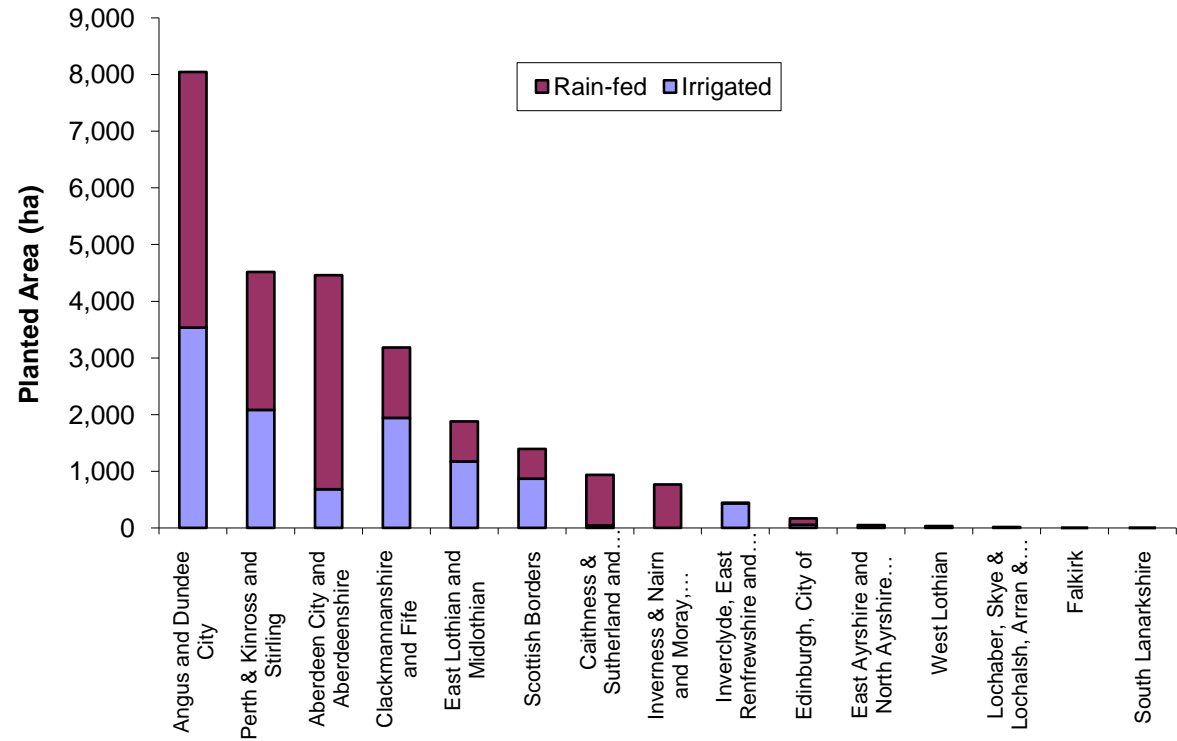
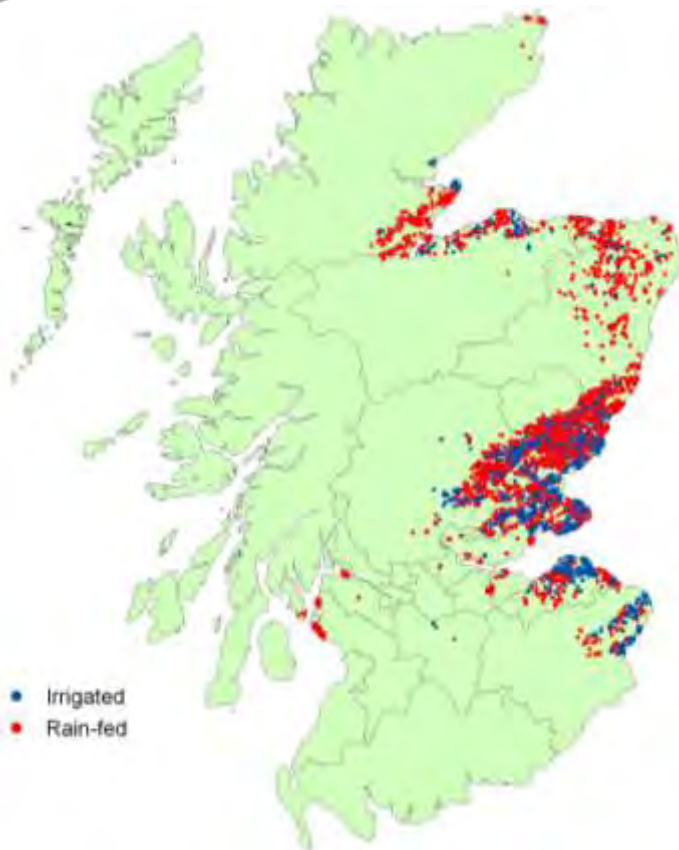
www.cranfield.ac.uk

- Overview on the Potato Industry
- What are the future projections and how can impact potato production?
- Results from different case studies
- Changes in Land suitability for potato and water resources availability

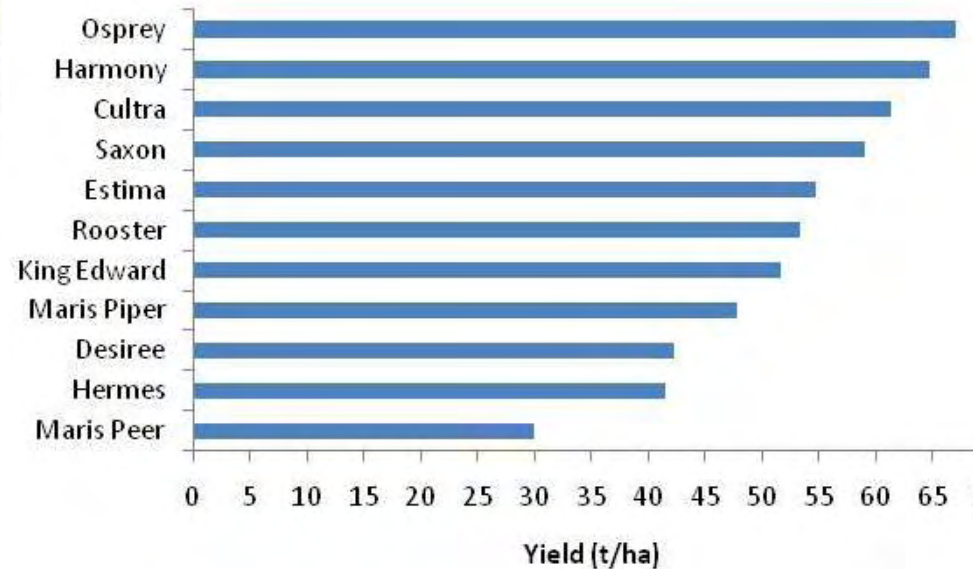
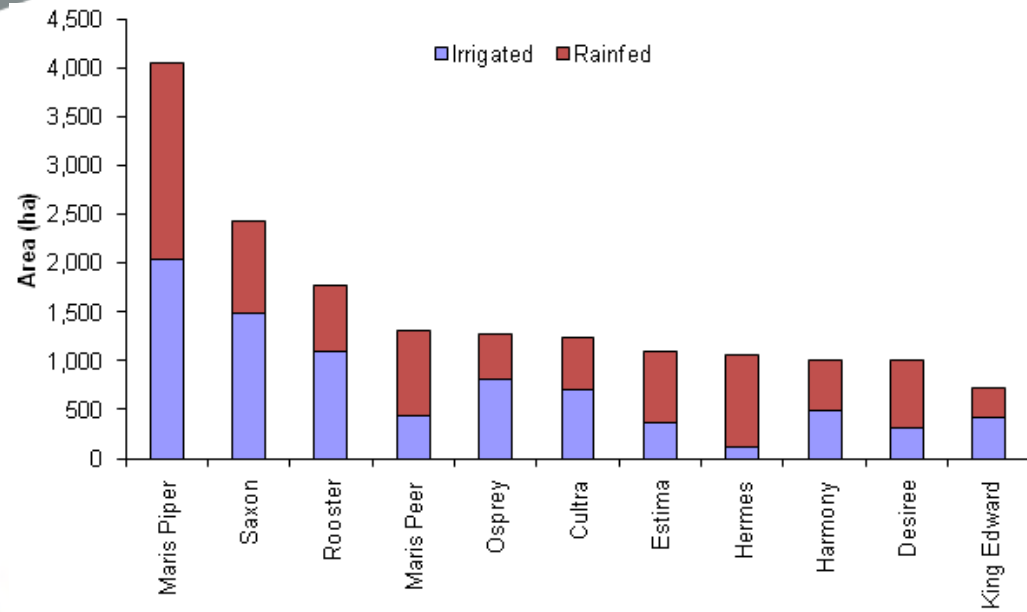
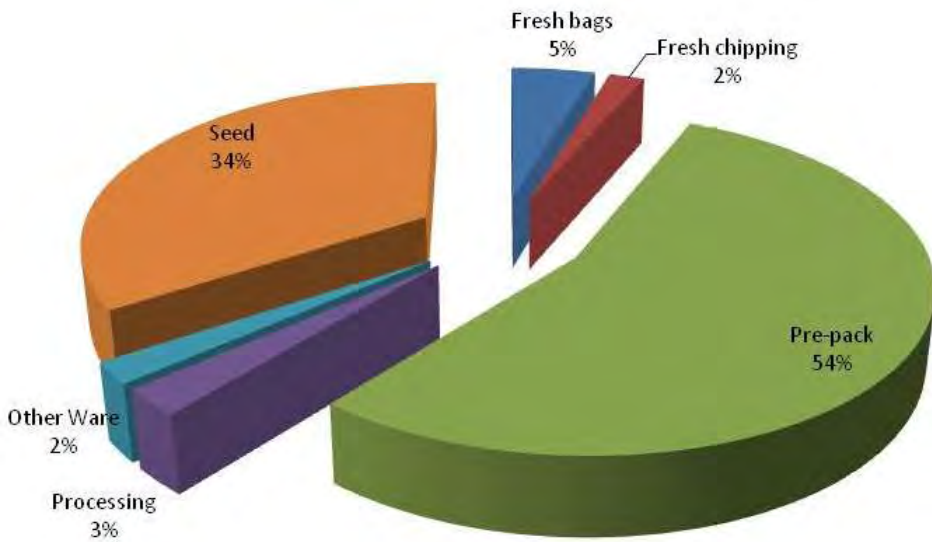
- More than 170 varieties
- Total production ~ 6 million tonnes
- Production value of £0.7 billion
- 43% of irrigated land
- 56% of water volume
- ~85% hose reels



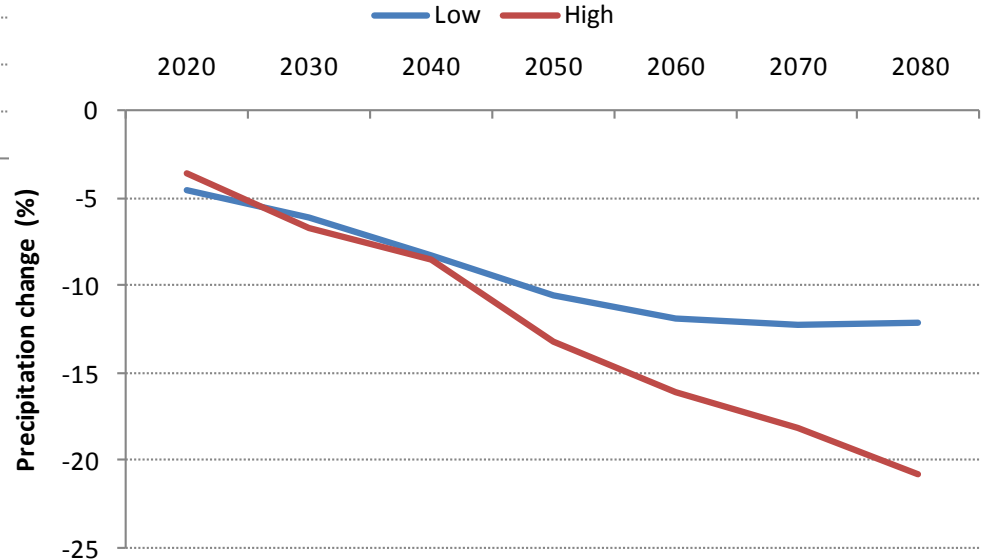
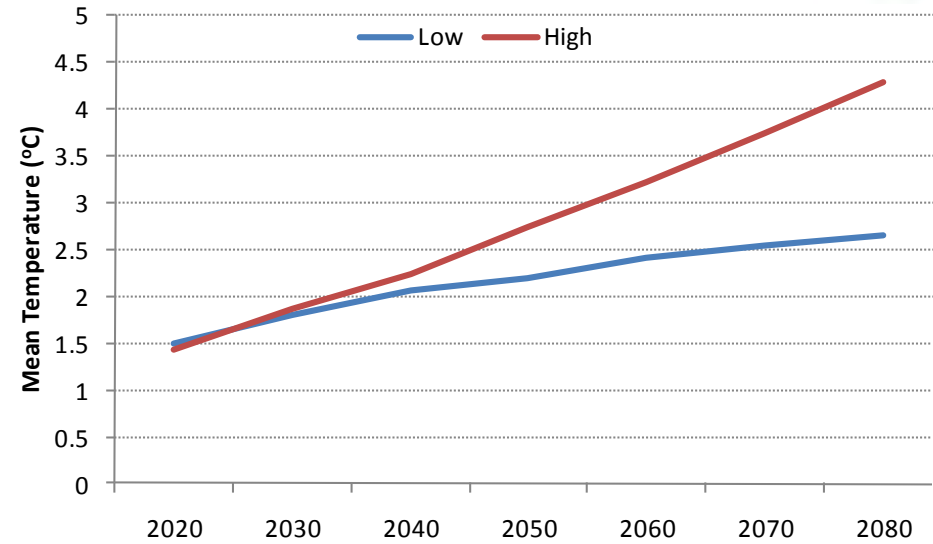
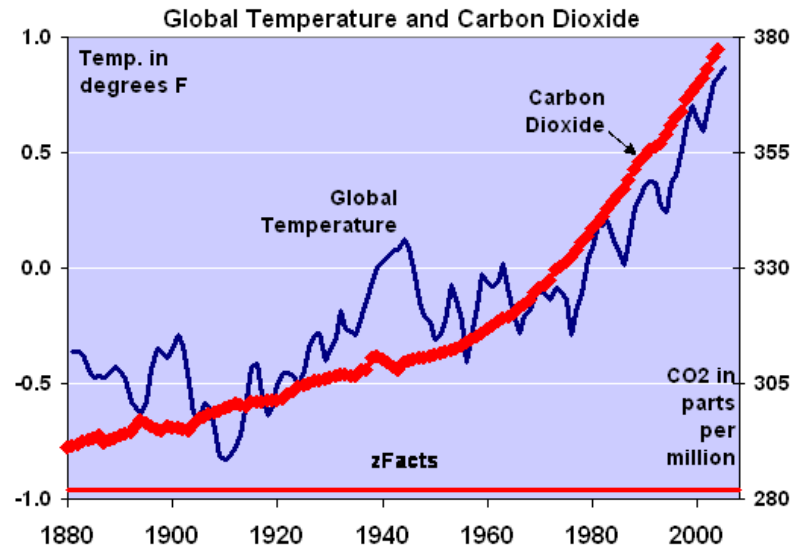
Scottish potato (Irrigated area)



Scottish potato (varieties and markets)



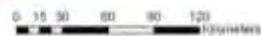
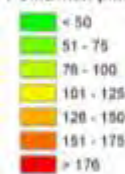
Climate Change projections



Baseline
(1961-1990)

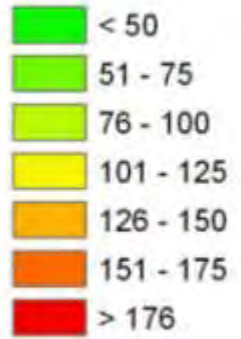
2050_H

PSMDmax (mm)

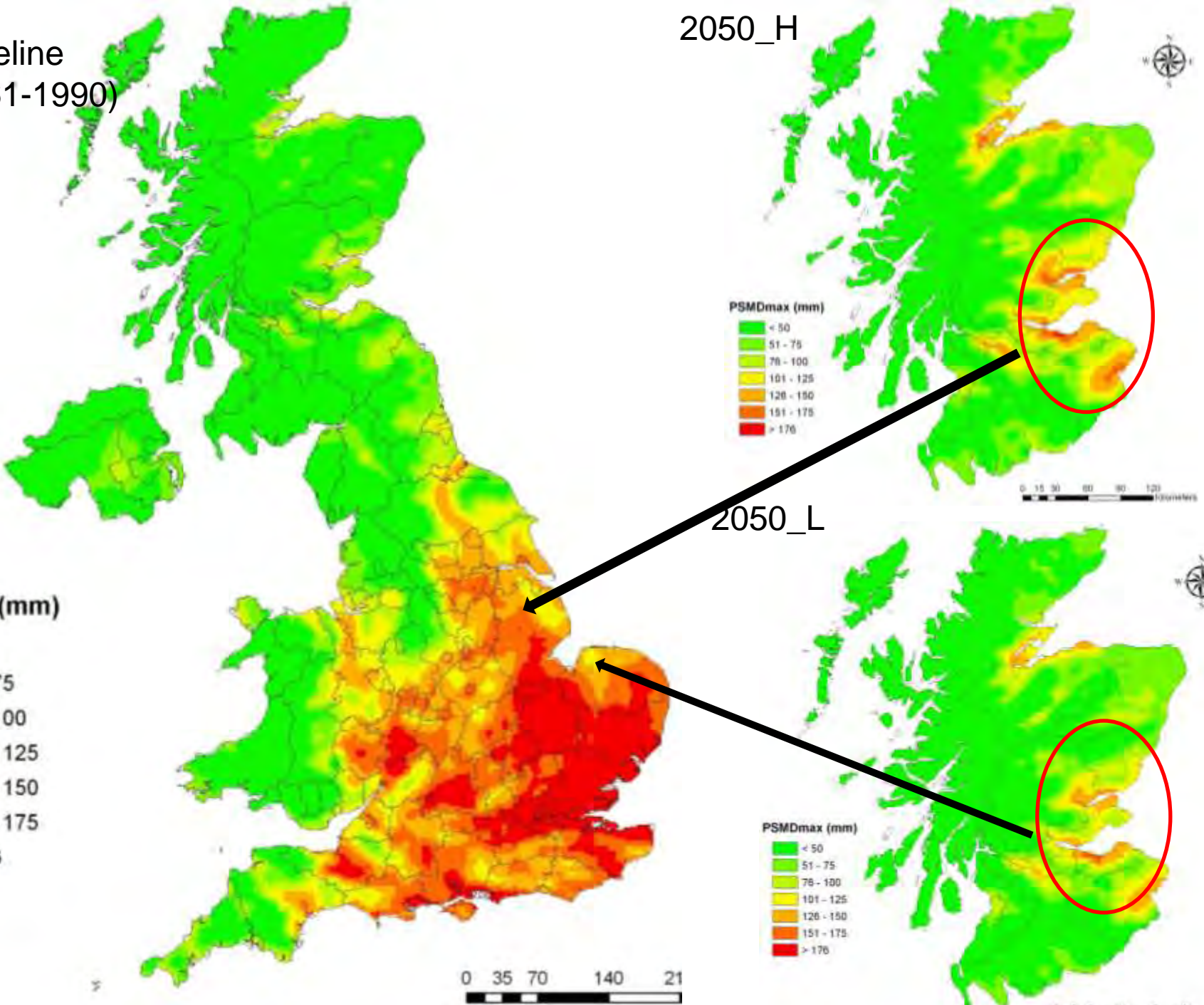
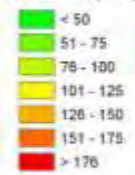


2050_L

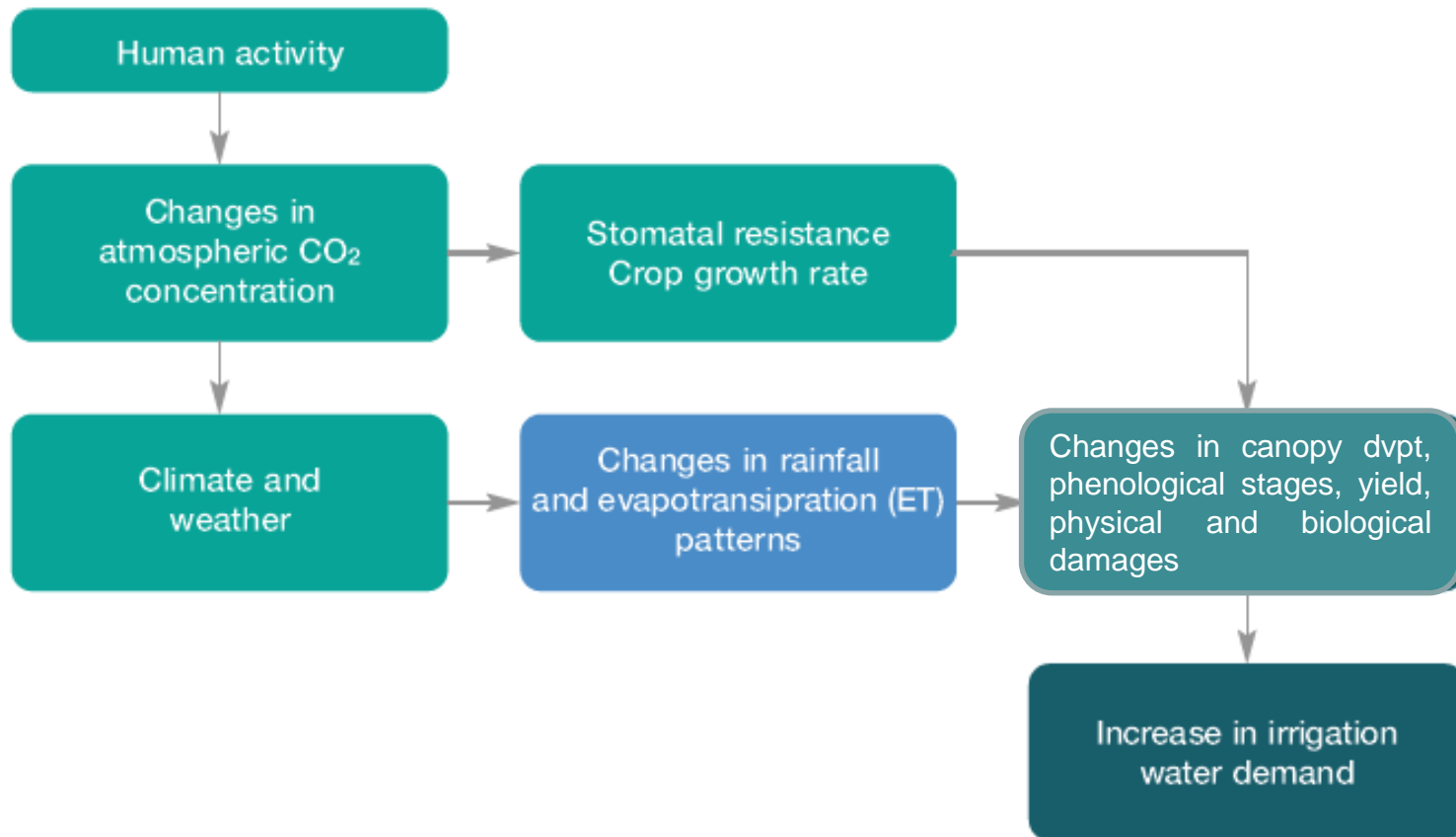
PSMDmax (mm)



PSMDmax (mm)

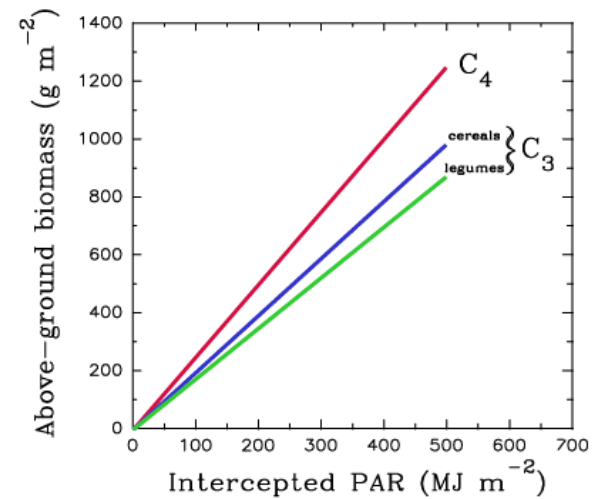
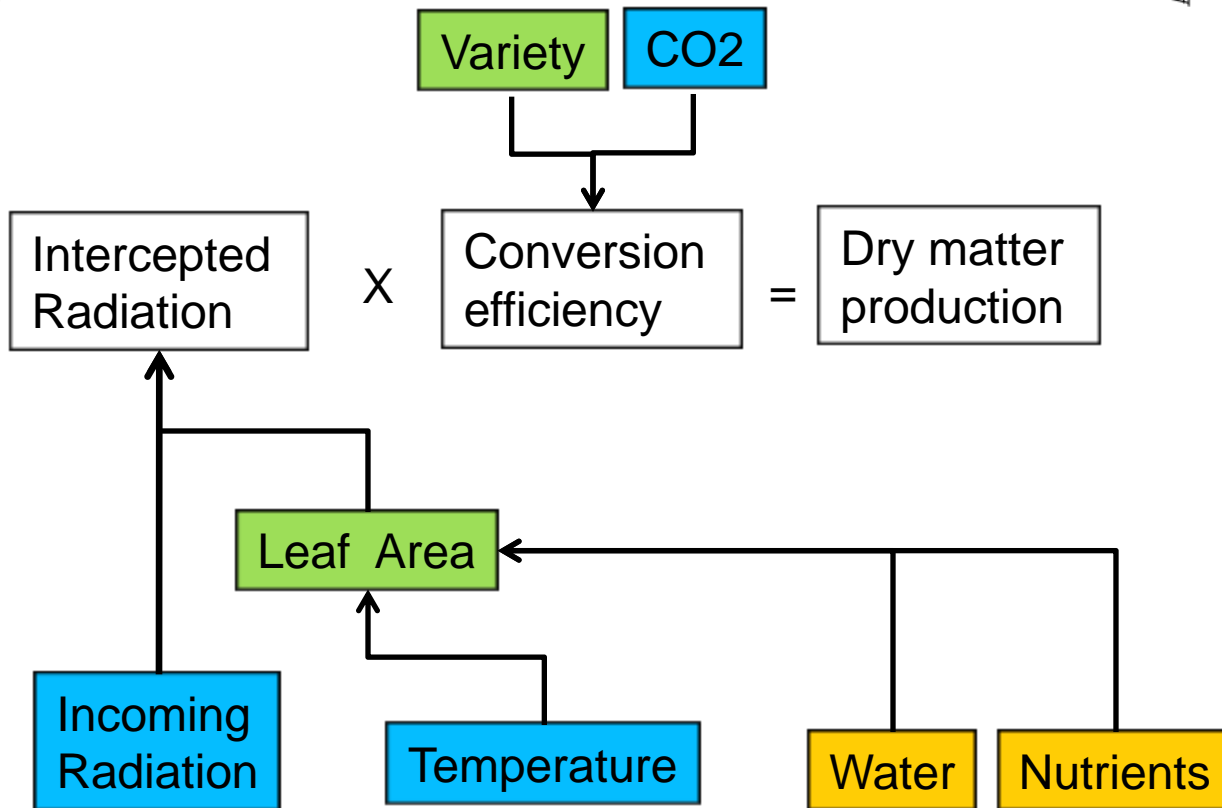


Climate change impact pathways



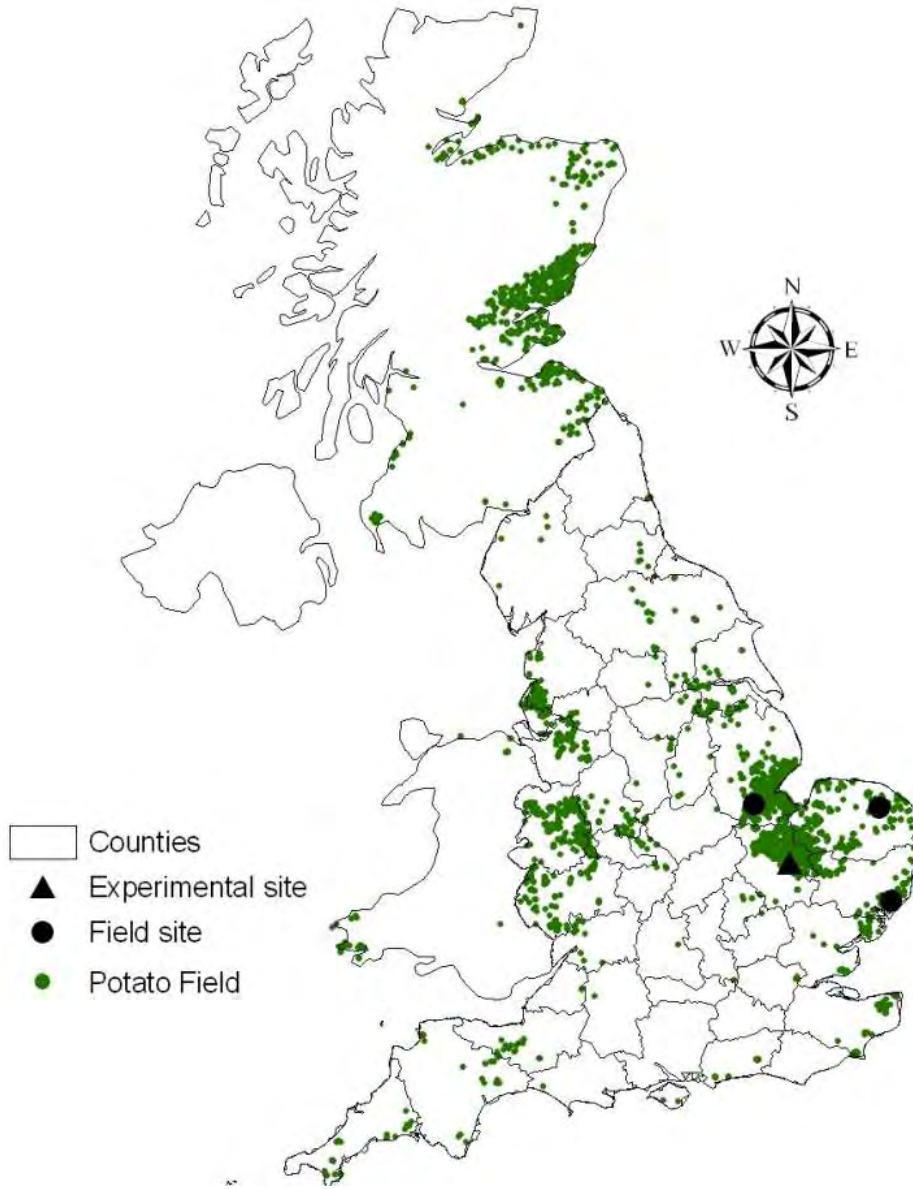
SUBSTOR-Potato

(Solar driven Engine)

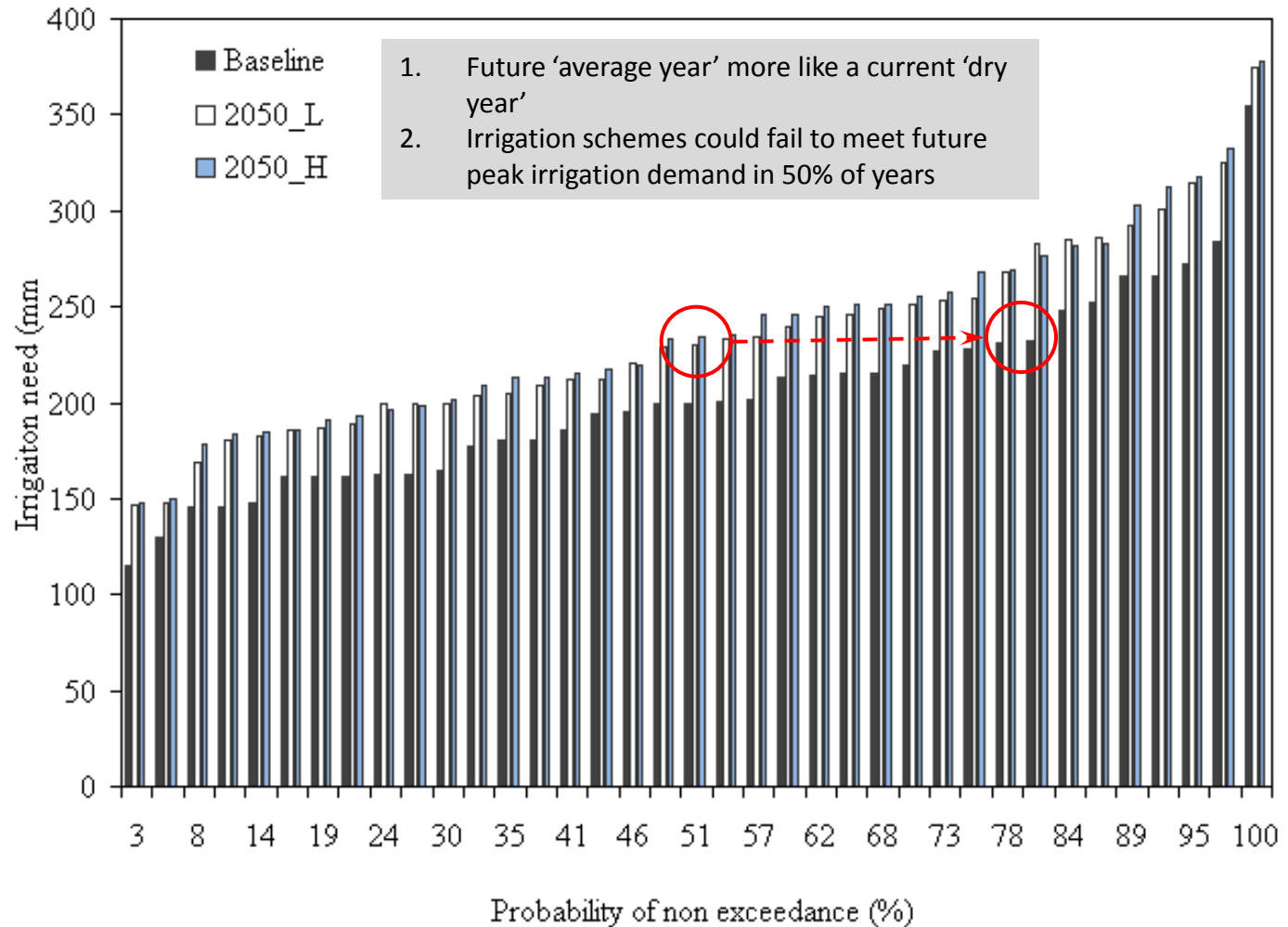


Assessing the impacts on potato yield and irrigation water use

Case studies



Future irrigation needs (mm) 2050s

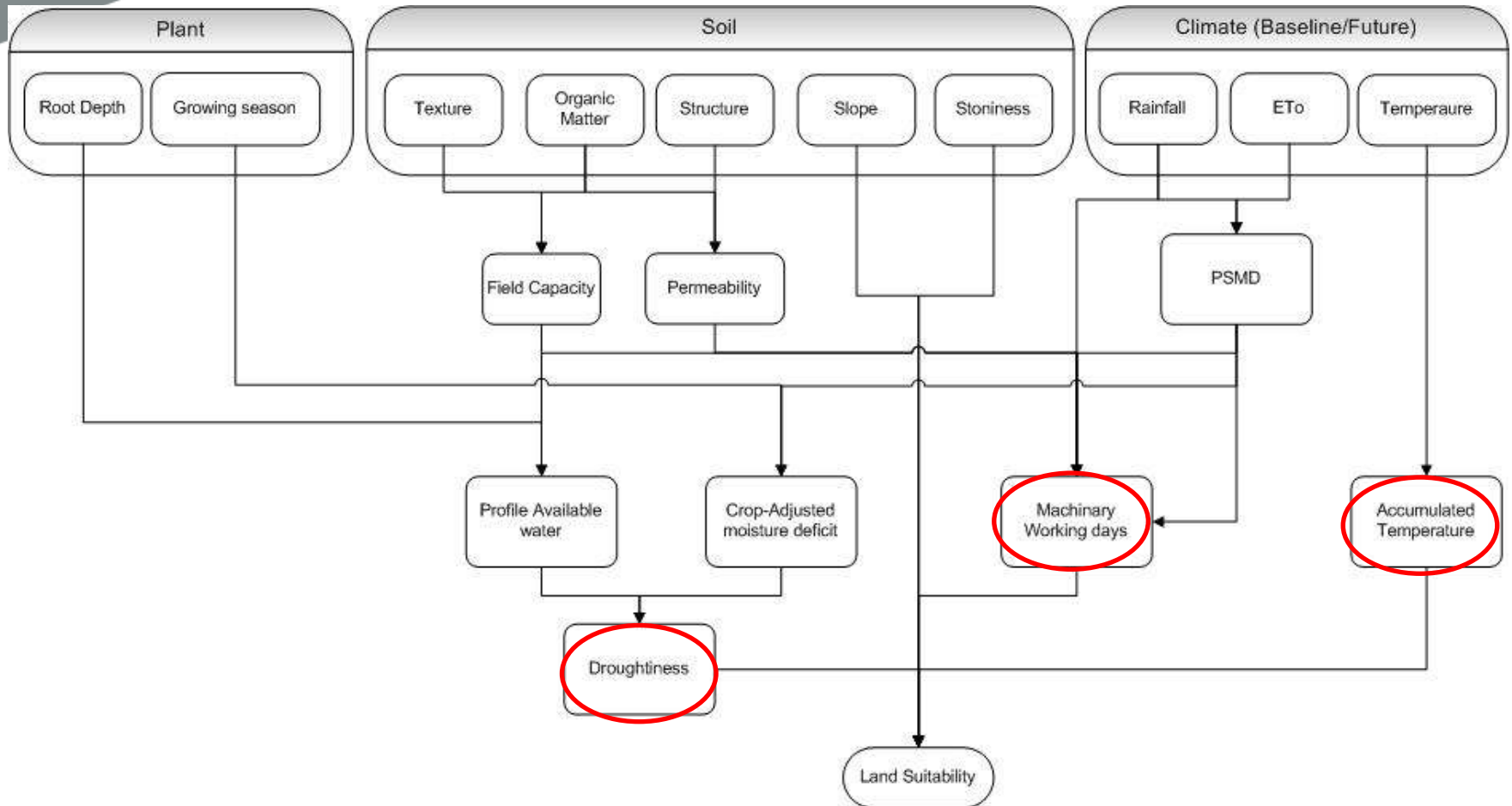


- Actual capacity of irrigation schemes might fail to meet future peak irrigation needs in nearly 50% of years
 - Increase in the equipment cost
- Future irrigation needs will increase by 14-30% to maintain the same level of production
 - Higher fuel and labour cost
 - Larger reservoirs and license volume
- Future potential yield is expected to increase by 13-16% but marginal increase under current practices (3-6%)

Modelling assumed unchanged practices - but there will be autonomous adaptation even if not planned adaptation

- Earlier planting and harvest dates
- Change to better adapted varieties or GM technology
- Less use of very light soils
- Reduce water losses (drip/subsurface irrigation, soil moisture sensors, PRD...)
- Move to lands more suitable for production and/or where water is available

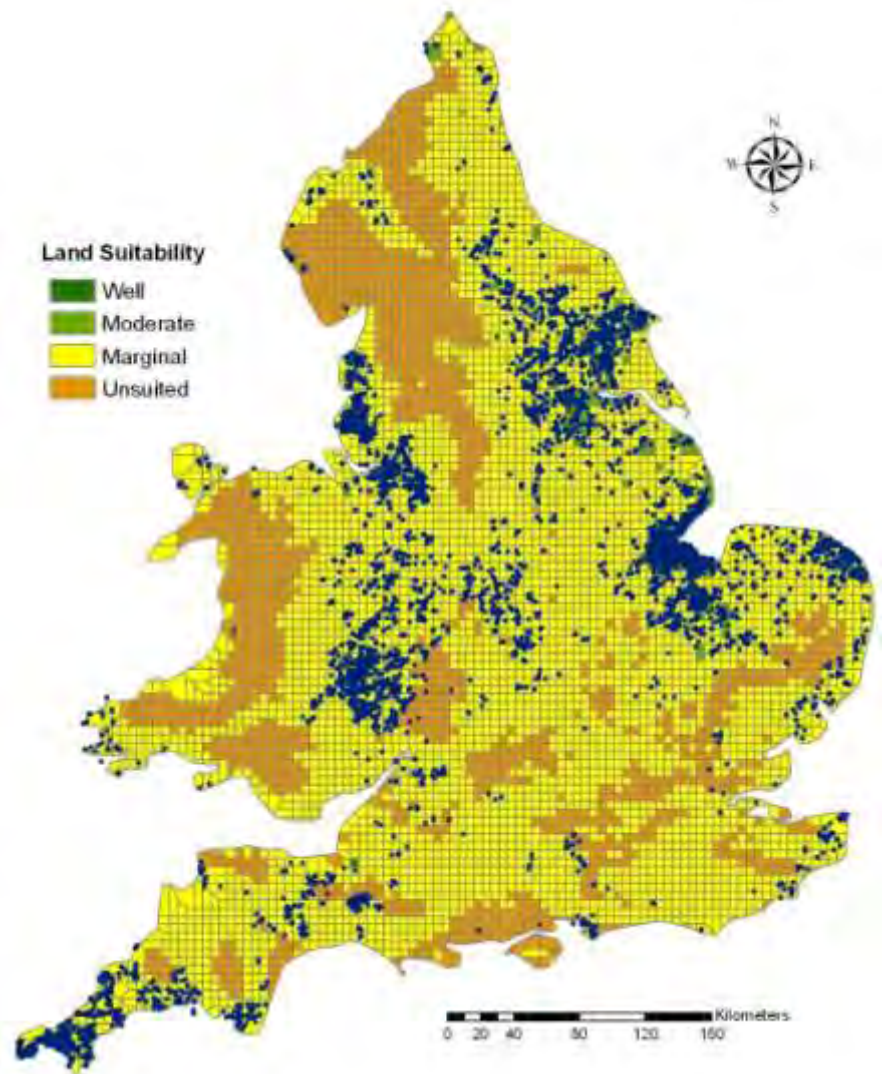
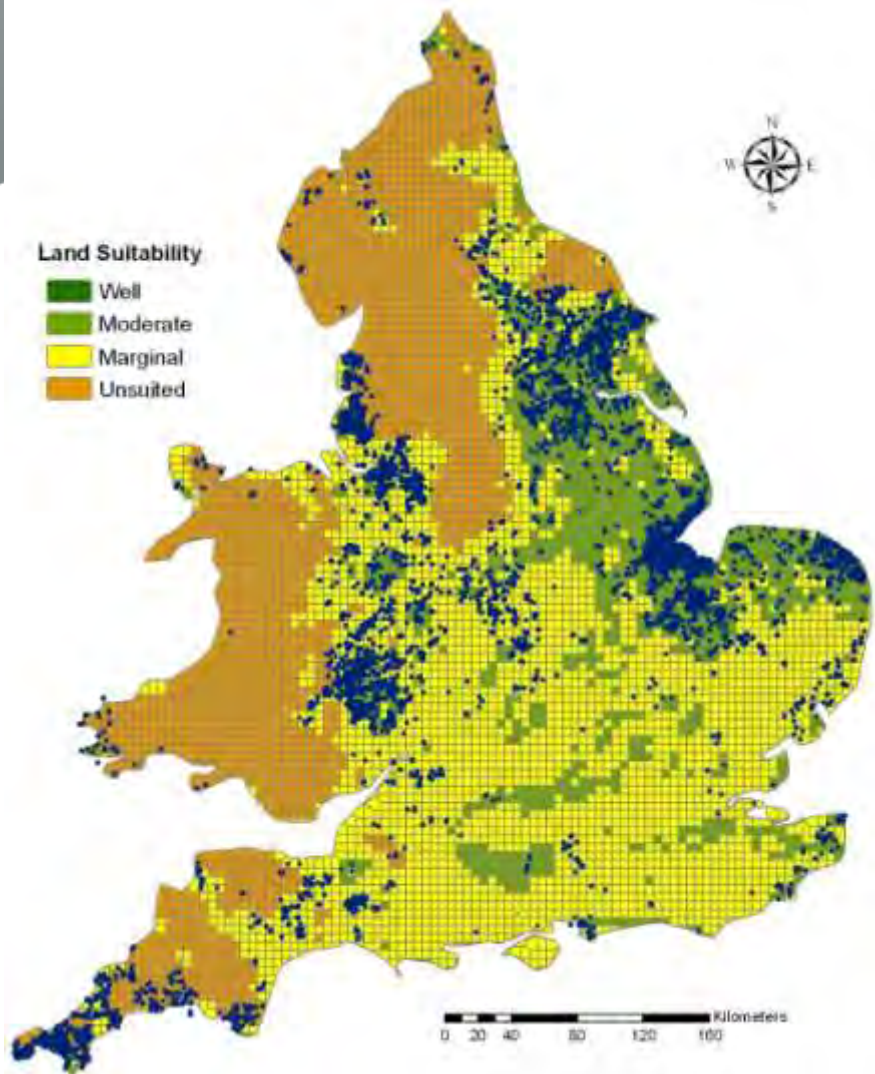
Assessing land suitability



Current and future land suitability (rainfed)

Baseline

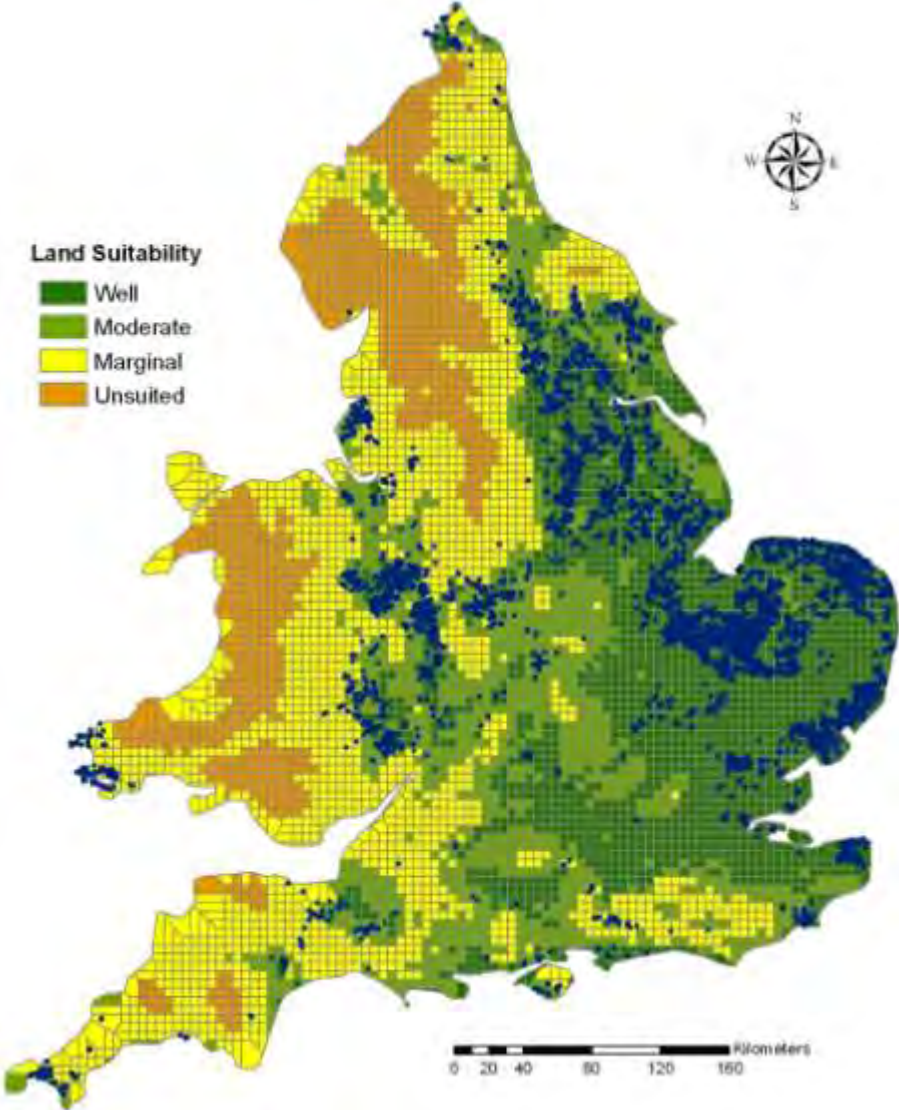
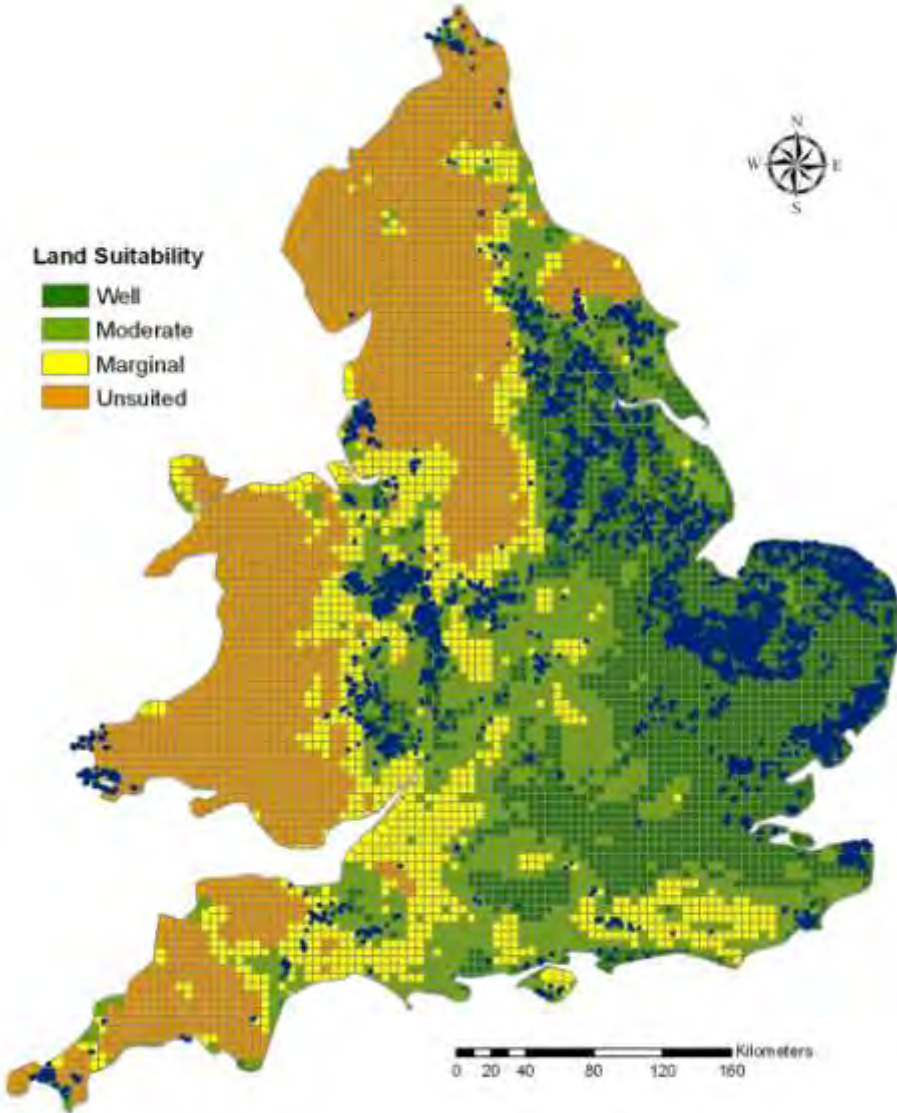
2050H



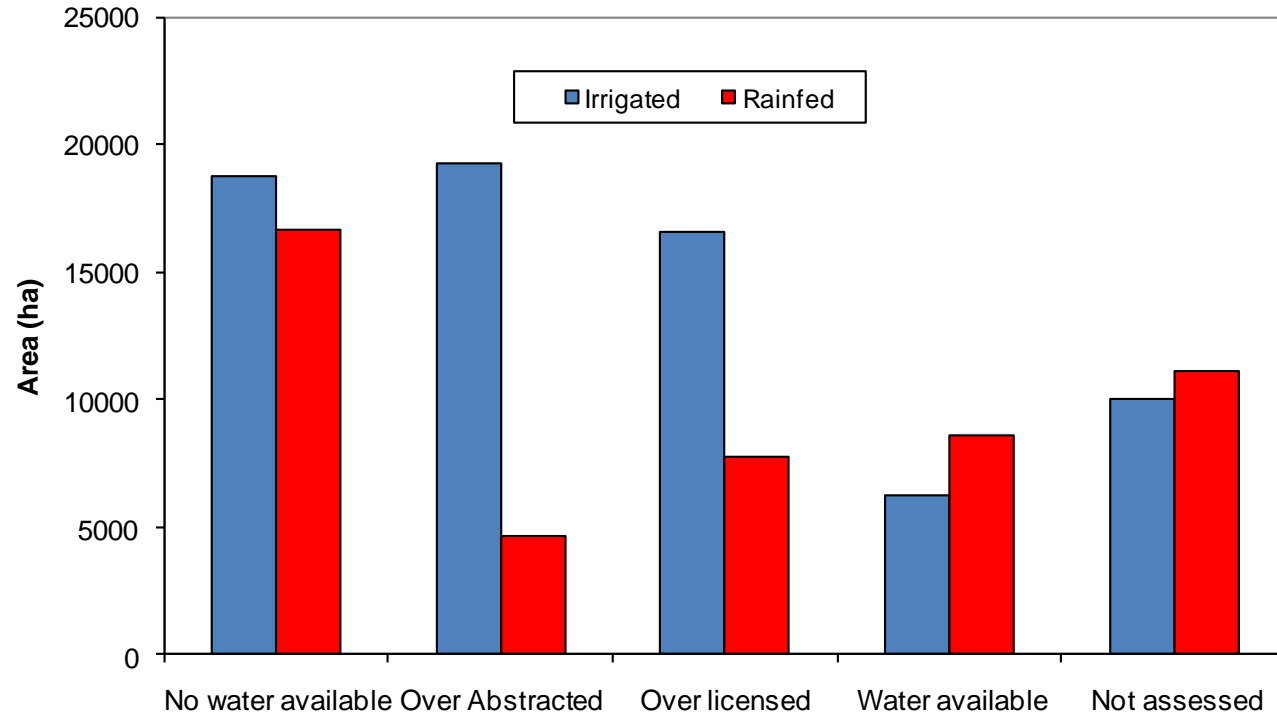
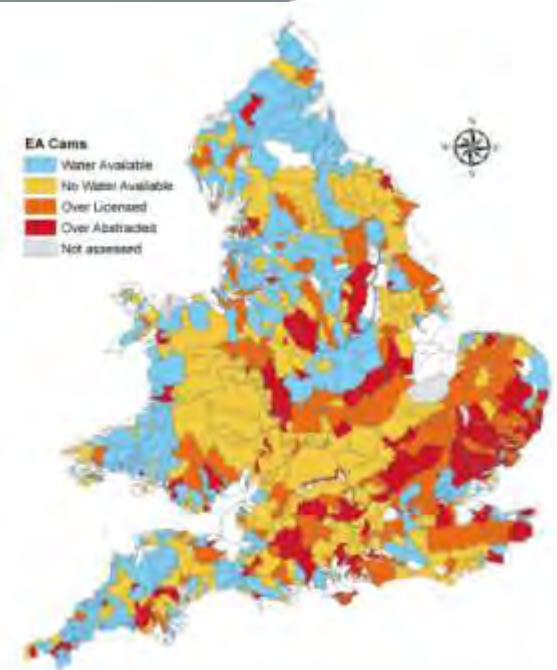
Current and future land suitability (irrigated)

Baseline

2050H



Potato production and water resources



In the future, potato production likely move onto new land with secure water supplies

- Land currently well to moderately suitable for rainfed production is projected to decline by 74-95%
- 85% of arable land will be suitable for irrigated production
- Expansion, relocation to suitable land will be constrained by water availability