Forum: Economic and Social Council (ECOSOC)

Issue: Addressing that 90 percent of Earth's topsoil is at risk by 2050

Officer: Pablo José Pérez Cañavate

Table of Contents

Introduction

Why does Soil Matter?

It is estimated that by 2050 a 90% of topsoil will be at risk. For decades, constant tilling practices, summed to the extensive use of chemical fertilisers, have seriously damaged the natural soil's components, vital elements for its protection against erosion. As such, soil natural processes are being replaced by artificial- human-made- ones, mainly directed to increase production. This situation is leaving topsoil increasingly unprotected and seriously damaging its health, leading to a no-return point by 2050. It is imperative to find effective solutions based on multinational agreements, as this is a matter that concerns humanity as a whole.

It is difficult to rate the importance of the different soil functions, since all are vital to our well-being, to some extent. However, the function of supporting food and agriculture worldwide is fundamental for the preservation and advancement of human life on this planet.

At its core, soil is the basis for plant growth and contributes to the maintenance of natural and planted vegetation, including our diverse forests and grasslands and the huge breadth of crop species and varieties (annuals, perennial shrubs and trees) that are cultivated or managed for their diverse food fibre, fodder, fuel and medicinal products in relation to the prevailing climate, landscape and soil type and according to societal needs.

Through plant growth, soil also plays an important role in supporting animal biodiversity above ground, including wildlife and domesticated livestock. Moreover, it also contains millions of diverse microorganisms, that carry out many vital functions such as breaking down plant debris, taking in components from the atmosphere, aerating the soil as well as regulating carbon, nutrient and hydrological cycles and breaking down toxic elements.

Furthermore, it plays a fundamental role in the quality and availability of our water supply. Soil, coupled with the landscape and its vegetation is responsible for the

distribution of all rainwater falling upon it and thus plays a key role with respect to the water cycle and supply as now recognised by hydrologists. Related to how water moves through the soil, and the absorption properties of soils, it can also be found in the soil's ability to perform an important function in pollution control (pesticides, nitrates etc).

Soil has been recognized as having a key role in modifying and ameliorating the risks and effects of climate change. Soil organic matter is one of the major pools of carbon in the biosphere and is important both as a driver of climatic change and as a response variable to climate change, capable of acting both as a source and sink of carbon.

Earth’s nature works in clear symbiosis, it is not possible to alter one element without affecting the rest. Soil’s health is not an isolated problem to overcome, it is rather embedded in the climate crises that humanity has been witnessing for the past decades. Earth’s health as a whole is at stake; searching for a partial solution is not the way. Instead, the risky situation of topsoil should be brought to the political agenda at the same level as the greenhouse effect. Only in this way, multidisciplinary groups of experts can work hand by hand with politicians and leaders, aiming to find a permanent fixture of the problem.

Term Definitions

Soil

Soil is the natural medium for the growth of plants. Soil has also been defined as a natural body consisting of layers (soil horizons) that are composed of weathered mineral materials, organic material, air and water. Soil is the end product of the combined influence of climate, topography, organisms (flora, fauna and humans) on parent materials (original rocks and minerals) over time. As a result soil differs from its parent material in texture, structure, consistency, colour, chemical, biological and physical characteristics.

Soil is an essential component of "Land" and "Ecosystems" that both are broader concepts encompassing vegetation, water and climate in the case of land, and in addition to those three aspects, also social and economic considerations in the case of ecosystems.

Earth topsoil

The surface layer of soil (soil horizon) that contains in great quantities the nutrients and minerals needed for plants to grow. This layer possesses an approximated depth of one feet (25-30 centimetres) and needs approximately 1000 years to form, but it can be destroyed much faster as a result oferosion. Constant tilling of agricultural areas, combined with the massive use of chemical fertilisers and deforestation, to increase the production is leaving topsoil unprotected.

Erosion

Soil Erosion is a common term that is often confused with soil degradation as a whole, but in fact refers only to absolute soil losses in terms of topsoil and nutrients. This is indeed the most visible effect of soil degradation, but does not cover all of its aspects. Soil erosion is a natural process in mountainous areas, but is often made much worse by poor management practices.

Soil degradation

Defined as a change in the soil health status resulting in a diminished capacity of the ecosystem to provide goods and services for its beneficiaries.

Tilling

To work the land, as by ploughing, harvesting, etc., to raise crops.

Soil survey and assessment

Soil survey is the systematic study of the soil of an area including classification, evaluation and mapping of the properties and the distribution of various soil units.

In the context of land evaluation, soil assessment focuses on the matching of the specific soil requirements of the land use versus the properties of the soil. Most soil assessments have been made for agricultural land uses and cropping systems, but the same principles could be used for other purposes.

Soil management

Soil sustains most living organisms, being the ultimate source of their mineral nutrients. Good soil management ensures that mineral elements do not become deficient or toxic to plants, and that appropriate mineral elements enter the food chain.

Soil health and improvement

The ability of the soil to sustain the productivity, diversity, and environmental services of terrestrial ecosystems.

The improvement of soil concerns the appropriate management of problem soils and also involves the improvement of degraded soils in terms of soil prevention, mitigation, and rehabilitation.

Soil biodiversity

The variation in soil life, from genes to communities, and the variation in soil habitats, from micro-aggregates to entire landscapes. Many studies have been carried out in this field regarding the possibility of nourishing soil and adding nutrients and microorganisms back in. Although it represents a foreseeable solution, its true effectiveness has not proven yet at large scale.

Soil governance and policy

Concerns policies and strategies and the processes of decision-making by nation states and local governments on how the soil is utilised. Globally, governance of the soil has been focused on agriculture due to increased food insecurity in the most populated regions on earth.

Background Information

Historical Context: Why Top-soil is endangered?

Present day civilizations and their ways of life are unthinkable without the presence of agriculture. Cultures from all corners of the world have long portrayed agrarian activities as part of its myths, customs and values, even establishing parallels between soil fertility and human fertility. This shows the importance that agriculture has had a long history, constituting a truly great leap forward in human survival. Not only that, but agrarian activities were also the basis for the creation and development of complex societies all around the globe.

As a result, agriculture has always been a matter of political debate in different governments; issues such as property rights, land distribution or agrarian reforms have always caught headlines in all societies. At the same time, agriculture has been targeted by many policies, especially those related to science, technology and innovation; in generally successful attempts to increase production.

However, the matter has never been directed towards soil's health. Ultimately, working the land is an activity deeply rooted in the common imagination as a must-do process to achieve the greatest possible results. These actions combined with constant and massive use of invasive techniques, such as chemical fertilisers, deforestation or continuous abuse of the land, have led to a situation in which our way of life as human species is being seriously threatened.

Up until the Industrial Revolution (XVIII Century), the components utilised to increase land productivity came from a natural origin, mainly animal one. Tilling and ploughing were also widespread across the globe, but agrarian activity was mainly targeted to subsistence; and despite some population booms, there were no greater incentives to increase production.

Things drastically changed with the arrival of industry, the need to divert workers from the fields to the factories resulted in several attempts to increase production through non-human labour, as many of the former land-workers were now employed in

manufacturing activities. These attempts led to a phenomena now known as the “Mechanisation of Agriculture”, agriculture lost some of its natural features that were replaced with mechanical ones that originated in the field of industry.

The increased use of technology in agriculture, either as the introduction of vehicles and assets to decrease the need of human effort, or as the increased appliance of chemical and artificially created fertilisers effectively achieved its objective, and human population experienced an exponential increase. Not only that, but these new techniques also spread all over the world, becoming a global trend, rather than a national or continental one.

For decades and even centuries, these techniques were refined, to keep the pace with the increase in population. However, all of this was being done at the expense of Earth topsoil. Constant use of chemical fertilisers and tilling have not directly harmed this natural medium, but it has left it defenceless and exposed to erosion, a phenomena that previously did not pose a threat.

Current Situation

On the 22nd of July 2022, the Food and Agriculture Organization (FAO) stated that 90 percent of the Earth's topsoil will be at risk by 2050; and 100 percent of it will be endangered by 2066. To raise public awareness, they stated:*"About one soccer field of Earth's topsoil is eroding every five seconds".*

Isaac Larsen, a geosciences expert at UMass Amherst, conducted research in the U.S Midwest, mainly in Illinois, South Dakota, Minnesota, Kansas and Nebraska, comparing the height of native prairie with that of farmed fields. Results were astonishing, researchers found that farmed fields were more than a foot lower than the prairie on average. The height difference showed the effects that abusive techniques have had on soil's health. While the prairie was able to contain erosion, the fields that have constantly been farmed for 150 years demonstrated clear symptoms of recession. This recession does not affect soil's vigour, but also its capacity for growing food.

This case does not only concern the U.S, it is a repeated pattern all across the globe. Earth's topsoil is being severely harmed as a result of constant land use, which effectively alters the biodiversity and equilibrium of the soil, resulting in it being unable to naturally restore its previous properties. This incapacity has led to an extensive use of fertilisers and pesticides, in an attempt to restore these properties through artificial methods.

This has led to an unsustainable situation. On the one hand, agricultors are facing higher costs to cope with their annual production, decreasing their benefits and resulting in an impoverished sector of society. This risky situation can be extended to all people directly or indirectly employed in agrarian activities, as an alteration in prices affects the whole productive and distributive chain.

On the other hand, constant population growth, as the human population is expected to reach 9-10 billion people by 2050, seriously affects the land's capacity to sustain human life. About 99% of the world's food supply comes ultimately from land-based production with about 50-70% of the land devoted to agriculture. If the increasing food consumption is to be covered by relying even more on modern

agricultural methods (ploughing, fertiliser application and pesticides), the long-run future becomes simply unsustainable.

To overcome this problem, the Global Soil Partnership (GSP) was founded in 2012 with the mission to position soils in the Global Agenda and to promote sustainable soil management. The Partnership, hosted by FAO, works hard to improve soil governance to guarantee productive soils towards food security, climate change adaptation and mitigation, and sustainable development for all.

The GSP has launched several initiatives mainly directed to raise public awareness, coordinate efforts between farmers and governments all across the globe and fundraising projects for soil evaluation, in order to get the necessary information to reach an appropriate solution in each type of soil. It has also conducted and sponsored many researchers through all the way, from field research to events and workshops in which they can interact with leaders and reach a common agreement.

Their media work has an invaluable effect, as they have created several sites and technical networks that provide databases to conduct further research. Inside this section, it is worth mentioning the role of SoiLEX: a database that gathers all the information regarding soil laws and regulations, either if it is displayed by organisations or by national governments. In doing so, it prepares farmers with enough instruments to get full knowledge of the topic in order to give them resources.

As such, the Earth's topsoil problem is gathering greater attention from the media and popular opinion. This can be featured as one of the GLS' main successes, mainly because the Earth's topsoil's relationship with other contemporary issues such as efficient water governance and the climate crises makes it a priority problem to tackle if humanity does not wish to face one of the worst natural disasters in history.

Countries and Organisations Involved

The United States of America

The U.S has long lasting history of soil conservation efforts, most of them launched from the U.S.D.A (U.S department of Agriculture), such efforts began in the 1930's as a result of the Dust Bowl, the greatest example is found in the Soil Conservation and Domestic Allotment Act of 1935. This chapter lays down rules and regulations regarding soil conservation. It is recognized that the wastage of soil and moisture resources on farm, grazing, and forest lands of the Nation, resulting from soil erosion, is a menace to the national welfare and that it is declared to be the policy of Congress.

This tradition has been further expanded by the Agricultural Act of 2014: An Act to provide for the reform and continuation of agricultural and other programs of the Department of Agriculture through fiscal year 2018.

China

The People's Republic of China is characterised by State property as an essential feature of the Communist Regime. Grassland Law of the People's Republic of China (Order of the President No.82), launched in 1985 and amended in 2002, was enacted with a view to protecting, developing and making rational use of grasslands, improving the ecological environment, maintaining the diversity of living things, modernising animal husbandry and promoting the sustainable development of the economy and society.

Kenya

Kenya possesses one of the oldest legislations for soil conservation and soil improvements, framed by the Agriculture (Basic Land Usage) Rules (L.N.26/1965). These Rules, for purposes of preventing erosion of the soil, place restrictions on the cultivation of land, the cutting of vegetation and the grazing of livestock on slopes exceeding a specified degree and near to watercourses. Exemptions may be granted by the Director of Agriculture, a provincial agricultural officer, a district agricultural committee or any

authorised officer. Persons shall follow orders of authorised officers regarding the flow of water and no person shall obstruct the flow of run-off water.

European Union

The European Union has launched several directives concerning soil conservation, the most important of them is the Habitat Directive, also known as the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, launched on the 21th May, 1992. The aim pursued by this Directive is to protect biodiversity through the conservation of natural habitats and of wild fauna and flora in the territories of the Member States. Pursuant to this Directive, measures shall be designed and undertaken in order to maintain or restore, as the case may be, natural habitats and species of wild fauna and flora. The State of soil plays a vital role in this directive, as shown in the first annex, which refers to it as an immediate requisite for the development of natural habitats.

This directive was accepted by all the member States, even leading to amendments to reflect the particular situation of countries like Croatia, issued in 2013. It is also noteworthy that Austria expanded many of the issues exposed in the directive through the Vienna Nature Protection Ordinance.

Timeline of Events

1780-1830 Beginning of the Industrial Revolution, rupture of some natural cycles related to soil.

2010 FAO Members acknowledge that soils constitute the foundation for agricultural development, essential ecosystem functions and food security and are key to fighting climate change and sustaining life on Earth

2012 GSP is established as an interactive, responsive, and voluntary mechanism open to governments, institutions, and other stakeholders. Its' mission? To promote sustainable soil management around the world

2013 **Plenary Assembly:**
As the Partnership's main decision-making body, the annual plenary reviews and prioritises the GSP's actions to position soils on the different sustainable agendas through collective action. It unites FAO Members and GSP Partners.
Establishment of the UN World Soil Day and International Year of Soils: The United Nations General Assembly adopted a resolution to raise awareness on the vital role of soil through an International Day on 5 December and Year in 2015

2015 **Status of World's Soil Resources Report:**
The first ever Report compiling the work from over 200 soil scientists from 60 countries on the status of global soils. It provides a unique global and regional overview of the current state of soils, their role in the provision of ecosystem services and the threats to their continued contribution to these services

2015 **Revised World Soil Charter:**
Revision of the original World Soil Charter adopted by FAO Members at the 1981 FAO Conference. FAO Members unanimously endorsed the updated version of the World Soil Charter during the 39th Session of the FAO Conference and agreed to the principles to boost soil health and address soil degradation

2016 **Glinka World Soil Prize:**
An annual award given to the GSP's partners – individuals or organisations – committed to solving national, regional, or local soil degradation problems. It comes in the form of a medal and a USD 15 000 cheque

2019 **Global Symposium on Soil Erosion:**

This science-policy attracted over 500 participants to discuss the latest findings on the status of soil erosion, its prevention and control for increased food security and ecosystem services.

2020 **International Network on Fertilisers Analysis:**
The Network builds and strengthens the capacities of laboratories in fertiliser analysis and provides a framework to harmonise fertiliser quality standards.

2021 **Global Map of Salt-affected Soils:**
The GSASmap was generated following a country-driven process. It allows countries to quantify the extent and degradation status of salt-affected soils thus improving food security

2022-2032 **GSP Action Framework Meeting local needs, responding to global challenges:**
Following an assessment of progress and achievements over the period 2012-2022, a new GSP action framework is under preparation and endorsement by FAO Members. It will fully unlock the potential of healthy soils and upscale sustainable soil management approaches through the setting of action areas and the definition of quantifiable objectives, targets and indicators.

Relevant UN Treaties/Resolutions

As stated before, the U.N efforts are embodied in the Global Soil Partnership, launched in 2012. In spite of its short life, the GSP is establishing a valuable base for future directives and resolutions. At this precise moment, it has focused on providing the necessary elements for raising public awareness and finding solutions.

A/RES/68/232

Nevertheless, the United Nations General Assembly adopted the resolution A/RES/68/232 on 20 December 2013. This document designated December 5th as the World Soil Day and declared 2015 the International Year of Soils. In so doing, the General Assembly recalled its decisions on the Rio Declaration on Environment and Development and Agenda 21, and highlighted the soil's importance for human existence and development, bringing the state of its health to the government's political agenda.

A/RES/77/166

The aforementioned resolution was expanded in December 2022, under the title A/RES/77/166. Its pivotal point was the implementation of the United Nations Convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa. (See also: A/RES/66/201)

Global Land Outlook

In 2022, the U.N also published the Second Edition of the Global Land Outlook; a prospect developed by experts and focused on land restoration across the world.

Previous Attempts to Solve Issue

Previous attempts to solve the issue were mostly focused on conservation and prevention, the legislation exposed by countries and the GLS in the previous section was mainly aimed to this objective

However, the current situation requires restoration, an important effort to return soil to its previous state based on biodiversity, rather than conservation of the existing soil. It is urgent to arrange the necessary measures to counter erosion and advance towards soil restoration.

The five key actions that FAO has called for, tasks civilians, governments and international institutions, with taking greater action to monitor and care for soil. One achievement of GSP, thus far, has been the partnership with farmers and local governments to enhance soil health.

Programmes have been initiated to improve the amount of organic matter in soil, “by adopting practices such as using cover crops, crop rotation and agroforestry”, said FAO. Costa Rica and Mexico have signed up to these pilot schemes and trained farmers in the use of best practices which include using so-called “cover crops” that prevent erosion, crop rotation and tree planting.

Digital mapping

Furthermore, the GSP has expanded data collection in the form of digital soil mapping. This technology informs policymakers of relevant soil conditions and empowers them to make informed decisions on managing soil degradation. The FAO also has, through the GSP, called for the coordination and integration of sustainable practices through investment in development and education.

These carefully planned programmes facilitate the transfer of information and technology concerning soil health. These networks harmonise methods, units and information relevant to soil analysis.

More inclusivity

Similarly, the highly technical nature of topsoil policy debate, can alienate constituencies who might otherwise be concerned and engaged on such an important environmental and social issue, FAO states.

Campaigns, such as the *International Year of Soils* and *World Soil Day* are designed to raise youth awareness of soils and increase participation in preventing further degradation.

While the work of the GSP represents the efforts of non-State partners to promote sustainable soil practices, State policymakers are necessary actors in implementing a sustainable soil policy.

Valuable guidance

Production of documents like the *Revised World Soil Charter,* the *Voluntary Guidelines for Sustainable Soil* and the *International Code of Conduct for the Sustainable Use and Management of Fertilisers,* contribute valuable guidance from the GSP, for national governments.

Source: FAO publication to raise awareness, 27th July 2022

The five achievements described above represent a key existing strategy within the United Nations system, for stemming soil degradation, in support of sustainable farming worldwide.

Possible Solutions

Due to the recent nature of the measures mentioned above, their efficacy and effectiveness has not been proven yet. In this sense, they still portray hope as, if they are applicable, results will be visible within a few decades.

Degrowth is often depicted as a possible solution, however, it has been demonstrated that it will do more harm than good. The justifications and political motives for degrowing can be forced through authoritarian measures that will harm many democratic regimes. The debate here is not about degrowth, but one about sustainable development.

Apart from the proper measures, the main concern would be cooperation to engage in them. This is to enhance collective action between governments, farmers and business conglomerates at the time of solving the issue. If soil in the U.S is restored, but it remains degrading in China and Europe, the solution would only be a partial patch. It is in dialogue and cooperation where lies the true solution of the debate that is forthcoming, and this dialogue does not imply to impose a unique solution, but to understand the nature of each soil, farmer and government, and treat all of them with respect and dignity. This is the way for advancing towards a global solution; a response in which equality is the base for the future.

Bibliography

Nielson D. Considering a soil initiative for Africa [Internet]. Chicago Council on Global Affairs; 2020 [cited 2023 Jan 16]. Available from: http://www.jstor.org/stable/resrep21291

Grassland Law of the People's Republic of China (Order of the President No.82).

Daily GC, Ehrlich PR. Population, Sustainability, and Earth's Carrying Capacity.

Guidelines for soil description. 4th ed. Rome: Food and Agriculture Organization of the United Nations; 2006. 97 p.

Soil Conservation and Domestic Allotment Act of 1935.

Smit E, Strehlenert P, Grassi L. Soils. Geography. 2018;103(1):38–41.

Golos PJ, Commander LE, Dixon KW. The addition of mine waste rock to topsoil improves microsite potential and seedling emergence from broadcast seeds in an arid environment. Plant Soil. 2019 Jul;440(1–2):71–84.

THE AGRICULTURE (BASIC LAND USAGE) RULES.

The Causes, Consequences and Remedies of Soil Erosion in Kenya. 2023;

Sess.: 2013-2014) UGA (68th. World Soil Day and International Year of Soils :: resolution /: adopted by the General Assembly. 2014 Feb 7; Available from: https://digitallibrary.un.org/record/765786

Sess.: 2022-2023) UGA (77th. Implementation of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa :: resolution /: adopted by the General Assembly. 2022 Dec 21; Available from: https://digitallibrary.un.org/record/3998607

Desertification S of the C to C. The global land outlook :: land restoration for recovery and resilience [Internet]. United Nations Convention to Combat Desertification,; 2022. Available from: https://digitallibrary.un.org/record/3972338