



## **SCALES : a large-scale assessment model of soil erosion hazard in Basse-Normandie (France)**

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The Basse-Normandie is regularly affected by mud flows whose origin is mainly related to the erosion of agricultural soils. The fight against erosion is registered like a priority in the policies of regional management which seek tools for diagnosis of fine scale of soil erosion hazard. For this reason, the Department of Calvados (Basse-Normandie) wished to obtain a tool to identify the areas of production of erosion on the whole of its territory (5500 km<sup>2</sup>). The SCALES model (Spatialisation d'eChelle fine de l'ALéas Erosion des Sols) which we propose registers from this point of view. It concerns the research tasks relating to the mapping of the risks of soil erosion).

SCALES is a cognitive model, i.e. it represents an operation in a way simplified by using qualitative rules, like the rules of transfert functions, and the evaluations and hierarchisations of parameters, based on the knowledge of experts. It is representable in the shape of a logical tree structure where each crossing of factors involves several possible answers. It is dissociated some to some extent by nature of the data and the choice of the space unit of integration of information. The first stage consists in defining the potential sensitivity of the environment in erosion starting from the taking into account of the factors of erosion which are the soil, the agricultural practices and the topography. The first two factors are evaluated starting from the combination of two parameters : the structural stability and the dynamics of hydrous desaturation for the soil, the land cover and the management of the crops (crop rotations data and intercrops management data) for the agricultural practices.

The second stage carries out to cross the preceding data with the climatic data in order to establish the soil erosion hazard. The rainfall erosivity is estimated by crossing the annual number of days for which the intensity of the rains is higher or equal to 10 mm and the yearly hydrological positive water balance. The potential sensitivity of

the environment in erosion and the rainfall erosivity are defined by levels which go from 0 to 5.

In spite of the large surface of the study area, the space resolution of the results is very fine. That is explained for three reasons. Firstly, that is due to the choice and the possibility of access of Elementary Integrated Spatial Units (EISU) corresponding to the elementary «Crop parcels». Crop parcels exist in digital format and has been derived from the Inventory of Common Agricultural Politics. Secondly, we could use a DEM with a grid resolution of 20 m. Soil ressource assessment. Lastly, the agricultural practises and soil resource assessment were obtained starting from extrapolation of investigation data near the farmers and from a large-scale global map carried out on the basis of 9000 soil boreholes (borehole density: 1 per 50 ha of UAS). The integration of all the data in a GIS makes it possible to consider scenarios of evolution and prediction of the soil erosion hazard on annual and seasonal scales in the most significant areas. This tool will allow to develop a monitoring concerning the potential surfaces of soil erosion production and to start procedures of actions in order to limit the consequences beyond transmitting surfaces.