Soil Erosion Control in Drylands

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Preface

Soil erosion is one of the issues that has created many problems for human societies nowadays. Some of them include dam filling, blocking of railway lines, removal of fertile soils from irrigated and rainfed agricultural lands, loss of fertile (macro and micro) elements from the soils and most importantly the occurrence of terrible and dangerous floods which have killed thousands of people and left survivors homeless in addition to financial losses. Hygienic problems are also caused by erosion (especially by wind erosion) every year, which has received less attention. Soil erosion has caused problems not only in the agricultural sector but also in other sectors (such as industry, mining, health, oil, road construction, energy, environment, housing, military, etc.), and proposing such cases is the need for compensation of damages in some way. The issue of erosion and the methods of controlling and combating it are among the basic principles that have to be also taught in pre-university education. Two issues have to be considered: one is that it takes several hundred years to form 1 cm of soil, and the other is that billions of dollars are needed if we want to retrieve the lost soil by adding chemical fertilizers. Today, soil protection must be at the forefront of governments' management programs so that they do not face the very complex problems of soil erosion. All governments are looking for quick ways to control soil erosion, and this has led to widespread interest in the use of structural and engineering methods, however, the calculations and formulas related to the design of structures in this method are the result of studies and surveys conducted in different countries and generally the calibration of these calculations according to the natural and ecological conditions of arid and semi-arid regions has not received much attention. Also, during the construction of structures, the necessary supervision and monitoring are often not carried out by the relevant stakeholders and contractors, and the implementation of the structural method often imposes heavy costs on governments and organizations in charge of protecting the natural resources in the countries. Structural and engineering methods are often not compatible with nature, while the use of plants to combat various forms of erosion (splash, water, gully, river, tunnel, landslide, wind, etc.) is very cost-consuming and the durability of the biological control method of soil erosion would be much longer than the engineering method. Also, in the biological control method, different plant species can be used to

prevent the occurrence of erosion before it occurs. Of course, combining the structural and the biological methods can be of great assistance to the stability and effectiveness of the structural method in combating soil erosion. In combating wind erosion issue, it should be noted that combating wind erosion has been common in Iran in the past, and biochemical methods (combining plant cultivation using mulches, biological mulches which are compatible with environment) are of great importance in controlling this erosion and this method can be used to stabilize the inner and coastal sand dunes.

There is a great tendency to use vegetation in watershed management and erosion control projects in Iran due to the climate and plant diversity, as well as the abundance and different types of water and soil erosion. Lower cost and ecological adaptability have presented the advantage of using this method in sloping land stabilization and soil erosion control projects. Lack of adequate scientific sources in this field led the authors of this book to compile and conclude the results of recent studies and research on biological control of soil erosion and degradation and is mostly based on studies and projects, master's and doctoral dissertations and experiments of international researchers. It is hoped that the book will meet the needs of students and experts in the fields of soil protection, watershed management, natural resources and the environment, especially in arid and semi-arid regions around the world.

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