

# Training farmers in regenerative food production in India: Andhra Pradesh Community-managed Natural Farming



Part of a series of case studies  
that exemplify elements of the  
Universal Circular Economy  
Policy Goals in practice.

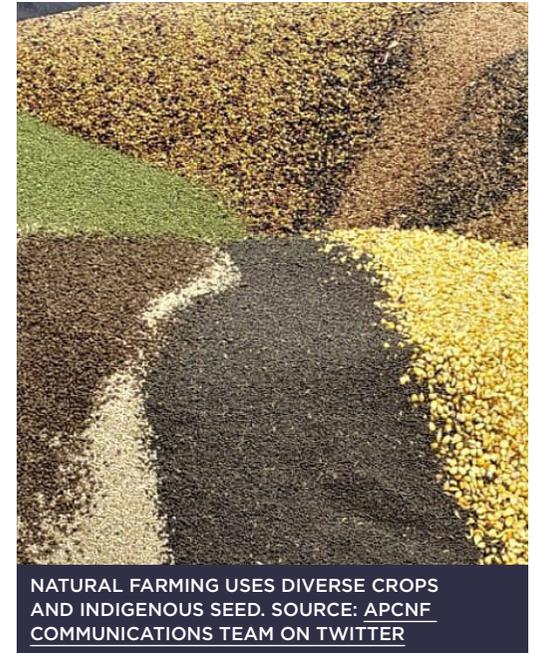
## Since the mid-1990s, a grassroots movement of farmers in India has adopted a set of agroecological approaches in response to multiple challenges including farmer debt, soil degradation, and biodiversity loss.

'Natural Farming', as the approach has become known in India, includes practices such as cover cropping and mulching, using no synthetic fertilisers or pesticides, and integrating livestock. It seeks to restore natural systems and improve biodiversity, in turn building resilience to weather- and climate-related shocks. For farming communities, it reduces costs, improves health and creates better livelihoods.

Recognising the potential of Natural Farming to create a more effective and just agricultural system, in 2016 the Government of Andhra Pradesh initiated a statewide Natural Farming training programme for farmers. The programme aims to reach all six million farmers in the state, over an area of eight million hectares, by 2031. In contrast to previous fiscal agricultural policies, the Andhra Pradesh Community-

managed Natural Farming programme (APCNF) focuses on providing field-level, farmer-to-farmer training in agroecological approaches. It works through existing local women's institutions and provides long-term support to farmers to make a gradual transition. It also aims to provide opportunities for farmers to take on leadership roles and develop skills in areas such as digital data collection, scientific assessments, and communications.

The bottom-up approach of APCNF empowers farming communities to become independent of financial support from either the state or agribusinesses, helping them to escape the debt cycle that has become prevalent among the farming community in India. Since 2016, APCNF has already reached out to 630,000 farmers in the state.



NATURAL FARMING USES DIVERSE CROPS AND INDIGENOUS SEED. SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER



PARTICIPATORY FARMER FIELD SCHOOLS. SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER



A FARM WITH DIVERSE CROPS: CHILLIES, ONIONS, CARROT, LEAFY VEGETABLES, MARIGOLD, CABBAGE, JOWAR AND BEETROOT.  
SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER

## Regenerative food production and the circular economy

In a circular economy, we eliminate waste and pollution, circulate products and materials, and regenerate nature. Transitioning to a circular economy means moving towards a food system that builds natural capital and allows nature to thrive. Regenerative food production generates positive outcomes for nature such as healthy and stable soils, improved local biodiversity, and clean air and water. Farmers may draw from many different schools of thought such as regenerative agriculture, agroecology, agroforestry, and conservation agriculture to apply the best set of practices to drive regenerative outcomes on their land.<sup>1</sup>

Natural Farming is one such set of agroecological farming methods, aimed at restoring soil health by mimicking nature and replacing synthetic chemicals with biological alternatives. It evolved from Indian agriculturalist Subhash Palekar's 'zero-budget natural farming' system, in which farmers use natural materials such as cow urine and neem leaves to both protect plants from pests and disease, and enhance the soil microbiome.<sup>2</sup> Today, the definition of Natural Farming used by the Government of Andhra Pradesh centres around nine universal principles that can be operationalised in different contexts:

- 1 **Soil to be covered with crops for all 365 days in a year**
- 2 **Minimal disturbance of soil**
- 3 **Biostimulants as necessary catalysts**
- 4 **Use of indigenous seed**
- 5 **Diverse crops and trees (15-20 crops)**
- 6 **Integrate animals into farming**
- 7 **Increase organic residues on the soil**
- 8 **Pest and disease management through botanical extracts**
- 9 **No synthetic fertilisers, pesticides or herbicides.<sup>3</sup>**

Natural Farming can be more knowledge-intensive than conventional farming and is therefore mostly adopted at small-scale and subsistence level farms. However, recent innovations by farmers in Andhra Pradesh have mechanised some Natural Farming processes, allowing the principles to be applied on farms of up to 20 hectares.

## Policy background

For decades, local women's organisations known as self-help groups have played a major role in tackling rural poverty and promoting women's empowerment in India, primarily through community financing and micro-credit programmes.<sup>4</sup> At the same time, nonprofits such as the Centre for Sustainable Agriculture have promoted agroecological training for farmers throughout India since the mid-1990s.<sup>5</sup>

In Andhra Pradesh, a heavily agriculture-dependent state in the southeast of the country, farmers have among the highest rates of fertiliser use, electricity consumption for agriculture, and indebtedness, in India.<sup>6</sup> The Government of Andhra Pradesh started to promote agroecology from 2000 with its Rural Poverty Program which provided training for farmers in non-chemical pest management and mobilised nearly nine million women into self-help groups.<sup>7</sup>

Building on this, from 2004-2014 the Department of Rural Development's Community-Managed Sustainable Agriculture programme disseminated training in soil health improvement and water conservation approaches. Learnings from these programmes laid the foundations for the formation and implementation of the Andhra Pradesh Community-managed Natural Farming (APCNF) programme, which launched in 2016.

APCNF contrasts with fiscal agricultural schemes, such as loan waivers and direct cash transfers, that previously dominated the state's agriculture policy.<sup>8</sup> APCNF invests instead in the capacity building and training of farmers at the field level, providing farmers with knowledge and techniques rather than subsidies, biological inputs, or other supplies such as seed banks. This bottom-up approach enables farmers to make their own decisions on how to run their farms, as well as avoid dependence on state support and other influences such as large agribusinesses.

## Funding

Significant financing is required to transition all six million farmers in the state to Natural Farming.<sup>9</sup> The programme is financed by a blend of public, private and philanthropic funding sources, including the Government of India via two national Ministry of Agriculture schemes, the Government of Andhra Pradesh, Germany's KfW Development Bank, and Azim Premji Philanthropy, which was one of the first investors.<sup>10</sup>

## Partnerships

Since the programme began in 2016, implementation and research support has been provided by a wide variety of partners:

- APCNF is led by the Agricultural Department of the Government of Andhra Pradesh, with input from other departments with related agendas including rural development, tribal welfare, and education.
- Many academic institutions including Andhra University, the University of Reading and the University of Edinburgh are carrying out research around the APCNF programme and the effects of adopting Natural Farming methods.<sup>11</sup>
- A number of NGOs are involved in implementation. This includes over 30 'field NGOs' which already had an active presence in farming communities before the APCNF programme started, and five 'resource NGOs' which provide thematic expertise, including around marketing and certification and integrated farming systems.<sup>12</sup>
- International institutions such as World Agroforestry, the United Nations Environment Programme and Food and Agriculture Organization of the United Nations (FAO) have, among other things, helped to set up the farmer field school programme, developed the training, brought in international scientists, and promoted APCNF in international fora.





SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER

## Implementation

Implementation of the APCNF programme is overseen centrally by Rythu Sadhikara Samstha (RySS), which translates as 'Farmers' Empowerment Organisation', a non-governmental entity set up by order of the state. RySS recruits, trains and deploys staff to villages to train farmers. However, the focus of the programme is increasingly on strengthening the roles of local people, embedding Natural Farming practices as a way of life across communities, and ensuring long-term support for farmers to make a gradual transition away from chemical pesticides and fertilisers.



A FARMER FIELD SCHOOL SESSION IN THE VILLAGE OF UYYALAWADA.  
SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER

Natural Farming methods are disseminated to farmers through farmer field schools, demonstration plots, case study videos, and discussions in women's self-help groups, among other means. There are several groups of people involved in training farmers, coming from both within and outside of the community:

### RySS personnel

Training is overseen by Community Resource Persons: Natural Farming experts employed by RySS, with each one overseeing the training of 100 farmers. They stay in the village for a period of time to answer farmer concerns and queries, create videos demonstrating the agroecological methods, and track the number of farmers converting to Natural Farming. Internal Community Resource Persons are the next tier, so-called because they emerge from a pool of leading farmers within their own village and are thus long-term residents in the community. Also remunerated by RySS, their role is to disseminate knowledge and provide support to farmers.

### Farmer-to-farmer training

Lead and Champion Farmers are best-practising farmers within the community who teach other farmers Natural Farming methods, and are mentored by Internal Community Resource Persons to take on other leadership roles.

### Women's self-help groups

Women's self-help groups also play a key role in the uptake of Natural Farming approaches throughout Andhra Pradesh. Due to their experience in providing micro-credit programmes, they are well-placed to deal with financial aspects of APCNF such as handling community funds and ensuring working capital requirements are met. They also authenticate the reported numbers of farmers adopting Natural Farming methods and their weekly meetings are the location for dissemination of training materials. Over time and with support from RySS, these groups gradually take over the programme management role from RySS, helping to ensure the programme's self-sustenance.

### Natural Farming Fellows

A further level of support comes from a Natural Farming fellowship scheme, which recruits agriculture and allied sector graduates from all over the world. Natural Farming Fellows are trained by RySS to model best practices of Natural Farming on leased land in villages, as well as carry out activities such as data collection, environmental assessments, organising workshops, and communications and marketing. The next phase of the fellowship will also recruit educated people from within farming communities in Andhra Pradesh, ensuring local people have the opportunity to expand their skill-set beyond farming, and are equipped to carry out these knowledge-based roles within their community.

Natural Farming approaches can save farmers in Andhra Pradesh up to **USD 2,000 per season**.<sup>17</sup> In some cases, farmer income has increased by **197%**.<sup>18</sup>

## Tracking, assessments and feedback mechanisms

Between 2016 and 2022, the number of farmers and farm workers adopting Natural Farming approaches grew from 40,000 to 630,000, a quarter of which have now eliminated all synthetic fertilisers.<sup>13</sup> Recognising the gradual nature of the transition and the need to embed Natural Farming practices in the long term, APCNF extended its target year for completion from 2024 to 2031. The government plans to support each village until the transition of all farmers is completed, taking on average eight years, after which point the programme management is passed to community-based organisations.

Since 2018, the Institute for Development Studies Andhra Pradesh has carried out an [assessment](#) of APCNF. It gathers feedback

from around 1000 farmers on many aspects of the programme - such as costs of cultivation, crop resilience, human health, and quality of training and support services - as well as analysing crop-cutting experiments, and measuring the land area where Natural Farming is practised. Feedback is taken into account by decision-makers and the recommended [package of practices](#) is iterated to reflect the experience of farmers and new research that emerges.

Impacts on soil health, biodiversity and pest occurrence are assessed by a science and research team assigned to each district, working with local farmers. Plans are underway to provide further training to Internal Community Resource Persons to become certified farmer scientists, through a newly established Natural Farming [research academy](#).<sup>14</sup> This will allow field experiments, data collection and analysis to be carried out by local scientists within their communities.

## Impact

Promoting Natural Farming methods through APCNF has already brought about many social, economic and environmental benefits in Andhra Pradesh:

### Income, yield and security

Applying Natural Farming principles can improve food security and lead to greater profits for smallholder farmers. This is because costs of cultivation decrease while yields tend to increase: **in 2020, yields of crops cultivated using Natural Farming methods increased in five of the top six crops in Andhra Pradesh**, while farmers can avoid high costs of seeds, fertilisers and other inputs, and spend less on irrigation and electricity compared to using non-Natural Farming methods (see Table 1), thereby helping to reduce debt. Growing a diverse range of crops - one of the principles of Natural Farming - may help to secure livelihoods and food supply compared to monocrops: if one crop fails, others are still available either to consume or sell. Furthermore, once the transition to Natural Farming is complete and the loans have been paid off, the Government of Andhra Pradesh anticipates saving USD 1 billion every year that it is currently spending on fertiliser subsidies.<sup>15</sup>

Even where Natural Farming has not improved incomes, the practices are also valued by farming communities for non-economic reasons such as greater social cohesion and a sense of connection with traditions and ethics.<sup>16</sup>



DEMONSTRATING HOW TO PREPARE NATURAL FERTILISER FROM COW DUNG IN SANIPAYA VILLAGE. SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER

Natural Farming could make significant progress on almost **a quarter** of the 169 targets within the Sustainable Development Goals.<sup>19</sup>

### Growing markets for Naturally Farmed products

Farmers can sell Natural Farming products, often at a premium, through various outlets including online, door-to-door delivery, and retail shops and stalls. RySS connects farmers to other channels such as weekly shandies (local marketplaces for agricultural produce, livestock and other goods) and farmers' markets. In 2022 RySS facilitated an agreement to supply 13 Hindu temples with Natural Farming ingredients:<sup>20</sup> the Tirumala temple alone ordered 22,000 tonnes of 12 types of Natural Farming agri-produce from 25,000 farmers this year.<sup>21</sup>

### Biodiversity and climate resilience

Healthy, biodiverse soils provide multiple ecosystem services including nutrient supply, water holding capacity, carbon sequestration, and resilience to external stresses such as changes in temperature.<sup>22,23</sup> Natural Farming uses natural inputs that enhance the soil microbiome; it eliminates pesticides that can kill birds and beneficial insects; and it ensures a diverse range of crops that can provide habitats for biodiversity. Data shows that Natural Farming methods increase bird and earthworm populations,<sup>24</sup> while farmers report the presence of many beneficial insects such as honeybees, lacewing bugs and ladybirds.<sup>25</sup>

### Earthworms per square metre

Natural Farming plot:

**232**

Non-Natural Farming plot:<sup>26</sup>

**32**

As climate change increases the frequency of extreme weather events such as hurricanes, heavy rains and drought, there is a need for adaptation to ensure the resilience of crops and security of food supply. Compared to other farming methods, Naturally Farmed crops can both withstand dry spells, thanks to continuous crop cover that keeps moisture in the soil, and recover more quickly following heavy rain, due to longer roots that give the plants greater stability and access to more nutrients.<sup>27</sup>

### Human health benefits

The use of pesticides in agriculture has been associated with damage to human health.<sup>28</sup> Natural Farming approaches reduce exposure to harmful chemicals, which can in turn reduce related illnesses and associated medical costs.<sup>29</sup> APCNF also engages with villages to diversify diets and ensure access to public health and nutrition services. Several studies are underway to examine both crop quality when Natural Farming principles are applied, and the health outcomes of APCNF.

Table 1  
**Difference between using Natural Farming methods and non-Natural Farming methods on crops** showing that yields are higher in eight out of nine crops, and net value is higher for all nine crops due to lower costs for farmers.

Crop	Paid out costs (%)	Yields (%)	Net value output (%)
Paddy	-21	+4	+61
Groundnut	-13	+32	+125
Cotton	-28	+14	+914
Black gram	-29	-2	+7
Maize	-13	+32	+111
Red gram	-43	+1	+79
Chillies	-45	+10	+18
Green gram	-28	+23	+53
Ragi	-35	+51	+420

SOURCE: 'ASSESSING THE IMPACT OF APCNF', 2020-2021 FINAL REPORT, INSTITUTE OF DEVELOPMENT STUDIES, ANDHRA PRADESH, P.XXI



**Natural Farming**  
**FARMER'S**  
**FRIDAY**  
**MARKET**

We sell only the freshest produce from our NF Farm!

MAY 13, 2022  
2:30 PM TO 5:30 PM

APCNF - RYSS  
State office

Parking lot, Sahasra Block-2,  
OPP-HOSANNA MANDIR,  
GORANTLA, GUNTUR.

SOURCE: APCNF COMMUNIICATIONS  
TEAM ON TWITTER



EARTHWORMS ON A NATURAL FARMING PLOT. SOURCE: RYSS NATURAL FARMING FELLOWS 2018

### **Uptake of Natural Farming beyond Andhra Pradesh**

Significant activity to promote Natural Farming approaches is underway in different states in India,<sup>30</sup> and states are cooperating to share best practices. For example, the Government of Andhra Pradesh is sending personnel to demonstrate Natural Farming training in Madhya Pradesh, Meghalaya and Odisha. It is also sharing knowledge internationally, including with the Alliance of Food Sovereignty in Africa. On a national level it is exchanging with the public policy think tank Niti Aayog and several national government ministries. The Government of India has indicated plans to roll out Natural Farming on a national level,<sup>31</sup> though consensus-building is expected to take some time due to the complex ecosystem of actors involved (the ministries of agriculture, rural development, commerce, and food distribution, to name a few).

## **Lessons learned so far**

### **Understanding social contexts and leveraging community networks**

Working with well-established and trusted institutions that understand local contexts can ease the roll-out of farming policies, and help to access harder-to-reach communities. Over 100,000 self-help groups are involved in implementing and monitoring the APCNF programme. Along with the field and resource NGOs, these groups provide an essential means to reach all of the farming community as well as a forum for knowledge sharing via the group meetings.



SOURCE: APCNF COMMUNICATIONS TEAM ON TWITTER

### **Iterating the policy to allow farmers to develop their own solutions**

The ability to respond and adapt to innovations and new insights is key for policies to effectively support the transition to a circular economy. Being responsive to feedback and revisiting assumptions has been crucial to the effectiveness of APCNF, which has undergone a considerable evolution since it first launched in 2016. It gives farmers a mandate to experiment and find the best solutions for their specific context, increasing the likelihood that Natural Farming is maintained in the long term.

### **Working with academia to ensure fact-based policy**

Transparent and reliable data is crucial for fact-based policy action.<sup>32</sup> To address early criticisms around a lack of scientific evidence on the benefits of Natural Farming approaches, the Government of Andhra Pradesh and RySS partnered with several universities and academic institutions to carry out independent studies, and recently established an academy in Andhra Pradesh dedicated to agroecological research and learning. The aim is to build a body of scientific evidence on the impacts of Natural Farming on soil health, crop yields, farmer incomes, biodiversity, and nutrition. Especially in such salient policy areas as food and agriculture, working with credible academic institutions to assess the outcomes of different farming methods is important to build confidence and buy-in among stakeholders, and support long-term implementation of policy measures.

### **Digitisation to ensure reliability of data**

Keeping track of the number of farmers adopting Natural Farming between the different farming seasons is a resource-intensive process, and there is a risk of human error when collecting field-level data. Authentication and digitisation of data are essential to ensure accuracy, and women's self-help groups play a key role in authenticating reported numbers. The Government of Andhra Pradesh is prioritising building the capacity of its digital functions, increasing the size of its in-house digital team as well as recruiting and training more digital systems operators at village level.



## How APCNF illustrates the Universal Circular Economy Policy Goals

The APCNF programme illustrates three of the Ellen MacArthur Foundation's five [Universal Circular Economy Policy Goals](#).



### GOAL 1

#### **Stimulate design for the circular economy**

Goal 1 focuses on stimulating the emergence of circular design for goods and services, and circular business models that keep inorganic and organic materials and goods in use and at the highest value possible. Food and agriculture policies that help to build a food system that supports natural capital and allows nature to thrive, are one important aspect of this goal. By providing training in Natural Farming methods, measuring outcomes, and helping to broker partnerships to grow markets, APCNF stimulates the design and production of food that regenerates nature.



### GOAL 4

#### **Invest in innovation, infrastructure and skills**

Through the APCNF programme, national and regional level public funding, and funds raised from external partners, are being channelled towards providing farmers with the skills and expertise needed to move towards regenerative food production. APCNF is supporting an inclusive transition to a circular economy, by aiming to reach all farmers in the state, and by working with existing local development institutions.



### GOAL 5

#### **Collaborate for systems change**

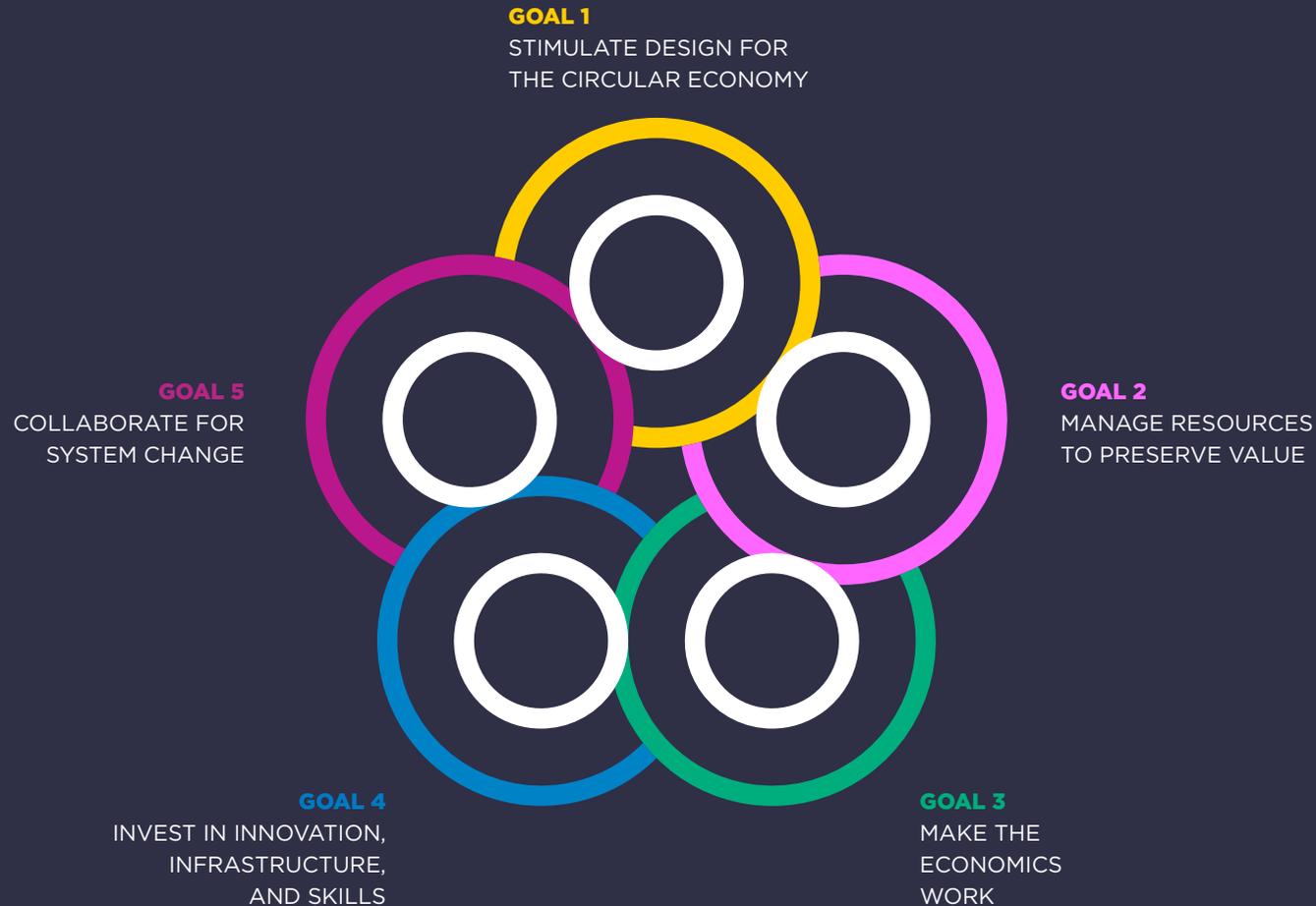
The move to a circular economy is a system change that is inherently dynamic and requires the involvement of all actors from across the public, private and civic sectors. The implementation of APCNF is heavily dependent on the network of women's self-help groups throughout the state, which ensures engagement at the community level. Training is implemented by a dedicated non-governmental entity together with a number of civil society organisations, and the Government of Andhra Pradesh is also collaborating with many other states in India, and internationally, to disseminate knowledge and best practices.

## Endnotes

- 1 Ellen MacArthur Foundation, [The Big Food Redesign](#) (2021)
- 2 Natural Farming evolved from 'Zero Budget Natural Farming', a system of four principles developed by Subhash Palekar in the Indian state of Maharashtra in the mid-1990s, in response to high levels of farmer debt. The four principles are: Beejamrutham - natural treatment of seeds and other planting materials against diseases; Jeevamrutham - the creation of biologically active soils through the addition of a fermented microbial culture; Achhadana - cover crops and mulching on ground surface to protect and enhance topsoil; Waaphasa - fast build-up of carbon-rich soil humus to feed micro-organisms and improve soil structure. Now, the Government of Andhra Pradesh's definition of Natural Farming and Package of Practices extends beyond Palekar's teachings to include many other practices aimed at achieving regenerative outcomes.
- 3 [Rythu Sadhikara Samstha, Department of Agriculture, Govt of Andhra Pradesh](#) (accessed August 2022)
- 4 Walker, G., Osbahr, H., Cardey, S., [Thematic Collages in Participatory Photography: A Process for Understanding the Adoption of Zero Budget Natural Farming in India](#) (2021), *International Journal of Qualitative Methods*, Volume 20: 1–13
- 5 Stephanie Cassidy, [Community Managed Sustainable Agriculture: An Outline for the Next Step in Development](#) (2014)
- 6 Veluguri et al, [Political analysis of the adoption of the Zero-Budget natural farming program in Andhra Pradesh, India](#) (2021), *Agroecology and Sustainable Food Systems*, 45:6, 907-930
- 7 National Institution for Transforming India (NITI Aayog), [Andhra Pradesh](#) (2021), *Agroecology and Sustainable Food Systems*, 45:6, 907-930
- 8 Veluguri et al., [Political analysis of the adoption of the Zero-Budget natural farming program in Andhra Pradesh, India](#) (2021), *Agroecology and Sustainable Food Systems*, 45:6, 907-930
- 9 According to Government of Andhra Pradesh figures, to transition one farmer to Natural Farming over eight years costs 15,000 INR (188 USD). This covers capacity building and compensation of training personnel, providing support to community institutions, quality assurance and certification, tracking and monitoring, technical support, and programme management.
- 10 Some key sources of funding have included:
  - In 2022 the central Government of India schemes Paramparagat Krishi Vikas Yojana (PKVY) and Bharatiya Prakriti Krishi Padhhati (BPKP), with KfW Development Bank, provided a USD 270m fund until 2024.
  - Loan of USD 100m from KfW to expand APCNF to 720 Gram Panchayats from 2020-2025
  - Grant of EUR 20m from KfW to set up the Indo-German Global Academy for Agroecology Research and Learning.
  - USD 13m from Azim Premji Foundation for technical support since 2017
  - Grant of USD 15m from Co-Impact, a global philanthropy collaborative for system change in the programme.
- 11 The Institute for Development Studies at Andhra University publishes regular [reports](#) on APCNF. The University of Reading led a [study](#) on yields and motivations for the adoption of Natural Farming, with a follow-up study expected in early 2023. The University of Edinburgh's [BLOOM](#) study is a community-based, cluster randomised controlled evaluation of APCNF which is in the initial data collection stages. The French agricultural research organisation CIRAD and FAO are also planning a foresight study on Natural Farming.
- 12 The resource NGOs are: Centre for sustainable Agriculture (CSA), Kovel Foundation (KF), JATTU Trust, AF Ecology, and WASSAN.
- 13 Vijay Kumar interviewed by The Hindu Business Line, [How Andhra wants to convert to 100% natural farming by 2027](#) (2021)
- 14 The Times of India, [CM YS Jagan inaugurates Indo-German global academy for agroecology](#) (accessed July 2022)
- 15 Reuters, [Innovative BNP Paribas loan helping 6 million Indian farmers go chemical-free](#) (accessed August 2022)
- 16 Walker, G., Osbahr, H., Cardey, S., [Thematic Collages in Participatory Photography: A Process for Understanding the Adoption of Zero Budget Natural Farming in India](#) (2021), *International Journal of Qualitative Methods*, Volume 20: 1–13
- 17 UNCCD, [Zero-Budget Natural Farming in Andhra Pradesh, India](#) (2021)
- 18 Zareen Pervez Bharucha, Sol Bermejo Mitjans & Jules Pretty: [Towards redesign at scale through zero budget natural farming in Andhra Pradesh, India](#) (2020), *International Journal of Agricultural Sustainability*
- 19 Tripathi, S., Nagbhushan, S., Shahidi, T., [Zero Budget Natural Farming for the Sustainable Development Goals](#) (2018)
- 20 Institute for Development Studies Andhra Pradesh, Andhra University, [Assessing the Impact of APCNF - Final Report, 2020-2021](#) (2022)
- 21 The Hindu Business Line, [Soon, that famous Tirumala laddu will be fully organic](#) (3 August 2022)
- 22 Duddigan et al., [Impact of Zero Budget Natural Farming on Crop Yields in Andhra Pradesh, SE India](#) (2022), *Sustainability* 2022, 14, 1689
- 23 FAO, [Healthy soils are the basis for healthy food production](#) (2015)
- 24 Hussain et al, [Do Birds Return to Agricultural Landscapes through Adoption of Natural Farming Practices? A Comparison of Natural Farming vs. Chemical Farming in Andhra Pradesh](#) (2022) *Agricultural Sciences*, 13, 358-377.
- 25 Zareen Pervez Bharucha, Sol Bermejo Mitjans & Jules Pretty: [Towards redesign at scale through zero budget natural farming in Andhra Pradesh, India](#) (2020), *International Journal of Agricultural Sustainability*, p.12
- 26 Ibid.
- 27 In focus groups, many farmers report that Natural Farming crops withstand heavy rains. Source: IDSAP, [Assessing the Impact of AP Community Managed Natural Farming \(APCNF\): Consolidated Report 2020-21](#)
- 28 Jaacks et al., [Impact of large-scale, government legislated and funded organic farming training on pesticide use in Andhra Pradesh, India: a cross-sectional study](#) (2022), *The Lancet*
- 29 Farmers in Andhra Pradesh reported reduced medical costs in discussion with Grady Walker and Sarah Duddigan of the University of Reading.

- 30 National Institution for Transforming India (NITI Aayog), [Bharatiya Prakritik Krishi Paddhati \(BPKP\)](#) (2021)
- 31 Business Standard, [PM Modi bats for natural farming, calls it basis for economic success](#) (accessed August 2022)
- 32 Ellen MacArthur Foundation, [Universal Circular Economy Policy Goals](#) (2021)

# About the Universal Circular Economy Policy Goals



In January 2021 the Ellen MacArthur Foundation published the *Universal circular economy policy goals: enabling the transition to scale*, aiming to create a common direction of travel in policy development for a faster transition to a circular economy. The five circular economy policy goals can offer solutions to key global challenges such as climate change, biodiversity loss, and pollution, whilst delivering economic development.



© COPYRIGHT 2022  
ELLEN MACARTHUR FOUNDATION

[www.ellenmacarthurfoundation.org](http://www.ellenmacarthurfoundation.org)

Charity Registration No.: 1130306  
OSCR Registration No.: SC043120  
Company No.: 6897785