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A circle on sustainable agriculture: Madhya Pradesh and Rajasthan

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Abstract: Sustainable agriculture in Madhya Pradesh plays a vital role in balancing environmental health, economic profitability, and social equity in the state's predominantly agrarian society. Madhya Pradesh and Rajasthan possess significant opportunities for sustainable agricultural development. Madhya Pradesh, with its diverse agro-climatic zones, offers tremendous scope for crop diversification, organic farming, and sustainable cultivation practices. agriculture in Rajasthan, emphasizing its role in achieving resilience and sustainability in one of India's most climate-vulnerable regions. Sustainable agriculture in Madhya Pradesh, based on the provided search results, emphasizes the need for a shift towards practices that balance economic viability, environmental stewardship, and social equity.

Keywords: Madhya Pradesh, Rajasthan, Sustainable Agriculture, environmental , economic

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INTRODUCTION

Madhya Pradesh and Rajasthan confront significant environmental and socio-economic hurdles that impact agricultural sustainability. Predominantly rain-fed agriculture makes these states vulnerable to climatic variability, droughts, and erratic rainfall patterns, thereby exacerbating crop failure risks and threatening farmer incomes. Rajasthan, in particular, experiences severe water scarcity issues, with prolonged droughts affecting agricultural productivity adversely. Madhya Pradesh, despite abundant natural resources, grapples with inadequate irrigation infrastructure, resulting in underutilization of available resources. Agriculture constitutes a critical economic backbone for the states of Madhya Pradesh and Rajasthan, playing a central role in employment generation, food security, and rural development.

However, both states face distinct yet interconnected challenges in ensuring sustainable agricultural growth. At the same time, unique opportunities have emerged, offering potential avenues for enhancing productivity, sustainability, and economic returns in agriculture. Moreover, soil degradation and declining fertility levels due to intensive cultivation, excessive chemical fertilizer use, and lack of organic matter recycling have negatively impacted long-term productivity in both states. Small and marginal farmers, who form the majority of the agrarian population, often lack access to advanced technologies, credit facilities, market information, and robust agricultural extension services. Consequently, these farmers frequently face low yields, limited market integration, and reduced profitability, contributing to rural poverty and outmigration.

Despite these challenges, Madhya Pradesh and Rajasthan possess significant opportunities for sustainable agricultural development. Madhya Pradesh, with its diverse agro-climatic zones, offers tremendous scope for crop diversification, organic farming, and sustainable cultivation practices. Initiatives promoting

conservation agriculture, integrated nutrient management, and precision agriculture can substantially enhance yield and sustainability while reducing input costs. Rajasthan, with its unique climatic conditions, holds potential for drought-resistant agriculture, incorporating advanced water conservation techniques like rainwater harvesting, drip irrigation, and micro-irrigation systems. The adoption of drought-resistant varieties of cereals, pulses, and oilseeds, alongside sustainable livestock management, particularly goat and camel husbandry, can provide resilient livelihood alternatives to rural populations.

Rajasthan, with its unique climatic conditions, holds potential for drought-resistant agriculture, incorporating advanced water conservation techniques like rainwater harvesting, drip irrigation, and micro-irrigation systems. The adoption of drought-resistant varieties of cereals, pulses, and oilseeds, alongside sustainable livestock management, particularly goat and camel husbandry, can provide resilient livelihood alternatives to rural populations. The majority of Rajasthan's work in agriculture, which is also the economic engine of the state.

The dry and semi-arid climate is one of the main obstacles faced by Rajasthan's agriculture industry. In order to provide solutions for long-term agricultural growth, this paper will examine the possibilities and threats facing Rajasthan's agricultural sector in depth, drawing attention to the most pressing issues and offering recommendations for improvement. Nearly two-thirds of the landmass of the biggest Indian state, Rajasthan, literally "Land of Kings" or "Land of Kingdom," is covered by deserts and semi-deserts. This culturally diverse state in the country's northwest occupies 10.4 percent of the country's total landmass. Almost every city has its own unique set of characteristics, such as temples, forts, and remnants from the Indus Valley Civilization.

LITREATURE REVIEW

Srivastava, Shivendra & Pal, Suresh. (2020). Agriculture in India has become steadier, more resilient, and more productive as the country has progressed. But it hasn't been as lucrative as other industries. Improving farmers' income and attaining sustainable agricultural development are the main goals of the policy debate in Indian agriculture. To realise its economic potential and maintain food supply, India's agricultural sector is undergoing a period of transformation that presents both possibilities and difficulties for investment. Agricultural investment in productive assets was $497,797 in 2017 and 2018, which is low when measured per hectare. Farmers are the main source of investment, and it has been trending lower in recent years, particularly in the agricultural sub-sectors. Farmers are projected to increase their investment in productive assets due to rising public investment and the government's emphasis on income improvement. Although private companies' proportion of overall investment is small, it has been on the rise as of late.

Dutta, Tanima et.al. (2020). Regional Inequalities in Agriculture: The Situation in Madhya Pradesh. 30. 19–31. Despite agriculture's relative obscurity in today's economies, its indisputable impact on gross value added (GVA) and employment levels is hard to ignore. Since industrialization failed to provide the expected outcomes, the government of Madhya Pradesh shifted its focus to the agricultural sector, which accounts for the majority of the economy. Thanks to the success of this state program, it has become an exemplar for those who advocate for government involvement in farming. The current administration eschewed balanced development in favor of an unbalanced growth strategy, which prioritized investing in

sectors that were already thriving and might provide exponential returns in the near future. Agricultural Development Index scores of 77.1 and 54.6, respectively, are greatest in Malwa and the Central region, which mostly consist of wheat- and soybean-growing regions.

S Selvan, Shilpa et.al. (2021). When it comes to a country's economic growth, agriculture is king. By 2050, the present decadal growth rate of around 18% is predicted to have increased India's population to 1.5 billion. Focusing on both present and future issues, this review article seeks to bring attention to the state of India's agricultural industry. The Indian economy has a number of problems, including insufficient food storage facilities, declining soil quality, water shortages, inadequate infrastructure for growing food, and so on. There has to be discussion and planning to fulfill future demands in light of the recent pandemic scenario, which has impacted agricultural industries and will lead to big changes in the future.

Singh, Bimlesh & Yadav, Jai. (2022). Producing enough food to support the growing population has been the greatest issue for post-independent India. Therefore, in the 1960s, efforts to enhance food production were initiated by the Green Revolution. During the Green Revolution, farmers expanded their farming areas, started planting two crops at once instead of one per year, used high-yield seed varieties, upgraded their irrigation systems, relied more on inorganic fertilizers and pesticides, and upgraded their farming tools and methods for protecting their crops. While the green revolution boosts output temporarily, it raises the likelihood of future food crises by making land less productive. Organic farming is being proposed by scientists as a potential solution to the issue of future food danger. This paper's primary aim is to assess the viability of organic farming as a means for India to attain sustainable development. It goes on to talk about the problem with this procedure and how to fix it.

Joshi, Meeta & Jareaa, Lubna. (2023). When enough food is available for everyone, we say that there is food security. Accessibility, stability, use, and availability are the four pillars upon which food security rests. Using the data that is currently available, this article delves into these characteristics and reviews the difficulties associated with food security. b) Research tools and materials for this article's objective, relevant secondary data were used. Official data, published publications, and reports from the government are all part of this category. An assessment of the primary obstacles to food security in India's three states supplemented this. b) Discussion of findings Concerning food security, Gujarat, Rajasthan, and Madhya Pradesh have significant issues due to their large populations, high poverty rates, and insufficient agricultural output. Access to food is one of the most important aspects of food security.

AGRICULTURE IN MADHYA PRADESH

A lot of people refer to Madhya Pradesh (MP) as the "Heart of India" because of its central location in the country. Gujarat, Maharashtra, Chhattisgarh, Uttar Pradesh, and Rajasthan form its borders; the state is landlocked. Chhattisgarh was formed in November 2000 from the southeastern portion of old Madhya Pradesh; before to that, it had the greatest geographical area in the nation. With an area of over 308 lakh acres, or almost 9% of the country's total landmass, Madhya Pradesh is now the second biggest state in India, after Rajasthan. During the monsoon season, MP typically receives around 95.2 cm of rainfall. This is responsible for over 91% of the state's total precipitation. When it comes to monsoon rainfall in Madhya Pradesh, the eastern sections get a little more than the western parts (87.6 cm vs. 105.1 cm).

· **Agricultural Growth In Madhya Pradesh**

Recent years have seen much praise for MP's agriculture sector, which contributed 7.5% of the state's GDP growth from 2005–06 to 2018–19. Even more impressive is the growth rate of agricultural GDP over the last three years, which has been 11.5% annually, far above the national average of 4.7%. While volatility was present in the industry, it has been less severe in recent years. Agricultural growth's coefficient of variation dropped from 626% in 2000-01 to 2008-09 to 113% in 2009-10 to 2018-19. In the early years, a series of dry spells impacted farming. Nevertheless, the industry was able to compensate for rainfall shortfalls in subsequent years via investments in irrigation.

· **Agricultural Livelihood In Madhya Pradesh**

With an estimated 82.3 million people calling Madhya Pradesh home in 2018, the state accounts for almost 6% of India's total population. The 2011 Census put that number at 72.7 million. The agricultural sector contributed 40% of Madhya Pradesh's gross state product (GSDP) in TE 2018–19 (CSO), while 54.6% of the state's workforce was involved in agriculture in 2015–16 (Labor Bureau, 2015–16). There are a lot of small and marginal farmers in the agriculture industry. Approximately 48% of the total land managed in 2015–16 was occupied by small and marginal farmers, or 75.5% of the total. Their holding sizes were less than 2 ha. Compared to 1995–1996 (2.28 ha), 2010–2011 (1.78 ha), and 2015–2016 (1.57 ha), the average size of a landholding decreased.

· **Determinants of Agriculture Growth In Madhya Pradesh**

In order to encourage investment in agriculture and boost agricultural development, physical infrastructure including irrigation systems, power grids, and highways is crucial (FAO 1996). In addition, research by Fan et al. (2007) and Fan and Zhang (2004) indicates that supporting rural infrastructure may improve farmers' access to markets for both inputs and outputs, boost non-farm businesses in rural regions, revitalize small towns, and ultimately boost demand from consumers in rural areas. If we want to know why agriculture in MP has grown so quickly, we need to look at the state's infrastructural development.

POWER FOR AGRICULTURE IN MADHYA PRADESH

As shown before, the government's deliberate attempts to provide electricity for agriculture were a major factor in the fast growth of tube well irrigation in MP. In 2005, the state government began the process of unbundling the electricity company in an attempt to introduce efficiency. They have taken extra measures to guarantee that rural regions have independent feeders for power delivery. The previous power supply to mixed load from rural feeders in MP lasted, on average, around 12 hours, which is why feeder separation was necessary. For the remainder of the day, supply was nonexistent because to generational limits. The following are some of the resulting obstacles encountered by the agricultural sectors.

For the first six to eight hours of the "pre-feeder separation" period, agricultural pumps typically had access to a three-phase supply; thereafter, they could only use a one-phase supply. There was no 24-hour electricity supply to the villages. Transmission and distribution transformers (DTR and PTR, respectively) were subject to imbalanced loads. Both substantial technical losses and frequent load shedding occurred. To address the issue of inadequate power for agricultural use in the state, the administration took the

following measures: Guaranteed a 24-hour power supply across the state, with 8 hours of the electricity going directly to farms.

CHANGES IN AGRICULTURAL SCENARIO OF MADHYA PRADESH

The soybean's introduction and subsequent study and development began around the close of the 18th century. Nevertheless, commercial soybean production in Central India's Malwa Plateau increased significantly after the 1980s, thanks to the introduction of high-yielding yellow-seeded soybean cultivars. In 1967, the All India Coordinated Research Project on Soybean (AICRPS) was started by the Indian Council of Agricultural Research (ICAR).

The following expansion of AICRPS centers allowed for the investigation of potential sites for soybean introduction. Since its establishment, the Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) has documented the entire history of soybean cultivation in Madhya Pradesh, from its introduction to commercial production, and has done outstanding work in the development and dissemination of technologies and practice packages. Since AICRPS was established, the institution has been credited with the development of almost 70% of the soybean varieties in the nation. Due to its large landmass, Madhya Pradesh has been a major agricultural producer over the last fifty to sixty years.

GROWTH OF AGRICULTURAL DEVELOPMENT IN MADHYA PRADESH: CHALLENGES AND POSSIBILITY

Madhya Pradesh's economy relies heavily on agriculture. A staggering 85.6% of rural residents and 69.8% of the state's working-age population are directly or indirectly involved in agriculture, as reported in the 2011 census. Of this group, 31.2% are farmers and 38.6% are people who work in agriculture. In 2020–21, the agricultural growth rate in India’s GDP fell by 3.37% compared to the previous financial year 2019–20, according to the Economic Survey for that year. In contrast, agricultural growth climbed by 3.4% during the COVID-19 pandemic, raising agriculture's contribution to GDP from 17.8% to 19.9%.

The study found that agriculture's contribution to GDP was 17.8% in 2019–20 and will rise to 19.9% in 2020–21. This came after an agricultural sector that had contributed 20.77 percent to GDP in 2003 and 2004. The proportion of the economy devoted to agriculture has been falling ever since. However, in 2019–20 and 2020–21, at the current prices, the agricultural and allied sectors will account for 43.93 percent and 46.98 percent of the state's GDP, respectively. Agricultural growth in the state has been hindered in recent years by unfavorable monsoon conditions; nonetheless, micro irrigation and government initiatives have brought about a remarkable transformation in the state's agricultural industry.

AGRICULTURE IN RAJASTHAN

The state's agricultural stability is under jeopardy. Crop output and the availability of food grain for the human livestock system remain under risk due to insufficient irrigation coverage. The availability of grains per capita is inversely related to rainfall levels that are too low. In comparison, the years with enough precipitation show a different image. Having access to essential grains for sustenance is always in jeopardy. The areas classified as marginal, small, semi-medium, and medium landholdings rose by 40.12%, 21.90%, 18.50%, and 14.79%, respectively, according to the Agriculture Census, 2010–11.

Compared to the national average of 1.08 hectares, the average size of land holdings in the state is 2.73 hectares, making it the largest in India.

An estimated 21.31% of India's oilseeds and 5.49% of the country's food grains come from Rajasthan. The cultivation pattern has been shifting in favor of horticultural crops in recent years. Rajasthan is fourth in winnow output in India and tops the list for seed spices including fenugreek, coriander, cumin, and fennel. The state is also the leader in producing ishabgol and mehndi. Most often grown in gardens are citrus fruits, guavas, mangoes, aonlas, pomegranates, kinnow, ber, and malta. Six distinct "Centre of Excellence" have been set up by the state in the horticulture sector. Particularly in Rajasthan's semi-arid and dry regions, animal husbandry is a significant economic driver. Rajasthan has a lot of cattle. The state is fortunate to have some of the nation's finest sheep, camels, and cattle breeds.

AGRICULTURE AND SUSTAINABLE AGRICULTURAL IN RAJASTHAN

Rajasthan is the biggest, spanning 3.42 lakh sq. kilometers. Deserts and semideserts cover 61% of the state's landmass. The states of Uttar Pradesh, Punjab, and Haryana border it to the northeast, while Madhya Pradesh and Gujarat form its southern and eastern and western borders, respectively, in the country's northwest. The Chambal, Banas, and Luni rivers are the three main ones. Ten agro-climatic zones make up the state. Winter temperatures may drop to 8–28 degrees Celsius, while summer highs can reach 25–46 degrees Celsius. The normal rainfall varies throughout the state as well, from 299.2 mm in the west to 671.3 mm in the east.

Even though it only accounts for 1.16 percent of India's total surface water resources, the state of Rajasthan covers 10.4 percent of the country's landmass. There are 6.86 crore people living in the state, and 66% of them are literate. About 62% of the state's population makes a living in agriculture or closely related fields, while 75% of the state's population lives in rural regions. Stones such as sandstone, marble, rock phosphate, and lignite are abundant in Rajasthan. Of all the states in India, this one produces more cement than any other. In addition to being India's leading wool producer, Rajasthan ranks second in milk production.

SUSTAINABILITY AND SUSTAINABLE AGRICULTURAL IN RAJASTHAN

Environmental preservation, financial gain, and social and economic justice are the tenets of sustainable agriculture. These aims have been advanced by a wide range of ideologies, policies, and behaviors. From farmers to customers, many others have believed in this idea and helped make it a reality. Definitions of sustainable agriculture tend to revolve around the following topics, despite the fact that individuals and their viewpoints are diverse: "Sustainability is based on the idea that we should take care of our current needs without jeopardizing future generations' capacity to do the same."

Figure 1. A systems perspective is essential to understanding sustainability

From the farm level all the way up to the local ecology and the people impacted by this agricultural system on a global and local scale, the system is seen in its widest possible context. By stepping back and looking at the bigger picture, we can see how agricultural methods affect people and the planet. We can learn more about the relationships between farming and the rest of the ecosystem by using a systems approach. Research and teaching involving several disciplines are also implied by a systems approach.

PERFORMANCE AND CHALLENGES IN RAJASTHAN'S AGRICULTURE

The state's economy is heavily reliant on the agricultural and related sectors. The agricultural sector continues to provide a living for almost two-thirds of the people. The state's economy is still heavily dependent on agriculture. Reducing poverty and hunger and promoting equitable development may be accomplished by giving agriculture a high priority. Because many agro-based companies and agro-services rely on agricultural products and services as their resource foundation. The value of agriculture extends beyond just farming and encompasses the whole value chain, from production to distribution, processing, and retail sale. The state has significant issues in agriculture due to insufficient rainfall, water shortages, and ineffective water management techniques, as stated in the Draft State Agriculture Policy (2013). Natural disasters may affect both crops and livestock. Droughts are a common cause of decreased agricultural output and efficiency. An already-present issue with biotic stressors in the state has been made worse by climate change, which includes global warming.

There is a lack of a holistic, technologically-based development strategy to support desert agriculture. Soil health declines due to factors such as vitamin deficiencies, excessive fertilizer usage, insufficient organic matter content, insufficient soil microbial flora, etc. Additionally, the soils have a very low organic matter concentration.

LAND DEGRADATION AND SUSTAINABLE AGRICULTURE IN RAJASTHAN

Degradation of land occurs when its productive capacity is diminished as a result of causes such as wind and water erosion, nutrient depletion, secondary salinization, loss of humus and soil nutrients, shrinkage and deterioration of plant cover, and biodiversity loss. Desertification is another name for land degradation in dry, semi-arid, and dry sub-humid regions caused by a variety of reasons, such as human activity and climate fluctuations. The increased exploitation of natural resources and the exponential growth of human population have both contributed to a dramatic acceleration in the rate of land degradation in recent

decades. Almost every method for producing food relies on land and water as its primary natural resources. Aristotle, a Greek philosopher, described "the soil as the stomach of plant" in his ancient work. Soil still accounts for 90% of food production, while freshwater sources provide for less than 10%.

CLIMATE CHANGE AND SUSTAINABLE AGRICULTURE

Water availability and quality, coastal zones, and Himalayan ecosystems are just a few of the many resources and industries that will feel the effects of the changing climate. They will also affect how often and how severe natural catastrophes are. Water availability, agricultural production, land loss to rising sea levels, disease transmission, and other systems on which human livelihoods rely are all susceptible to even small temperature shifts. Numerous communities' lives and means of subsistence are under jeopardy. People living in rural regions rely largely on natural resources like water and arable land, making them more susceptible to the effects of climate change. As a matter of fact, 70% of the world's population resides in rural regions; these people are particularly at risk from climate change since agriculture is their primary means of subsistence.

CONCLUSION

Sustainable agriculture in Madhya Pradesh, based on the provided search results, emphasizes the need for a shift towards practices that balance economic viability, environmental stewardship, and social equity. While Madhya Pradesh has demonstrated rapid growth in its agricultural sector, the need for sustainable practices is crucial to ensure long-term productivity and well-being. Supportive government policies, farmer education, and the promotion of climate-resilient practices are crucial to this transition. Ultimately, sustainable agriculture in Madhya Pradesh is not just an environmental necessity but also a pathway to improving rural livelihoods, ensuring food security, and building long-term resilience in the face of climate change. Sustainable agriculture in Rajasthan is essential for ensuring food security, conserving scarce natural resources, and supporting rural livelihoods in one of India’s most arid states. sustainable agriculture offers a viable path for Rajasthan to achieve ecological balance, economic stability, and long-term agricultural growth. Rajasthan, in particular, experiences severe water scarcity issues, with prolonged droughts affecting agricultural productivity adversely. Madhya Pradesh, despite abundant natural resources, grapples with inadequate irrigation infrastructure, resulting in underutilization of available resources.

References

1. Srivastava, Shivendra & Pal, Suresh. (2020). Fostering Responsible Investment for Sustainable Agriculture and Food Systems in India.
2. Dutta, Tanima & Rawat, Anupama & Singh, Jaspal. (2020). Agricultural Regional Disparities: A Case of Madhya Pradesh. 30. 19-31.
3. S Selvan, Shilpa & Wahid, Aseeya & Patel, Abhishek & Kumar, Vijay & Sahu, Parmanand. (2021). Challenges in Indian Agriculture. Agricultural Reviews. 10.18805/ag. R-2103.
4. Singh, Bimlesh & Yadav, Jai. (2022). Sustainable Agriculture Development through Organic Farming in India. ECS Transactions. 107. 14919-14929. 10.1149/10701.14919ecst.

5. Joshi, Meeta & Jareaa, Lubna. (2023). A Review on the Determinants and Challenges of Food Security in Selected States of India. 12. 16658-16674. 10.48047/ecb/2023.12.si4.1486.

6. Mubashir, Mohammad & Bhat, Arshad. (2021). Agriculture and Farming Community in India: Challenges, Problems and Possible Solutions.

7. Joshi, Neeshu & Joshi, Shourabh & Jinger, Dinesh. (2022). Integrated farming system for productivity and sustainability in agricultural production. 72. 8-11.

8. Gavali, Ravindra & Suresh Babu, Venkatachalapathi & Kakumanu, Krishna & Mukate, Shrikant & Khan, Y D & Patil, Basavaraj & Ghate, Utkarsh & Vendrapati, Srinivasa Rao. (2023). Scalable Adaptation Model for Sustainable Agriculture Livelihoods Under Changing Climate: A Case Study from Bihar and Madhya Pradesh. 10.1007/978-981-99-2206-2_29.

9. Patel, Sanoj & Sharma, Anil & Barla, Anil & Tiwari, Amit & Singh, Rinku & Kumar, Sudhanshu & Singh, Gopal. (2023). Socio-ecological Challenges and Adaptation Strategies of Farmers Towards Changing Climate in Vindhyan highlands, India. Environmental Management. 75. 46-62. 10.1007/s00267-023-01880-3.

10. Paroda, Raj. (2022). Crop Diversification for Sustainable Agriculture. Ecology Economy and Society–the INSEE Journal. 5. 10.37773/ees. v5i1.611.

11. Elayaraja, Mr & Vijai, C. (2020). Organic farming in India: Benefits and Challenges. 7. 3021-3029.

12. Chetti, Praveen Kumar & Giri Babu, Kodela. (2023). Challenges and Opportunities in Urad and Moong Beans Production in Andhra Pradesh: A Comprehensive Analysis of Factors and Interventions. 1. 4-5.