



## Regenerative Agriculture-A Step towards Sustainable Development

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Humans have been practicing agriculture for more than 10,000 years. Many of the farming practices used in varying forms of agriculture have had a significant impact on the sustainability of food systems, food security, animal wellbeing, environmental health, and human health <sup>[1]</sup>. Agriculture is also a large contributor to climate change. Regenerative agriculture looks to not only stop damaging our ecosystem but actually improve it, all while continuing to produce our food, fiber, and fuels. By taking the necessary steps and transitioning to more regenerative farming methods, agriculture could go from being considered one of the leading causes of health and environmental issues, to a solution for these problems.

**Regenerative** agriculture is a holistic land-management system which involves farming principles and practices that increases biodiversity, enriches soils, improves water cycle, enhances ecosystem services, support biosequestration, increasing resilience to climate change, and overall strengthening the health and vitality of farming communities. It is a method of farming that improves the resources and its uses, rather than destroying or depleting them. Basically, it is a way of farming that not only protects the soil, but also enhances it and it's a view of farm life, how we grow food, and how we interact with cultivated landscapes resulting in improving soil health, crop yields, water resilience, and nutrient density.

Regenerative agriculture is not a specific practice itself. Rather, proponents of regenerative agriculture use a variety of sustainable agriculture techniques in combination.<sup>[2]</sup> Practices include recycling as much farm waste as possible and adding composted material from sources outside the farm.<sup>[3]</sup>

### Regenerative agriculture Principles and Practices

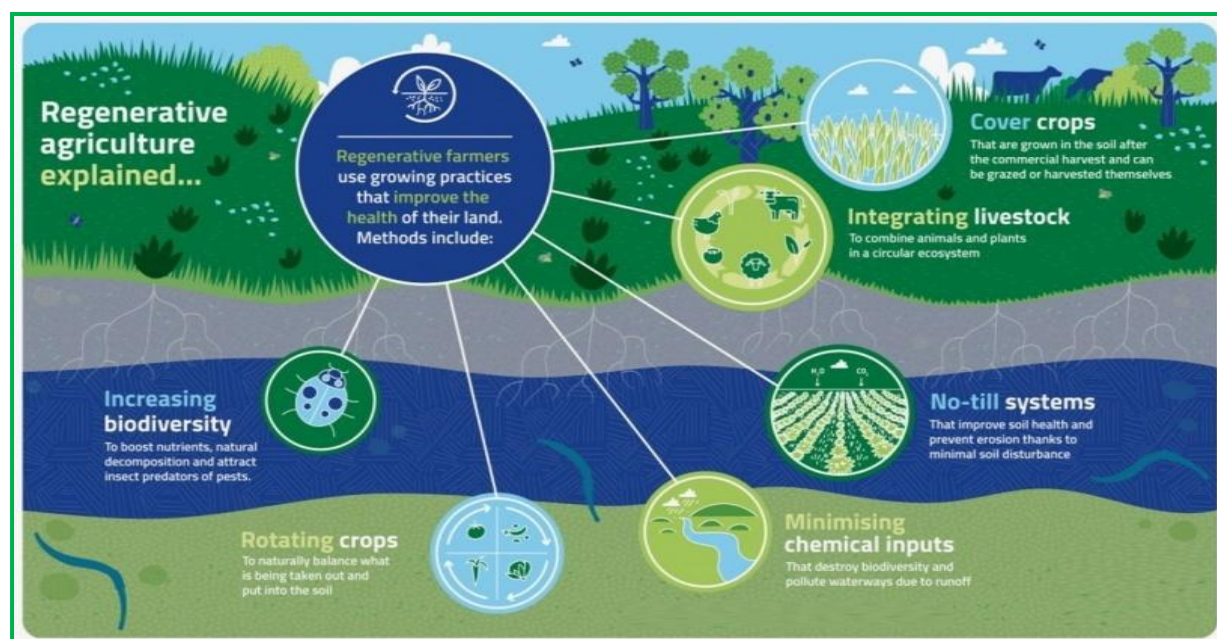
- **Minimizing soil disturbances:** The ultimate focus of regenerative agriculture is to restore natural soil conditions, starting with the soil's health. To achieve this primary goal, agriculturists believe that minimization or elimination of tillage and encourage farming practices such as limited or no-tilling that minimizes physical, biological, and chemical soil disturbances.
- **Soil coverage and Keeping living roots in the soil as much as possible:** If soil is left exposed to the elements, it will erode and the nutrients required for plant growth will either dry up or wash away. Keeping the soil covered with vegetation and natural materials through mulching, cover crops, and pastures helps in capturing carbon from the atmosphere and convert it into stable soil carbon, reduces soil erosion, minimize weed growth, increase water retention, improve soil health, increase biodiversity, and enhances the food chain.
- **No-till/minimum tillage:** In conventional farming, soil is often dug up and left bare after harvest. Tilling and ploughing erodes the soil, breaks the soil aggregates, depriving it of

its nutrients and releasing large amounts of carbon dioxide (CO<sub>2</sub>). By adopting no-till practices, farmers can reduce physical disturbance to the soil, increase water infiltration and retention maintaining its overall structure and also preventing erosion and carbon sequestration.

- **Increased plant diversity:** Soil biodiversity as well as plant diversity is an essential component in agriculture and its helps in the development of a diverse mix of plants from different ecological niches which will ultimately complement the growth of other plants, in nutrient and nitrogen fixation. Different plants mineralize different nutrients, so it is important to maintain as much diversity wherever possible.
- **Integrate animal husbandry:** Livestock is an important component in regenerative farming. Manure produced by livestock can add valuable nutrients to the soil, reducing the need for fertilizers, and increasing soil organic matter. Confined animal feeding systems significantly contribute to unhealthy monoculture production systems, low nutrient density forage, increased water pollution and CO<sub>2</sub> and methane emissions etc.

With a focus on rotational grazing, which involves continuously rotating animals through different grazing areas prevents soil erosion, saves on feed costs, averts the manure buildup of concentrated animal feeding operations, and contributes to soil fertility.

- **Crop rotation:** Simultaneously planting the same plants in the same spot can result in an overabundance of some nutrients and a deficiency in others. Through crop rotation, farmers interrupt pests' reproductive cycles, reduce the need for pest control, and can reduce the need for added fertilizer. Above ground plant diversity leads to below ground diversity of the soil microbial community-the key to healthy soils.
- **Natural farming:** Natural farming is promoted in India as a centrally funded scheme known as Paramparagat Krishi Vikas Yojana (PKVY). BPKP aims to promote traditional indigenous practices like use of beejamrutha, jeevamurta, mulch and other preparations and decrease the need of imported inputs.
- **Composting:** Regenerative agriculture encourage preparation and use of green and brown compost.
- Other advanced practices include silvopasture (the intentional combination of trees, forage plants, and livestock together as an integrated, intensively managed system) and agro forestry (the restoration of trees and tree crops on farms).



Pictorial representation of Regenerative Agriculture System

## Benefits of Regenerative Agriculture

### Climatic benefit

- **Reduce Greenhouse Gas Emissions in Agriculture:** Some regenerative practices like including no-till farming, cover cropping, and rotational grazing can decrease overall emissions of greenhouse gases from the agricultural sector and aid soil carbon sequestration.
- **Boost Climate Resilience:** As flood, drought, and other extreme weather patterns become more frequent in today's climatic change scenarios, so our land have to be to be more resilient. Healthy soils with high amounts of organic matter are able to absorb more water during a flood to the benefit of the farmer and downstream communities and even help maintain water security during a drought.

### Socio-Ecological Benefits

- **Healthier yields:** It goes without saying that the healthier the soil, the healthier the crop yield. When plants have the nutrients and root systems they need to thrive, they build compounds to help protect against insects and disease. There is also growing evidence that a healthy soil micro biome full of vital bacteria, fungi, and nematodes is more likely to produce nutrient-dense food, promoting better human health.
- **Reduce cost and reliance on synthetic inputs:** Employing regenerative agricultural practices means to make every effort to reduce their reliance on synthetic inputs, such as herbicides, pesticides, and chemical fertilizers because in this farming soil is healthy and replenishes itself and as vibrant microbial communities and wildlife return and diverse crop and livestock rotations disrupt weed cycles, the ecosystem becomes more resilient. And with fewer toxic chemicals, there are reduced human health risks as well as increased financial independence from avoiding the recurring costs of synthetic inputs.
- **Supports pollinators:** Regenerative agriculture reduces the use synthetic agricultural chemicals, which are known for being harmful to pollinators, thus increases the population of pollinators and helps in maintaining a ecological balance.
- **Restore the health of watershed organisms:** When it rains, healthy topsoil absorbs the water, whereas deficient soil is too dry to do so, resulting in water runoff. This runoff is hazardous because it carries any poisonous fertilizer or pesticides that have been sprayed into rivers, streams, and the ocean. Supporting organic soil matter and avoiding the use of chemicals ensures that we all have access to safe, clean water.
- **Reduced runoff and erosion:** Crops can be rotated year-round and soil is covered by green biomass in regenerative agriculture, which reduces water and fertilizer runoff. Healthier soil is also less prone to erosion.
- **Greater financial security from diversified revenue streams helps in achieving food security and food equity and promotes the socio- economic development of rural people.**

### Constraints

- Time consuming
- Difficult to do on a large scale
- Takes careful planning and organization
- Labour intensive

### Conclusion

Adopting regenerative agriculture practices not only helps farmers deal with current climate change impacts by making their farms more resilient and adaptive to what is happening around them now, but it also allows them to take long-term action by participating in a larger solution to the crisis through carbon sequestration. For farmers, a regenerative approach can offer new profitable and nature-friendly economic models. For policymakers, it offers



alternative ways of thinking about sustainability. And for change makers looking to reduce the negative impacts of farming, it represents small actions and changes that are closely linked to a large-scale vision.

### References

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