



## **Introducing an interactive six-step approach to obtain the required soil data for regional land use analyses**

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The soil data required for regional land use analyses (RLUA) changed over the last decades. Regional land use analyses became more interdisciplinary, more quantitative, and increasingly use simulation models. This change caused a gap between the soil data that are available and that are required. Current regional land use analyses often do not know which method to apply for obtaining the required soil data most effectively. This study introduces an interactive six-step approach that helps studies on regional land use analyses find the required soil data. The approach is introduced as the ARDAIG approach:

1. Define the modelling Approach. The modelling approach can range from qualitative to quantitative and from empirical to mechanistic. The scale at which the soil data are required also needs to be identified in this step.
2. Define the soil data Requirements. This does not only include information on the required soil properties, but information on the variation over depth and spatial variation as well. A sensitivity analysis on the soil data forms an essential part to support the definition of the requirements.
3. Inventorize available soil Data. For example, soil data warehouses can be consulted in the inventory (e.g., European Soil Data Centre (ESDAC) of the Joint Research Centre and the recently renewed ISRIC Soil Data Hub). However, also soil data that come along agronomic experiments can be useful for RLUA and should be inventorized. When no soil data are available, continue to step 5.
4. Assumptions and quality of the available soil data need critical evaluation. Different assumptions were made when a soil dataset was established and the quality of a soil dataset for a particular application differs as well. The suitability of a soil dataset for a particular RLUA needs to be evaluated and unsuitable soil datasets eliminated.
5. Identify the gap between the available and required soil data. Not all RLUA have a gap, but it is important to verify the absence of the gap. If there is a gap, identify the missing soil data. Based on the soil data requirements defined in step 2 and the evaluation in step 4, the gap can be identified.
6. Bridging the Gap. Evaluate the available project resources, auxiliary data and mapping tools and techniques, to identify whether the gap can be bridged by transforming available soil data or collecting new or additional soil data. When it is impossible to bridge the gap, e.g., due to lack of resources, reconsider step 1.