



Multi-temporal Analysis of Desertification Sensitivity in the Province of Azuay since 1982.

Análisis multitemporal de la sensibilidad a la desertificación en la provincia del Azuay a partir del año 1982.

Pineda, F., Pacheco, F., Huamani, A., 2008. *Investigación Científica y Tecnológica*. Quito, Ecuador. Universidad Politécnica Salesiana.

SUMMARY

Multiple research highlights the importance of desertification, so the present study has as its main objective, to improve existing documentation and information in order to historically evaluate the process of desertification in the province of Azuay- Ecuador to compare it with a multi-temporal analysis and multi-criteria GIS as a basis methodology aimed to determine the guidelines needed to reverse, control and prevent the desertification process. The sources of information (materials) come from climate data and mapping national institutes (INAMHI, SENPLADES, MAE, Geological and Mining Institute), with practices in surveys and interviews with technicians and farmers. By applying the ESA's Environmental Sensitivity Areas method for desertification developed by the MEDALUS

Methodology

An analysis of the environmental sensitivity to desertification was performed by modifying the model developed in the European project MEDALUS (Mediterranean Desertification and Land Use). Based on the applied methodology, different areas with varied degrees of environmental desertification were identified by means of calculating the (Kosmas, et. Al, 1999) rate. Climate information and thematic mapping of Azuay that was available was used to assess each criterion.

Table 1. Type of information, scale and source of thematic layers used as parameters for calculating the soil quality index (SQI), climate (CQI) and vegetation (VQI).

Index	Resolution	Information
Soil	Provincia	Soil texture, soil depth, soil organic matter, soil pH, soil salinity, soil water content, soil temperature, soil moisture, soil erosion, soil compaction, soil fertility, soil quality, soil health, soil sustainability, soil resilience, soil adaptability, soil tolerance, soil resistance, soil recovery, soil regeneration, soil restoration, soil rehabilitation, soil remediation, soil decontamination, soil detoxification, soil disinfection, soil sterilization, soil disinoculation, soil decontamination, soil detoxification, soil disinfection, soil sterilization, soil disinoculation
	Parcela	Soil texture, soil depth, soil organic matter, soil pH, soil salinity, soil water content, soil temperature, soil moisture, soil erosion, soil compaction, soil fertility, soil quality, soil health, soil sustainability, soil resilience, soil adaptability, soil tolerance, soil resistance, soil recovery, soil regeneration, soil restoration, soil rehabilitation, soil remediation, soil decontamination, soil detoxification, soil disinfection, soil sterilization, soil disinoculation
Vegetation	Provincia	Vegetation cover, vegetation index, vegetation density, vegetation height, vegetation biomass, vegetation productivity, vegetation quality, vegetation health, vegetation sustainability, vegetation resilience, vegetation adaptability, vegetation tolerance, vegetation resistance, vegetation recovery, vegetation regeneration, vegetation restoration, vegetation rehabilitation, vegetation remediation, vegetation decontamination, vegetation detoxification, vegetation disinfection, vegetation sterilization, vegetation disinoculation
	Parcela	Vegetation cover, vegetation index, vegetation density, vegetation height, vegetation biomass, vegetation productivity, vegetation quality, vegetation health, vegetation sustainability, vegetation resilience, vegetation adaptability, vegetation tolerance, vegetation resistance, vegetation recovery, vegetation regeneration, vegetation restoration, vegetation rehabilitation, vegetation remediation, vegetation decontamination, vegetation detoxification, vegetation disinfection, vegetation sterilization, vegetation disinoculation
Topography	Provincia	Topographic position, topographic index, topographic relief, topographic slope, topographic aspect, topographic orientation, topographic exposure, topographic shelter, topographic protection, topographic barrier, topographic obstacle, topographic hindrance, topographic impediment, topographic restriction, topographic limitation, topographic constraint, topographic restriction, topographic limitation, topographic constraint, topographic impediment, topographic hindrance, topographic obstacle, topographic barrier, topographic protection, topographic shelter, topographic exposure, topographic orientation, topographic aspect, topographic slope, topographic relief, topographic position
	Parcela	Topographic position, topographic index, topographic relief, topographic slope, topographic aspect, topographic orientation, topographic exposure, topographic shelter, topographic protection, topographic barrier, topographic obstacle, topographic hindrance, topographic impediment, topographic restriction, topographic limitation, topographic constraint, topographic restriction, topographic limitation, topographic constraint, topographic impediment, topographic hindrance, topographic obstacle, topographic barrier, topographic protection, topographic shelter, topographic exposure, topographic orientation, topographic aspect, topographic slope, topographic relief, topographic position

Results and discussion

Four maps were elaborated, they had been evaluated during the periods 1982, 1983-1990, 1991-2000 and 2001-2008 were developed. ESA's values were divided into four main classes; they were arranged according to the degree of sensitivity as unaffected areas, potential areas, fragile areas and critical areas.

Conclusions

1. The Multi-temporal analysis identified changes in sensitivity to desertification in Azuay during period 1982-2008. This information is essential in order to know territorial trends and prevent solutions.
2. The increase of the sensitivity to desertification is attributed to several reasons like agricultural colonization that the process subjected, the expansion of agricultural frontier due to grazing and overgrazing, land use, excessive irrigation and the

La provincia del Azuay se enfrenta a un proceso de desertificación y el investigador de la Sede Cuenca, Fredi Portilla Farfán, Ph.D, compartió los resultados de sus estudios sobre el fenómeno en The International Conference on Regional Climate ICRC-CORDEX 2016 (Conferencia Internacional sobre el clima Regional) realizada en Estocolmo-Suecia. Portilla presentó el artículo científico «*Multi-temporal analysis of Desertification sensitivity in the Province of Azuay since 1982*”, (Análisis multitemporal de la sensibilidad a la desertificación en la provincia del Azuay a partir del año 1982), donde se recogen los resultados del proyecto de investigación sobre desertificación en el Azuay, en el marco del estudio del Cambio Climático y sus consecuencias sobre la biodiversidad.

El evento fue organizado por la Academia del Bolin Centre for Climate Research–Stockholm University y SMHI (Swedish Meteorological and Hydrological Institute); validado por la WCRP (World Climate Research Programme) y ECRA (European Climate Research Alliance), y patrocinado por EUMETSAT, ESA y FORMAS. (Academia del Bolin centro de investigación del clima, Universidad de Estocolmo y SMHI (Instituto sueco de meteorológico e Hidrológico).

La conferencia internacional se enfocó en la recopilación de información sobre vulnerabilidad, impactos y adaptación de fenómenos meteorológicos y su potencial



influencia sobre el clima regional y mundial.

En este evento participaron entre ponencias y posters científicos 372 investigadores provenientes de 127 países de los cinco continentes. Fue la oportunidad para conocer e intercambiar ciencia y para potenciar los proyectos de investigación bajo la dirección del Dr. Portilla, quien viene trabajando en temas de Cambio Climático desde la óptica de la gestión del suelo, biodiversidad, agua e impacto antropogénico. El campo de investigación se encuentra en los cantones y parroquias de la provincia del Azuay, con enfoque en los bosques andinos como Bosque Protector Aguarongo, situado entre los cantones de Cuenca, Gualaceo y San Bartolomé. Participaron de este trabajo de investigación los alumnos de Ingeniería Ambiental: Fernando Pacheco, Alexandra Noguera, Pablo Parra, Paola Criollo, Vanessa Contreras, Elizabeth Lomas y Daniel Zumba.

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