RECIPE

Reinforcing civil protection capabilities into multi-hazard risk assessment under climate change

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Guidelines for a participatory crisis management plan to manage wind throw along roads

- Jakob Hörl

- 21st February 2020, Barcelona

CTFC · PAU COSTA FOUNDATION · protecció civil · FVA Forest Research Institute Baden-Württemberg · cima FOUNDATION OBSERVE TO PREDICT · BFW Austrian Research Centre for Forests · INSTITUTO SUPERIOR DE AGRONOMIA Universidade de Lisboa · ICGC Institut Cartogràfic i Geològic de Catalunya

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Outline

- Problem and future challenges
- Recent Example winterstorm “Sabine”
- Case-study development
- Risk dialogue

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Problem & challenges

- Storms unpredictable
- Climate change impact:
  - Frequency of storms unchanged
  - Increased intensity and severity
  - Change of storm tracks
- Increased complexity and connectedness of infrastructure and daily life
  - Higher economic damages when system fails

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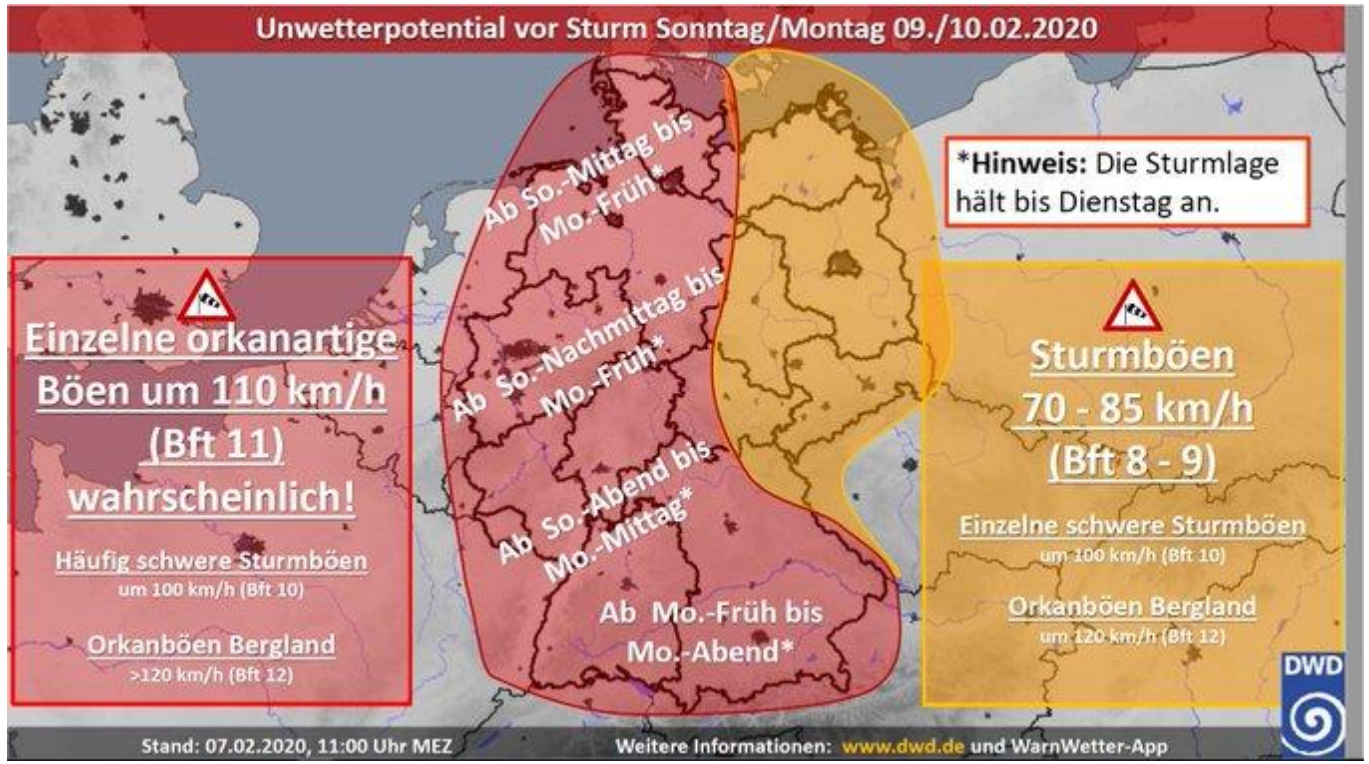
Winterstorm „Sabine“ 9th – 10th February 2020



- Wind speed > 120 km/h
- Thunderstorm & heavy rain
- Early warning system
- Broad media coverage

- Damages not as high as expected
- Forest damage remarkable in some areas (1/2 a.c.)

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Winterstorm „Sabine“ 9th – 10th February 2020

- Many road blockages
- Train & flight cancellations
- Power outages (France, Czech)
- Injured persons

- Local fire service:
  - 35 of 43 operations 2020

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Case-study development

"Guidelines for a participatory crisis management plan to manage wind throw along roads"

1. Prepare methodology
   - Literature search
   - Application of Swiss tool "RiskPlan"
2. Develop case
   - Define factors and identify data basis (available parameters, requirements)
   - Define case (develop scenarios, object areas)
   - Identify stakeholder groups / authorities to involve
3. Find partners
   - Contact districts / municipalities willing to conduct case study
   - Contact state forest administation and civil protection agency of Baden-Württemberg
4. Workshop "risk dialogue" / risk assessment
5. Develop participatory crisis management plan for case-study
6. Prepare guidelines at state level

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Define case

Assessment area:

- Administrative district (Landkreis): XXX
- Regions within assessment area: 25 – 30 municipalities

Object areas:

- Roads (direct and indirect damages)
- Buildings
- Train track
- Protected areas

Hazard processes

- Windthrow of trees (with and without climate change impact)
- Scenarios
  - Return period/frequency
  - Intensity
  - Weather before and during hazard event
- Expositions
  - Normal
  - Unfortunate
  - Catastrophic

Measures

- Combinations
- Cost-effectiveness analysis

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Identify stakeholder groups

- State administration (Forest service; civil protection agency)
- District administration
  - Resp. Departments (e.g. Fire and Civil Protection, Public Roads, Forestry)
- Fire service
- Federal Agency for Technical Relief (THW)
- Media
- Private forest owners
- Associations
- Insurances
- Appraisers (e.g. for tree control)
- Forest contractors

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Identify data basis (available parameter)

Factors:

- Critical wind speed
- Topografy
- Tree height
- Tree species
- Rooting depth
- Forest management
- Stand structure

- **Storm damage probability maps**

  Based on actual tree heights and species distribution

  Norway spruce (today; actual values)

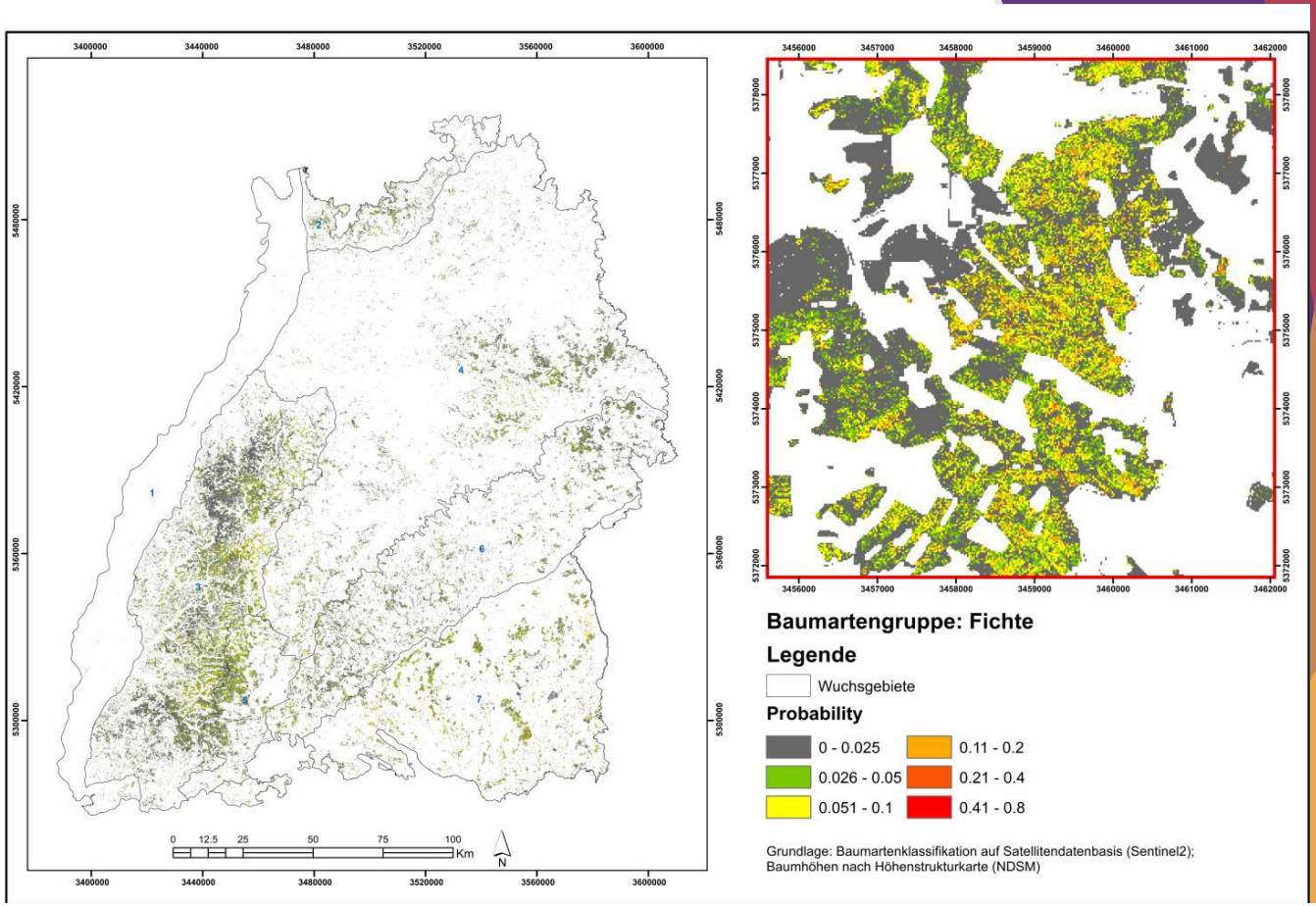

Abbildung 10: Kartenset I: Sturmgefährdung (Probability) für die Baumartengruppe Fichte (Picea abies) anhand deren realen heutigen Vorkommen und deren luftbildbasiert ermittelten Baumhöhen. Die Karte rechts ist eine beispielhafte Nahansicht.

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Identify data basis (available parameters)

- Storm damage probability maps

  Based on actual tree heights and species distribution

  Oak and beech (today; actual values)

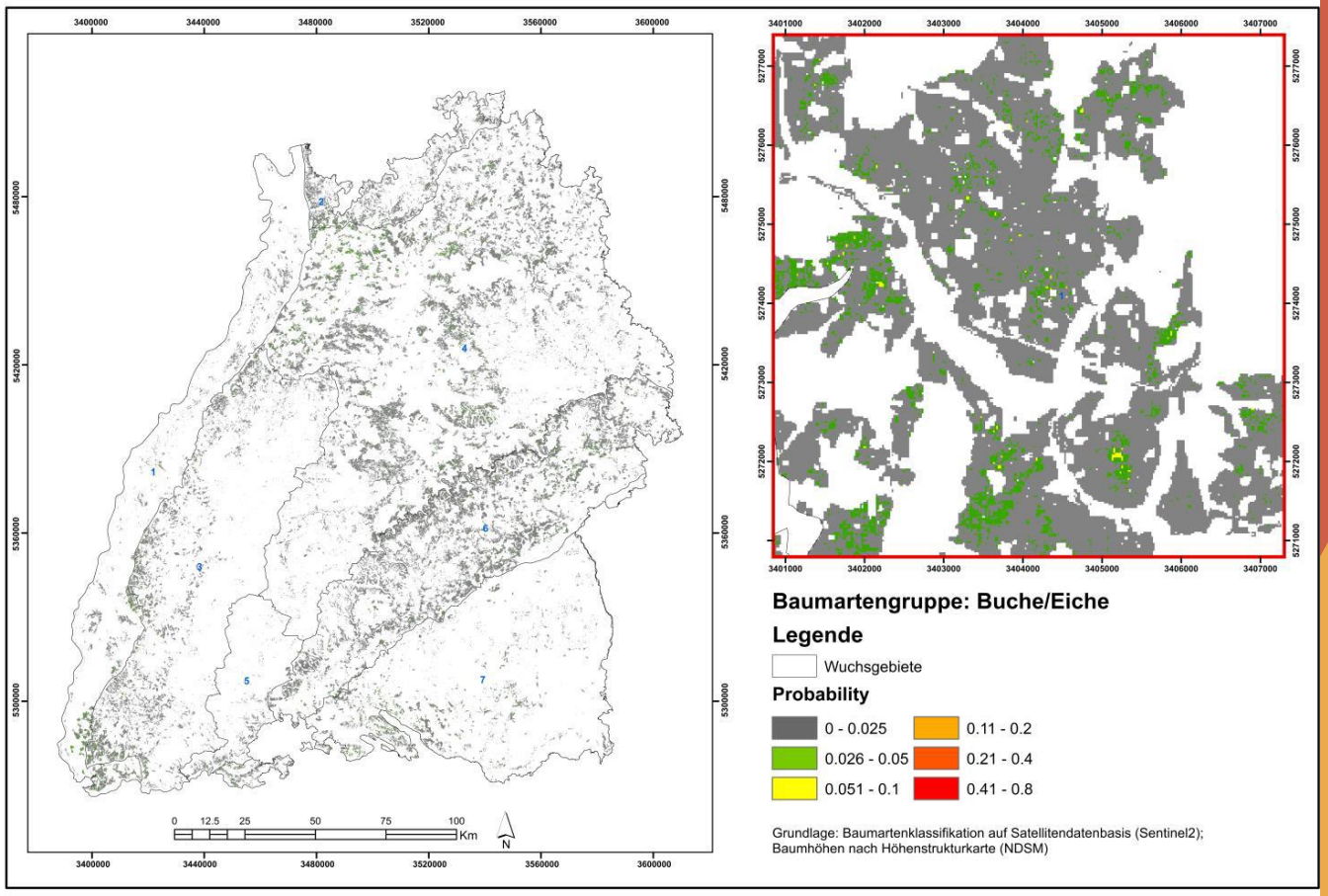

Abbildung 12: Kartenset I: Sturmgefährdung (Probability) für die Baumartengruppe Buche/Eiche (Fagus sylvatica Quercus robur, Q. petraea, Q. rubra,) anhand deren realen heutigen Vorkommen und deren luftbildbasiert ermittelten Baumhöhen. Die Karte rechts ist eine beispielhafte Nahansicht

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Identify data basis (available parameters)

- Storm damage probability maps

Based on actual tree heights and species distribution

Norway spruce (climate change)

Increase of wind gust speed by 1,58 %

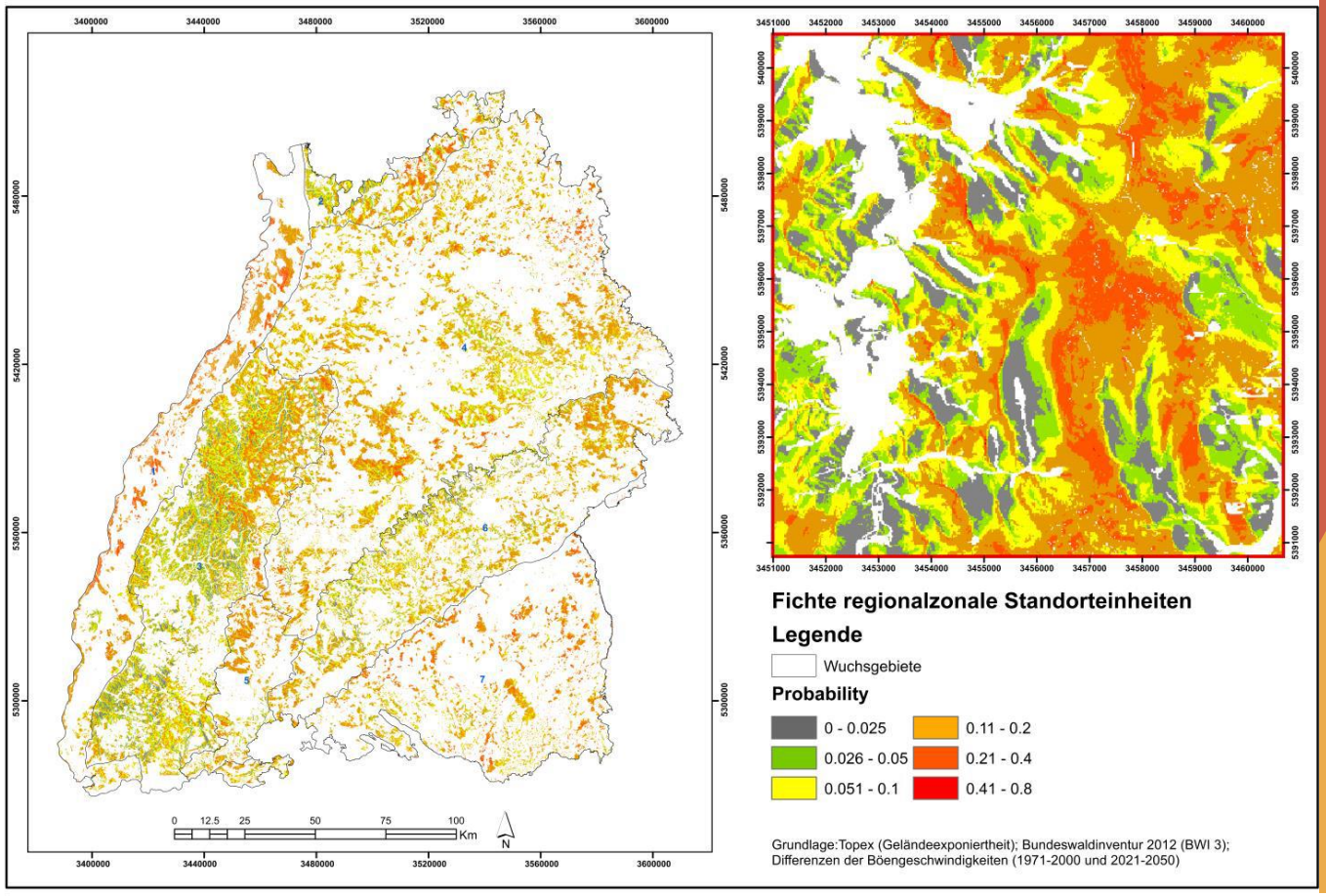

Abbildung 28: Kartenset III: Unter Klimawandel möglicherweise leicht erhöhte Sturmgefährdung (Probability) als Potentialkarte für einen Normbaum der Baumartengruppe Fichte. Beurteilungsgrundlage für die Staunässeinformation ist die regionalzonale Standorteinheit nach Standortskartierung. Nicht standortskartierte Waldflächen sind in dieser Karte nicht abgebildet. Die Karte rechts ist eine beispielhafte Nahansicht

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Identify data basis (available parameters)

- Storm damage probability maps

Based on actual tree heights and species distribution

Oak and beech (climate change)

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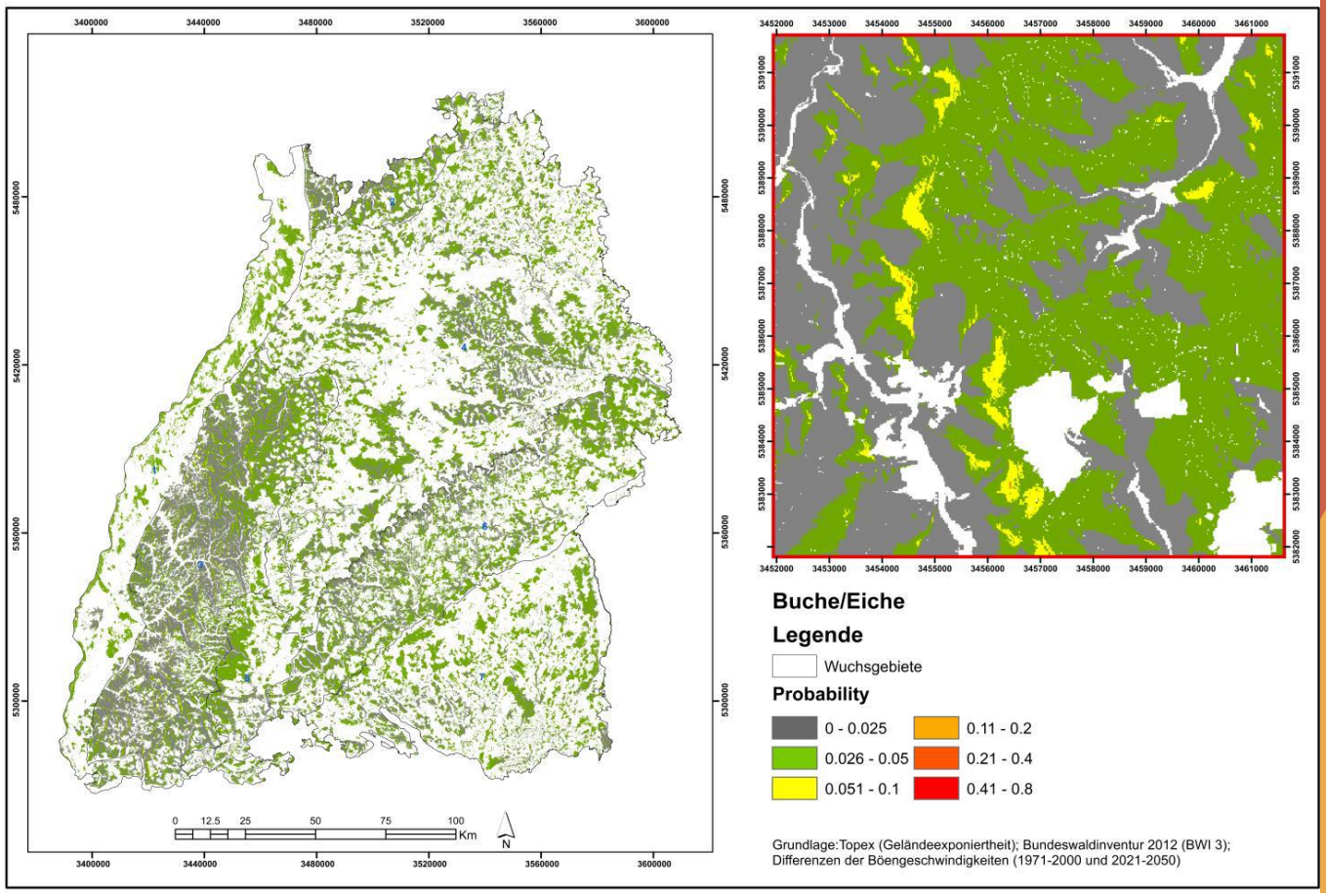

Abbildung 32: Kartenset III: Unter Klimawandel möglicherweise leicht erhöhte Sturmgefährdung (Probability) als Potentialkarte für einen Normbaum der Baumartengruppe Buche/Eiche. Abgebildet sind alle Waldflächen Baden-Württembergs. Die Karte rechts ist eine beispielhafte Nahansicht.

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Identify data basis (available parameters)

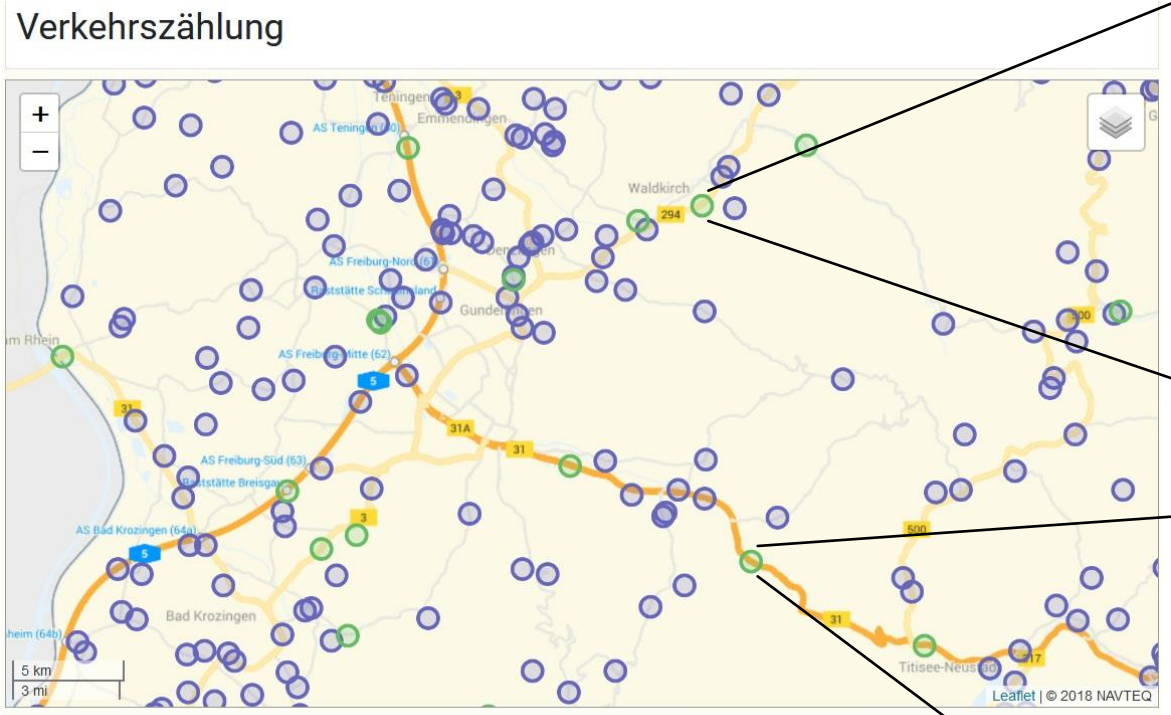
- Traffic volume data

Calculate

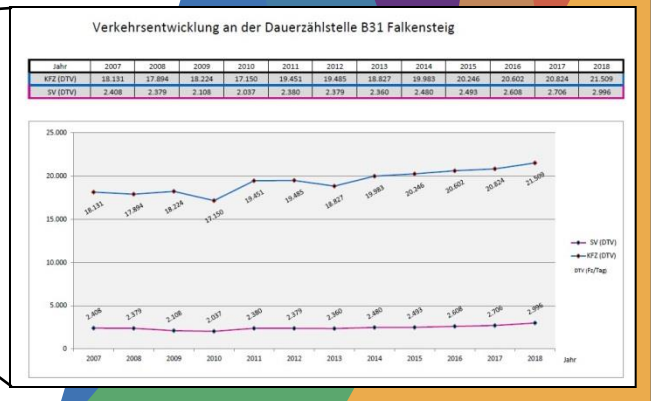
- Exposure
- Damage potential

Indirect damages

- Economic losses due to road closure



2018: 22.173 Kfz/24h ; 817 SV/24h (3,68 %)



2018: 21.509 Kfz/24h; 2.996 SV/24h (13,93 %)

Traffic type	Mean value [€/vehicle and h]
Commuter traffic	22,50
Leisure traffic	9,00
Business traffic	90 ,00
Freight traffic	96,00

From IREK(2012)

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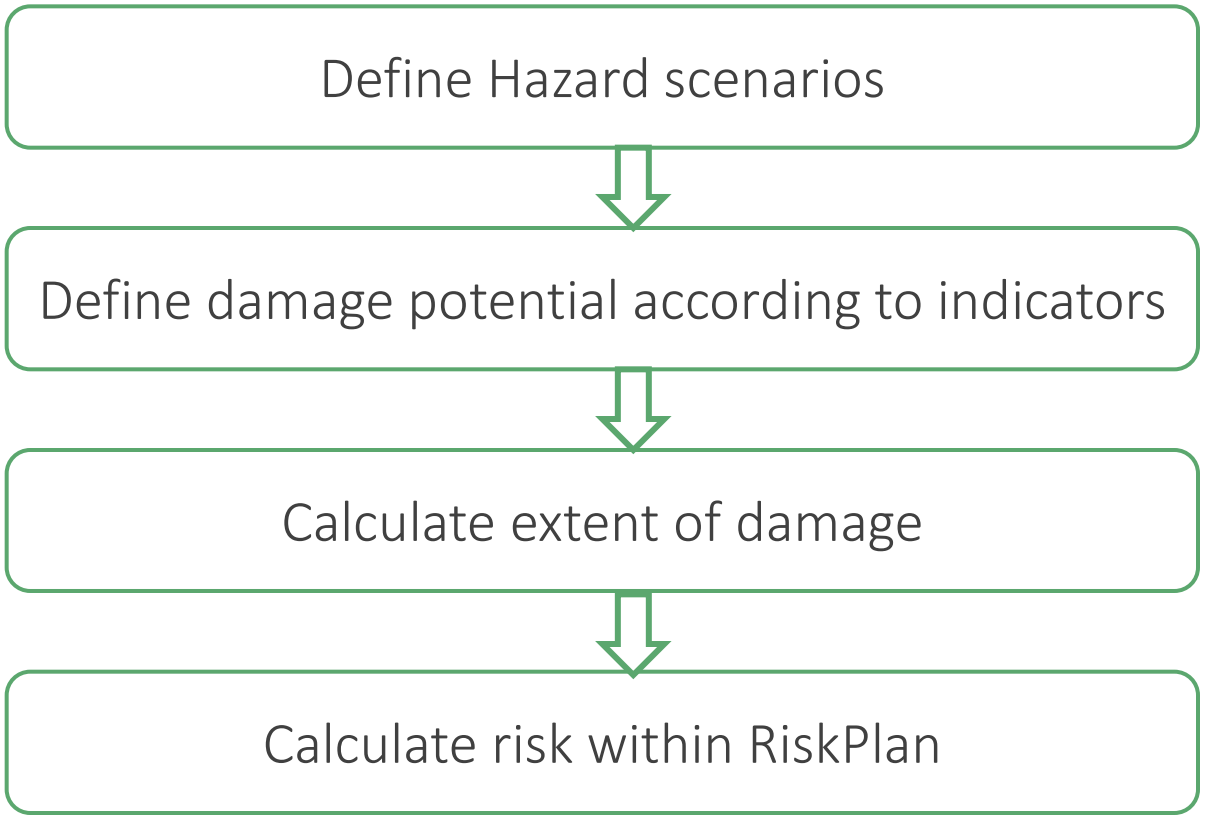
Procedure for risk assessment with RiskPlan



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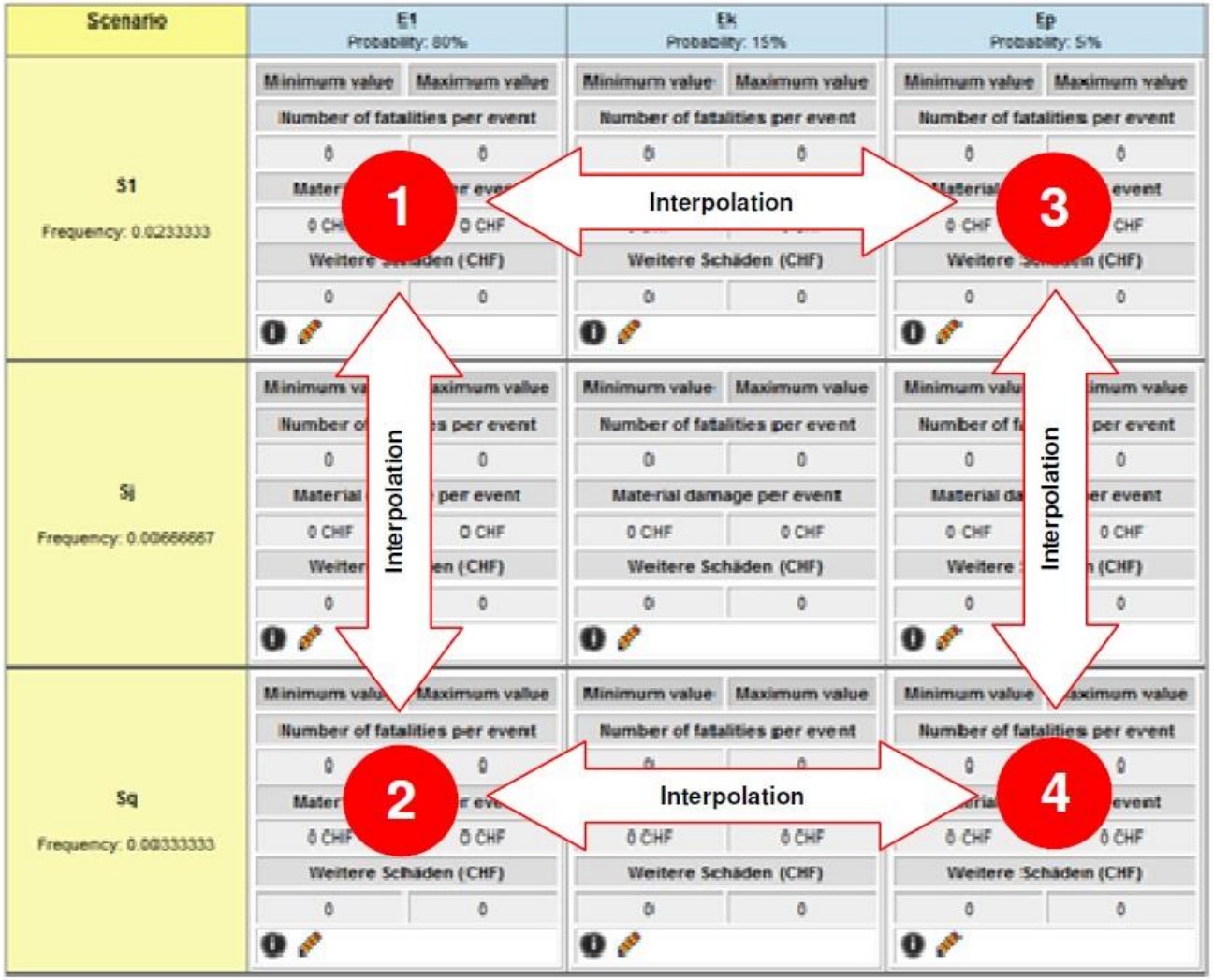
Risk dialogue

- Prepare scenarios
  - Frequencies
  - Exposures
  - Discuss
- Rough estimates of damage costs
- Identify needs and requirements of authorities / stakeholder



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Thanks for your attention

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