

## ***Simulation Effects of Improvement and Restoration Operations of Rangeland on Soil Loss using RUSLE Model***

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### **Extended Abstract**

#### **Introduction**

Rangelands are natural ecosystems with native plant species. Water, soil and vegetation have fundamental role in management of natural ecosystems such as rangelands. Thus, it is essential to perform researches for preservation of the natural and human environment. Proper and allowable utilization of the rangelands in range management projects is the important scientific and technical measure of the range management in Iran. Range management projects as improvement - restoration and reclamation guidelines have particular importance in the Natural Resources Organization of Iran. On the other hand, erosion and soil loss and sediment production has become today one of the main problems in the human environment. Restoration of vegetation and its effects on reduction of erosion have been studied by Li, 2006, Zhou, et al. 2008, Zhanga et al. 2004, Abdelkrima, et al. 2013. The Goal of the improvement - restoration operations in natural ecosystems is recovery plant composition for more protection of water and soil and decrease in soil erosion. Therefore, soil management for optimal utilization is essential to reduce its degradation. Mapping the rate of erosion and sediment yield and regional prioritization are effective steps for management, protection and utilization of the soil. The purpose of this study is to estimate the amount of soil erosion and to simulate the effects of improvement and restoration of soil loss in the Lar area, Mazandaran.

#### **Material and methods**

In the present research, Revised Universal Soil Loss Equation (RUSLE) was applied using GIS. The parameters of this model are consisted of R, K, LS, C and P. These are calculated with

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rainfall data, soil maps, digital elevation models and remote sensing techniques. Suitable location of improvement - restoration projects was determined based on maps of slope, elevation, vegetation, pedology and rangeland condition. Then, by combining these maps and applying basic principles of range management, we offered rangeland management model for improving or maintaining the optimal status. Then, erosion risk map was prepared using revised universal soil loss equation. Finally, changes in erosion after restoration and reclamation operations were predicted using this model in GIS.

### **Results and discussion**

The results showed that the mean values of the parameters R, K, LS, C and P for study area was 67.143, 18.0, 52.5, 37.0 and 1, respectively. Average of yearly sediment load was estimated about 51 tons ha<sup>-1</sup> year<sup>-1</sup>. Allocation of the areas to restoration and reclamation operations is including 378 ha for seeding, 246 ha for inter seeding and 176 ha for planting pile. Also cultivation on contour lines with seeding and strip cultivation with inter seeding was suggested and simulated. Simulation results after the suggested operations showed that the P and C factors will be 0.8 and 0.31, respectively. Therefore, erosion value will be reduced to 34 tons ha<sup>-1</sup> year<sup>-1</sup> and following that it is equivalent to 34% reduction. RUSLE model was used by many researchers and its performance was confirmed according to the results of this research. The results showed that the areas with low slope had more sediment rate than other areas. Average of yearly sediment load was ranged from zero to 595 tons ha<sup>-1</sup> year<sup>-1</sup> in study area. Soil erosion was more in eastern south parts of the watershed. This is similar to the results of Asadi, et al. 2010. Restoration and reclamation operations have changed C factor that can cause reduction of erosion. After simulation, these operations had reduced erosion from zero to 464 tons ha<sup>-1</sup> year<sup>-1</sup>. This is also similar to the results of Ligdi and Morgan, 1995, Terranova, et al. 2009, and Stevens, et al. 2009.

### **Conclusion**

The reduction in P and C factors and consequently decrease in erosion have indicated the importance of improvement - restoration projects within rangelands. . It has been revealed that combination of GIS with sediment and erosion models can be an effective method to determine spatial distribution of sediment and erosion. The suggested improvement – restoration operations in addition to protection of water and soil have caused an increase in forage production and as a result increased livestock products and household income.

**Keywords:** *rangeland reclamation, RUSLE Model, soil erosion, vegetation cover.*