

THE ASSESSMENT OF THE FUTURE RISK OF CLIMATE IMPACTS ON TREE SPECIES IN BRITAIN *USE OF PROBABILISTIC CLIMATE CHANGE PROJECTIONS AND AN ECOLOGICAL SITE CLASSIFICATION*

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Outline

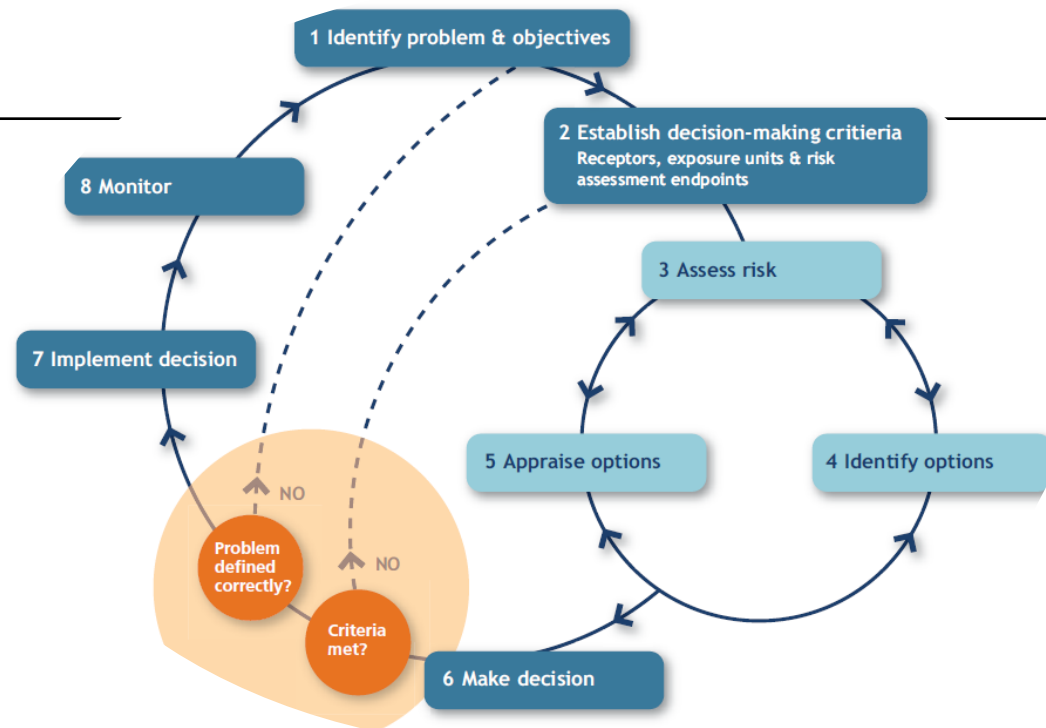
- Introduction
- Climate change – UKCP09
- Risk assessment framework
- Preliminary results – drought assessment
- Conclusions

Introduction

- What is risk?
 - An island in the sea of uncertainty (Nowotny et al. 2001)
- The need for risk assessment:
 - Reduction of losses and increase of benefits from forests
 - Knowledge about when, where and how much might climate affect trees/forests - is vital for sustainable forestry and forest planning
 - For implementation of adaptation measures to climate change **when and where** needed
 - To avoid a regrettable development pathway of no return

Introduction

- Risk framework under climate change

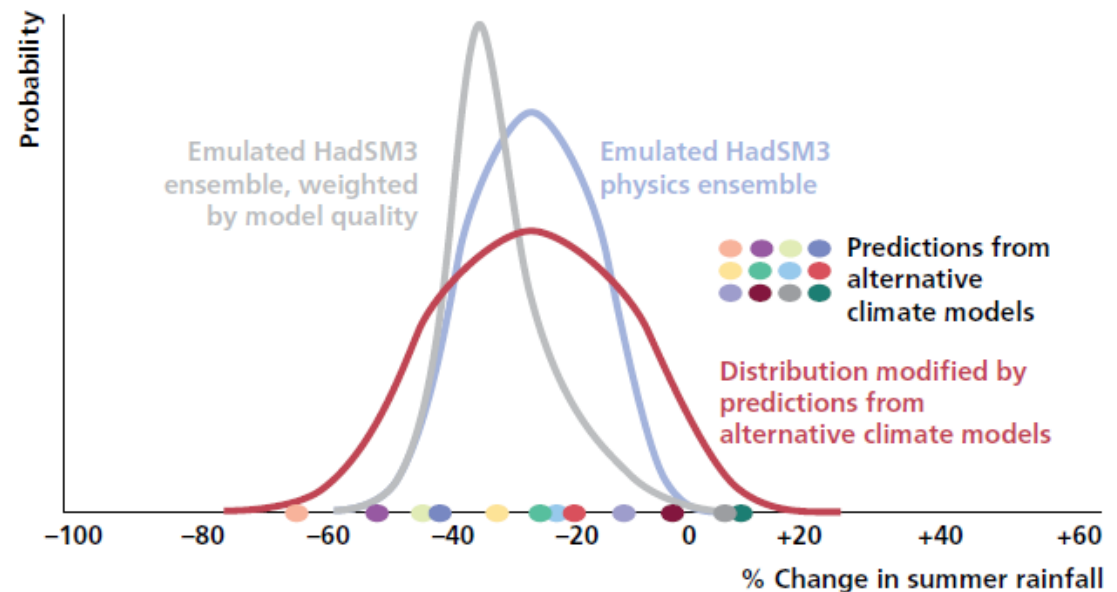


Brown, A. et al., 2011

- Research question
 - What is the effect of climate change spatial and temporal uncertainty on ecological risk for dominant British tree species?

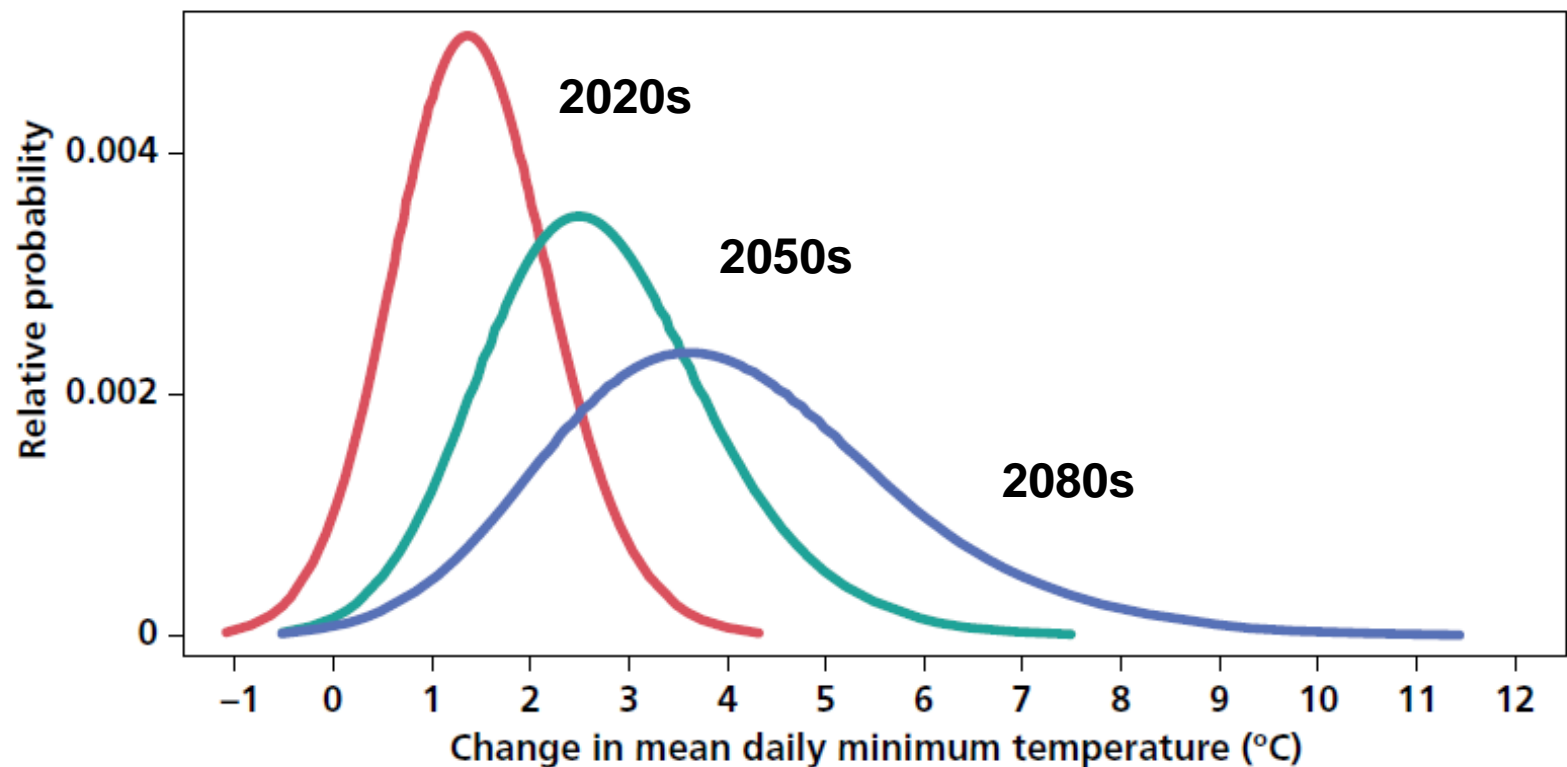
Climate change – UKCP09

- Probabilistic projections
 - Uncertainty
 - Natural variability
 - Modelling
 - Emissions
 - Representation
 - CDF and PDF
 - Weather generator



Climate change – UKCP09

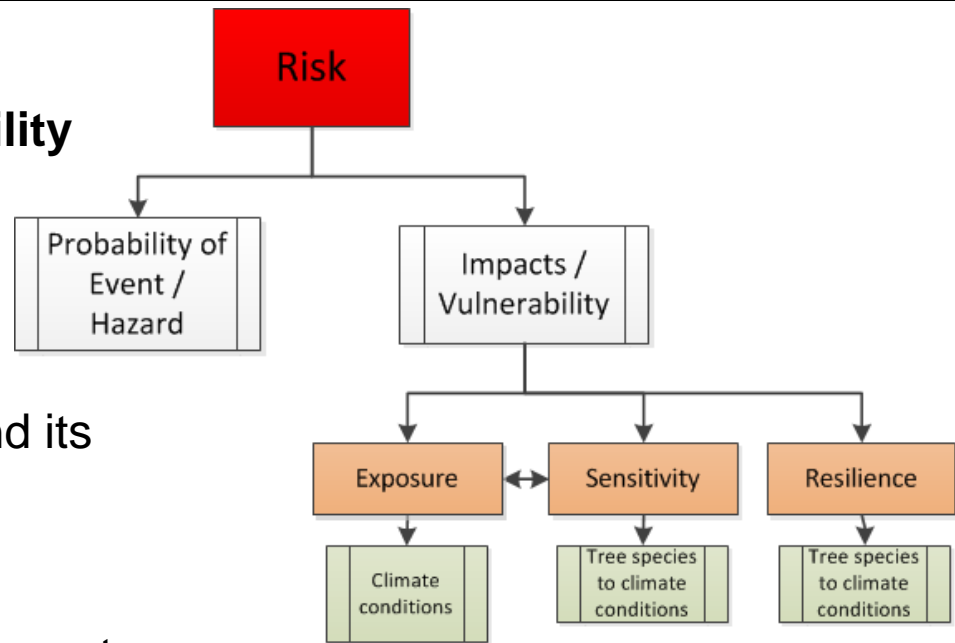
- Uncertainty Spatial Temporal



Risk assessment framework

- **Risk = Hazard * vulnerability**
(Blaikie 1994)

- Hazard = probability of
an event occurrence and its
intensity
- Vulnerability = capacity of a system
to respond to harmful effects of a
hazard



Turner, B.L. et al., 2003.

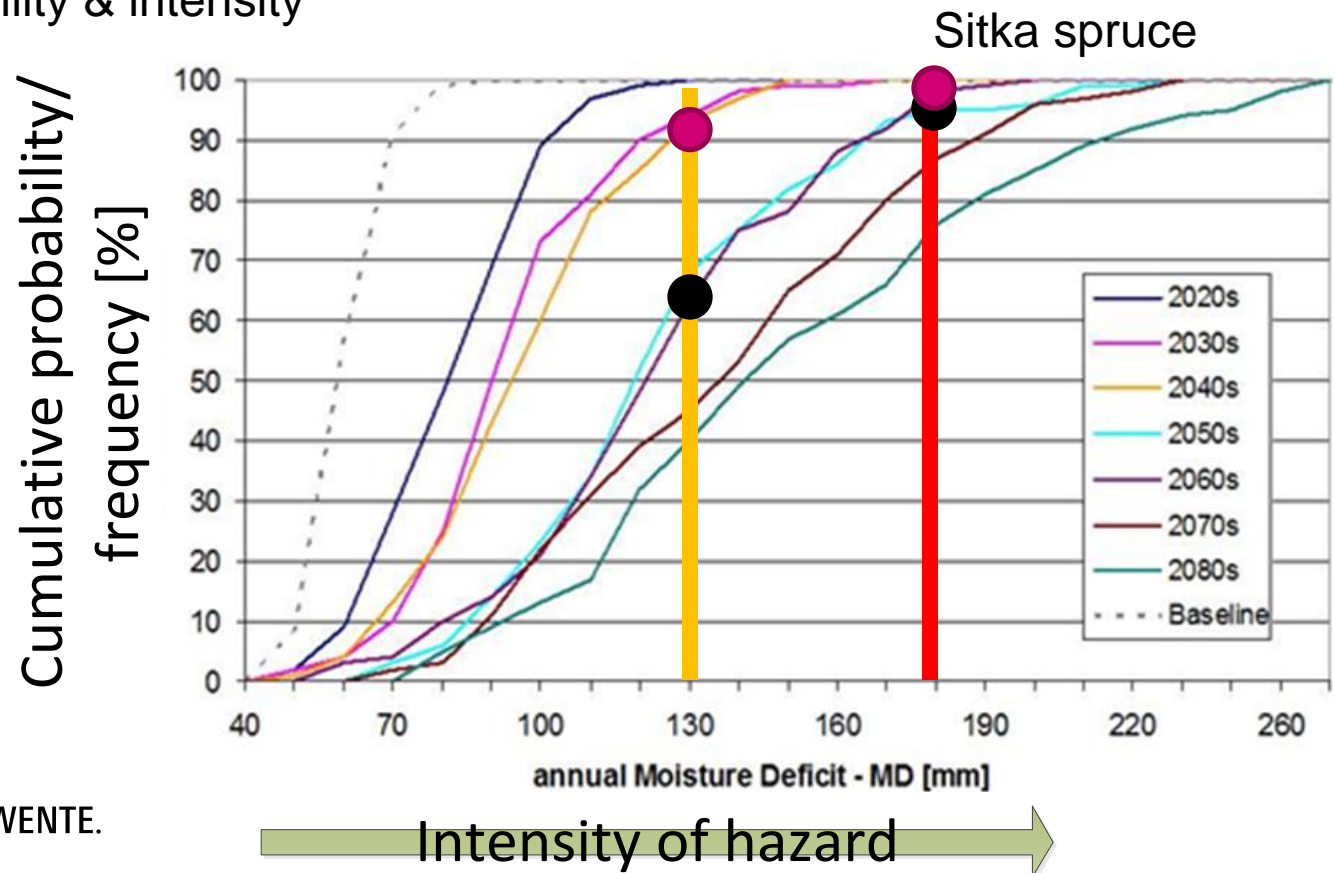
Risk assessment framework

- Steps in risk assessment
 1. Elements at risk – current dominant tree species (SS, SP, PO)
 2. Identification and calculation of hazard – drought
 3. Estimation of vulnerabilities
 4. Calculation of risk

Risk assessment framework

2. Calculation of hazard – drought (moisture deficit)

- Probability & intensity

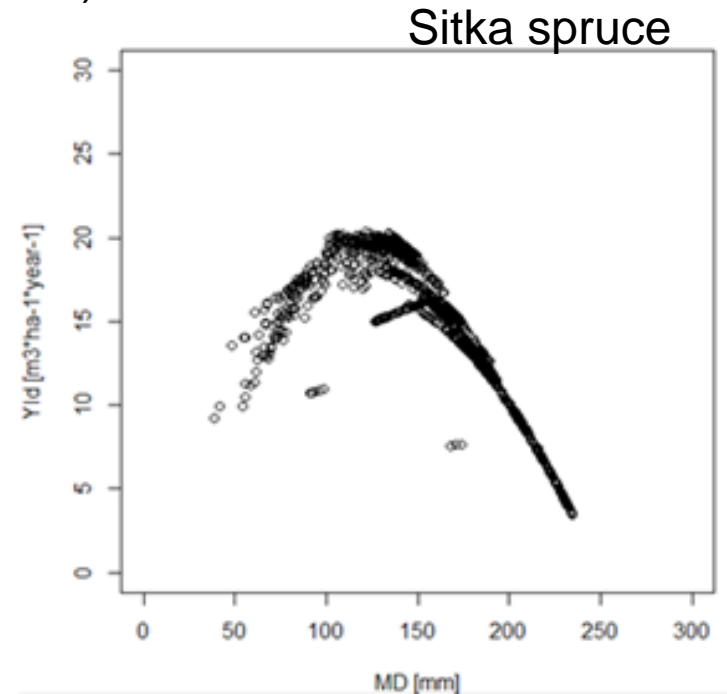


Risk assessment framework

3. Estimation of vulnerability

- Use of Ecological Site Classification (ESC) model
 - Tree yield estimates
 - Climate variables
- Exposure, sensitivity and resilience
- Tree growth related to drought

Sensitivity and resilience ↑

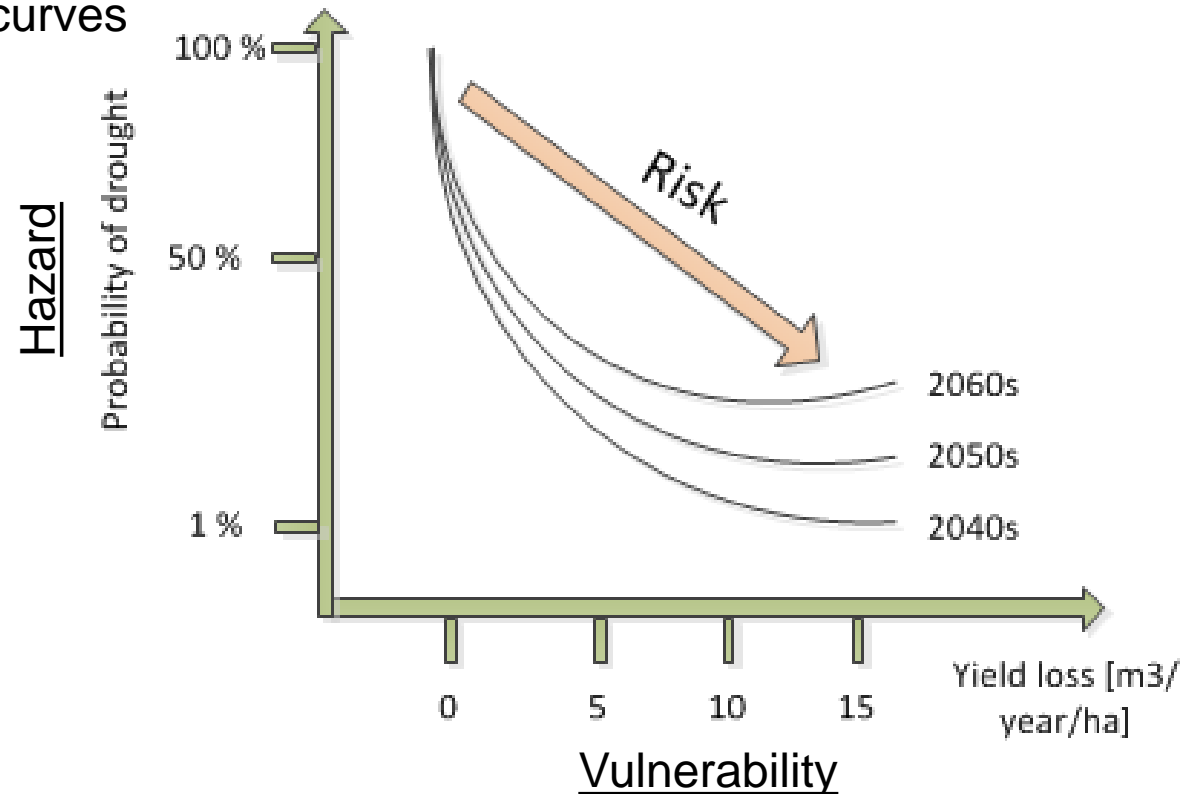


Exposure

Risk assessment framework

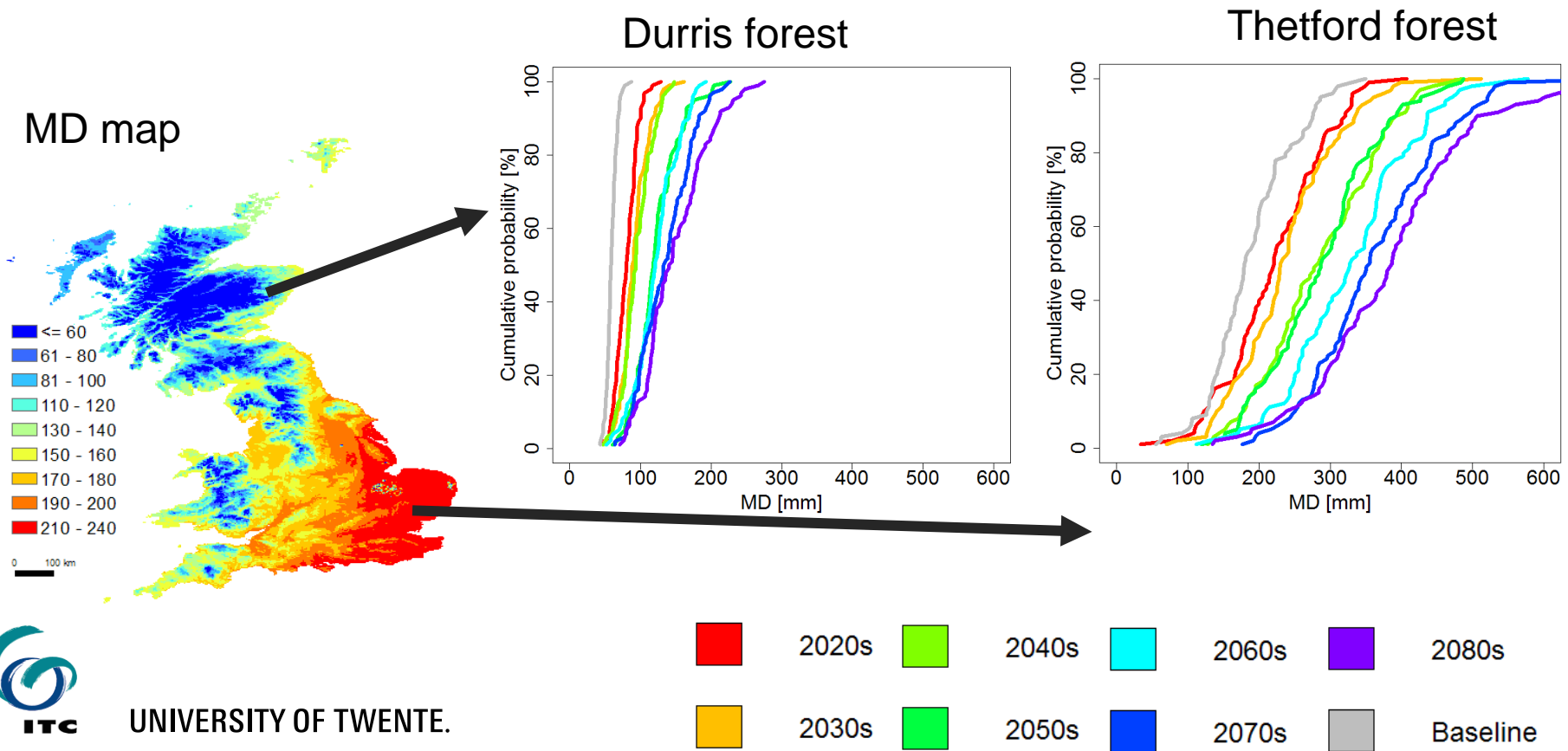
4. Drought risk

- Combination of hazard and vulnerability
- Theoretical risk curves



Preliminary results – drought hazard assessment

- Assessment of drought hazard using WG for A1Fi high emission scenario



Preliminary results – drought risk assessment

A1Fi (high) emission scenario, 2080s

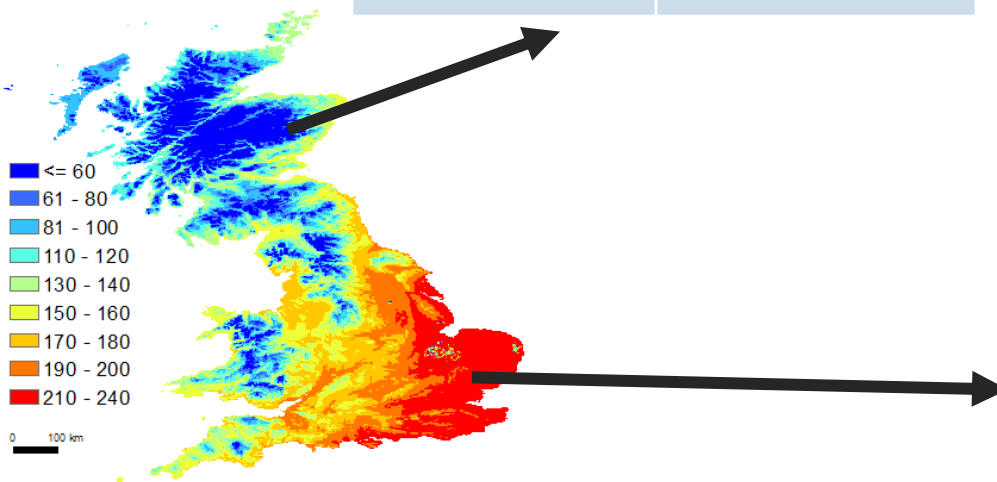
Durriss forest

Probability <i>below</i>	Moisture deficit [mm]
20%	111
50%	140
80%	184

Tipping point in yield decrease:

Sitka spruce ~ 150 mm (MD)

MD map



Thetford forest

Probability <i>below</i>	Moisture deficit [mm]
20%	213
50%	287
80%	353

Conclusions

- Risk assessment is possible with probabilistic climate data
- Risk assessment help to identify hot-spots locations of higher risk
- Risk assessment support spatial forest planning – when and where to take action
- Risk assessment help to avoid or reduce maladaptation to climate change in forestry

References

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