



atopica®

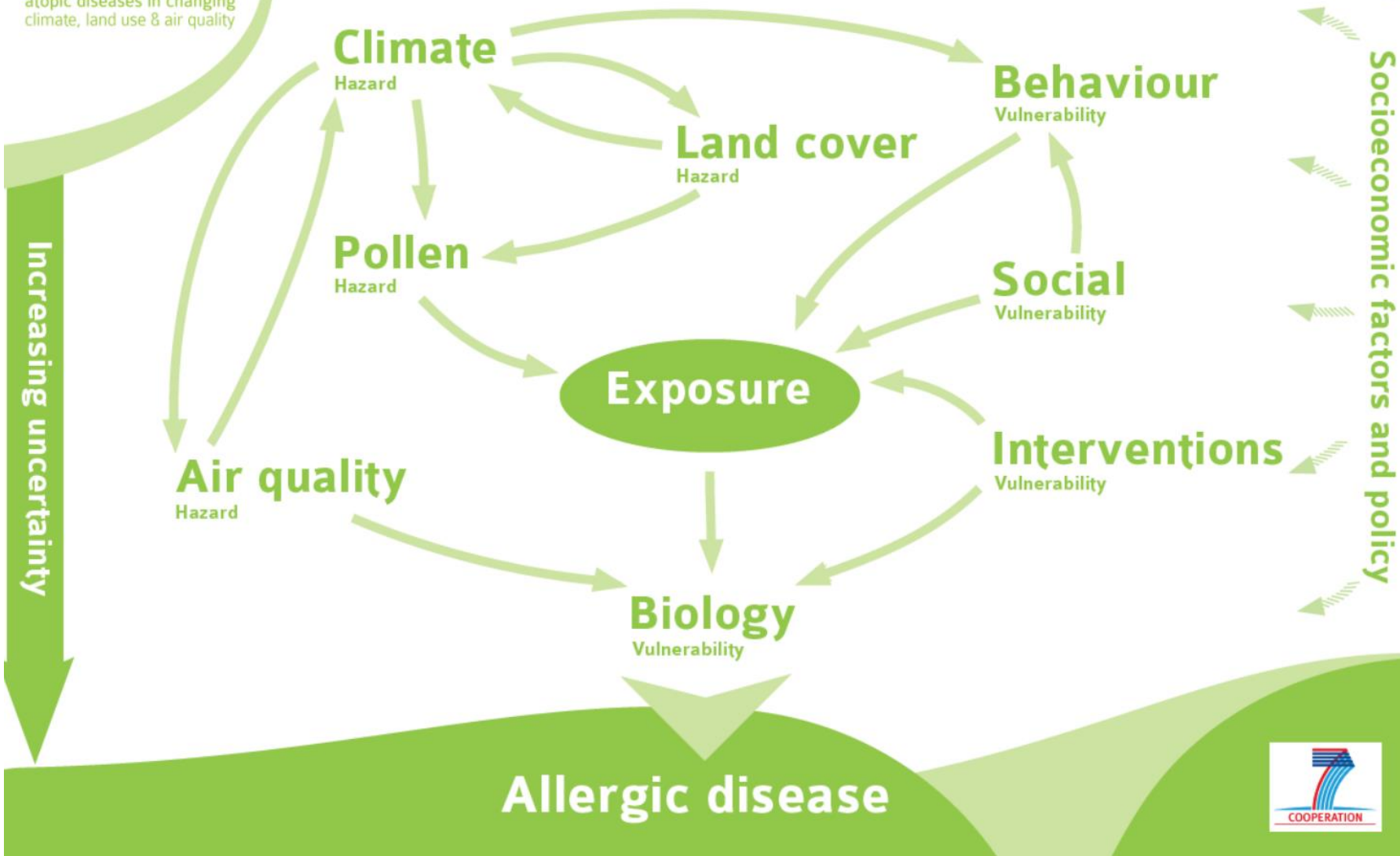
atopic diseases in changing
climate, land use & air quality

6 March 2015

Perspectives on the
integrated assessment
methodology and
interdisciplinary working
within ATOPICA
Clare Goodess



Key influences on the risk of allergic disease



Interdisciplinary working

The **ATOPICA** team:

- Climate scientists
- Plant and pollen experts
- Clinicians
- Statisticians
- Media and communications



Some of the challenges:

- Language/jargon
- Collecting 'real time' data
- Integrating very different types of data
 - Different time scales
 - Different spatial scales

<i>Aeroallergen</i>	<i>Scenario</i>
<i>Epigenetics</i>	<i>Projection</i>
<i>Atopic</i>	<i>RCP</i>
<i>IgE</i>	<i>SSP</i>
<i>eCRF</i>	<i>CHIMERE</i>
<i>ISAAC</i>	<i>PM10</i>

To what extent can we extrapolate?



??????



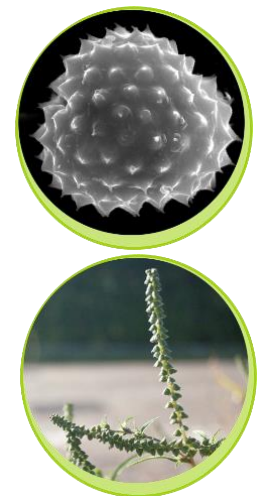
E.g., Clinical studies

- The largest uncertainty is extrapolating from small areas and 2012-2014 diaries
 - Confounders:
 - Population distribution
 - Societal behaviour
 - Time spent outdoors
 - etc

For this reason, the dose-response curve used in the European assessment was derived from the literature covering 20 different countries

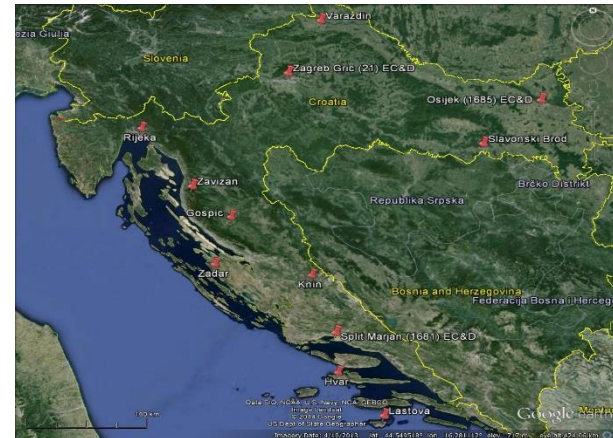
Assumptions: extrapolation

- All empirical relationships can be extrapolated and hold for the future
- Pollen and presence observations and potential distributions provide a reliable indication of the actual number of ambrosia plants
- Climate/pollen/air quality measured at nearest site are representative of conditions experienced by exposed individuals
- Empirical relationships:
 - Ambrosia life-cycle model including germination rates, seed dispersal rate, plant phenology, biomass production and pollen release
 - Bias correction used in air quality modelling
 - Dose-response relationship



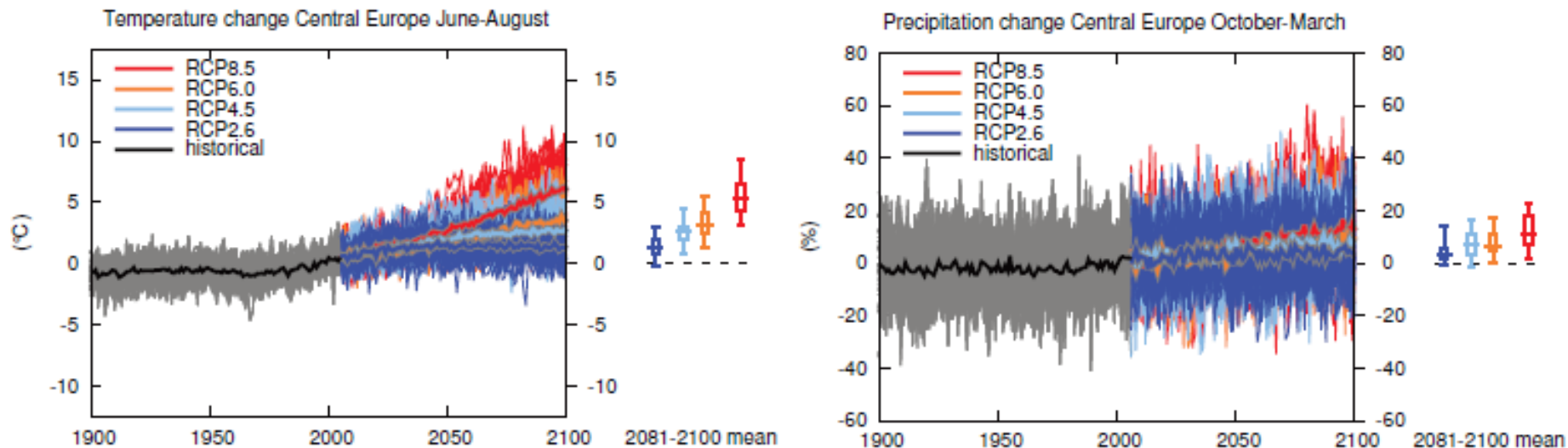
Assumptions: data biases & sampling

- Questionnaire/diary respondents have perfect recall
- No systematic biases in data sets (pollen, air quality, climate, genetic samples, serum samples, skin prick tests)
- Sampling is unbiased (clinical cohorts, location of climate/pollen/air quality monitoring stations)



Assumptions: uncertainty

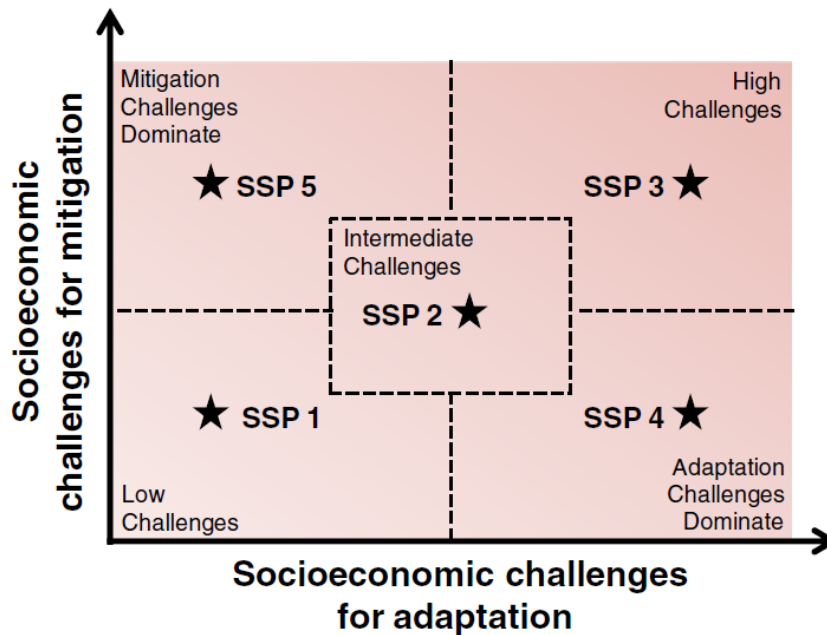
- The different variants provide some indication/reflection of the wider uncertainty range:
- Two climate and two transport/air quality models (RegCM & WRF/CHIMERE)
- Four assumptions on ragweed pollen invasion (Reference, Rapid, Slow, None)
- Two RCPs (Representative Concentration Pathways – RCP4.5 & RCP8.5)



Implications for climate mitigation

IPCC WGII AR5 Summary for policy makers

“Uncertainties about future vulnerability, exposure and responses of interlinked human and natural systems are large (*high confidence*). This motivates exploration of a wide range of socioeconomic futures in assessments of risks.”



Health in the Shared Socioeconomic Pathways
Ebi et al., 2013: *Int. J. Environ. Res. Public Health*

- SSP1: Sustainability
- SSP2: Middle of the road
- SSP3: Fragmentation
- SSP4: Inequality
- SSP5: Conventional development

We have assumed some things don't change (population, land use, intervention, behaviour etc) – but some narratives could be developed.....

Key messages concerning uncertainty

- We have been transparent about the assumptions underlying our analyses and the fact that all stages of the integrated assessment are subject to uncertainties.
- Despite these assumptions and uncertainties we are confident that our key messages are robust.
- One of the most important of these messages is that, without a major reduction in greenhouse gas emissions, the number of individuals with symptoms of ambrosia allergy is likely to more than double by the middle of the century.

Thank you!

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Further analysis, & more data, would allow us to better understand & disentangle the underlying processes & factors & to make more detailed & quantitative assessments:

- More pollen & plant observations/monitoring
- More climate & air quality simulations
- More years of cohort data
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