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Andhra Pradesh Community Managed Natural Farming and Sustainable Agricultural Transformation: A Case Study

Dr. Vadithe Mallikarjuna Naik
ICSSR Postdoctoral Fellow, Centre for Economic and Social Studies (CESS), Hyderabad

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Abstract:

Andhra Pradesh Community Managed Natural Farming (APCNF) has emerged as one of the world's largest community-led agroecological transformation programmes. Implemented by Rythu Sadhikara Samstha (RySS), a Government of Andhra Pradesh-owned not-for-profit organisation, APCNF aims to reduce farmers' dependence on synthetic fertilisers and pesticides, restore soil health, improve climate resilience, increase farm incomes and promote safe and nutritious food systems (APCNF, 2026a; CEEW, 2026). Since its launch in 2015–16, the programme has expanded across thousands of gram panchayats and reached more than 1.77 million farmers and over 0.92 million hectares, demonstrating the possibility of scaling natural farming through community institutions rather than only through conventional agricultural extension systems (APCNF, 2026a). This article examines APCNF as a sustainable development model with special focus on cost reduction, climate resilience, women-led community institutions, natural-input systems, Pre-Monsoon Dry Sowing, 365 Days Green Cover, farmer well-being and policy scalability. The study follows a GRD-style secondary-data research design using APCNF official reports, RySS materials, CEEW studies, FAO agroecology documentation, UNEP case evidence and field-experiment literature on natural farming in Andhra Pradesh (FAO, 2022; UNEP, 2026; Duddigan et al., 2022). The findings indicate that APCNF's strength lies not merely in chemical-free farming but in its community-managed structure, where women's self-help groups, community resource persons, peer learning and farmer-scientist approaches support behavioural change. The article concludes that APCNF offers a practical model for sustainable agricultural transition in India, especially for small and marginal farmers, rainfed regions, tribal farming communities and climate-vulnerable rural households.

Keywords: *APCNF; Natural Farming; Agroecology; Sustainable Agriculture; Women SHGs; Climate Resilience; Soil Health; Andhra Pradesh; RySS.*

JEL Codes: Q01, Q12, Q16, Q18, Q56, O13.

1. Introduction

Indian agriculture is facing a structural crisis caused by rising input costs, soil degradation, water stress, climate variability, declining farm profitability and health risks from chemical-intensive farming. The Green Revolution helped India achieve food security, but its long-term dependence on synthetic fertilisers, pesticides and irrigation-intensive practices has created ecological and economic stress in many farming regions (CEEW, 2026). In this context, Andhra Pradesh Community Managed Natural Farming has become an important policy experiment in

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sustainable agriculture. APCNF is implemented by Rythu Sadhikara Samstha, which is a not-for-profit organisation established and fully owned by the Government of Andhra Pradesh. RySS is nested in the Department of Agriculture and Cooperation and implements APCNF as per G.O. Rt. No. 764 dated 10 November 2016 (APCNF, 2026b). The programme's mission is to advance farmer prosperity, food safety, nutrition security, human health, animal health, soil health, climate resilience and environmental sustainability through natural farming and a holistic natural farming food system (APCNF, 2026b).

The major difference between APCNF and many earlier agricultural schemes is its community-managed design. It does not depend only on departmental officers or market-based input suppliers. Instead, it uses women's self-help groups, village organisations, community resource persons, farmer trainers and peer-to-peer learning systems to spread natural farming practices. This makes APCNF both an agricultural programme and a rural social mobilisation model (CEEW, 2026; APCNF, 2026b). The programme is especially relevant for small and marginal farmers, tribal farmers, tenant farmers and rainfed farming households because these groups are more vulnerable to input-cost shocks, debt cycles and climate risk. Natural farming reduces dependence on purchased inputs and promotes locally prepared bio-inputs, mulching, crop diversity, soil biology, water conservation and year-round green cover (FAO, 2022; UNEP, 2026). Therefore, APCNF may be understood as a sustainable development intervention that connects agriculture, ecology, rural livelihoods, women's empowerment and public health.

2. Statement of the Problem

The central problem addressed in this study is whether APCNF can provide a sustainable alternative to chemical-intensive agriculture in Andhra Pradesh. Conventional farming has increased farmers' dependence on fertilisers, pesticides, external credit and market-purchased inputs. This has led to high cultivation costs, income instability, soil fertility decline and ecological stress (CEEW, 2026; UNEP, 2026).

The second problem is scalability. Many natural farming and organic farming experiments remain small, scattered or individual farmer-based. APCNF is different because it attempts to scale agroecology through government ownership and community institutions. However, large-scale transition raises important questions: Can natural farming maintain yields? Can it reduce costs? Can it improve income? Can women's self-help groups and community resource persons sustain behavioural change? Can such a model work in tribal, rainfed and drought-prone areas? These questions are central to the present study (Duddigan et al., 2022; CEEW, 2026).

3. Objectives of the Study

1. To examine APCNF as a sustainable agricultural transformation model in Andhra Pradesh.
2. To analyse the role of natural farming practices in reducing cultivation costs, restoring soil health and improving climate resilience.
3. To assess the institutional role of RySS, women's self-help groups, community resource persons and peer learning systems.
4. To evaluate the relevance of APCNF for small farmers, marginal farmers, tenant farmers and tribal farming communities.
5. To suggest policy measures for strengthening APCNF-based sustainable rural development.

4. Research Questions

1) How does APCNF differ from conventional chemical-based farming systems?
2) What are the major ecological, economic and social benefits associated with APCNF?
3) How do women-led SHGs and community resource persons influence natural farming adoption?
4) What is the relevance of APCNF for climate-resilient agriculture and tribal livelihoods?
5) What policy framework is required to scale APCNF without weakening its community-managed character?

5. Hypotheses

H_1: APCNF reduces farmers' dependence on synthetic fertilisers and pesticides and lowers cultivation costs.

H_2: APCNF improves farm resilience through crop diversity, soil health, mulching, natural inputs and 365 Days Green Cover.

H_3: Women-led SHGs and community resource persons significantly improve adoption intensity of natural farming practices.

H_4: APCNF has strong relevance for small, marginal and tribal farmers because it reduces external-input dependence and improves ecological security.

6. Review of Literature

Natural farming is an agroecological approach that seeks to reduce dependence on synthetic chemical inputs and promote soil biological activity, ecological pest management, crop diversity and locally prepared bio-inputs (FAO, 2022; CEEW, 2026). FAO describes APCNF as an agroecological farming approach based on the view that soil already contains nutrients required for plant growth and that farming practices should help release and make those nutrients available to plants (FAO, 2022). UNEP has recognised APCNF as a model that combines traditional knowledge with science to restore ecosystems, diversify crops and improve soil health. UNEP also notes that monocropping and chemical-intensive farming contribute to biodiversity loss, soil erosion, water runoff and nutrient leaching, while natural farming offers a pathway toward more resilient food systems (UNEP, 2026).

Duddigan et al. (2022), based on field plot experiments in six districts of Andhra Pradesh, found no short-term yield penalty when adopting Zero Budget Natural Farming in small-scale farming systems compared with conventional and organic alternatives. This is important because one major criticism of natural farming is the fear of yield decline during transition. However, evidence suggests that yield outcomes depend on practice quality, local agro-climatic conditions and sustained farmer support (Duddigan et al., 2022). CEEW's 2026 study on natural farming adoption in Andhra Pradesh found that sustained interaction with community resource persons increased adoption of natural farming practices, while women's participation in farm decision-making also increased adoption intensity. The study also found that health and nutrition concerns are major motivators for farmers adopting natural farming (CEEW, 2026). This shows that APCNF is not just a technical input-substitution programme; it is a behavioural, institutional and social transformation process.

7. Methodology

This article follows a GRD-style secondary-data and conceptual research methodology. The study is based on official APCNF materials, RySS documents, policy reports, FAO agroecology documentation, UNEP case evidence, CEEW research, and peer-reviewed literature on natural farming in Andhra Pradesh. The study uses descriptive analysis, institutional analysis and an author-constructed Sustainability Performance Matrix.

Table 1: Research Design and Data Sources

Component	Description
Research design	GRD-style secondary-data and conceptual analysis
Study area	Andhra Pradesh, with relevance for tribal and rainfed regions
Programme studied	Andhra Pradesh Community Managed Natural Farming
Implementing agency	Rythu Sadhikara Samstha, Government of Andhra Pradesh
Data sources	APCNF website, RySS reports, FAO, UNEP, CEEW, peer-reviewed studies

Analytical tools	Descriptive analysis, institutional analysis, sustainability scoring
Limitation	No primary household survey used in this draft

Source: Author's design based on APCNF (2026a, 2026b), CEEW (2026), FAO (2022), and UNEP (2026).

8. APCNF Programme Profile

APCNF is designed as a large-scale transition from chemical-intensive agriculture to natural farming. It promotes low-cost, locally prepared natural inputs, crop diversity, soil cover, biological pest management, seed treatment, mulching and year-round vegetation. The programme's long-term vision is to create a natural farming economy in Andhra Pradesh involving millions of farm families and farmworker families by 2035–36 (APCNF, 2026b).

Table 2: APCNF Programme Profile

Indicator	Description
Programme name	Andhra Pradesh Community Managed Natural Farming
Implementing agency	Rythu Sadhikara Samstha
Government linkage	Department of Agriculture and Cooperation, Government of Andhra Pradesh
Legal/institutional basis	G.O. Rt. No. 764 dated 10 November 2016
Programme launch phase	2015–16 / 2016 expansion phase
Core approach	Community-managed natural farming and agroecology
Major institutions	Women SHGs, village organisations, community resource persons, farmer trainers
Main practices	Natural bio-inputs, PMDS, 365 Days Green Cover, mulching, crop diversity, ecological pest management
Development goals	Lower costs, higher resilience, soil health, safe food, farmer income, climate adaptation

Source: APCNF (2026a, 2026b), CEEW (2026), and FAO (2022).

9. Analysis and Results

9.1 Economic Sustainability

The economic logic of APCNF rests on reducing paid-out costs. Conventional agriculture often requires farmers to purchase seeds, fertilisers, pesticides and other external inputs. This increases working capital requirements and pushes vulnerable farmers toward informal credit. APCNF reduces dependence on external inputs by promoting locally prepared bio-inputs and ecological crop management (FAO, 2022; CEEW, 2026). APCNF reports indicate verified farmer income gains ranging from 38% to 66% in different contexts, along with reduced cultivation costs (APCNF, 2026a). A final consolidated APCNF report for 2023–24 also reported that APCNF farmers earned 38.5% more agricultural income with greater risk resilience than conventional farmers (APCNF, 2026c). These findings suggest that natural farming can improve profitability mainly by reducing costs and improving net returns rather than only through yield increases.

9.2 Ecological Sustainability

APCNF promotes ecological restoration through crop diversity, mulching, soil cover, natural pest management, biological inputs and reduced chemical dependence. The programme gives special importance to Pre-Monsoon Dry Sowing and 365 Days Green Cover. PMDS involves sowing multiple seeds in dry soil before the monsoon and using crop residue mulch, while 365 Days Green Cover promotes continuous soil coverage with crops, trees, cover plants or mulch throughout the year (APCNF, 2026d). These practices are highly relevant for climate

resilience. Mulching reduces evaporation, crop diversity reduces risk, green cover improves soil biology and ecological pest management reduces chemical exposure. UNEP notes that APCNF combines traditional knowledge with science to restore ecosystems, diversify crops and improve soil health (UNEP, 2026).

9.3 Social Sustainability and Women's Empowerment

APCNF is not only a farming method; it is also a community institution-based movement. Women-led self-help groups form a major foundation of the programme's dissemination model. APCNF's institutional network includes Zilla Samakhyas, Mandal Samakhyas, Village Organisations and Self-Help Groups, showing the importance of women's collective institutions in rural transformation (APCNF, 2026b). CEEW's 2026 study found that households where women actively participated in farm-related production decisions adopted 14% more natural farming practices. It also found that sustained interaction with community resource persons increased adoption by 51% during rabi and 36% during kharif (CEEW, 2026). This shows that social capital, peer learning and women's decision-making are central to the success of natural farming.

9.4 Health and Nutrition

Natural farming also has health and nutrition implications. Farmers adopt natural farming not only because of economics but also because of concerns about chemical residues and household food safety. CEEW found that around 84% of surveyed farmers cited concerns regarding synthetic chemicals in food production as a primary motivation for adopting natural farming (CEEW, 2026). This suggests that APCNF may contribute to household-level food safety, nutrition awareness and health-oriented farming behaviour.

9.5 Relevance for Tribal and Rainfed Areas

APCNF is highly relevant for tribal and rainfed areas because these regions often face low irrigation access, high climate vulnerability, low cash reserves and dependence on mixed farming, forest-linked livelihoods and local seed systems. Practices such as PMDS, mixed cropping, millets, pulses, mulching and 365 Days Green Cover are suitable for dryland and upland farming systems (APCNF, 2026d; UNEP, 2026). For tribal farmers in Andhra Pradesh, particularly in Eastern Ghats and agency areas, APCNF can be linked with traditional Indigenous agriculture, millet revival, nutrition gardens, minor forest produce value chains and women-led SHG enterprises. However, implementation must be locally adapted and should not impose a uniform model across all agro-climatic and cultural contexts.

10. Sustainability Performance Matrix

Table 3: Sustainability Performance Matrix of APCNF

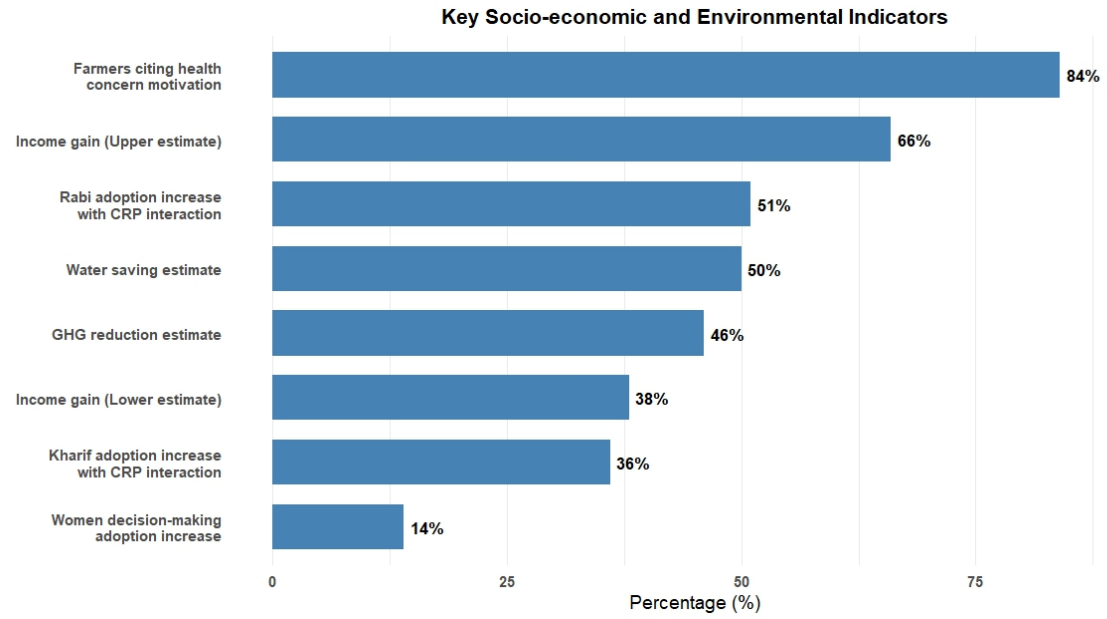
Dimension	APCNF Contribution	Evidence/Interpretation
Economic sustainability	Reduces paid-out costs and improves net returns	Income gains reported in APCNF studies
Ecological sustainability	Reduces chemical use, promotes soil cover and biodiversity	PMDS and 365 Days Green Cover practices
Climate resilience	Supports dry sowing, mulching and diversified cropping	Useful for rainfed and drought-prone areas
Social inclusion	Uses women SHGs and community resource persons	Women's decision-making improves adoption
Health and nutrition	Promotes chemical-free food and nutrition awareness	Health concerns motivate adoption

Scalability	Uses government-community institutional model	RySS, SHGs and CRPs support expansion
Tribal relevance	Compatible with mixed cropping and local ecological knowledge	Requires local adaptation in agency areas

Source: Author's synthesis based on APCNF (2026a, 2026b, 2026d), CEEW (2026), FAO (2022), and UNEP (2026).

11. Graphical Analysis

Graph 1: Selected Reported Outcomes and Adoption Drivers of APCNF



Note: Values are percentages drawn from APCNF and CEEW-reported evidence.; Source: APCNF (2026a) and CEEW (2026).

12. APCNF Sustainable Development Framework

Graph 2: APCNF Sustainable Development Framework

Community Institutions
↓
Women SHGs and Community Resource Persons
↓
Natural Farming Practices
↓
Reduced Input Dependence
↓
Soil Health and Crop Diversity
↓
Climate Resilience and Safe Food
↓
Higher Net Income and Sustainable Rural Livelihoods

Source: Author's framework based on APCNF (2026b), CEEW (2026), FAO (2022), and UNEP (2026).

13. Discussion

The analysis shows that APCNF is important because it changes the method of agricultural development. Conventional extension systems normally transfer technology from experts to farmers. APCNF instead uses farmer-to-farmer learning, women's collectives, community resource persons and locally prepared natural inputs. This makes the programme more socially embedded and behaviourally sustainable (CEEW, 2026).

The second major finding is that APCNF's economic strength lies in reducing input dependency. Farmers may not always achieve dramatic yield increases immediately, but lower input costs can improve net returns. Duddigan et al. (2022) found no short-term yield penalty in small-scale ZBNF systems compared with conventional and organic alternatives, which supports the argument that natural farming can be economically viable when properly implemented.

The third finding is that APCNF has strong climate relevance. PMDS and 365 Days Green Cover are not merely technical practices; they are ecological strategies for moisture conservation, soil protection, biodiversity enhancement and cropping-system resilience (APCNF, 2026d). These practices are especially important in rainfed, drought-prone and climate-vulnerable areas.

The fourth finding is that women's institutions are central to APCNF's success. CEEW's finding that women's participation in farm decision-making increases adoption intensity shows that natural farming is not gender-neutral. Women's SHGs can act as platforms for knowledge exchange, seed sharing, nutrition awareness, input preparation, kitchen gardens and community monitoring (CEEW, 2026).

The fifth finding is that APCNF has strong potential for tribal development, but tribal implementation should be culturally sensitive. In tribal areas, natural farming should be linked with Indigenous seed systems, millet cultivation, forest-food knowledge, nutrition gardens, community seed banks and local agroecological calendars. A uniform package approach may weaken local relevance. Therefore, APCNF in tribal areas should be planned through Gram Sabhas, women farmers, traditional knowledge holders and local youth.

14. Policy Recommendations

1. APCNF should strengthen district-specific and agro-climatic-zone-specific planning. Natural farming practices should be adapted to coastal, delta, rainfed, dryland and tribal agency areas rather than implemented as a uniform package (Duddigan et al., 2022; CEEW, 2026).
2. Women-led SHGs should remain the core of APCNF scaling. Evidence shows that women's participation in farm decisions increases natural farming adoption, and therefore women should be trained as farmer-scientists, input-preparation leaders, nutrition-garden mentors and community monitors (CEEW, 2026).
3. Community Resource Persons should receive long-term institutional support. Since sustained CRP interaction significantly improves adoption intensity, the CRP system should be professionalised through training, honorarium support, performance incentives and digital advisory tools (CEEW, 2026).
4. APCNF should be integrated with tribal development programmes in agency areas. ITDAs should promote natural farming with millets, pulses, tubers, mixed cropping, community seed banks, NTFP value addition and nutrition-sensitive agriculture.
5. APCNF produce needs stronger market linkage. Farmers will benefit more if chemical-free produce receives assured procurement, local branding, farmer-producer organisation support, digital market access and consumer trust certification.

6. Scientific monitoring should be strengthened. Universities and research institutions should conduct long-term studies on soil organic carbon, biodiversity, water use, yield stability, farm income, nutrition and labour use in APCNF and non-APCNF farms.
7. APCNF should protect farmer knowledge. Since the programme is built on traditional and community practices, farmer innovations should be documented with proper acknowledgement and benefit-sharing mechanisms.

15. Conclusion

APCNF represents a major experiment in sustainable agricultural transformation. It combines natural farming practices, government support, women-led institutions, community resource persons, farmer-to-farmer learning and agroecological principles. The programme's relevance lies not only in reducing chemical inputs but also in rebuilding the relationship between soil, farmer, food, community and ecology (APCNF, 2026a; UNEP, 2026). The study concludes that APCNF can contribute to sustainable development through five major pathways: cost reduction, soil restoration, climate resilience, women-led community mobilisation and safe food systems. Evidence from APCNF reports, CEEW, FAO, UNEP and field experiments suggests that natural farming can be economically and ecologically viable when supported by strong community institutions and scientific learning (FAO, 2022; Duddigan et al., 2022; CEEW, 2026). For tribal and rainfed regions, APCNF has special relevance because it aligns with mixed cropping, low external-input farming, local seed systems and ecological knowledge. However, tribal implementation must be locally adapted and should respect Indigenous farming practices, Gram Sabha institutions and women's knowledge. The future of APCNF depends on maintaining its community-managed character while strengthening scientific monitoring, market access, youth participation and policy convergence. Therefore, APCNF should be seen not merely as an agricultural scheme but as a rural transformation model. It has the potential to link farmer prosperity, soil health, climate resilience, nutrition security, women's empowerment and sustainable development in Andhra Pradesh and beyond.

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