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REVIEW ARTICLE

Natural Farming & the Concept of Recycle, Reuse through Case Studies

Sanskriti Tripathy[1], Tridibesh Tripathy[2]

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ABSTRACT

The concept of natural farming coupled with the concept of recycle, reuse is not only environmental friendly but also sustainable in nature. Natural farming by the Padmashri awardee Subhash Palekar is the primary focus of the article. It deals into the details of the process of natural farming. The article also focuses on the key issues & challenges faced in the process of this farming.

Thereafter it moves into the realm of 4Rs - 'Reduce, Refuse, Recycle & Reuse' of waste management. Out of these, two are discussed in the article. The concept of reuse & recycle are discussed through various facets of the referred case studies.

The article looks into organic farming in one angle & the modern farming on the other. The issue of genetically modified foods is linked to modern farming on one hand and the organic farming on the other hand is free from these issues. Soil fertility is linked in a better way with organic where as in a negative way with the modern or fertilizer based farming.

Mixed cropping, rotational cropping, horticulture farming are the various effective strategies that addresses soil fertility. On the other hand, the nation has to address the issue of food security and this can only be addressed by mass production that lies within the fringes of modern farming.

Food security is a triangle that is completed by the elements of availability, accessibility, affordability with utilization at its tip. Food has to be produced, ensure that it is within the reach of people geographically & economically. Finally, the body has to be in a shape or stage where the food is used optimally.

KEYWORDS

• Natural Farming • Recycle • Reuse • Waste Paper

AUTHOR'S AFFILIATION:

[1] IVth year Student, B.Tech in Biotechnology, Bennet University, Greater Noida, Uttar Pradesh, India.
[2] Visiting Professor, Department of Social Work, Lucknow University, Lucknow, Uttar Pradesh, India.

CORRESPONDING AUTHOR:

Tridibesh Tripathy, Visiting Professor, Department of Social Work, Lucknow University, Lucknow, Uttar Pradesh, India.

E-mail: tridibeshtripathy@gmail.com

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INTRODUCTION

The article begins with the study that was conducted in the Kangra district of Himachal Pradesh by Shareya, DD Sharma, Ritika Sankhyan and Vishal Saini. About 70 percent of the population of Himachal Pradesh relies on agriculture/horticulture as a major source of livelihood. The government of Himachal Pradesh aimed to increase the income of the Himachali farmers by introducing the SPNF system in the agricultural territory (2016-17). A scheme was launched by the government to promote natural farming by the name, Prakriti Kheti Khushal Kisan Yojana (PK3Y). SPNF (previously called ZBNF), was introduced so that farming could be done with zero or low cost of production. Natural/Organic farming was started by Subhash Palekar in India. Globally, Masanobu Fukuoka introduced natural farming. Himachal Pradesh being rich in flora and fauna also intended to preserve its natural heritage and natural farming was one of the best options to begin with.

It helped substitute high input, chemical fertilisers with their organic versions. The four major pillars of SPNF were involved in the process-Jeevamrit, Beejamrit, Acchadan and Whapasa. Jeevamrit increased the microbial activity of the soil and the population of the earthworms. Beejamrit helped provide nourishment to the seeds, seedlings and other types of plants. Acchadan involved three types of mulching techniques live mulch, soil mulch and straw mulch. Mulching helped in developing humus in the soil and decreasing the rate of evaporation. Whapasa helped reduced the need for constant irrigation. The process also involved the combination of monocots and dicots along with the usage of contours and bunds to conserve rainwater. Indigenous cow breeds were used to provide dung and urine to get a higher concentration of microbes. Various formulations like Neemsatra, Agniastra and Brahmastra were used to combat several plant infections and diseases.

Nearly, 1.7 lakh farmers started practicing SPNF either fully or partially. The technique was used by 3590 panchayats out of the 3615 panchayats of the state. Intercropping and multicropping systems involving leguminous crops were also promoted to optimally use the land. As per the study, cauliflowers and French beans were cultivated together to study the impact on the yield of cauliflower under the SPNF and conventional system of farming. The following table gives the details through 5 variables.

Table 1: Details of the 5 variables

Particulars	Quantity	Unit	Rate (Rs./Unit)	Amount (Rs./ha)
Cauliflower Seed	0.3	Kg	45000	13500
FYM	8	Tonne	400	3200
Transportation and application cost	5	Mandays	250	1250
IFFCO (12:32:16)	200	Kg	31.4	6280
Urea	225	Kg	6.22	1400
Overhead cost				1000
Field preparation	12	Per hour	320	3840
Levelling and bunding	6	Mandays	250	1500
Nursery management	5	Mandays	250	1250
Transplanting	10	Mandays	250	2500
Irrigation	3	Mandays	250	750
Bavistin (seed treatment)	0.01	Kg	160	1.6
Pendimethalin	3	L	465	1395
Atrazine 50%	2.5	Kg	284	710
Spray cost	4	Mandays	250	10000
Cypermethrin 25% EC	0.75	L	316	237
Harvesting Mandays	10	Manday	250	2500
Total				**42313.6**
Cauliflower yield	91	Quintal	3000	273000
Total				**273000**

Cost of Cultivation under Conventional farming system

The cauliflower seeds were comparatively costlier than the beans seeds. The total cost of production including all the components like seeds, growth formulations like jeevamrit, Ghanjeevamrit etc., levelling, bonding, nursery, hand weeding etc. was Rs. 38735. The total yield was Rs.273450. The net return from the cultivation was around Rs. 234715/ha. The Benefit Cost ratio was 6.05.

The cost of production under the conventional farming system was Rs. 42313.6/ha. The net returns and the Benefit Cost ratio were Rs. 230686/ha and 5.45 respectively. The BC ratio was observed to be higher in the case of SPNF. Higher profits were observed for SPNF. Mixed cropping was more effective as it improved the soil quality. Fruit-pulse-vegetable based crop rotation generated 21.55 % higher profit in HP. The following table gives the details through 5 different variables.

Table 2: Details as per 5 other variables

Particulars	Quantity	Unit	Rate (Rs./Unit)	Amount (Rs./ha)
Cauliflower seed	0.18	Kg	45000	8100
Beans seed	1	Kg	790	790
Ghanjeevamrit	0.5	Tonnes	15000	7500
Transportation and application cost	5	Mandays	250	1250
Overhead cost				500
Field preparation	12	Per hour	320	3840
Levelling and bunding	6	Mandavs	250	1500
Nursery management	5	Mandays	250	1250
Transplanting	7	Mandays	250	1750
Irrigation	2	Mandays	250	500
Beejamrit	1	L	5	5
Hand weeding	25	Mandays	250	6250
Jeevamrit (plant protection)	1500	L	2	3000
Harvesting	10	Mandays	250	2500
Total				**38735**
Yield				
Cauliflower	79	Quintal	3000	237000
Beans	8.21	Quintal	4500	36450
Total				**273450**

The above section detailed out the cost of cultivation under SPNF. To conclude, SPNF gave higher a higher cost benefit ratio and helped maintain soil quality as well. Hence, SPNF turned out to be more successful.

Recycle and reuse old newspapers and magazines

The current population of India stands nearly at one billion. With a rising population, paper consumption and paper waste generation is also meant to rise exponentially.

With these rising estimates, the need to have proper waste collection, reuse and recycling mechanisms has become a necessity. Indian paper consumption is expected to rise to 30 million tonnes per annum until 2026-27 in comparison to the current level of consumption of 16 million tonnes per annum. Currently, the per capita consumption of paper is merely 15 kgs, Recycling becomes an important aspect as it can balance the dual need of waste management and resource acquisition. Waste paper recycling plays a key role in the generation of employment, reduction of soil waste, decreasing the need for importing raw materials as well as reducing their cost. Paper waste can be utilised for construction, fuel moulded packaging, production of modified cellulose etc.

The following table 3 represents the composition of raw material for waste paper recycling.

Table 3: Waste paper recycling's raw material composition

Raw material	Percentage
Waste paper	80 %
Wood	13.61%
Agro-residue	6.38%

Paper waste and cardboard waste comprise 21 % of the total dry waste produced in the country. Hence, paper and card board based waste accounts only for 0.1 lakh metric tonnes of MSW produced in India.

The overall flow of the paper industry starting from raw material acquisition to finally reaching the end user is divided into three parts:

1) Procurement of raw material

2) Production

3) Disposal of waste

The total numbers of mills in India are 861. These three stages are interlinked and operate in a cyclical manner, with the consumer market being the point of intersection. The consumer market includes both exported and imported paper. About 24.76 MT of paper and paperboard is produced in the market. The raw material required for this production comprises of 19.8 MT of waste paper out of which 7.92 MT comes from imports and the rest 11.88 MT is domestically sourced. About 3.37 MT of wood and 1.5 MT of agro-residue is required as a raw material for paper production.

From the total waste generated only 30 % gets collected and sorted while the rest of the 70 percent does not get collected at all. This indicates that only a small portion of the recyclable waste generated is getting reintroduced into the system. The maximum recovery rate stands at 40-45%. This forces the nation to import paper and paperboard. Recycled fibre also makes a significant contribution to the recycling of waste paper. However, due to poor recovery mechanisms only 60 can be sourced domestically.

The following table 4 shows the contribution of recycled fibre into the production of different types of paper.

Table 4: Recycled Fibre

Type	Contribution (in %)
Newspaper	15
Writing and Printing	20
Packaging	65

The total demand of 20 million tonnes of recycled paper is met through the import of 7 million tonnes of recycled paper from USA, Middle East and Europe. Recycling has two major benefits. The first is achieving an infinitely large ecological footprint and reduction in energy requirements for virgin paper production. It helps negate the harmful effects of deforestation and promotes the principles of circular economy while conserving the water and energy as well as reducing GHG emissions.

The following tabulated data in table 5 shows the ecological benefits of producing and utilising recycled paper.

Table 5: Ecological Benefits

Type of paper	Trees	Energy	GHG emission (CO_2 equivalent)	Wastewater	Soild waste
1 ton virgin fibre paper	24	33 million BTUs	5601 pounds	22583 gallons	1922 pounds
1 ton 100% recycled paper	0	22 million BTUs	3533 pounds	11635 gallons	1171 pounds
Environmental savings due to the recycled content	100%	33%	37%	39%	39%

Waste paper collection mostly involves the unorganised collectors and distributors. The sources are basically of two types, direct and indirect. Directly the paper is collected from the households, offices, religious places, hospitals etc. while the indirect sources are rag pickers and scrap dealers. Households provide notebooks, textbooks, old newspapers and magazines. Weekend hawkers are responsible for collecting these. Printers, publishers and converters mostly contribute paper trimmings, print rejects, overprint/misprint sheets etc. Old corrugated cartons, answer sheets, old office and library records are provided by

industries, offices and libraries. Waste from both these sources is collected by contractors. The undernoted table 6 shows the collection rates of various grades of papers.

Table 6: Collection rates of grades of papers

Grade	Type of waste	Rate of collection
Copier	Post consumer	20%
Cream wove	Pre-consumer and post-consumer	Pre-consumer-100% and Post-consumer-20%
Packaging paper	Pre-consumer and post–consumer	Pre-consumer-100% and Post-consumer-50%
Newspaper	Pre-consumer and post–consumer	Pre-consumer-100% and Post-consumer-30%

The following figure gives the details of the mechanism of waste paper collection.

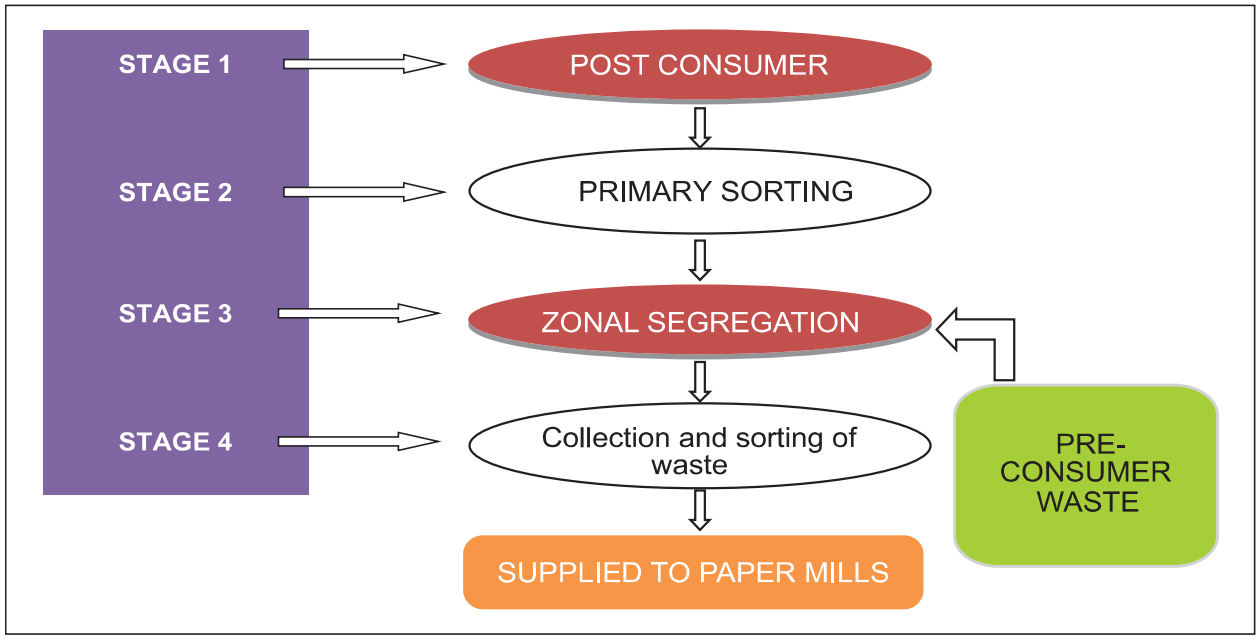

Figure 1: Details of Waste Paper collection

Stage 1 involves the collection of post-consumer waste from all the waste collection. This waste is then first manually sorted. After this, the waste goes to a zonal segregation centre where mechanical sorting is carried out for both the post and pre consumer waste. After this, the sorted waste is collected and segregated on the basis of usage and sent to the paper mills.

India produces different kinds of paper like writing, packaging, and specialty papers like tissue papers, copier paper, super printing paper, stone paper, cream weave paper etc. Paperboards and posters, and kraft papers are generally used for packaging.

Apart from the collection rate of various grades of paper, it is also important to know their consumption and recovery levels. The following table shows the data of both these parameters.

Table 7: Grades of consumption & recovery levels

Grade	Consumption (in millions tons/ annum)	Amount recovered (in million tons/ annum)
Writing/printing	7.18	2.87
Packaging grade	10.31	6.18
Newsprint	2.628	1.84
Speciality	>1	Data not available

The Indian paper industry has an average growth of 3-4% as compared to the global average growth of 1 %. This indicates that the Indian paper industry has a major growth potential of paper and paper board. The following table shows the number of Paper production units present in 21 states of India for the year 2023. The units have been classified into micro (<50 TPD), small (50 to 100 TPD), medium (150 to 300) and large units (>300 TPD).

Table 8: Paper production units in India

States	Large Units	Small Units	Medium Units	Micro Units	Total
Andhra Pradesh	4	11	7	–	22
Gujarat	10	62	16	23	111
Himachal Pradesh	1	–	1	1	3
Karnataka	1	8	5	5	19
Maharashtra	3	17	7	21	48
Odisha	2	1	–	–	3
Punjab	4	19	4	12	39
Tamil Nadu	7	32	9	22	70
Telangana	1	40	1	2	4
Uttar Pradesh	9	14	23	12	84
Uttarakhand	2	15	14	3	33
West Bengal	2	2	3	12	32
Assam	–	1	2	2	6
Chhattisgarh	–	2	–	5	6
Haryana	–	1	2	2	6
Jammu and Kashmir	–	3	–	1	2
Kerala	–	1	1	5	9
Madhya Pradesh	–	1	2	2	4
Odisha	–	4	–	2	3
Rajasthan	–	–	–	1	5
Bihar	–	–	–	1	1
Total	**46**	**234**	**97**	**127**	**510**

The above table shows that large production units are only present in 12 states of the country with Gujarat having the highest number of manufacturing centres. Most of the states possess small and micro-units of production. Tamil Nadu, Andhra Pradesh, and Maharashtra hold the largest paper mills of the country. The paper industry faces a shortage of wood fibre which is a very important raw material.

International market is achieving saturation and an unprecedented hike demand is not highly expected. The Indian market is also about to receive further impetus as Single Use Plastic (SUP) gets banned. The wood-based paper industry has also cut down its water consumption from 200 KL to 30 KL at an average per ton of paper meant for the virgin fibre mills. The newsprint sector however still faces the issue of import dependence upto 50%. This is a major gap that needs to be checked. The industry aims to be more export oriented for the future. As per the annual report of Central Pulp and Paper Research Institute, the production capacity for the financial year 2021 to 2022 stood at 25.28 million tons. The industrial production for the same time period amounted to 22.43 million tons. The import and export figures touched 2.178 million tons and 3.53 million tons respectively. The paper consumption for the same fiscal year was 21.07 million tons. The report exhibited that the exports sector has been gaining momentum for the industry starting from the fiscal year 2016-17 up to 2021-22.

For the Financial year 2023, the total numbers of waste paper recycling plants were 2,057. This number was double the number of plants installed in 2020. This increase in the number of plants is very positive for the paper industry as it will play a key role in its growth. The sector is governed by prominent pan-India associations like Indian Agro & Recycled Paper Manufacturers Association (IARPMA), Indian Paper Manufacturers Association

(IPMA), Indian Recycled Paper Manufacturers Association (IRPMA) and Indian Newsprint Manufacturers Association (INMA), etc.

However, the industry still faces a lot of challenges. The recycling process involving the use of recycled fibre poses issues like stiffening of the polymeric structure post drying, reduction in horrification etc. The need to import also arises due to the low quality of indigenous waste paper generated. This is due to reasons like improper segregation, unsystematic bailing of different grades of paper, a low recycling rate due to an improper collection system, obsolete infrastructure, a predominantly labour intensive segregation procedure, presence of too many stakeholders, and the usage of obsolete technology.

The paper industry faces a shortage of wood fibre, a very important raw material that is provided by the agro-forestry industry and agricultural areas. Majority of the mills depend on this raw material. Hence, increasing the tree plantations is necessary. Wood based mills have helped associate 12 acres of land with agro-forestry. The industry has also helped improve agro-farming through investments in research and development. These challenges can be overcome by taking measures like increasing public awareness, using AI based sorting technology, integration of the circular economy principles, integration of the informal sector with the government, setting recycling targets, expansion of EPR programs, investment in infrastructure, issuing green certification standards etc.

The industry has given a major contribution however to GHG emissions. The pulp and paper industry has contributed 190 million metric tonnes of CO_2 emissions. As per the estimates of the Global carbon budget (2022), India was responsible for the highest rate of carbon emission growth. However, Indian per capita carbon emissions are one-eighth of that of USA and one-third of the global level.

Other problems that are hovering around the industry are price competition as a lot of small and large producers present within a single community. Chinese and other ASEAN countries have access to low cost supplies and raw materials which makes it difficult to restrict their indiscriminate shipments. The 2023-24, budget mainly focused on technological development. The budget aimed to encourage agro-forestry and commercial forestry. The government offered forest land and non-forest government land for pulpwood plantation to the industry.

Due to the pandemic, the industry severely slowed down with its inward and outward supply chains getting disrupted. Significant demand losses occurred during that time. The major demand got focused on craft and manufacturing paper. Most of the mills had shut down during the primetime of the lockdown. A rising literacy rate is however, a good news for the Printing & Writing segment of the industry. The 2023-24, budget mainly focused on technological development. The budget aimed to encourage agro-forestry and commercial forestry. The government offered forest land and non-forest government land for pulpwood plantation to the industry.

DISCUSSION

The article revolved around a published study in a district of Himachal Pradesh where in the concept of natural farming was highlighted. Further, the article dealt on the issue of recycle & reuse of old newspaper & magazines which is a dire need across the globe. The crux information regarding the paper industry was another area of focus. Moving on, the partnership between India & Japan on this issue is another area that encourages further such collaborations under the Department of Science & Technology of Government of India. The concept of creating wealth from agricultural waste is another area that needs to be scaled up. Further issues like mechanism of waste paper collection & the ecological benefits of recycled paper through the eyes of the Journal of Environmental Research needs roll out & reflections so that masses benefit from these steps on sustaining the environment.[9,10]

CONCLUSION

The country needs a balance while seeing the issue of natural farming & farming for production. We need to remember that the masses need to be fed as well. The issues related to waste management such as recycling, reducing, reusing, refusing are to be percolated to the next generation so that the environment is sustained.

The article only aspires that the huge network of public, private, corporate, civil society &

community based organizations act as catalyst to optimal use & recycle of agricultural waste, old papers so that this generation leaves behind a better life for the next generation.

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REFERENCES

1. Shareya, Sharma D D, Sankhyan R, Saini V, Subhash Palekar natural farming vis-a-vis conventional farming a case study of Kangra district, Himachal Pradesh, IJCS PUB, v14, i01, March 2024, pp 892-895. ISSN: 2250-1770. www.ijcspub.org
2. Friends of the Earth UK, 34 uses of old newspapers, 28.7.2017, https://friendsoftheearth.uk.
3. Infomerics Ratings, India's Paper Industry: from pulp to prosperity, 18.06.2024, India ranks as the 15th largest paper producer, 22.4.2025.
4. GOI, DST, India-Japan Co-operative Science Program, IJCSP, https://dst.gov.in
5. GOI, ICAR, collecting wealth from agricultural waste, https://icar.org.in
6. Koul B, Yakoob M, Shah PM, agricultural waste management strategies for environmental sustainability, Journal of Environmental Research, v206, 15.4.2022, 112285, ISSN: 0013-9351.
7. Papermint, waste paper collection mechanism in India: current status, https://papermint.in
8. Tomasik B, environmental benefits of recycled paper, 2003, https://briantomasik.com.
9. GOI, SBM Urban 2.0, https://sbmurban.org
10. GOI, Waste to Wealth, SBM Urban 2.0, https://sbmurban.org