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Impact of Green Revolution on Environment

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ABSTRACT: High-yielding rice and wheat cultivars were introduced in the 1960s as part of India's Green Revolution, which aimed to boost food production and reduce hunger and poverty. Government programmes after the "Green Revolution" quadrupled output of wheat and rice, but at the expense of indigenous rice types and millets. A number of unique native crops became extinct as a result of this, and agriculture in these areas declined as a result. The effects of the Green Revolution on the cultivation of native plant species are discussed in this article, along with their repercussions on society, the environment, dietary habits, and food availability per person, as well as the strategies that can be employed to bring native plant species back into cultivation and pass on this knowledge to the next generation.

KEYWORDS: Green Revolution, India, Farmers, Indigenous varieties, Rice,

I.INTRODUCTION

At 157.35 million hectares, India's arable land is the world's second-largest. The country also has 20 distinct climate regions ideal for different types of agriculture. While India's economy is no longer based on agriculture, it nevertheless plays a significant part in the lives of 58% of rural households. Research conducted by the Indian government's Department of Agriculture, Food Cooperation, and Farmers' Welfare estimates that food grain production in India for the 2017-2018 crop year would be 279.51 million metric tonnes. It's true that India can meet its own food demands, but famine was a serious threat in the years between 1947 and 1960 because food production was so low. In the 1960s, the sustainable development concept was introduced to increase food production, decrease poverty and hunger, and feed more people. Despite these efforts, 24 percent of the world's hungry live in India, where 195.9 million people go hungry; 58.4 percent of children under the age of five have anaemia; 53 percent of women and 22.7% of men in the age group of 15-49 have anaemia; 23 percent of women and 20 percent of men are thin; and 21 percent of women and 19 percent of men are obese [2, 3].

Until the Green Revolution, the most common grains planted were rice, millets, sorghum, wheat, maize, and barley [4, 5]. But the total yield of rice and millets much outpaced that of wheat, barley, and corn put together. Millets, formerly a mainstay in every household, were relegated to the role of fodder crop during the Green Revolution. At the same time, the number of locally accessible rice varieties has plummeted to 7,000, and not all of them are farmed, meaning that many of the rice grown kinds consumed before to the Green Revolution have disappeared. Because of this, India having lost over a million varieties of indigenous rice since the 1970s [6], many of which took hundreds of generations to perfect. Most of the responsibility for this extinction crisis lies with the government, which has promoted monoculture and subsidised high-yield hybrid crops.

Improved agricultural production is directly attributable to government programmes, and the country is thus no longer dependent on food imports. This ranged from rice and wheat to lentils and other legumes. Unfortunately, this method also eradicated the prevailing genetic variety. Increased crop yields may be attributed to the use of fertiliser, pesticides, and groundwater. However, the land remained infertile and hydrological drought became frequent in agricultural districts owing to poor administration, excessive use of artificial fertilisers and pesticides, as well as a inability to rotate crops. More troublesome yet was the fact that such consequences led to increasing expenses associated with producing crops.
This article explores the origins of the Green Revolution and its effects on agriculture, the environment, human health, and the efficiency of regionally appropriate plant varieties. It also delves deeply into potential methods for revitalising native plant species and passing this information on to future generations.

II.THE GLOBAL ECONOMIC IMPACT

There is still a dearth of causal evidence on the economic benefits of the Green Revolution, despite the fact that there were large changes in agricultural production as a result of it and that agricultural productivity increase is key to many theories of industrialization and development (e.g. Murphy et al. 1989). This is because changes in agricultural

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productivity may be influenced by a wide range of factors, including but not limited to governmental expenditure, literacy rates, credit and property rights, and even individual wealth. There is much discussion among experts and politicians over the Green Revolution's impact. While conventional wisdom, based in part on England's encounter during the Industrial Revolution, holds that an increase in agricultural output should lead to industrialization and, ultimately, development, the connection here between Green Revolution but also structural change is conceptually unclear (Matsuyama 1992). Further, this doubt calls for a deep empirical investigation of the Green Revolution's real-world financial impacts.

The study

By taking advantage of the fact that various areas were able to embrace and enjoy the advantages of Green Revolution technology to varying degrees due to time-invariant traits, we give estimates of the influence of the Green Revolution on structural change and economic development (Moscona 2017). Considering India's central role in the rise in agricultural output spurred by HYVs, we begin with an examination of that phenomenon as it unfolds throughout India's many administrative divisions. These findings, however, cannot be taken as definitive evidence of the Green Revolution's effect on India or any other nation. They wouldn't be able to detect macro-level processes, such as demand-driven industrialization or spillover effects between districts. This is why we provide a second set of findings, this time focusing on the global effects of the Green Revolution.
We create a metric of the expected shift in agricultural production at each level of analysis to disentangle the Green Revolution's impact. We evaluate the expected productivity shift that would occur from the introduction of new agricultural technology given the current features of an area rather than assessing actual changes in productivity, which might be affected by things like income fluctuations (including geographic and ecological conditions). We utilise the projected productivity at both the district and national levels as a tool for measuring actual changes in productivity.

District-level impacts in India
Growth in agricultural production in India's rural areas:

- higher salaries for farmers, better roads, more schools, and medical facilities;
- increased agricultural employment at the district level, both in absolute numbers and as a share of all jobs.;
- planted more crops and raised more livestock; and
- It decreased the percentage of people working in agriculture who were also landowners, contributing to a more unequal allocation of land..

Development in urban areas slowed as a result of these factors' effects on rural expansion. District-level industrialization, as well as employment in services, retail, and other non-agricultural sectors, fell as a result of the Green Revolution. A decrease in net migration towards areas with higher agricultural productivity increases helps explain these findings, but it cannot account for them entirely.

Country-level impacts
As was said above, the outcomes at the local level may not provide insight into the national level structural transformation process. Using the same empirical approach as the sub-national research, we show that the global effect of the Green Revolution is very consistent with findings from inside India. Increases in national agricultural production resulted in more farmland, more farm jobs, less food imports, and less population growth in urban areas. The magnitude of these impacts is greatest in low-income nations in 1960.
Income growth due to increased agricultural production may be tested at the national level. We discover no proof that perhaps the Green Revolution increased GDP; in fact, it reduced per capita income in the poorest nations in the 1960s income distribution.

Impact on the cultivation of food grains
The total area of farmland grew from 97.32 million hectares in 1950 to 126.04 million hectares in 2014 [1] thanks in large part to the Green Revolution. From a peak of 37.67 million hectares in the 1950s, coarse grain cropping has shrunk to a low of 25.67 million hectares in 2010. When compared to the 5.82 million hectares utilised for pearl millet, the 15.57 million hectares used for sorghum production is striking. As a whole, the amount of land used for farming rose from 30.81 million to 43.95 million [1]; the area used to grow rice, millet, and maize climbed from 9.75 million to 31.19 million, and the area used to grow pulses rose from 19.09 million to 25.23 million. As a result of changes in food grain production, both rural and urban areas experienced disruptions in their food consumption and supply.

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Impact on the availability and consumption of food grains

Many different historical eras have the potential for rising levels of net food availability grains per person. The average annual net availability of rice rose from 58.0 to 69.3 kg between 1951 and 2017. In terms of net rice availability per person, 1961 was the highest such year on record. In addition, wheat availability has increased from 24.0 kg per year in 1951 to 70.1 kg per year in 2017. While the net availability of wheat increased, the availability of those other cereal crops like millets and pulses decreased. Because of this, people started eating more rice and wheat and less rice and wheat, and other uncommon grains and pulses. It's a shame that the green revolution has some negative side effects. Some people still go hungry even though there is more food available than ever before in history. Those who were already financially stable among farmers were the only ones who could afford to make these modifications. As a result of not being able to afford essentials like fertiliser and irrigation systems, poor farmers have a far more restricted range of crop options available to them. Soil fertility is diminished by chemical fertilisers, and insects may develop resistance to pesticides if they are used too often. Farmers now must employ more fertilisers to get the same harvest as they did a generation ago.

The so-called "green evolution" is not environmentally viable. Despite initial successes brought on by technical advancements, studies have shown that yields have recently declined in a number of green revolution sectors. Central Luzon in the Philippines is a good example of a region where rice yields increased gradually during the 1970s, peaked in the early 1980s, and have been progressively declining ever since. Agricultural species have been wiped off in large numbers because to the green revolution. Many native plant and animal species fell extinct when farmers elected to replace them with newer, more productive types. Pesticides and other agrochemicals have been widely used, leading to serious environmental degradation and posing a threat to human health. Chemical fertiliser usage on a global scale has led to soil degradation, including the loss of humus, soil cracking, and a diminished ability to hold water. Since the technology required to implement the green revolution was costly, many farmers took out loans to pay for it.

Growing a single kind of crop over a large region is called large-scale monoculture. Because monoculture results in the steady depletion of a small number of soil nutrients without variation, it may contribute to the spread of disease. When compared to closed cycles seen in natural ecosystems, the cycles of nutrients, water, energy, and wastes are open in monoculture. It's becoming harder to recycle nutrients in the agricultural system despite the large volumes of crop waste and manure generated on farms. Due to the geographical separation of the production systems, animal wastes cannot be returned to the land in an economically viable manner as part of a nutrient recycling process. The green evolution method relies heavily on healthy, fertile soil. Green evolution's large yields are made possible by the rich soils that arise from chemical usage. Soil infertility caused by widespread green evolution and industrial-scale monoculture has rendered it incapable of supporting plant life on its own.

Owing to the absence of competition from other plant species, large-scale monoculture has resulted in enhanced yields, but over time, the soil fertility has decreased due to over fatigue. The recent rise in large-scale monoculture has been good for the economy thanks to higher yields, but it might have negative long-term consequences if it continues, as soil fertility declines.

Sustainable food for the world's expanding population may be achieved in a number of ways outside green evolution and industrial-scale monoculture. The issue of scarce resources and the difficulty of ensuring global food security can be overcome with the help of sustainable agriculture. Sustainable farming has three main components. All three of these factors—environment, economy, and society—are crucial to the success of any effort to practise sustainable agriculture. Climate change, water shortages, soil degradation, energy consumption, and biodiversity are just few of the environmental concerns that must be addressed, and it all begins with focusing on and improving the natural environment. Access to affordable nutrition, community wellness, and worker protection all fall within the purview of the social aspect of sustainable agriculture. On the economic front, sustainable agriculture is fruitful, aggressive, and effective. Businesses may benefit from sustainable agricultural techniques and initiatives because they guarantee a steady supply of food and provide new avenues for growth.

Environmental effects of the green revolution were discussed in this paper. The consequences of climate change on farms are significant since agricultural yields plummet when crops are subjected to environmental circumstances that aren't optimal for their growth. Get the most out of your property by reclaiming it. Fecund soil is crucial for raising healthy crops and animals, and it also benefits biodiversity, water filtration, and water efficiency. Carbon dioxide is absorbed by fertile soil, reducing the impact of global warming. The sustainability of agricultural quality and yields, as well as the protection of native species populations, need effective pest control. Businesses are looking into ways to increase productivity while also protecting and enhancing biodiversity, which is a primary concern in many agricultural

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practises. To ensure social sustainability in agriculture, it is necessary to guarantee decent wages and working conditions for all workers in the industry. Businesses can play an important role in improving workers' and their families' access to basic social services like healthcare, education, and training. A sustainable food supply is another way to ensure agriculture's long-term viability. All sorts of manufacturers, suppliers, and processors will be able to check off an objective on their lists thanks to this action. Sustainable farming is possible if we take care of our animals. Being the backbone of every farm, livestock are essential to the achievement of production and sustainability goals.

III.CONCLUSION

It's important to stress that upper watershed deterioration isn't unrelated to the long-term productivity of the lowlands, notably the condition of irrigation infrastructure. Research funds for upland conservation are often misallocated in cases where this externality is not taken into consideration. By providing jobs in the agricultural sector in the lowlands, the Green Revolution policy has reduced stress on the uplands. However, if the present pattern of stagnation or loss in lowland production continues, this might lead to a reduction in available jobs in the lowlands, putting further stress on the higher regions.

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