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Mathematical model to select the optimal alternative for an integral plan to fight against desertification and erosion in the Chaco area in Salta Province of Argentine

J M Anton (1), J B Grau (2), F Colombo (3), L de los Rios (3), and A M Tarquis (2)

(1) Universidad Politecnica de Madrid, Matematica Aplicada, Madrid, Spain (josemanuel.anton@upm.es, 34 91336 5817), (2) Universidad Politecnica de Madrid, Matematica Aplicada, Madrid, Spain (34 91336 5817), (3) Universidad Catolica de Salta, Salta, Argentina (ldelosrios@ucasal.net)

That area in the Province of Salta at North West of Argentina has a size not smaller than Belgium and low growing population, and is a specific example of combined natural, ecologic, agricultural and human evolution, where a main restriction is the necessity to avoid desertification, that is the soil quality loss studied now in several forums, the U.N.O. having said "Desertification has a very high incidence in the environmental and food security, socioeconomic stability and world sustained development". It is one of FAO's most important preoccupations as hunger in the world is increasing. Multiple factors are involved on it. Ones are in relation with natural phenomena like water and wind erosion. Others with human activities linked to soil use and water management, and finally with inappropriate activities. The parallel 24º S is central and sun is intense, annual rain is between 1000mm to 600mm being lower at East, and climate is agreable for humans specially at dry season from May to November. The soils came mostly as large deposits from rivers, from Andes Mountains, the large study area is rather flat with low mountains at SW, otherwise altitude is from 500m at NW to 200 at SE. The Bermejo is the greater river and at cross from NW to SE and has elevated land and consequently has migrated 50-100 km to NE letting a smaller channel in previous course. The city of Salta is out at West, organized since about 1588, and a main road runs N-S at the higher West of the area communicating it with Salta and towards distant Rio de la Plata for commerce, and with Bolivia at Nord. The use of land changes from West, which is now intensely cultivated and uses somewhere water from rivers, to East were the Wichi Indians live primitively and freely in a very large natural area using goats and "chanchos" (pigs) of European origin that grow in big numbers undomesticated, having somehow degraded original natural vegetation that contains now specific shrubs and small trees in areas more or less inundated by Bermejo in rainy season that is roughly from November to May. The Indians have at disposal schools and the limits of the organized area are moving to east with care for them and to prevent desertification. The authors from UPM and UCS consider diverse alternative possibilities of future use of soil, taking into account economical, environmental, cultural and sociological criteria. They have elaborated for this presentation a multicriteria model to select among different alternatives to prepare an integral plan in order to solve this problem in each area. Eight criteria and six alternatives have been introduced in the model. Six subzones have been established following previous studies.