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Vulnerability analysis for a drought Early Warning System

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Early Warning Systems (EWS) for drought are often based on risk models that do not, or marginally, take into account the vulnerability factor. The multifaceted nature of drought (hydrological, meteorological, and agricultural) is source of coexistence for different ways to measure this phenomenon and its effects. The latter, together with the complexity of impacts generated by this hazard, causes the current underdevelopment of drought EWS compared to other hazards.

In Least Developed Countries, where drought events causes the highest numbers of affected people, the importance of correct monitoring and forecasting is considered essential. Existing early warning and monitoring systems for drought produced at different geographic levels, provide only in a few cases an actual spatial model that tries to describe the cause-effect link between where the hazard is detected and where impacts occur. Integrate vulnerability information in such systems would permit to better estimate affected zones and livelihoods, improving the effectiveness of produced hazard-related datasets and maps.

In fact, the need of simplification and, in general, of a direct applicability of scientific outputs is still a matter of concern for field experts and early warning products end-users. Even if the surplus of hazard related information produced right after catastrophic events has, in some cases, led to the creation of specific data-sharing platforms, the conveyed meaning and usefulness of each product has not yet been addressed. The present work is an attempt to fill this gap which is still an open issue for the scientific community as well as for the humanitarian aid world.

The study aims at conceiving a simplified vulnerability model to embed into an existing EWS for drought, which is based on the monitoring of vegetation phenological parameters and the Standardized Precipitation Index, both produced using free satellite derived datasets. The proposed vulnerability model includes (i) a pure agricultural vulnerability and (ii) a systemic vulnerability. The first considers the agricultural potential of terrains, the diversity of cultivated crops and the percentage of irrigated area as main driving factors. The second vulnerability aspect consists of geographic units in which a set of socio-economic factors are modeled geographically on the basis of the physical accessibility to market centers in one case, and according to a spatial gravity model of market areas in another case. Results of the model applied to a case study (Niger) and evaluated with food insecurity data, are presented.