ASSESSING AGROECOSYSTEMS’ VULNERABILITY AND RISK REGARDING EXTREME WEATHER EVENTS

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1. Introduction
2. Approach
3. Application
4. Discussion & Perspective
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General idea
but ...
Based on expert knowledge

• Critical factors
• Rules between these factors and vulnerability
• Fuzzy Inference Systems

• e.g. soil erosion under heavy rain
1. Introduction
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Major factors

Row crops

Slope

Soil erodibility

Created by Takao Umehara from Noun Project
Fuzzy membership functions
Fuzzy membership functions

![Graph showing fuzzy membership functions for slope and row crops.](image-url)
Fuzzy membership functions

- **Slope**
- **Row crops**
- **Vulnerability**
Basic rules

• slope is high OR rowcrops is high  
  → vulnerability is high

• slope is moderate OR rowcrops is low  
  → vulnerability is moderate

• slope is low  
  → vulnerability is low
Let’s evaluate the vulnerability of a point where...
Let’s evaluate the vulnerability of a point where...

- Slope = 80
- Rowcrops = 45
We evaluate the antecedent of the first rule.
We evaluate the consequent
We evaluate the consequent

If slope is high

or row crops is high

then vulnerability is high (max)

Slope = 80

Rowcrops = 45
We obtain ... a first implication
We obtain ... a first conclusion.
... a second conclusion
... and a third one
We obtain the final evaluation of the vulnerability
1. Introduction
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The application of the method

Erosion

- Mean acreage of fields
- Row crops
- Short rotations (biennial)
- Compaction (deep)
- Slope
- Heavy rain
- Organic matter
- Loamy sand
- Loam
- Soil type

Legend:
- Ecological factor
- Human factor

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Inputs

Erodibility of soil (k-factor)
Inputs

Row crops in the UAA (%)
Inputs

Slope
Vulnerability

Vulnerability of agroecosystems under heavy rain
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Risk evaluation
RMI data

Daily rain - 20 years return level map