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Short Communication

What was the message of the Global Symposium on Soil Erosion in soil erosion assessment tools?

Mohammadreza Gharibreza*

Soil Conservation and Watershed Management Research Institute, Agricultural Research, Education and Extension Organization (AREEO)

***Corresponding author:** Mohammadreza Gharibreza,Soil Conservation and Watershed Management Research Institute, Agricultural Research, Education and Extension Organization (AREEO)

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Introduction

The 19th Global Symposium on Soil Erosion was held in FAO Headquarter, Rome, May 15-17, 2019. One of the symposium themes was soil erosion assessment tools and data; creation, consolidation, and harmonization, which assume to be most controversial among soil sciences in terms of applicability and reliability of resultant data. The most known soil erosion assessment tools around the world are the direct assessment of water erosion in the field, remote sensing, experimental plots, rainfall simulators, and fallout radionuclides (FRN) [1]. Application and standards of each method have been modified and improved since the last decades, Besides, the scale of application and reliability of such methods remain controversial between researchers and users of results. Accordingly, the advantages and disadvantages of soil erosion assessment tools have been proved for users that resulted in their application on the basis of the research aims and scale of studies [2].

There has been much research carried out in recent decades to better understand the mechanisms and spatial distribution of soil loss by water erosion and, to some extent, by wind and tillage. Although some significant progress has been made concerning large-scale assessments of some water erosion processes Borrelli[3], the lack of comprehensive information about global soil erosion dynamics forces both decisionmakers and the scientific community to resort to pioneering studies carried out during the late 1980s and early 1990s such as the United Nations Environment Programme's (UNEP) project on Global Assessment of Soil Degradation (GLASOD)[4].

Regional and global estimates of soil loss rates due to erosion differ substantially depending on the method used to derive them. Generally, estimates of mean annual soil loss from field plots are substantially higher (8 to almost 50 t ha-1 yr-1) than those from regional and global models (2 to 4 t ha-1 yr-1). Any estimate of erosion must also be placed in the context of the acceptable or tolerable rate of loss. Rates of tolerable soil loss calculated using soil production rates range from 0.2 to 2.2 t ha-1 yr-1 and tolerable rates based on maintenance of crop production range from approximately 1 to 11 t ha-1 yr-1. The ranges for both soil loss and tolerable soil loss demonstrate the need for site-specific estimates to reflect the different sensitivity of soils to the removal of surface soil through erosion [5].

Key outcomes

1. Fallout radionuclide (FRNs) and relevant conversion models have been used widely as a reliable tool in different scales [6].

2. Tillage erosion is a major cause of moderate to high rates of soil erosion and should be the focus of future soil conservation efforts.

3. Great attention should be focused on dust storms that are caused by wind erosion. Wind erosion is also a serious threat to natural environments, especially in arid zones that cover 47 percent of the earth.

4. Streambank erosion or coastal erosion recognized as a serious problem in the advent of climate changes that require specific research.

5. Estimation of gully erosion has been remained challenging because it is not represented in the models and the world-wide method has been not established.

6. In agricultural land, research is still needed to define more precise ranges of soil erosion because it causes the greatest loss of soil fertility, due to the drag of soil colloids.

7. Modeling should not replace field observation and measurements. Although modeling is commonly preferred at large scales, there are concerns about availability for validation data. New devices and technologies could be used for precision agriculture such as drones that could allow cost-effective data validation.

8. The last challenge concerns the establishment of integrated models, which remain very complex and so far, most available models consider single processes.

9. At larger scales, integrated modeling for soil conservation management and planning purposes must consider the integration of wind, water, and tillage erosion modeling. On cultivated lands, tillage erosion operates and interacts with wind and/or water erosion.

10. Discussions led to the conclusion that both global and local data were needed for different outcomes.

11. Necessary to assess the extent of soil erosion at larger scales for policy and programming purposes. This necessity requires the aggregation of model outputs at provincial, national, regional, and global scales.

12. Soil erosion is a transboundary issue; the collaboration of neighboring countries is needed. In this regard, there is a need to develop standards to harmonize the data produced to compare erosion levels between different border areas.

13. Particular attention should be taken in order to properly communicate the results to farmers and land users, as well as policy decision-makers.

Recommendations

a. Creating expert groups to develop the methodology and guidelines for the preparation of the Global Soil Erosion map.

b. Organize capacity development and training for countries to develop national soil erosion assessment, as well as the necessary data management and monitoring facilities.

c. Developing a database of good practices for addressing soil erosion control.

d. Defining and conducting an action plan on the assessment of effective policies and practices to control soil erosion and to analyses major gaps in the development and implementation of soil erosion control policies at global, regional, and national levels.

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