# "A Review of Soil Health Benefits in Regenerative Agriculture Practices"


**Abstract**

Degradation of the soil and lower yield are possible outcomes of traditional farming practices. Proponents of regenerative agriculture (RA) contend that the two main ways to address these issues are through soil health and carbon sequestration. The main goals of reforestation (RA) are to maintain soil cover, reduce soil disturbance, maintain living roots in the soil throughout the year, increase species diversity, include animals, and use as little or no synthetic material as possible (such as fertilizers and pesticides). Regenerating the land and soil as well as improving the social, economic, and ecological circumstances for the greater community are the primary objectives. The vast majority of farmers are reluctant to utilize RA techniques despite its purported benefits since there is insufficient scientific proof of its profitability. We evaluated the alleged benefits and RA-related processes against the body of extant literature. The research indicates that by boosting soil carbon, crop production, and soil health, certain soil types and climate zones can profit from farming practices such residue retention, limited tillage, and cover crops.As a result, farmers and other decision-makers will have access to the data they require to put RA practices into practice, reap their social and economic benefits, and strengthen their resistance to climate change.



**Keywords:** Regenerative agriculture, soil health, soil carbon, climate mitigation, farming systems.


## INTRODUCTION

Traditional farming methods can cause productivity to drop and soil to deteriorate. Proponents of regenerative agriculture (RA), which emphasizes soil health and carbon sequestration, claim to provide an answer for these problems. The main goals of reforestation (RA) are to maintain soil cover, reduce soil disturbance, maintain living roots in the soil throughout the year, diversify species, integrate livestock, and use as little as possible synthetic substances (fertilizers and herbicides). Rejuvenating the land and soil as well as benefiting the larger community's ecology, economy, and society are the main goals. Despite the alleged advantages of RA, the great majority of growers are hesitant to implement these techniques because there is insufficient actual data to support the profitability of the promised benefits. Overuse of manmade chemicals can lead to biodiversity loss and ecological degradation. Adding livestock to agriculture and agroforestry in the same area can lead to

**Comment [RK1]:** I suggest this title "Regenerative Agriculture: Integrating Soil Health, Carbon Management, and Socio-Ecological Outcomes"

**Comment [RK2]:** Be specific in the abbreviation, do you mean reforestation or regenerative agriculture

**Comment [RK3]:** Instead, we can use terms like 'this research,' 'this article,' or 'this stud

**Comment [RK4]:** Rewrite the abstract to accurately reflect the entire article, ensuring that the aims of your study are clearly stated

**Comment [RK5]:** Rewrite the introduction in a way to be clearer to the reader, the concepts of regenerative agriculture (RA) and socio-ecological systems (SES) should be better organized and articulated

**Comment [RK6]:** Do you mean regenerative agriculture? I suggest unifying the terminology to keep the reader on track

**Comment [RK7]:** Do you mean regenerative agriculture increased soil carbon content and several other benefits. However, the benefits of RA techniques could not necessarily apply to different agro ecological zones and might vary among different agro ecosystems. To improve knowledge of the benefits and processes associated with RA at regional levels, we recommend conducting thorough, long-term research comparing conventional and RA farming systems.

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Regenerative agriculture (RA) is a farming technique that uses natural processes to increase soil health, optimize nutrient cycling, increase biological activity, produce food and fiber, preserve or increase farm profitability, and restore the functionality of the landscape. The strategy is based on a set of guiding principles and uses a range of tactics that combine biological and ecological processes to improve production and restore the functionality of the landscape. Regenerative agricultural (RA) systems are being used by a growing number of agricultural land managers, sometimes known as farmers, as a solution to these problems.When he coined the term "regenerative agriculture," Robert Rodale was the first to advocate for a farming system that could both rehabilitate the environment and provide enough food to fulfil the social and economic needs of the farmer and their community (Rodale, 1983). Interest in and funding for regenerative agriculture have grown recently, despite the fact that the exact number of regenerative farmers is unclear. One of the driving forces behind the expansion has been the assertion that this type of farm management improves farmers' social and psychological resources, including their well-being and quality of life. Recent research indicates that RA has beneficial social and psychological impacts by assisting farmers in adapting to climate change and other issues (Gosnell *et al.*, 2020a; Gosnell *et al*., 2019; Sherren *et al*., 2012). One important aspect of RA has been the farm's adoption of a socio-ecological systems (SES) approach to management, which has been proposed as the source of these benefits. Applying SES concepts to farm management requires an understanding of and control of the interconnections between the environmental, social, and productive aspects of the farm. Decisions on management should also be made using this whole-system approach (Hruska *et al.*, 2017).This point of view holds that the outcomes derived from the landscape are not as important as the social and psychological consequences of RA. RA is a farming approach that combines agricultural practices with the environment's natural processes to improve soil quality, increase biodiversity, and build resilience in the landscape. Similarly, RA agrees that the farm's social components are essential to its overall functioning (Gordon *et al*., 2021; Massy, 2017).

## Need of Regenerative agriculture

Degradation of land and soil has been caused by a number of agricultural management techniques used worldwide, including the use of herbicides and pesticides, artificial fertilizers, and monoculture techniques. As a result, our food crops and plants ended up being of poor quality due to a decrease in soil fertility. It is vital to boost healthy soils in our agroecosystem and raise crop production (yields) of affordable, nutrient-dense, and culturally suitable food crops as the world's population grows every day. Healthy soil is the foundation for agriculture, crop productivity, and human security in the future, according to recent research and discoveries. Research suggests that "alternative" farming methods could help address problems related to soil and water deterioration (FAO, 2019).These practices are adopted to promote healthier soils and can result in increasing crop productivity, greater economic viability, and increased local food security. Major emphasis is placed on 'regenerative agriculture' and 'biostimulation' as conservation and alternative approaches/management practices improve soil health and agricultural productivity. This paper presents a review and an assessment of regenerative agriculture and plant biostimulation and their potential benefits to soil health and agricultural production. It will summarize and communicate the benefits of these two innovative alternative practices to agriculturists, government officials, and farmers.Maintaining our soils and empowering farmers to accelerate the transition to global food security require alternative agriculture systems that enhance the health of our ecosystem and are deemed both economically and ecologically sustainable. Organic farming, conservation farming, "zero-till" farming, biostimulation, and bioremediation are just a few of the several methods and production systems that fall under the umbrella of alternative agriculture. In order to attain high agricultural yield, these techniques have been proposed to improve soil management's sustainability (FAO, 2019).Degradation of the soil and ongoing losses are results of the existing intensive agricultural system. International scientists predict that in the next fifty years, there could not be enough soil to feed everyone on the planet. Global biodiversity and fertility of soil. Regenerative agriculture uses techniques that boost soil organic matter, biodiversity, and biota to enhance soil health. It also seeks to improve carbon sequestration and water retaining capacity.

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- It facilitates soil aggregation, water infiltration, retention and nutrient cycling.
- Regenerative agriculture also reduces erosion, provides habitat and food for diverse species and is beyond sustainability.

Fig 1 :Regenerative agriculture




**Principles of Regenerative agriculture**

Five principles that guide the approach are as follows:

- ✓ Minimize soil disturbance
- ✓ Keep the soil covered year-round
- ✓ Keep live plants and roots in the soil for as long as possible
- ✓ Incorporate biodiversity
- ✓ Integrate animals.

**Regenerative agriculture (RA)**

The theory behind regenerative agriculture (RA) aims to create sustainable food systems. Vvaried actors have varied perspectives about RA, and there isn't a consensus definition from science. In order to identify similarities and differences between the goals and actions that characterize RA, we examined 28 research. Our findings demonstrate convergence with respect to goals that improve the environment and emphasize the significance of socioeconomic factors that support food security. However, the goals of RA concerning socio-economic aspects are vague and do not have a structure for execution. Based on our research, we provide a tentative description of RA as a farming strategy that starts with soil protection and uses it to regenerate and support a variety of ecosystem services.Regenerative agriculture (RA) is an outcome-based approach of food production that improves agricultural productivity and profitability while preserving biodiversity, the climate, and water resources proponents and practitioners assert that their methods will lower greenhouse gas emissions, halt soil erosion and depletion, actively rebuild soil, supply sufficient crop nutrients with little external inputs, generate high-yielding, healthy crops with few weeds and pests, enhance human health, and more.

- Biological and ecological systems are combined in a number of ways used by RA practitioners to improve production and restore the function of the landscape. The primary goal is to reap the benefits of natural processes, which may be accomplished by doing the following actions: soil carbon is collected by photosynthesis in plants with high biomass.
- Improving symbiotic soil micro biota plant interactions.
- Using biological systems to enhance soil structure and water retention.
- Including livestock, with an anticipated positive impact on ecosystem services.

It is necessary to tailor these strategies to the specific farming and environmental conditions in which they are employed, as there is no one strategy that fits all circumstances. Variables including precipitation, temperature, soil type, agricultural enterprise mix, markets, and human preferences must be considered while implementing a RA system. Furthermore, RA is not a rigid agricultural method nor an organic farming practise. Rather, it is based on basic principles that enable individuals to apply various techniques to their properties to get the desired outcomes. Many of the techniques used by RA farmers are well-known "good farming" techniques that conventional farmers also use. Other forms of sustainable agriculture, such as carbon farming, low-input farming, organic farming, climate wise agriculture, and low-input farming, also employ certain RA techniques.

**Benefits of Regenerative agriculture**

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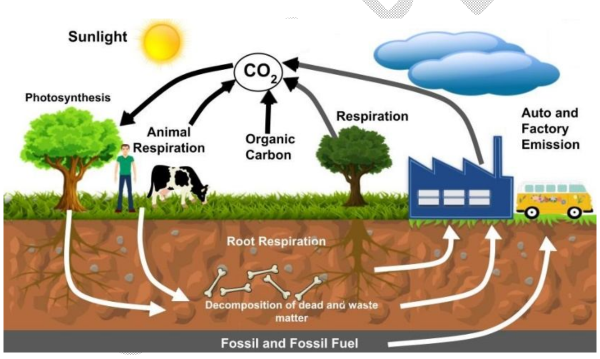
Soil health has been defined as the capacity of soil to continue operating as a vital living system within ecological and land-use boundaries, sustaining biological production, preserving the quality of the air and water, and enhancing plant, animal, and human health (Doran *et al*., 2013 and 2014). The International Technical Panel on Soils (ITPS) has defined soil health as the soil's capacity to sustain the productivity, diversity, and environmental services of terrestrial ecosystems (ITPS 2020). In addition to its desirable physical properties (texture, water holding capacity), pH, and soil organic matter (SOM), healthy soil also has desirable chemical, biological, and biological (microbial diversity, N mineralization, and soil respiration) characteristics that support healthy, productive crops. According to theory, soil is a dynamic, living ecosystem that is home to a wide range of micro- and microbiota that regulate its properties. The intensification of agriculture employing modern technology has compromised soil's ability to maintain its functions, which has an effect on long-term productivity and results in the loss of ecosystem services (Tilman *et al.*, 2001; Bender *et al.*, 2016 and Wagg *et al.*, 2016). By adding more organic matter to the soil and raising its fertility and production, RA aims to promote soil health.



Fig 2 :Benefits of Regenerative agriculture




**1 Increased soil carbon**

As soil has the capacity to store three times as much carbon as the atmosphere, it is thought to be an active carbon storage reservoir (Reeves *et al.*, 1997). One of the primary factors contributing to soil deterioration is the loss of soil organic carbon (SOC). Research has shown that adding sulfur dioxide to soil improves itsstructure, fertility, nutrient availability, aeration, water infiltration, and water-holding capacity (Robertson *et al.*,2015). As a tactic to lessen climate change, it has lately been considered (Chabbi *et al.*, 2015).

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The depletion of SOC supplies in terrestrial ecosystems is a key factor contributing to lower agricultural yield. In order to optimize agricultural output, it is recommended to employ management strategies that increase SOC. It has been shown that raising SOC by up to 2% increases maize and wheat yields, which may reduce the demand for N fertilizer (Oldfield *et al.*, 2019 and Kane *et al.*, 2021).While soil carbon build-up is influenced by regional climate and management practices (Hoyle *et al.*, 2016), SOC is believed to be lost as a result of events such erosion, fire, land use conversion, and deforestation. In particular, land cultivation removes topsoil, breaks down the structure of soil aggregates, and exposes SOC to oxidation, all of which change the physical properties of the soil and the availability of nutrients.

The following section discusses a number of cropping techniques used to preserve or raise SOC:

**Minimum/No tillage**

RA farmers prioritize little to no tillage in order to minimize soil disturbance. The strategy aims to lessen soil disturbance while also encouraging the formation of fungal hyphae, which will enhance the soil's nitrogen cycle. Soil disturbance resulting from intense tillage is the cause of carbon dioxide (CO2) fluxes to the atmosphere and water resources (Sapkota *et al.*, 2015). In many countries, regions at danger of soil and water erosion benefit from limited or no tillage in addition to economic savings. Apart from these benefits, experts believe that conservation tillage methods can increase carbon sequestration, lessening the impact of global warming (Yang *et al.*, 2013). Tillage and ploughing cause significant soil deterioration and emissions of

carbon dioxide into the atmosphere. Additionally, it could make the soil compacted or bare, which is bad for healthy soil bacteria. Conversely, when combined with other regeneration strategies, no-till/minimum tillage improves soil aggregation, water infiltration and retention, and carbon sequestration. In some soils, intermediate ripping can increase soil health and sequester carbon by breaking up hard pans and increasing root zones and yields.The best management strategy for increasing SOC stocks in croplands is to retain residue in a double-cropping system while doing little tillage. Increasing the stock or concentration of SOC in the

Comment [RK14]: Do you think it will affect only the soil bacteria, or will it impact the entire **Microbial** community (**Microbiota)**? Pleas be specific topsoil not only promotes more biologically active and productive soil but also increases the soil's resistance to extreme weather.

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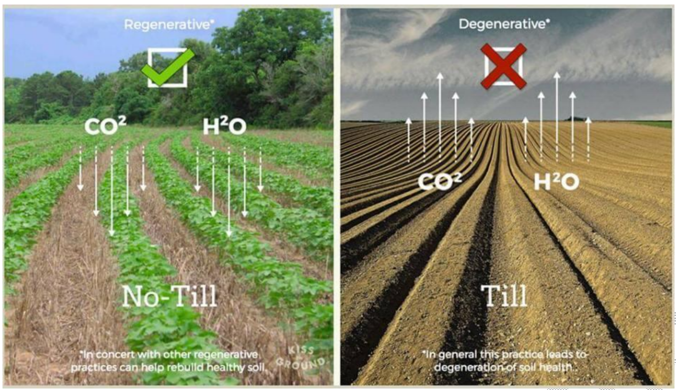
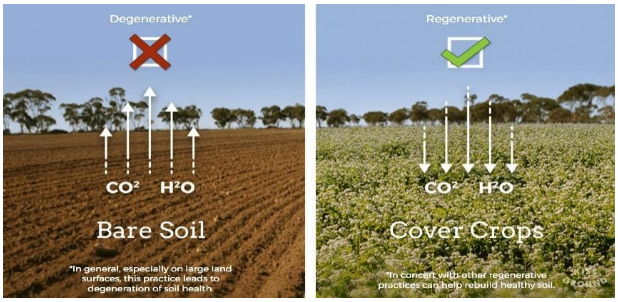
Fig 3 :Comparison of regenerative and degenerative agriculture






Based on a global met analysis, Haddaway *et al.* (2017) estimated the increased C stock under no tillage versus high tillage in the upper soil (0–30 cm) to be roughly 4.6 Mg/ha (0.78–8.43 Mg/ha, 95% CI) over approximately 10 years, while no influence was found in the complete soil profile (Deen *et al.*, 2003).On the other hand, it was found that slow SOC accumulation could be achieved by adding perennial pastures on a rotational basis to continuous cropping in a warm, semi-arid temperate or subtropical climate with zero tillage (Chan *et al*., 2003 and Young *et al.*, 2009). Conservation tillage's capacity to raise SOC is contingent upon several factors, such as soil depth, crop yield, rainfall, stubble retention, and rate of decomposition. The practice of no-till (NT) farming has been advocated as a way to improve the biological properties of soil.Martinez *et al.* (2013) observed that soil chemical fertility rose under NT, with larger levels of N, P, and K. They assessed particular soil parameters in irrigated Mediterranean no-till and conventional tillage (CT) systems. Compared to conventional tillage, no-till yielded increased carbon dioxide storage. Greater SOC under NT compared to CT resulted in greater biological activity. No-till farming improves soil quality, although Powson*et al.* (2014) argue that its significance in mitigating climate change is greatly exaggerated. They also support the enhanced productivity of NT soil with respect to its chemical composition.

Fig 4 :Comparison of bare and cover soil




**Cover crop**

The second and third RA principles demand that soil cover and live roots remain in the soil for the whole year. One option is to incorporate cover crops into the farming system. Cover crops are often planted between main crops in order to cover the soil and keep live plants there during non-cash farming seasons. This is accomplished by sowing cover crops following harvest or by underseeding cash crops (often grains) with perennial plants that will develop and maintain soil cover for the duration of the subsequent growing season.

Cover crops can be single species or mixtures of several species. While a single species can be managed easily, a combination of species can provide all the benefits of each species in the mixture (Finney *et al.*, 2017). Legumes are one of the multi-species cover crops that are thought to improve ecosystem processes like biological nitrogen fixation, microbial variety, reduced compaction, attraction of beneficial insects, suppression of weeds, temperature regulation of the soil, and increased water infiltration.Expanding the use of cover crops might improve soil fertility and aid in carbon sequestration while reducing agricultural GHG emissions by 10%, which is equivalent to using no-till or other cropping techniques (Kaye *et al.*, 2017). Increasing the quantity of SOM in the soil allows cover crops to boost microbial biomass, which is one of their main benefits (McDaniel *et al.*, 2014). However, a significant rise in soil carbon can take a few years. Ghimire *et al.*(2018); Poeplau*et al*. (2015).There have been recorded reactions of cover crops to SOC build-up in a variety of agroclimatic regions worldwide. In a temperate, humid region of North America, it has been shown that applying cover crops six times in eight years improves SOC surface storage; however, profitability relies on the type of production system used (Chahal *et al.*, 2020).Soil carbon acquisition using cover crops has been linked to soil texture, with clay soils having a greater chance of accumulating soil carbon. Studies carried out in Argentina indicate that the

**Comment [RK16]:** Greenhouse Gases

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absorption of soil carbon is enhanced by the planting of cover crops on soils with both fine and coarse textures (Alvarez *et al*., 2017). The benefits of no tillage are more evident because residue decomposition proceeds more slowly than it does with conventional tillage, even if cover crops can help eroded soils with low carbon content accumulate more carbon (Hassink*et al*., 1997; Berhe *et al*., 2007). (Olson *et al*., 2014).

fig 5 :Benefits of cover crop



**Stubble retention**

Leaving the stubble on the field after harvest has several advantages, including lessening water runoff and soil erosion, restocking the soil with nutrients, and enhancing water infiltration and carbon input (Packer et al., 1992). Generally speaking, stubble retention affects C build-up more when combined with other management strategies (Saffigna*et al.*, 1989). Plant variety influences how above- and below-ground plant litters decompose and change, which in turn influences how SOC is produced and accumulates (Cotrufo*et al.*, 2015). Furthermore, the amount of carbon sequestered (C:N ratio) depends on the quality of the residual C intake. Manure with a higher C:N ratio breaks down more slowly, releasing more carbon into the soil, and vice versa. According to Pandey *et al.* (2019), burning stubble results in greenhouse gas emissions, physical, chemical, and biological damage, and a decrease in SOM. Another way to improve soil biodiversity and SOC is to use garbage as a surface mulch (Tomar *et al*., 1992). The capability for sequestering carbon may be significantly or negligibly impacted by stubble addition, depending on the kind of soil. Clay soils with integrated stubble sequester more carbon than sandy soils do. Numerous studies have shown that when stubble retention and no tillage were coupled, crop yield and SOC stocks significantly increased (Xia *et al*., 2018 and Shi *et al*., 2022).

Although keeping stubble in place has been suggested as a way to enhance soil health, it can also pose a risk for the spread of diseases that are carried by stubble and impact crop output.

However, the negative impacts can be lessened by implementing integrated disease management measures.

fig 6 :Crop rotation

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**Crop rotation**

Crop rotation, sometimes referred to as diversification, is a centuries-old technique that breaks the cycle of pests, diseases, and weeds while improving production and profit. But around the middle of the 20th century, crop rotation as a technique went back to monoculture because of increased dependence on artificial fertilizers and pesticides, better crop types, and occasionally, financial concerns.

In the end, all of these led to SOM loss and land degradation (Di Bene *et al*., 2016). The potential of crop rotation to enhance soil quality is getting more and more attention (Jarecki *et al*., 2003). SOC and N may be greatly increased by farming techniques that include crop rotation with high residue-producing crops, keeping surface residue cover, and minimizing tillage (Havlin *et al*., 1990). However, in WA's rich soil, crop rotation had little effect on SOC. Pulse crops have a major role in the biological fixation of nitrogen, which increases SOC.

The yield benefit of rotating wheat and pulse crops, however, depends more on the kind of pulse crop in rotation than SOC as certain pulse crops generate far less biomass and residual inputs than others.

fig 7 :**grazing practices**

**Well managed grazing practice**

Even though raising livestock is sometimes blamed for contributing to methane emissions, integrating animals is another popular RA strategy that enhances soil health and broadens the source of income. In order to improve soil health and elevate SOC, rotational grazing is recommended over continuous grazing. They enhance the total productivity of pastures and grazing areas, as well as plant growth and soil carbon deposits. Additionally, they improve soil carbon sequestration, variety of plants and insects, and soil fertility. These activities improve dietary omega balances and the availability of micronutrients, which is advantageous for the environment, animal health, and human health. Feed lots and restricted animal feeding practices significantly contribute to-

- Un-healthy monoculture production systems,
- low nutrient density forage,
- increased water pollution,
- antibiotic use and resistance
- $CO_2$ and methane emissions

All of which combine to produce unreliable food production systems that are bad for the environment. One of the most important elements of the many techniques for raising organic livestock is rotational grazing, which involves transferring cattle over pastures on a regular basis to enhance the health of the soil, plants, and animals. Animal welfare must come first in order to satisfy the needs of the animals and keep them healthy without using hormones or antibiotics.

**2. Pest, Pathogen, and Weed Control/Suppression**

Crop viruses, pests, and weeds cause significant production losses and financial losses on a global scale. Certain diseases and pests—especially those that prefer warmer climates—are expected to become more common and severe as a result of climate change. Certain environmental conditions, such elevated temperature, CO2, humidity, and nutritional status, can affect plant immune responses. One agricultural practice that promotes disease and pests is monoculture. To lessen the resulting losses, integrated disease and pest control is frequently suggested. Using fungicides and insecticides for traditional plant disease and pest management is one of the recommended approaches, but it has a lot of disadvantages.

In addition to pollution and negative effects on soil microbiota, pesticide consumption in recent years has led to the emergence of pesticide resistance. Consequently, there is a global desire among specialists to develop sustainable and environmentally safe disease control solutions.

Numerous microorganisms present in soil have been recognized as agents that inhibit pests and illnesses. Microbial biological control agents protect crops from diseases by several mechanisms, such as competition, hyper parasitism, and antibiosis. Numerous beneficial soil fungi, viruses, bacteria, and microfauna have been noted as potential candidates for biological control and the restoration of ecological balance (Ruiu*et al*., 2018). Weeds are a big problem in WA farming systems, and chemical weed control is frequently used. It will be extremely difficult to manage weeds in no-till and other regenerative farming practices without the quick development of novel non-chemical strategies. Chemical weed control is not only costly, but it also presents serious issues since certain weed species breed to produce resistant populations.Integrated weed management (IWM), which combines physical, cultural, genetic, biological, and chemical strategies, is the way of the future for long-term weed control. Allopathy is another tactic to reduce the usage of weedicides. Soil microorganisms, including nematodes, bacteria, viruses, and fungus, help reduce weed seed banks. A major drawback is that most of the microorganisms employed to control weeds are diseases that affect both weeds and agricultural plants.

**3.Climate Mitigation**

According to RA practitioners, one of the extra advantages of RA is decreased greenhouse gas emissions. Australia's annual greenhouse gas emissions are made up of methane and nitrous oxide, which are produced by the enteric fermentation of crops and livestock/animals, respectively. A 10% to 20% decrease in agricultural productivity can result from a loss in SOC brought on by rising temperatures and likely soil erosion (Delgado *et al*.,2011).

The potential of agricultural methods to mitigate climate change stems from the sequestration of SOC in soil through photosynthesis. The greatest capacity for sequestration is found in crops, grazing/range lands, degraded/deserted lands, and irrigated soils. These areas have the ability to offset emissions from fossil fuels by 5–15% each year. Increased C sequestration in soil may be achieved by a variety of management strategies, such as the use of perennial fodder crops, the removal of bare fallows, the development of biofuel crops, improved nutrient management, less tillage, and the creation of high residues (Paustial*et al*., 1997).

**A global shift to RA**

**Feed the world:** Small farmers presently account for less than 25% of the world's land.

**Cut greenhouse gas emissions**: One of the main components of climate change solutions may be a new food system. Of all greenhouse gas emissions, 44 to 57% come from the industrial food system that is in place today.

**Reversing climate change:** simply means that cutting emissions is not enough. Fortunately, we can really slow down climate change by increasing soil carbon storage.

**Improve yields:** In cases of extreme weather and climate change, yields on organic farms are significantly higher than conventional farms.

**Make soil resistant to drought:** Adding organic matter to the soil raises its ability to retain water. Organic regenerative farming increases the organic matter in the soil.

**Regenerative agriculture in India**

In India, natural farming is encouraged by the BhartiyaPrakritik Krishi Paddhati Programme (BPKP), a centrally supported initiative known as the Paramparagat Krishi Vikas Yojana (PKVY). The goal of BPKP is to promote traditional indigenous lifestyles that decrease reliance on outside resources. In cooperation with the Ministries of Agriculture and Farmers Welfare, NITI Aayog organized a number of high-level discussions on natural farming methods with experts from outside. In India, regenerative agriculture is already practiced by over 2.5 million farmers. Twenty lakh hectares of organic farming, including natural farming, are expected to be planted in the next five years; twelve lakh of those hectares are expected to come under the BPKP. It is thought to be a profitable farming technique with the potential to boost employment and rural development.

**Conclusion**

A farmer who uses regenerative practices and doesn't disturb the soil reduces the impact of climate change by cultivating organic matter. Furthermore, the more organic matter there is in the soil, the more water-retaining capacity it has. Regenerative agriculture techniques help farmers deal with the immediate effects of climate change by increasing their farms' resilience and adaptability to external events. They also empower farmers to take longer-term action by contributing to a larger solution to the crisis through carbon sequestration. RA is gaining popularity as a solution to issues brought on by rising input costs and climate change.Adopting climate smart agricultural techniques, like RA, is supposed to reduce greenhouse gas emissions and mitigate the consequences of harsh weather. Restoring soil health is the primary goal of reforestation (RA), which may revitalize damaged land and benefit a wider community in terms of the environment, economy, and society. RA

**Comment [RK18]:** Support your finding with citation reference

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**Comment [RK20]:** This section highlights a beneficial point regarding the application of regenerative agriculture in India. To enhance the value of your paper, consider providing more detailed information in this section, supported by references, statistical data, and diagrams. Including maps that refer to the specific regions where this practice is applied would also be valuable

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The conclusion should summarize the entire article and clearly state your findings

incorporates elements from established sustainable agricultural systems rather than being a completely new farming method. Due to their ability to regulate a range of biological activities in the soil, SOM and SOC are significant components of soil biodiversity. By impeding ecosystem functions, even a slight decrease in SOC can have detrimental impacts on the health of the soil.

The formation of microbial communities is influenced by management practices, and this has an effect on ecosystem services. It is well recognized that soil biodiversity is lost in heavily treated soils. Soil biodiversity is presently under severe risk because to Western Australia's naturally low SOC agricultural soils. The body of research indicates that sustainable management practices boost soil functionalities, microbial biomass, and activity. Though producing SOC in WA dry lands is extremely challenging, especially in areas with limited water supplies, research suggests that by modifying agronomic practices, there is possibility for carbon sequestration and enrichment of below-ground biodiversity.

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