

ECRA GA 2015



Impacts of hydrological changes, risk assessment

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March 26, 2015

New knowledge for risk reduction?

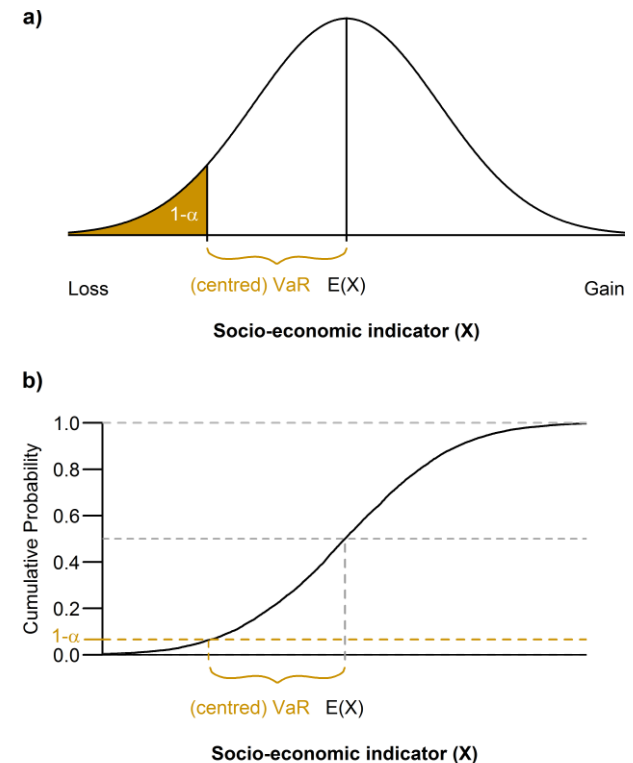
- First priority: understanding risk
 - Catastrophic
 - Non-catastrophic
- Understanding Weather Risk is a precondition to Understanding Climate Risk
- Human response functions create economic risks
- How to communicate risk to stakeholders?

A measure for weather induced risks

Value-at-Risk_(Weather) or Weather-VaR

Weather-VaR (α) denotes „the Value at Risk resulting from adverse weather conditions, and represents – for a given level of confidence $[\alpha]$ over a given period of time – the maximum expected loss“.

(Toeglhofer, Mestel & Prettenhaler, 2012)





<https://www.wedda.eu/en/>

WEather Driven Demand Analysis



Deutsch

Homepage About WEDDA My Data Manager Contact

Get your weather-dependent sales forecast in just 3 steps.*

→ Register for a 1 month free trial

Step 1

📄 Register

Step 2

📄 Accept the privacy policy

Step 3

📄 Upload data

*After sending us your data on daily sales or visitor/guest entries (for instance of the last 3 years) you will usually receive your first sales or entrance forecast within 10 working days. The forecast will be available to you online and will be updated on a daily basis.



Location Austria

Data is stored on servers located in Austria, thus we adhere to the strict data protection legislation of the Republic of Austria.



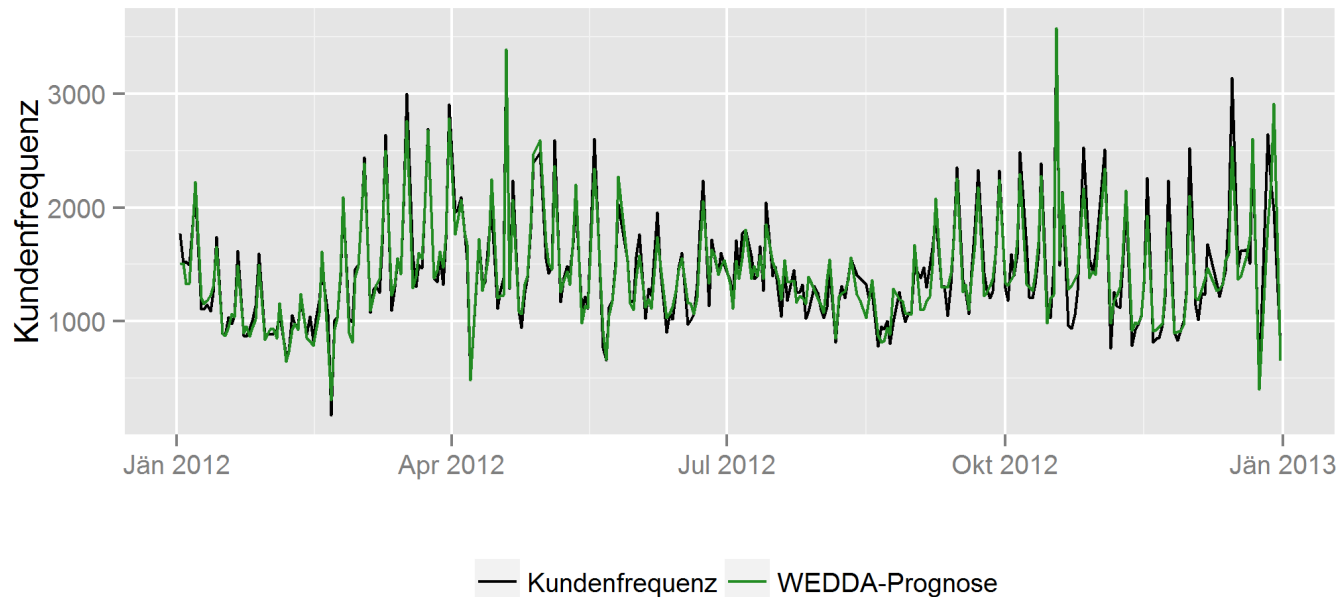
Security

All connections are protected with SSL.

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Weather based prediction of shoe sales

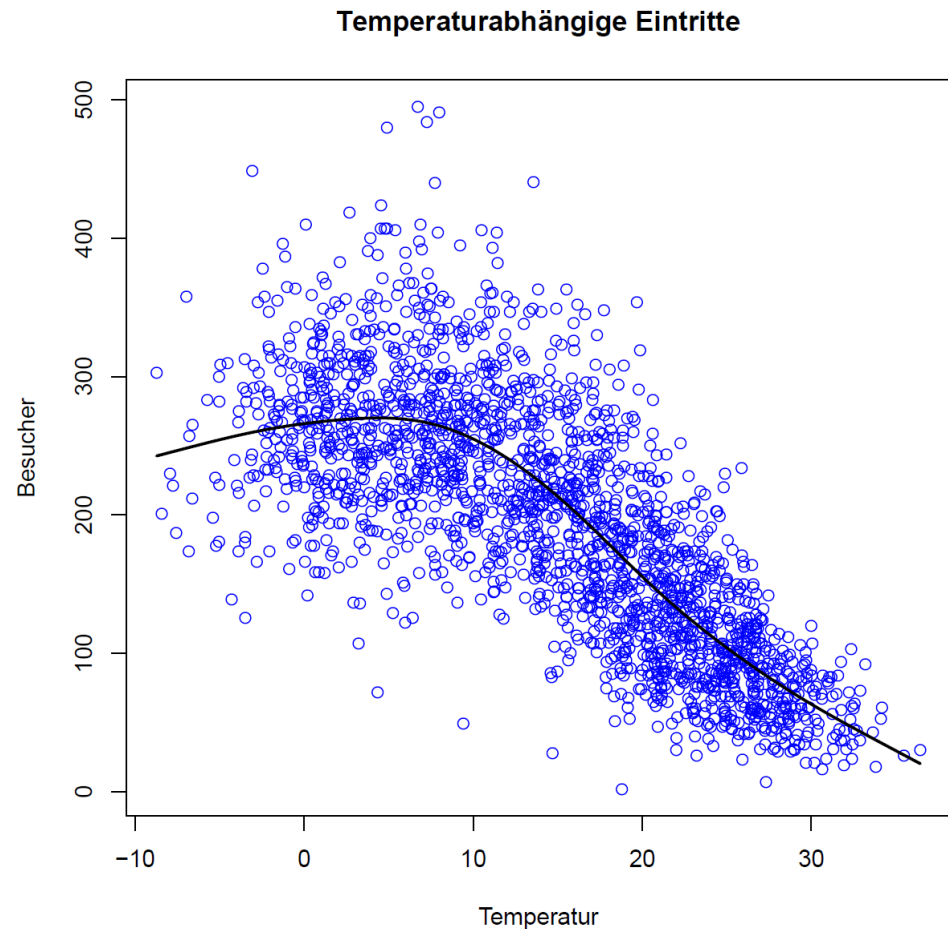
- Composed seasonal models predict well the year
- Degree of explanation 78% (summer) vs 96% (spring)



Typical curves by sector

■ Indoor sports

- Daily entrance climbing hall depending on temperature

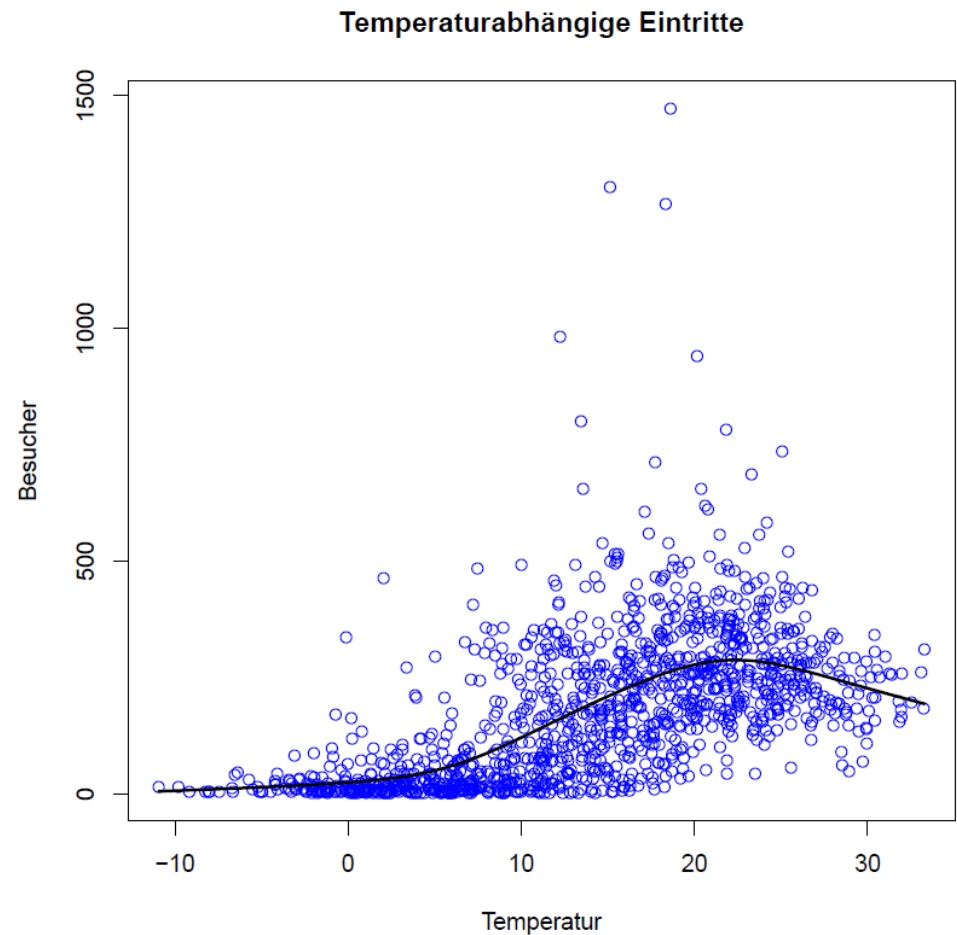


Typical curves by sector

Outdoor sports

Hiking

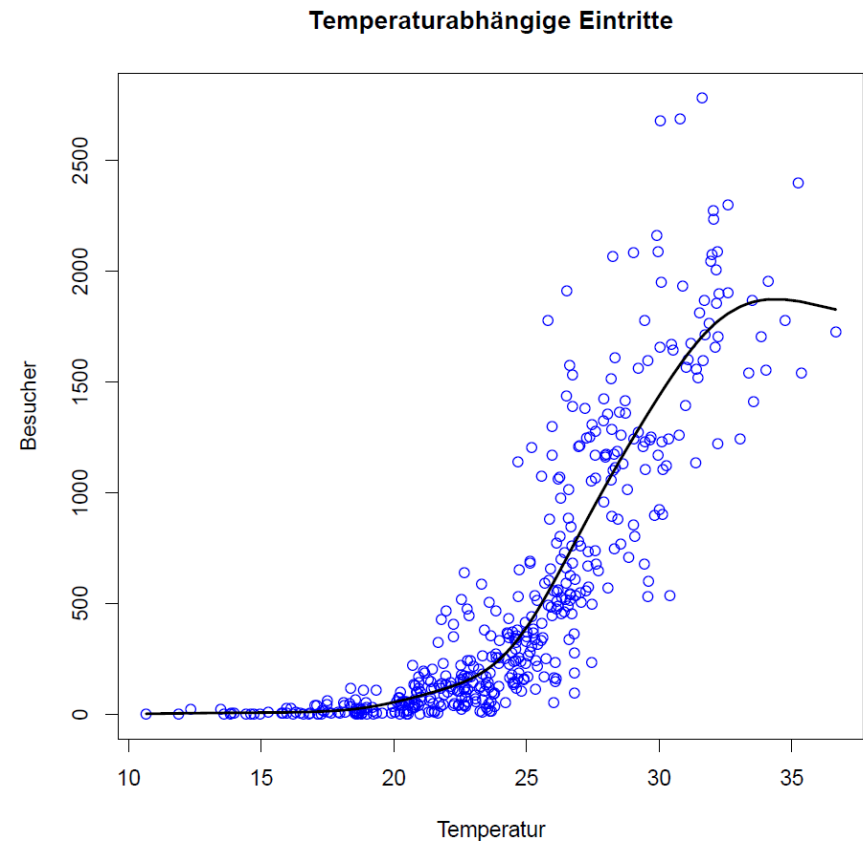
Visits to a park



Typical curves by sector

Outdoor water based leisure activities

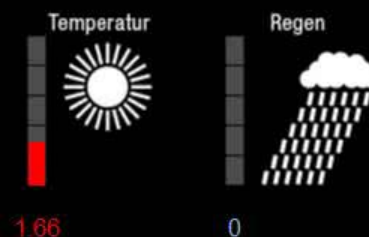
- Public Pools
- Lakes



0 10 20 30 km



Freizeitmonitor WEDDA®



1. Jänner

Samstag Sonn- und Feiertag Schulfrei

2013



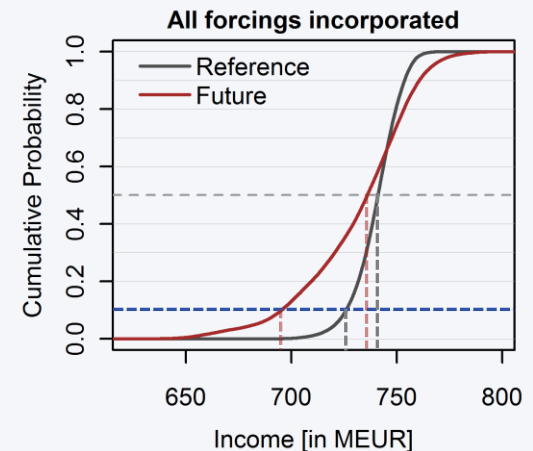
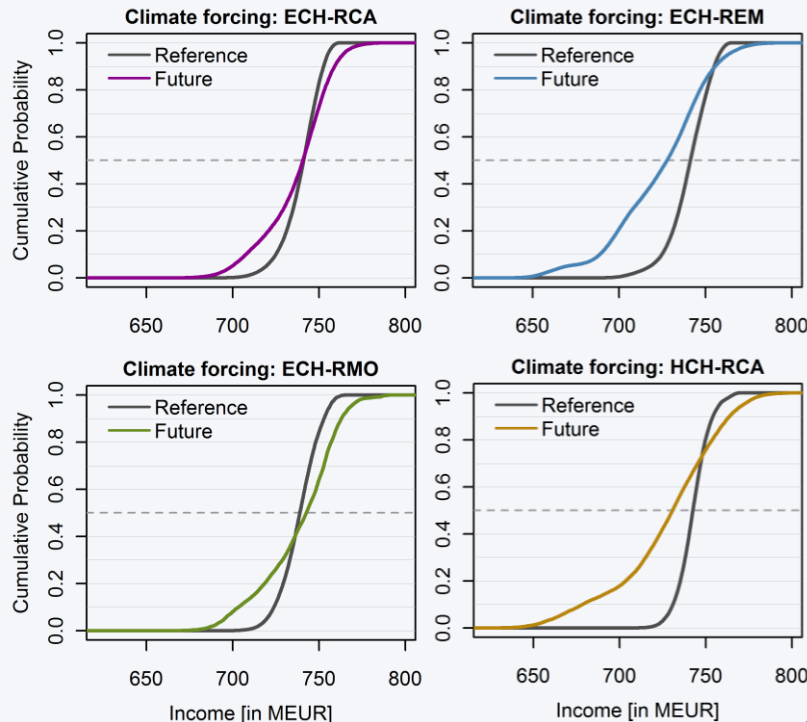
WEDDA®

- The linkage of our demand models with short term weather forecasts or long term climatological forecasts leads to the following main applications of WEDDA
- Short term - WEDDA
 - Implementing short term forecasting-systems (e.g. attendance of public swimming pools, entrance to ski areas, shoe sales, ...)
 - Quantifying the weather risks of a sector or an enterprise
 - Determine business performance of a period subtracting the weather (& calendar) induced effects
- Long term – WEDDA – 4CPI (Climate proof investments)
 - Assessment of the potential effects of a changed climate on a sector or a business unit

FROM UNCERTAINTY TO RISK-BASED DECISION MAKING

- **Example:** Distribution of income generated by tourism in Sardinia (Jun.-Aug.) as a function of year-to-year weather variability ("Approach A")

Climate signal uncertainty (CUS)



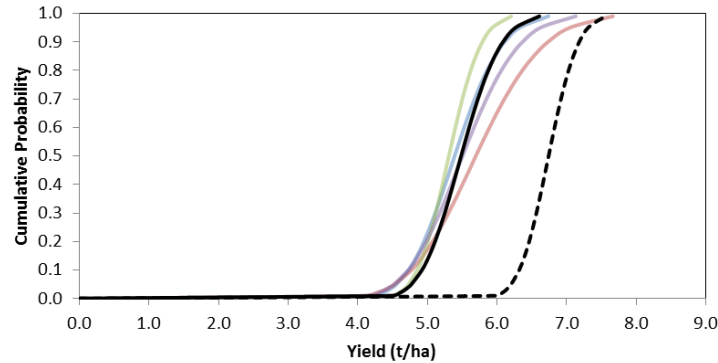
VaR(0.9):

	MEUR	%
REF	15	2.0
FUT	41	5.5
FUT (+Trend)	46	6.2

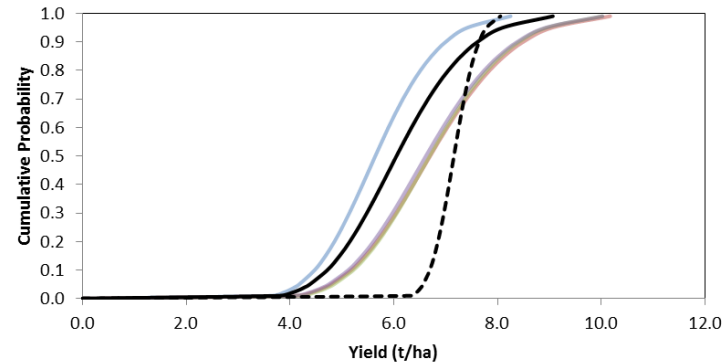
Income estimation: overnight stays * average expenditure per overnight stay

RESULTS – TOMATOES (SAME WATER USAGE AS CURRENT)

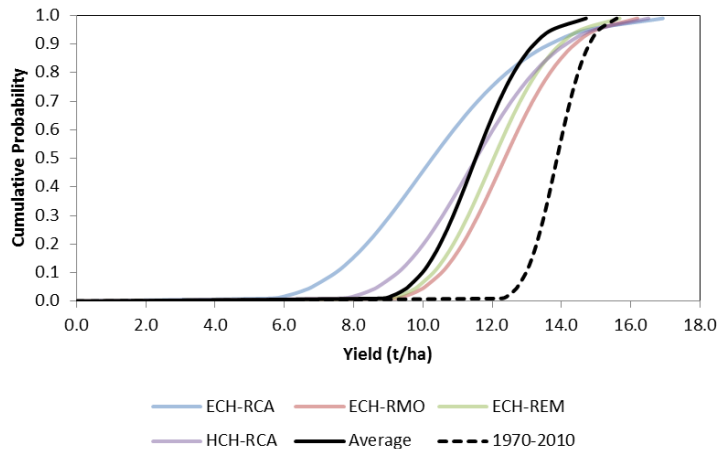
**March Plantings
2040-2070**



**August Plantings
2040-2070**

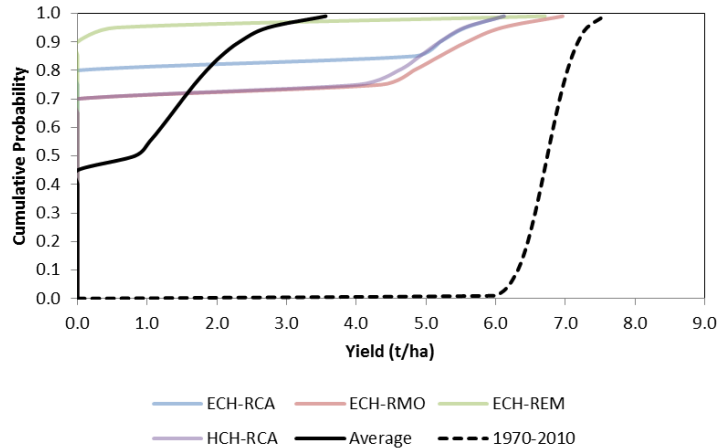


**Total Harvest
2040-2070**

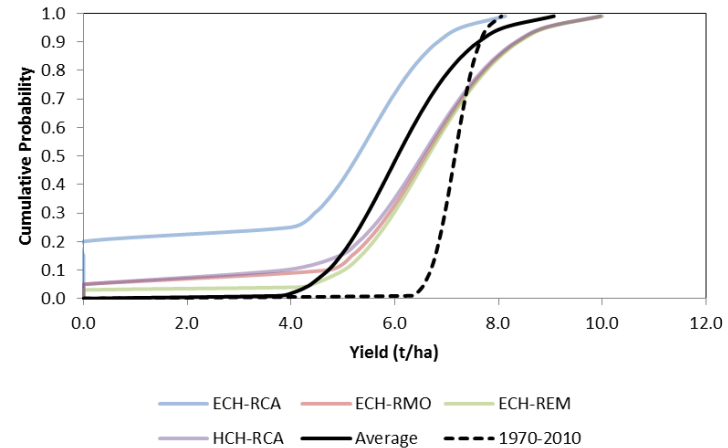


- March plantings
 - Yield ↓ 17%
- August planting
 - Yield ↓ 17%
- Results are soil dependent
 - Sandy clay loam strongly affected
 - Sandy loams least affected

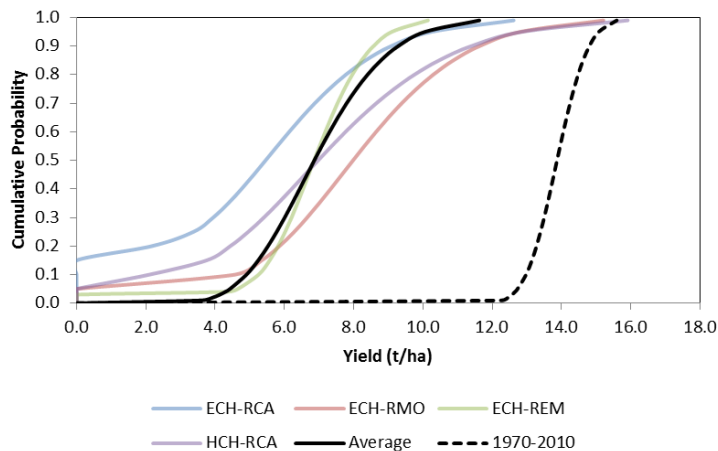
March Plantings
2040-2070



August Plantings
2040-2070



Total Harvest
2040-2070



- March plantings
 - Yield ↓ 86%
 - Crop failure 45%
- August planting
 - Yield ↓ 17%
- Total harvest
 - 50% less yield
- Results are soil dependent

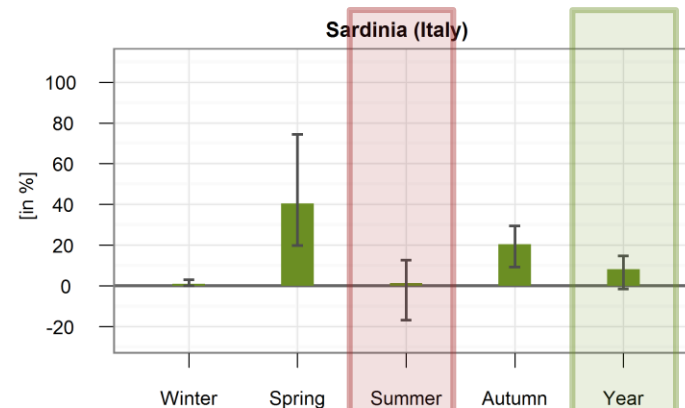
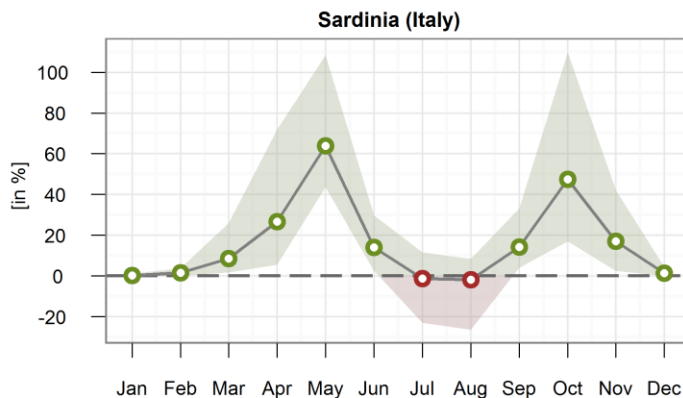
How do we know how much water is available?

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- Ask what happens with tourism demand

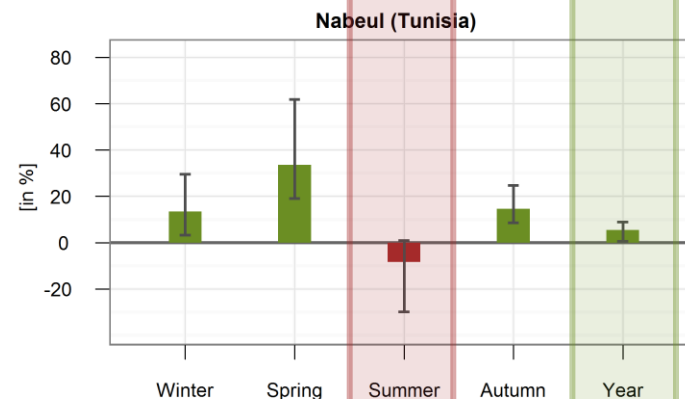
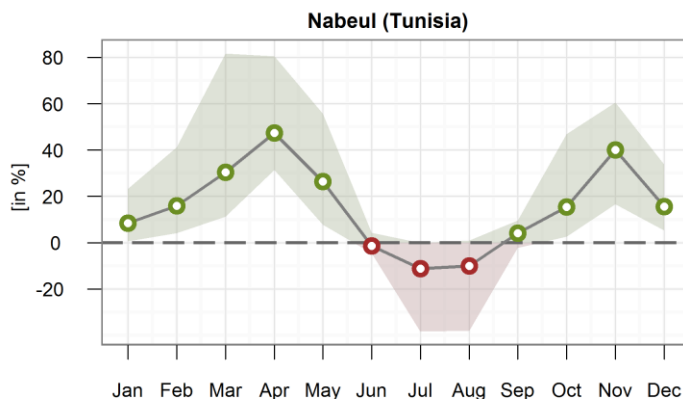
TOURISM – POTENTIAL CC-IMPACTS

- Expected change in overnight stays (in %) due to a change from reference (1971-2000) to future (2041-2070) climatic conditions



**Potential losses
in summer ...**

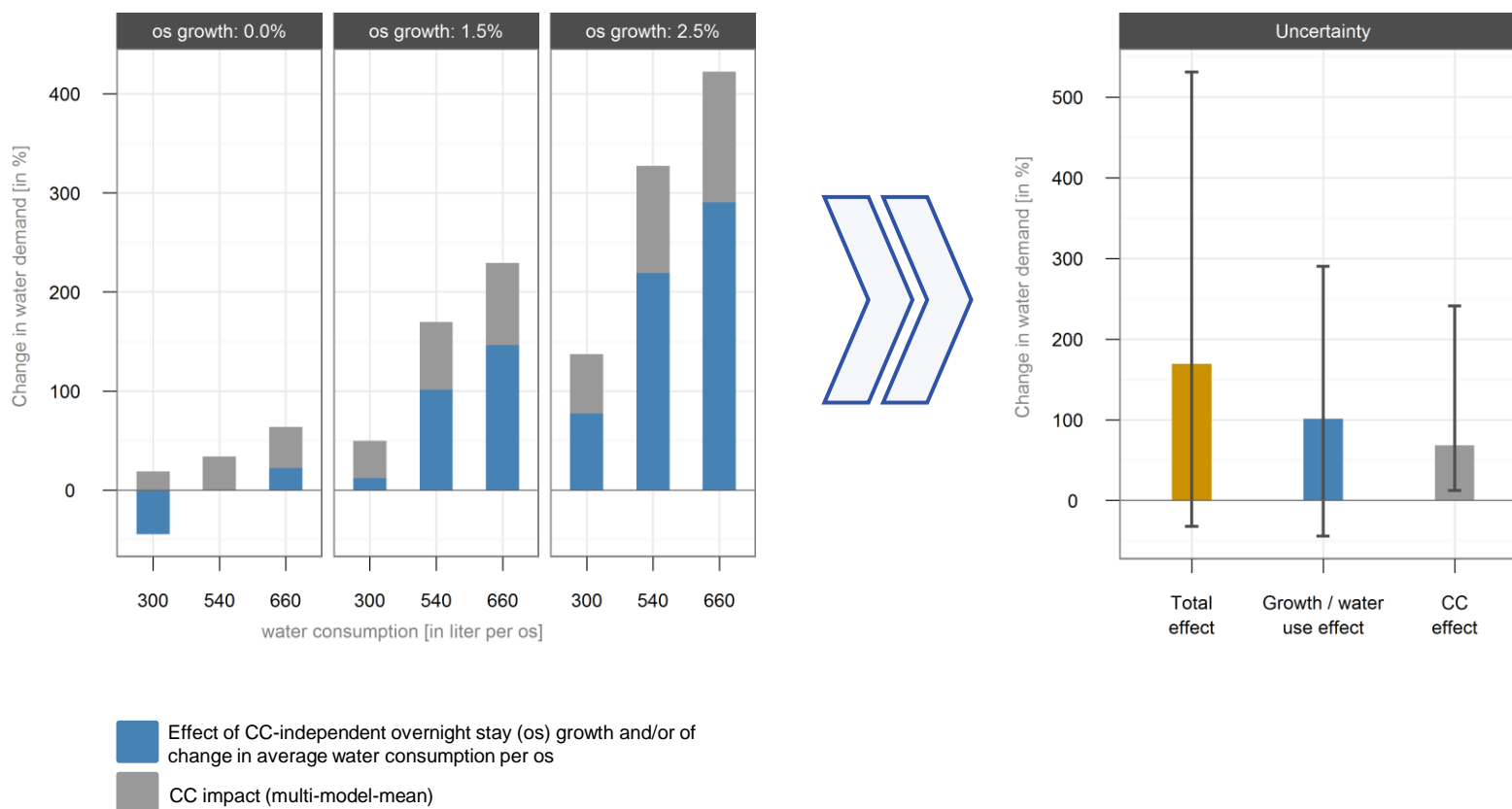
... BUT ...



**... tendentially
positive annual
net impacts.**

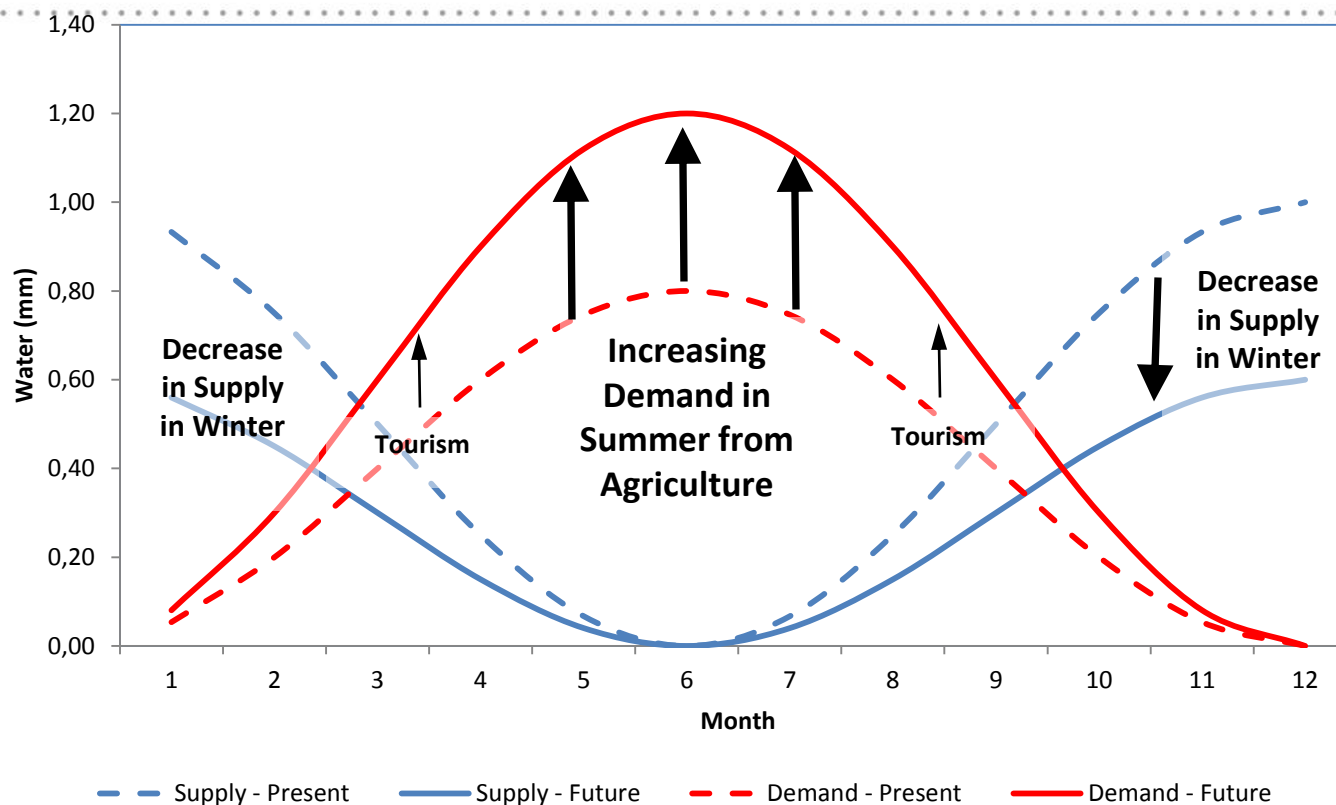
TOURISM – FUTURE WATER DEMAND SCENARIOS

- Change in future water demand (2041-2070) of tourism (Nabeul, Tunisia) during **spring** for different growth and water use scenarios



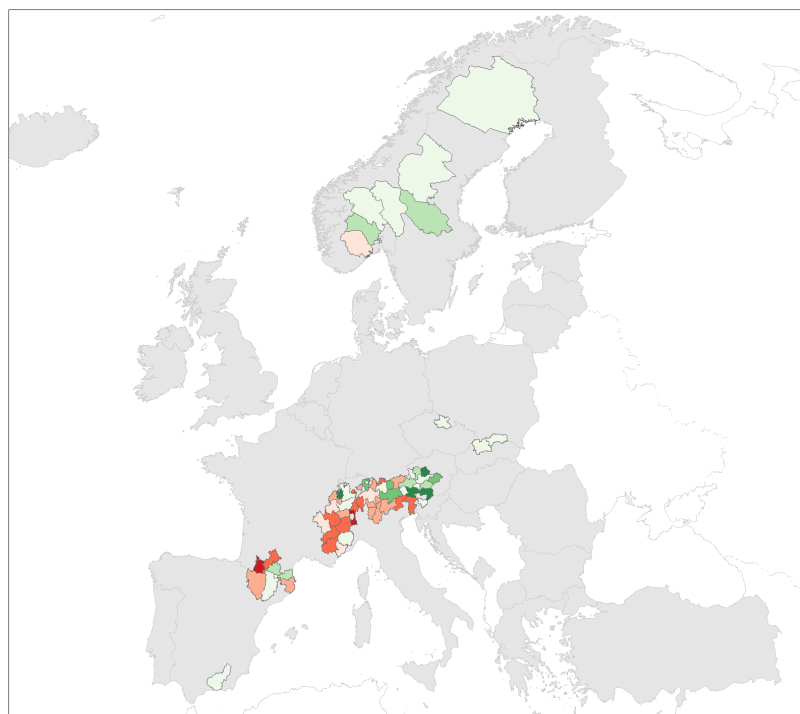
THE MAIN CHALLENGE

Conceptual Supply and Demand

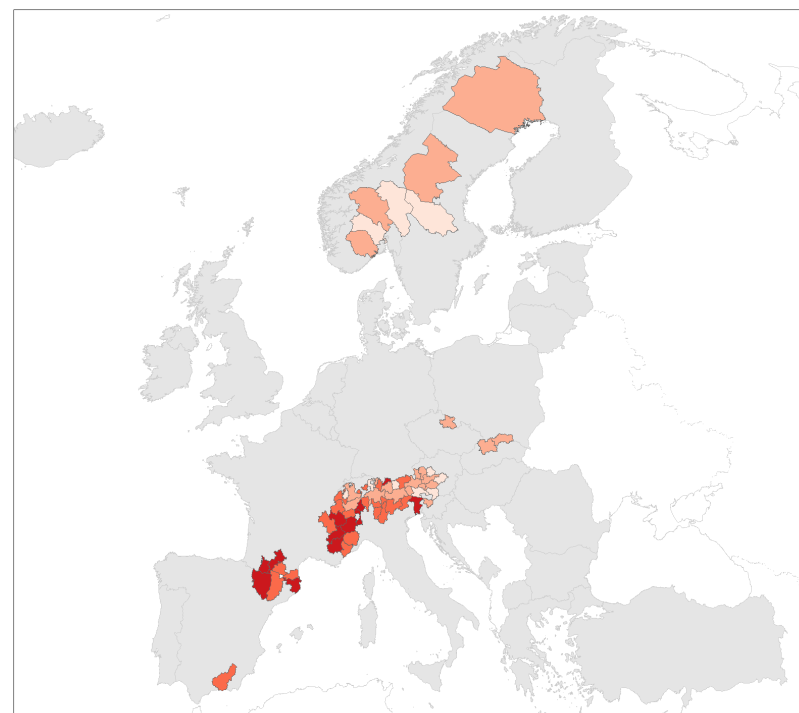
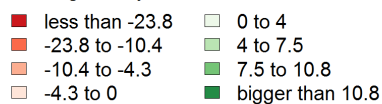


Impacts on touristic stream winter for RCP4.5 and 2035-2065

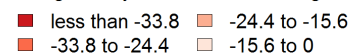
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Change in overnights stays when tourists stick to skiing in [%]



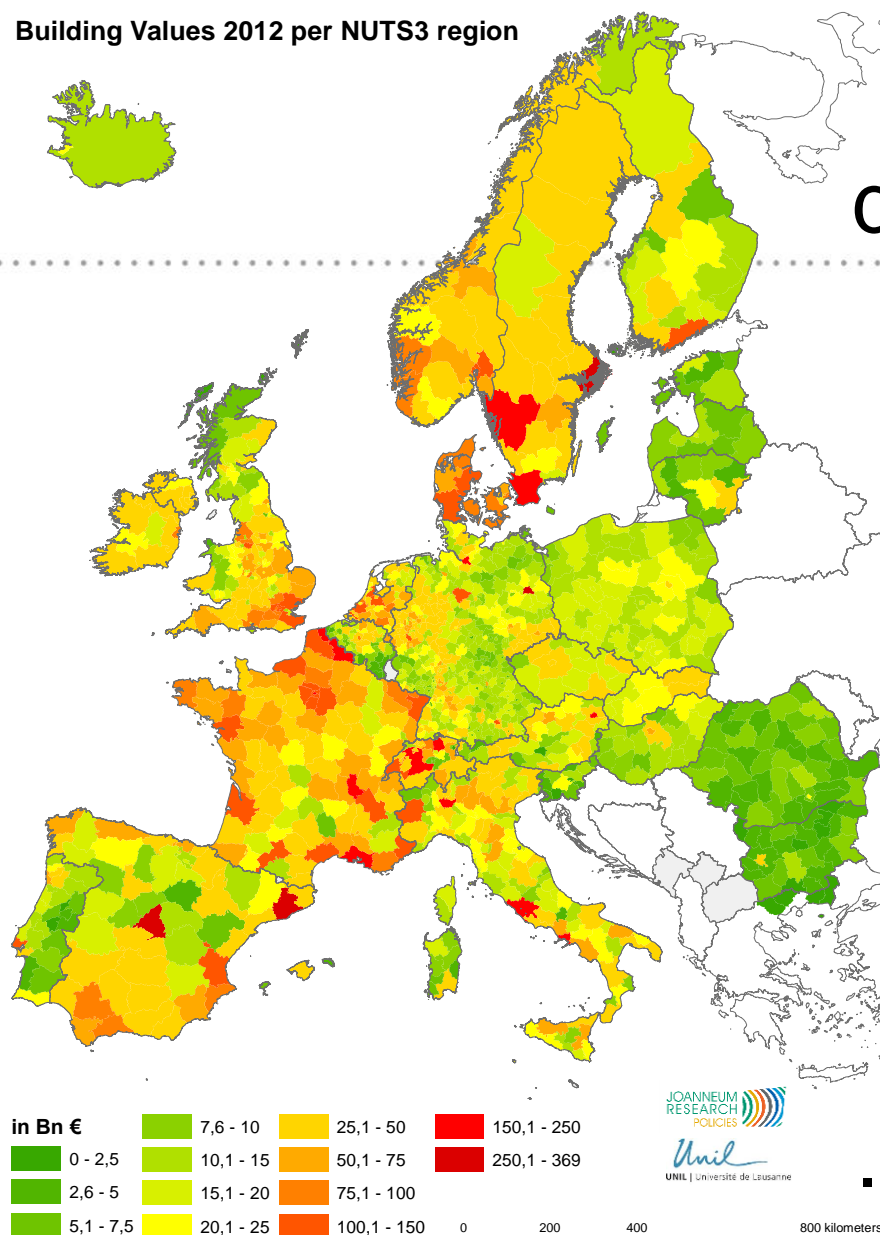
Change in overnights stays when tourists change activity in [%]



Building Values 2012 per NUTS3 region

Building value data base (100mx100m)

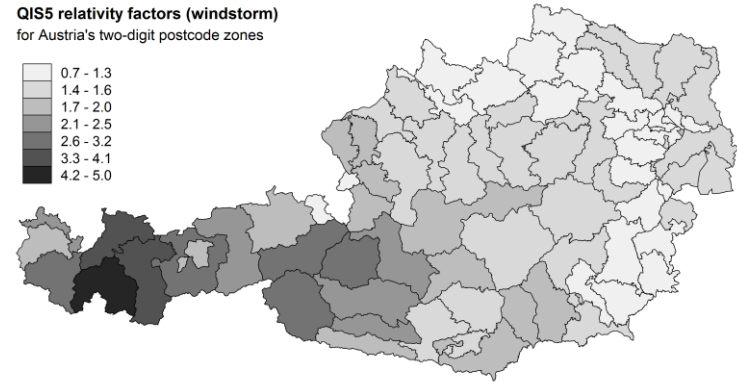
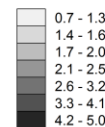
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Storm damage: why vulnerability matters

■ QIS5: wind speed based

QIS5 relative factors (windstorm)
for Austria's two-digit postcode zones



■ Average damage

Loss degree

Residential damage in ‰ of the building stock value

