A new model for hazard evaluation of vegetation degradation using DPSIR framework, a case study: Sadra Region, Iran

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INTRODUCTION

Iran lies within the arid and semi arid climatic belt, and in such climatic conditions the land degradation processes are known to progress more speedily and pervasively. Compared to other countries in the Middle East, the present status of land degradation in Iran is alarming as about 94% of arable lands and permanent pastures are estimated to be in the process of degradation (FAO 1994). This includes the large proportion of land that has already been affected by vegetation degradation which forms one of the major types of land degradation in Iran. That is why evolving a model, such as the present one, for assessing the hazard of vegetation degradation is extremely important.

Vegetation cover changes play an important role in the development of environmental processes (Van Wijngaarden 1991). Vegetation degradation results in reduction in the available biomass, and decline in the vegetative cover. The Sadra watershed which covers the upper reaches of Marharlu basin, in southern Iran, has been chosen for a test hazard assessment of this type of degradation. The different kinds of data for indicators of vegetation degradation were gathered from collecting of field data like percent canopy and biomass and also records and published reports of the governmental offices of Iran. A new model has been developed for assessing the hazard of vegetation degradation using DPSIR (Driving forces, Pressures, State, Impacts and Responses) framework. The approach is based on the use of indicators, which may be direct or indirect, ecological, technical, socioeconomic or cultural causes of environmental hazard. Taking into consideration fourteen indicators of vegetation degradation the model identifies areas with different hazard class. The preparation of hazard maps based on the Geographic Information System (GIS) analysis of these indicators will be helpful for prioritizing the areas to initiate remedial measures. By fixing the thresholds of severity classes of the fourteen indicators, a hazard map for each indicator was first prepared in GIS. The hazard classes were defined on the basis of hazard scores arrived at by assigning the appropriate attributes to the indicators and the final hazard map was prepared by intersecting fourteen hazard maps in five main hazard layers including anthropogenic, natural, current state of hazard, livestock pressure and trend of degradation in the GIS. Results show among the five main hazard maps used in the model, the most main effective indicator in vegetation degradation of the study area is ‘Current State of Hazard’. Also areas under severe hazard class have been found to be widespread (58%) and areas under moderate hazard class have been found (42%) in the Sadra watershed.