Vulnerability concepts:

**Intrinsic or environmental vulnerability:** natural conditions that determine vulnerability of an aquifer to leaching of a solute

**Specific vulnerability:** the non-environmental factors

The overall vulnerability is the combination of both aspects, which need to be considered when looking at vulnerability in the context of groundwater monitoring for pesticides.

Vulnerability mapping:

- Environmental conditions determining leaching are spatially variable.
- Therefore geospatial analyses can be used to identify areas where environmental conditions provide more or less protection against leaching to groundwater.
- Such an analysis can be used to create a vulnerability map showing areas where an active substance or metabolite is more or less likely to leach to groundwater compared to other areas.
- Analyses can inform study design and/or interpretation, e.g.
  - where are the most appropriate areas to locate monitoring sites?
  - how does the leaching vulnerability at monitoring sites where data are available compare to other areas?
- Possible analysis approaches include index methods, spatially distributed process-based models and metamodels.

Monitoring site characterisation:

To understand relevance and representativity of monitoring data, information about the monitoring sites themselves – characterisation - is needed. Generally, the better the characterisation of the site, the higher the level of confidence in the monitoring data.

Characterisation has two main aspects

- Assessment of intrinsic, specific and overall vulnerability (see above)
- Establishing a connectivity between the sampling point and treated fields; can the sampled water be linked hydrologically to infiltration from treated fields?