ISSN 2277 – 8322

Measures for Soil & Water Conservation via Vegetative and Future perspectives for soil and water conservation

Dr. Anil Kumar Gupta
Lecturer, Department of Agronomy
S.C.R.S. Govt. College, Sawaimadhopur, Rajasthan

Abstract: The productivity of rainfed lands is increased by using vegetation and soil management techniques to reduce runoff and soil loss. Vegetative filter strips, riparian forest buffers, conservation cover, contour buffer strips, alley cropping, and grassed waterways are some of the different vegetative strategies for decreasing sediment and nutrient losses and explain future potential for soil and water conservation.
Keywords: conversation, vegetative, rainfed

Introduction

The productivity of rainfed lands is increased by the mechanical/engineering soil and water conservation methods, which are successful in reducing runoff and soil loss. These steps have been taken as part of numerous government programmes to reduce soil erosion on arable lands. However, the cost of building these safeguards is very high, and farmers are unable to adopt them without assistance from any initiatives or organisations. The use of vegetation and other measures, which are inexpensive and simple for farmers to apply, helps to some extent reduce soil erosion and preserve rainwater. Measures to Conserve Soil and Water Through Vegetation Vegetative filter strips, riparian forest buffers, conservation cover, contour buffer strips, alley cropping, and grassed waterways are some of the various vegetative techniques for decreasing sediment and nutrient losses. The alternative biological methods, such as live-bunds or vegetative barriers, have been found to effectively preserve soil and water by reducing surface runoff and allowing for longer infiltration times.

Fig1.Vegetative measures (photo courtesy of USDA-NRCS)

Vegetative filter strips:

A vegetative filter strip is a slope that has been covered with densely planted vegetation (usually grass with a short height up to 45 cm) to filter out sediment and other pollutants from runoff from nearby cropland. The main purpose of vegetative filter strips is to treat runoff, hence they are placed between the table land and any surface water collection devices, such as ponds, tanks, reservoirs, rivers, etc. The soil and minerals in runoff from agricultural regions can be captured by vegetative filter strips (VFS). The VFS as sheet flow prevents the formation of gullies and rills, catches sediments along the way, and allows runoff that is free of sediment to reach the gully bed.

A vegetative filter strip is a designated patch of vegetation next to a canal that is intended to filter runoff water by nutrient uptake, water infiltration, and particle settling. Before the contaminated runoff reaches any surface water, a filter strip's job is to filter and catch nutrients, sediment, and pathogens in surface runoff from grazing areas (manure, farmland, etc.). The main job of a filter strip is to keep faecal coliform bacteria and other pathogens found in livestock manure out of seasonal drainages like ditches and streams. It is possible to regulate filter strips to produce feed and lower pollutants. Existing hayfields and pastures that are close to sensitive areas offer ideal filter strips

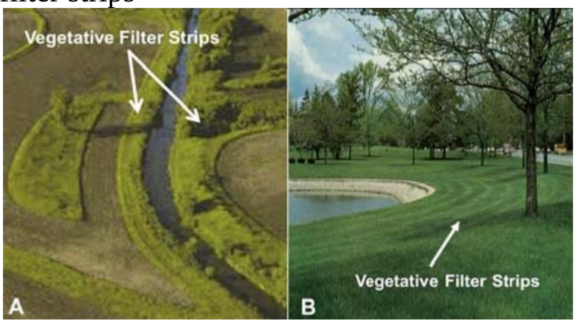

Fig2.Vegetative filter strips**:**

Vegetative barriers

The tall, erect, stiff-stemmed, native perennial grasses that make up the grass barriers are planted on the contours in narrow strips that are about 1.2 metres wide to minimise the production of silt, delay and scatter runoff, and promote benching of the slopes. Conversely, the vegetative filter-strips that are created between field borders and water channels are often much wider (more than 5 m). Plant-based barriers are thought to be more affordable, environmentally benign, and farmer-friendly. Their value as an addition to or a replacement for earthen bunds is becoming more apparent.

Fig3.Vegetative barriers

Grassed waterways

A grassed canal is a vegetated channel that transports runoff to a stable exit at a nonerosive pace. Grassed streams can be improved by adding filter strips to capture particles outside the waterway and filter runoff. While vegetation in the filter strips should be tall and stiff to prevent submersion and to filter particles from runoff, vegetation in the channel should be laid down to transport water. Grassed canals can move water down natural draws across fields safely if they are built and sized properly. Waterways also provide diversion channels, contour cropping patterns, and outlet channels for developed terrace systems. When the watershed area generating the runoff water is quite vast, grassed rivers are an effective remedy to the erosion caused by concentrated water flows. Broad, shallow, and often saucer-shaped channels known as "grazed waterways" are used to transport surface water through agricultural land without eroding the soil. The vegetation in the river reduces the water flow and shields the channel surface from runoff water's eroding impacts. Snowmelt and runoff will flow towards a field's natural drainage draws if left unchecked. Grassed waterways are frequently formed in these locations.

Fig4.Grassed waterways

Future perspectives for soil and water conservation

The burgeoning world population, food insecurity and natural resource degradation are the major issues in the present era of climate change. It has been projected that the world population will be ~10 billion in 2050. Furthermore, it is anticipated that the demand on land and water resources would expand in the near future due to industrial growth that is occurring quickly and intensive farming methods. A paradigm shift in soil and water management and conservation is therefore required for agricultural sustainability. Future concerns for sustainable agriculture and soil and water conservation include the following:

1.creation of new technology and the formulation of new policies depending on the social, economic, and cultural characteristics of a specific location.
2.The adoption and implementation of efficient conservation strategies to maintain agricultural productivity.
3. Depending on the severity of the degradation of the natural resources, it is important to create and improve current soil and water conservation practises.
4.In order to effectively save soil and water, a participatory approach needs to be emphasised more.
5 To determine whether soil and water conservation methods are effective in boosting output, financial returns, and stakeholder livelihood, post-impact evaluation and monitoring should be conducted.
6.Conservation practises that are both affordable and successful are being developed to help repair degraded lands and maintain agricultural productivity.
7. Farmers should actively participate in the demonstration of effective technology for soil and water conservation on the fields.
8.Put more emphasis on research, instruction, and reaching out to stakeholders with efficient methods for soil and water conservation.
9.Adopting effective management techniques and using soil and water

Conclusion

Measures of soil and conversation by vegetation are shown in the current study to be beneficial in reducing runoff and soil loss and boosting the productivity of rainfed areas. Vegetative filter strips, riparian forest buffers, conservation cover, contour buffer strips, alley cropping, and grassed waterways are some of the different vegetative strategies for decreasing sediment and nutrient losses and explain future potential for soil and water conservation.

References

1.Eswaran H, Lal R, Reich PF. Land degradation: An overview. In: Bridges EM, Hannam ID, Oldeman LR, et al., editors. Responses to Land Degradation. Proceedings of the 2nd International Conference on Land Degradation and Desertification, Khon Kaen, Thailand. New Delhi: Oxford Press; 2001

2.Manivannan S, Thilagam VK, Khola OP. Soil and water conservation in India: Strategies and research challenges. Journal of Soil and Water Conservation. 2017;16(4):312-319

3.UNCCD. Integration of the sustainable development goals and targets into the implementation of the United Nations

convention to combat desertification and the intergovernmental working group report on land degradation neutrality. Decision 3/ COP.12. Report of the Conference of the Parties on Its Twelfth Session, Held in Ankara from 12 to 23 October 2015; 2015
4.Yousuf A, Singh M. Watershed Hydrology, Management and Modeling. Florida: CRC Press; 2019
5.Gachene CK, Nyawade SO, Karanja NN. Soil and water conservation: An overview. In: Zero Hunger. Encyclopedia of the UN Sustainable Development Goals. Cham: Springer; 2019
6.Quinton JN, Govers G, van Oost K, Bardgett RD. The impact of agricultural soil Erosion on biogeochemical cycling. Nature Geoscience. 2010;3:311-314
7.Sidhu HS, Jat ML, Singh Y, Sidhu RK, Gupta N, Singh P, et al. Sub-surface drip fertigation with conservation agriculture in a rice-wheat system: A breakthrough for addressing water and nitrogen use efficiency. Agricultural Water Management. 2019;216:273-283
8.Fischer G, Tubiello FN, van Velthaizen H, Wiberg DA. Climate change impacts on irrigation water requirements: Effects of mitigation, 1990-2080. Technological Forcasting & Social Change. 2007;74:1083-1107
9.Blanco H, Lal R. Principles of Soil Conservation and Management. Dordrecht: Springer; 2008. pp. 167-169
10.Uri ND. Agriculture and the environment—the problem of soil erosion. Journal of Sustainable Agriculture. 2000;16:71-94
11.Pimentel D, Harvey C, Resosudarmo P. Environmental and economic costs of soil erosion and conservation benefits. Science. 1995;267:1117-1123
12.Lal R. Managing soils and ecosystems for mitigating anthropogenic carbon emissions and advancing global food security. Bioscience. 2010;60:59-82
13.Guo M, Zhang T, Li Z, Xu G. Investigation of runoff and sediment yields under different crop and tillage conditions by field artificial rainfall experiments. Water. 2019;11(5):1019
14.Singh RK, Chaudhary RS, Somasundaram J, Sinha NK, Mohanty M, Hati KM, et al. Soil and nutrients losses under different crop covers in vertisols of Central India. Journal of Soils and Sediments. 2020;20(2):609-620