

REGENERATE AGRICULTURE AS AN ALTERNATIVE TO THE INDUSTRIAL REVOLUTION

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Summary

The industrial revolution in agriculture, launched with great momentum in the second half of the 20th century, changed the way food is produced globally. Despite the increase in productivity, this model of agriculture has numerous negative consequences for the environment, biodiversity and socio-economic aspects of rural communities. In this paper, we explore the concept of regenerative agriculture as an alternative to industrial agriculture, highlighting its potential for sustainability and a just transition. Regenerative agriculture promotes the restoration and preservation of ecosystem health through the integration of biological diversity, soil restoration, and natural cycles into agricultural practice.

Keywords: *industrial agriculture, regenerative agriculture, sustainability, biodiversity, socio-economic justice, transition, ecosystem, soil restoration, agricultural practice*



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1 INTRODUCTION

Industrial agriculture, often referred to as agribusiness, stands at the intersection of traditional farming practices and modern industrial processes. It represents a pivotal evolution in the agricultural sector, where technological advancements and efficient production methods converge to meet the growing demands of a global population. This article explores the multifaceted landscape of industrial agriculture, examining its contributions to productivity, sustainability challenges, and its transformative impact on rural economies worldwide. By delving into the complexities of this industry, we gain insight into its role in shaping the future of food production and addressing critical global challenges.

The industrial revolution in agriculture, which began with a strong momentum in the second half of the 20th century, transformed the way food is produced around the world. However, despite the increase in productivity, this model of agriculture brings with it numerous negative consequences for the environment, biodiversity and socio-economic aspects of rural communities. In this paper, we explore the concept of regenerative agriculture as an alternative to industrial agriculture, with an emphasis on its potential for sustainability and a just transition.

1. INDUSTRIAL AGRICULTURE

Industrial agriculture is characterized by mechanization, intensive use of synthetic chemicals such as pesticides and artificial fertilizers, and monocultures. This approach is aimed at maximizing yield per hectare, often at the expense of soil health, biodiversity and long-term ecosystem sustainability. Although industrial agriculture brought cheap food and increased production, it simultaneously contributed to environmental degradation,

loss of natural resources and economic impoverishment of small farms.

Key problems in industrial agriculture include soil, water and air pollution, loss of biological diversity, and increased sensitivity to climate change. In addition, centralization and concentration ownership of resources in the hands of large corporations has created an imbalance in the bargaining power of small farmers. Industrial agriculture, also known as agribusiness, represents the integration of agricultural production with industrial processes. This sector plays a crucial role in modernizing agriculture by providing efficient methods to process raw materials from primary agricultural production into final products that can be distributed and sold.

One of the main objectives of industrial agriculture is to increase productivity through the use of technology and modern farming methods. This includes the application of machinery, the use of high-yield hybrids, and genetically modified organisms (GMOs) to enhance yields and disease resistance, as well as optimizing resource use such as water and fertilizers.

The processing of agricultural products is a key component of industrial agriculture. This process involves various operations such as cleaning, sorting, packaging, and preserving products to extend their shelf life and enhance their market value. Examples of industrial agricultural products include juices, canned food, oils, flour, and dairy products.

Moreover, agribusiness provides opportunities for rural development by creating jobs and stimulating local economies. Integrating agricultural production with industrial processes also contributes to food security and reduces food losses, which is crucial in the face of global challenges such as climate change and population growth.

However, industrial agriculture is not without challenges. Some of the main issues include environmental impacts due to intensive use of pesticides and fertilizers, as well as the need for sustainable approaches to minimize ecological footprints and potential health risks.

In conclusion, industrial agriculture is a critical segment of modern agriculture that combines technological advancements with traditional farming methods to optimize production, increase profitability, and ensure the sustainable future of agriculture. Balancing industrial demands with environmental imperatives remains a key challenge for further development in this important economic sector.

2 REGENERATE AGRICULTURE AS AN ALTERNATIVE

Regenerative agriculture represents a comprehensive approach to farming that focuses on restoring ecosystem health, preserving soil, and enhancing biodiversity, while simultaneously providing sustainable food yields. This approach goes beyond conventional or even organic agriculture by emphasizing the integration of farming practices with natural processes.

One of the key principles of regenerative agriculture is soil conservation as a vital habitat for plants and microorganisms. This is achieved through agroecological practices such as crop rotation, soil cover crops, diverse crop planting, and the use of natural fertilizers. These practices improve soil fertility and reduce the need for chemical inputs, thereby minimizing negative environmental impacts.

Regenerative agriculture also emphasizes minimal soil disturbance to preserve its structure and prevent erosion, thus safeguarding soil from degradation and promoting its long-term sustainability.

Another crucial aspect of regenerative agriculture is the integration of livestock and crop production into systems that support nutrient cycles and reduce greenhouse gas emissions. The use of agroforestry and silvopasture can further contribute to soil conservation and biodiversity enhancement.

Ultimately, regenerative agriculture is not just about food production but a holistic approach that supports ecosystem health, community well-being, and economic resilience. Promoting these practices can have long-term positive effects on the environment, climate change mitigation, and the sustainability of global agriculture.

Regenerative agriculture represents a paradigm that strives to restore and preserve the health of the ecosystem through the promotion of biological diversity, soil renewal and the integration of natural cycles into agricultural practice. The main principles of regenerative agriculture include minimal use of chemicals, crop rotation, reduction of soil erosion, promotion of healthy livestock and reuse of resources within the local ecosystem. Regenerative agriculture represents a revolutionary approach to agriculture that emphasizes soil health as a fundamental link in the sustainability of the entire ecosystem. While traditional approaches often focus on maximizing yield through the intensive use of agrochemicals and mechanical operations such as deep plowing, regenerative agriculture with innovative methods tends to restore the biological activity of the soil, increase biodiversity and reduce the ecological footprint. Regenerative agriculture represents an innovative approach to agriculture that focuses on the restoration and preservation of ecosystem health through the integration of biological diversity, the restoration of soil fertility, and the promotion of natural cycles.

This agricultural practice opposes the traditional model of industrial agriculture, which often results in environmental degradation, loss of biodiversity and socio-economic challenges in rural communities. Key principles of regenerative agriculture include minimal use of synthetic chemicals such as pesticides and artificial fertilizers, crop rotation to preserve soil fertility, keeping the soil covered year-round to prevent erosion, and integrating livestock into agricultural systems to improve nutrient circulation and soil renewal.

The goal of regenerative agriculture is not only to increase productivity, but also to create more resilient ecosystems that can withstand climate change and ensure the sustainable use of natural resources for future generations. This practice also encourages local communities through the development of local food markets and the reduction of economic inequalities in rural areas.

This paper will explore the key principles of regenerative agriculture, their economic and ecological implications, and examples of successful implementations.

The central principle of regenerative agriculture is the reduction of soil disturbance, such as deep plowing, which negatively affects soil structure. Healthy soil is characterized by well-formed aggregates that allow air and water infiltration, and are key to retaining moisture and nutrients. Soil disturbance destroys these aggregates, reduces soil porosity and promotes anaerobic conditions that negatively affect soil microbiological activity. In regenerative agriculture, methods such as no-till systems and cover crops are used instead of aggressive plowing, which helps preserve soil structure and stimulate biological activity (Prescott et al., 2020).

An important aspect of regenerative agriculture is keeping the soil covered

throughout the year. By growing cover crops and leaving crop residues on the soil surface, erosion is prevented, microorganisms are protected and moisture retention is encouraged. The continuous presence of living roots in the soil also contributes to the nutrition of soil biology, which is crucial for its fertility and health (Chapman, 2020).

Regenerative agriculture promotes the diversity of both plant and animal species. Through the mixing of crops, rotational grazing and the integration of livestock into agricultural systems, greater resistance to pests and diseases is achieved and the circulation of nutrients in the soil is improved. The diversity of plant communities and crops contributes to a better use of resources and a reduction in the need for chemical inputs (Soil Association, 2018). Animals play a key role in regenerative agriculture by contributing organic matter and microorganisms to the soil, which is essential for its fertility. Grazing animals are especially important because of their contribution to the nutrient cycle and maintaining the balance in the ecosystem. With proper management, livestock can positively affect soil structure, increase biodiversity and reduce the need for artificial fertilizers and pesticides (Brown, 2018).

Economically, regenerative agriculture can reduce the cost of inputs such as fertilizers and pesticides and increase profitability in the long run. Studies show that farms that apply regenerative techniques are less sensitive to input price fluctuations and achieve more stable and long-term sustainable profits (LaCanne & Lundgren, 2018). Ecologically, regenerative agriculture contributes to restoring biodiversity, reducing soil erosion and increasing water retention, thereby improving ecosystem resilience to climate change (Clark et al., 2019).

The example of the White Oak Pastures farm in Georgia illustrates the successful application of regenerative principles. This farm successfully integrates multiple types of livestock and crops, uses a group grazing system and has its own slaughterhouse that minimizes waste and contributes to the local economy. In addition to increasing profitability and resilience to climate change, the farm has become an engine of local development by employing large numbers of workers and encouraging sustainable food consumption (Brown, 2018).

Regenerative agriculture promises numerous advantages over industrial agriculture, including increased resilience to climate change, conservation of natural resources, improved biodiversity, and improved soil and water health. In addition to environmental benefits, this agricultural practice can improve economic opportunities for local communities through the development of local markets and the reduction of input costs.

The implementation of regenerative agriculture requires a just transition that takes into account the socio-economic and cultural specificities of rural communities. This includes support for small farms through education, access to financial resources, political support and strengthening of local food markets.

Furthermore, regenerative agriculture encourages farmers to adopt practices that promote water efficiency and conservation. Techniques such as rainwater harvesting, contour farming, and agroecological water management help mitigate drought risks and enhance overall water use efficiency on farms.

A significant benefit of regenerative agriculture is its potential to sequester carbon dioxide from the atmosphere and store it in the soil, thus contributing to climate change mitigation. Healthy soils

rich in organic matter not only support higher crop yields but also act as a carbon sink, helping to reduce greenhouse gas levels in the atmosphere.

In addition to environmental benefits, regenerative agriculture fosters resilience in farming communities by diversifying income streams and reducing reliance on external inputs. By promoting local food systems and direct-to-consumer marketing, it enhances food security and strengthens community ties.

Challenges remain, including the need for broader adoption of regenerative practices, overcoming initial investment costs, and educating farmers about the benefits and techniques involved. Policy support and incentives can play a crucial role in scaling up regenerative agriculture and overcoming these barriers.

In conclusion, regenerative agriculture represents a promising pathway towards sustainable food production, environmental stewardship, and resilient farming communities. By prioritizing soil health, biodiversity, and climate resilience, it offers a transformative approach to addressing global agricultural challenges in the 21st century. Continued research, innovation, and collaboration are essential to fully unlock the potential of regenerative agriculture and ensure its widespread adoption worldwide.

Moreover, regenerative agriculture promotes biodiversity conservation by creating habitats that support a wide range of plant and animal species. Diverse crop rotations and intercropping methods not only enhance soil health but also provide ecological niches for beneficial insects, birds, and other wildlife, contributing to natural pest control and ecosystem balance. The holistic approach of regenerative agriculture extends beyond individual farms to encompass landscape-level planning and management. This includes efforts to

restore degraded lands, protect watersheds, and enhance ecological corridors that connect fragmented habitats, thereby promoting resilience in the face of environmental changes and preserving biodiversity. Economically, regenerative agriculture offers potential benefits through improved farm profitability over the long term. By reducing input costs, enhancing soil fertility, and diversifying income streams through value-added products like organic crops or grass-fed meat, farmers can achieve greater economic stability and resilience to market fluctuations. Socially, regenerative agriculture fosters community engagement and empowerment by promoting local food systems, supporting small-scale farmers, and enhancing food sovereignty. It encourages collaboration among farmers, researchers, policymakers, and consumers to create sustainable food networks that prioritize health, equity, and social justice. However, the transition to regenerative agriculture requires commitment and collaboration across sectors. Farmers need access to training, technical support, and financial incentives to adopt new practices. Policymakers play a crucial role in creating enabling environments through supportive policies, research funding, and market incentives that reward sustainable practices.

In conclusion, regenerative agriculture represents a paradigm shift towards farming practices that not only sustainably produce food but also restore ecosystems, support biodiversity, and enhance community well-being. Embracing regenerative principles offers a pathway to address the interconnected challenges of food security, climate change, and environmental degradation, ensuring a resilient and prosperous future for agriculture and society as a whole.

CONCLUSION

In conclusion, regenerative agriculture offers hope for a sustainable future of

agriculture that is balanced between ecological, economic and social aspects. With a just transition to this model, we can build more resilient and sustainable agricultural systems that will support the long-term well-being of both farmers and communities that depend on agriculture. Regenerative agriculture is an advanced approach to agriculture that not only optimizes food production but also preserves and restores ecosystems. Through the implementation of principles such as reducing soil disturbance, maintaining soil cover, increasing biodiversity and integrating animals into agricultural systems, regenerative agriculture paves the way for a sustainable and profitable agricultural sector. Continued research and application of these principles is key to building resilient and environmentally friendly agricultural systems in the future. Regenerative agriculture is not only an approach to food production, but also extends the vision of preserving resources and ecosystems for future generations. Integrating these principles into agricultural practices can have a profound and positive impact on the environment, society and economy. Industrial agriculture represents not just a technological revolution in rural settings, but a crucial pillar for maintaining food supply stability in a rapidly changing world. The integration of advanced technologies with traditional farming methods enhances productivity and processing efficiency, yet poses challenges related to environmental sustainability and social responsibility. As industrial agriculture expands, it is imperative to focus efforts on balancing economic interests with the imperative of environmental protection and natural resource conservation. Only by doing so can we ensure that agribusiness plays a positive role in the future of the global agricultural system, providing food security and prosperity to rural communities worldwide.