



Decision Theories used in Areas Planning around La Colacha Basin (Cordoba, Argentina) considering Natural and Human Hazards

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The authors of U.P.M. have had relations with Argentine Universities and Administrations, in part with J.M.Cisneros that is Professor at Universidad Nacional de Rio Cuarto in Prov. de Córdoba Arg., and have applied Decision Theories with Mathematic tools for the planning of defences and uses of soils in these areas and especially of La Colacha bassin enlarged with larger areas around it as “Cuenca de los Arroyos Menores” at West and South of Rio Cuarto. These large flat lands have loess soils brought by winds from Los Andes that are much far at West, there is a very old line of not high mountains at West near the study area from which rivers flow with little slopes to somehow lower flat areas at West with some marshes. Rivers through loess get regressive erosions with rains forming kilometres long ditches in the loess called “cárcavas” some meters deep and quite large across otherwise flat agricultural lands, and J.M. Cisneros, that has numerous publications about local soil uses, has directed diverse genie rural works to halt the regression of some of them. Part of the study is about protection against floods and “cárcavas”. There are famous experiences and records of higher inundations of large areas by rivers. Latitude of Rio Cuarto is 31°25’ South, that area is temperate refreshed by south winds, Zonda föhn winds from West being hotter and drier, and there are monsoons and so winter in July is dry and summer and December has rains, that average 829mm per year. Wind erosion and fires occur frequently on these loess soils in winter. This is an excellent area for agriculture but some actual uses may be not sustainable in long term such as excesses with genetically engineered soy, and the authors have studied aided with mathematical models (ELECTRE I, PROMETHEE and Expert Choice) the preferences of various alternative systems of land use (Autochthonous forest, High value forest, Traditional farms, Erosion control Crop with agriculture use, and Erosion control Crop with industrial use (biomass)) in view of diverse Criteria (Water erosion index, Eolian erosion index, Implementation facility, Water resources, Economical Benefits, Hand power, Environmental Impacts, social Acceptance), as contribution for territorial planning, in part in relation with local official agencies.

There are numerous references in local Spanish Argentine literature about the region uses of soils, some of J.M.Cisneros, and many general references, let note about Decision Theory:

- (1) Grau, J. B., Antón, J.M., Tarquis A. M., Andina, D. Election of water Resources Management Entity using a Multi-criteria decision (MCD) Method in Salta Province (Argentina)”. CITSA 2008, Orlando 29 June-2 July, 2008.
- (2) Roy, B., D. Bouyssou. Aidé Multicritère à la Décision: Méthodes et cas. Economica, Paris 1993.
- (3) Saaty, T. The Analytic Hierarchy Process, Mac Graw-Hill, New York, 1980.