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ENVIRONMENTAL PROTECTION

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In the modern society individuals face with a huge problem which associated with environmental degradation. The practice of protecting the environment is known as environmental protection and is carried out by all levels of society, including governments and organizations. Its goals are to preserve natural resources and the current natural environment, as well as to repair harm and reversing trends where practical.

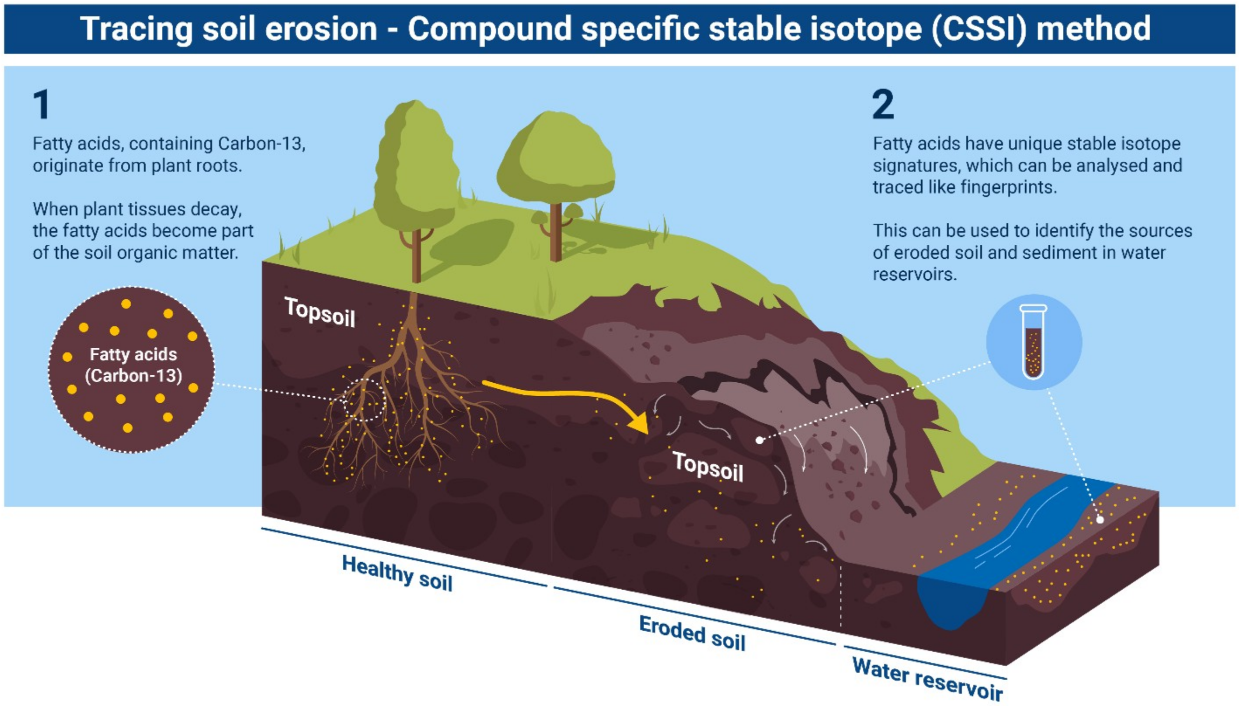
Programs for environmental protection include those that aim to lower the hazards that contaminants like fuels, lubricants, and hazardous waste provide to the environment. By outlining safe working practices for handling these compounds, monitoring the storage vessels and placements, and designating preventative maintenance methods, these interventions target pollution preventive methods and regulatory compliance. Environmental emergency plans are also included, which outline the proper steps to be performed in the case of a leak or discharge [1].

Currently, there is a real threat to the entire world. The issues that endanger human existence on Earth include overpopulation, acid rains, global warming, and air and water pollution. Due to burning or cutting them down, our forests are disappearing. Our ability to breathe will eventually run out if this tendency keeps up. In addition to this it should be common attention to soil erosion, a significant issue in human life. If we delve more into environmental protection, we may have a protracted conversation about it. Furthermore, are humanity able to stop this problem? is a debatable issue.

The LandSoil model (Ciampalini et al., 2012), a landscape development model simulating soil erosion at fine spatial resolution (1–10 m) and midterm temporal scales (10–100 years), was evaluated in this work for its sensitivity analysis. Our goal was to discover the model’s most important variables and the critical parameter combinations that resulted from their interaction. To calculate soil loss on a topographical entity—a virtual hillslope—we used a local sensitivity analysis, commonly known as a “one-factor-at-a-time” approach, which was based on the virtual catchment framework given by Cheviron et al (2010, 2011). The effects and hierarchy of Hydrological elements, soil-terrain parameters, and the primary topographical configurations of the watershed (i.e., hillslope profile) were then controlled using a multicategory analysis. The findings demonstrate the traditional relevance of rainfall amount (no rain means no water erosion). In a second level, the findings show the interactions between variables that affect sediment production function, including soil roughness, soil crusting, and soil cover, as well as the impact of topography on water flow at the catchment scale [2].

The top layer of soil, where plants obtain the majority of their nutrients and water, is removed through a process called soil erosion. The most typical kind of land deterioration is this one. The productivity of the land decreases when fertile topsoil is removed. All continents experience soil erosion naturally, however human activity substantially speeds up this process. The majority of soil erosion happens on slopes. Wind, torrential rain, or the melting of snow in the north are examples of natural causes. Based on the information gathered, soil preservation techniques such terracing, contour and strip farming, minimal tillage, no-tillage, mulching, usage of cover crops, erosion ridges and furrows, can be used. Moreover, humankind has developed numerous techniques to delay soil erosion, including modifying the intended usage, in order to prevent it.

It is crucial to accurately determine the extent of erosion and the amount of soil lost, as well as to optimize land management and put soil conservation measures in place, because eroded soil may not recover for many years. Atomic technology can be useful in this situation. PHV measurement and CCCI analysis are the two approaches that are most frequently used to stop soil erosion. The amount of soil lost and the rate of erosion can be measured using the RHV measuring method, and the erosion-prone locations can be found using the CSSI-analysis [3].



Picture 1- Tracing soil erosion

Researchers can locate pockets of erosion and determine how different land uses and crops affect erosion by monitoring the presence of stable isotopes in soils, such as carbon-13. (Photo: IAEA/A. Vargas) [3].

More than 1.5 billion people worldwide struggle to grow enough food because of soil erosion, according to the UN. Governments are searching for ways to shift to a green economy, and the global society is seeking novel approaches to sustainable development. How to continue farming while preserving soil fertility.

The natural and climatic characteristics of the nation are most apparent when discussing the condition of the soil. Over 32 million hectares of arable land are present in Kazakhstan. Around half of these—roughly 55%—are located on the dry steppe. Black earth, a soil type native to Kazakhstan, has a humus level ranging from 3 to 6%. They are primarily found in the country's northern, eastern, and central regions. With a humus level of 2 to 3%, chestnut soils can be found in Kazakhstan's north, center, east, and western regions. With the proper supply of cultivation methods, these soils could be advantageous for the cultivation of agricultural crops. Light chestnut soils, which also demand for an appropriate tillage strategy and occasionally irrigation, are more prevalent in the southern region of Kazakhstan, gray earth. When discussing the fertility of these soils, it is important to keep in mind that since the 1950s, when virgin and fallow lands were developed, the natural ecosystem has been harmed, and the humus content has decreased from its original level. But eventually, soil fertility leveled off. But it's important to keep in mind that farming practices are the only factor affecting land fertility [4]. It is unacceptable to discuss a long-term decline in soil fertility because there is no solid evidence for such a claim. The methodical application of soil-protection measures will affect a lot of things [5].

Picture 1- Water erosion

Regrettably, the soil erosion caused by wind in many parts of the nation serves as a reminder. Dust storms still happen today in Kazakhstan's southern regions. For instance, light soils with mechanical composition in the Zhambyl, Mangistau, and Pavlodar regions exhibit wind-induced soil erosion. Fallow fields are more frequently linked to wind erosion of soil in the republic's north. Mechanically prepared fallow fields are vulnerable to soil erosion from the wind. We advise chemical fallows as a wind erosion defense for soils. The moldboard plowing must be entirely disregarded. Experts recommend rich crop rotations, entirely replacing fallow lands with "cash" crops, to protect soil fertility and enhance soil structure. Several mixes of cover crops may be used throughout the southern part of the nation.

Picture 3- Wind erosion

The result of soil erosion by water, gully formation. It is primarily seen in northern grain-growing regions. Water erosion of soils is visible on fallow fields and on predecessors of stubble on low-slope NKO areas. Fallow lands must be totally excluded from farming operations in order to preserve soils from water erosion. The contour farming system can be used in specific circumstances. It is also possible to flatten the soil across the slope while leaving plant remains and stubble on top of the soil. Planning should be done before planting perennial grasses with good projective cover in the developed gullies and water courses. Topographic data is required for the deployment of soil conservation cropping systems and the shift to targeted application of cropping components. For the deployment of soil conservation cropping systems and the shift to targeted application of cropping system components, topography information is required. It is crucial to remember that climate change can make the decline in soil fertility worse, which can then result in the loss of agrobiodiversity and degradation of the water cycle for both soils and plants. Ecosystems are negatively impacted by land degradation and desertification, which also makes them more vulnerable to the effects of global warming.

Soil erosion is a difficult problem to solve currently. The land cadastre can help us think of answers to this issue, but not everyone will be able to comprehend it at all. The proper use of land that prevents further degradation is the responsibility of land management. By modifying the designation of this or that parcel of land, the issue of soil erosion can be resolved. By doing this, we can protect the soil and reduce soil erosion. You might wonder how exactly we might preserve humus by altering the land's intended usage. This is the issue with changing arable land to pasture, which gives the land a vacation from all physical and chemical impacts, as well as giving the top layer of the source of nitrogen and preventing wind erosion on the layer of plants that remain. a a a How exactly, you could ask? The moisture and plant pollen in the topsoil will protect the humus, which is a straightforward solution. Forest belts can potentially be a solution in this case. In this scenario, the trees will serve as a wall. By doing so, the wind won't be able to lift the grounds of top layers.

To stop soil erosion, utilize the example of the land that my father uses. The land was protected and even improved after he switched 390 hectares of farmland to pasture in 2019. Additionally, after three years, this plot was producing three times as much as the others. It illustrates how wise land management benefits not only our planet but also for individuals.

Picture 4- Forest belts

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