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Thinking beyond Ecology: Can Reskilling Youth Lead to Sustainable Transitions in Agri-Food Systems?

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Abstract: Green and decent work in the Global South is inextricably linked to sustaining rural livelihoods especially in agriculture that has undergone significant deskilling under the top-down, technocentric assemblages of the Green Revolution. Additionally, agrarian communities are also seeing youth quitting farming occupations in search of better livelihood options. Scholarly attention to green transitions though has been largely limited to the ecological dimensions. Enacting futures with a focus on ecologically responsible livelihoods need to go beyond existing narratives of technocentric and economic change and foreground the diverse micro institutional innovations that offer newer framings of reskilling. The growing evidence of agroecological initiatives across India indicates less discussed stories of transformation and innovations. Recognising the processes and linkages that allow for, and hinder, transformations at multiple scales and organisational levels is crucial for designing transformative initiatives and policies. Using two illustrative case studies, this paper explores opportunities for green work and the newer skills that might be required to enable sustainable agri-food systems. The case of Natural Farming Fellows (NFFs), a unique programme to encourage young agri-graduates to pursue Natural Farming is presented to understand enabling processes at the grassroots level. The second study explores institutional initiatives to engage rural youth through discussing the pedagogy and curricular approach of a Gandhian university along with opportunities to intern with field organisations. Together, these cases illustrate possible pathways and complexities underlying the process of nurturing sustainable livelihoods, the conception of which needs a broader idea of skilling based on personal aspirations and institutional support.

Keywords: sustainable transitions; green livelihoods; reskilling; agri-food systems

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1. Skills for Transforming Agri-Food Systems

Promoting "sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" (UNDP 2015) is an important sustainable development goal (SDG 8). The underlying assumption aligns with technocratic imaginations of accelerated growth accompanied by reduced environmental impacts, despite critiques of this view (Frey 2017). Yet, other elements of SDG 8 subtly underscore the conception of decent work beyond economic parameters. Questioning the modern educational aims and unsustainable aspirations cultivated through neoliberal policies privileging certain communities and practices based on reductionist logic of efficiency, productivity and profit (Date et al. 2021) is a required starting point to design alternatives.

The neoliberal food regime, which is based on the commodification of agri-food systems, has been thought to have adverse impact on both ecology and the livelihood of small farmers (McMichael 2009). In the Indian agrarian sector, the phenomenon has been most acutely reflected through the Green Revolution reforms. These reforms were designed in the backdrop of food shortages in the country. Therefore, the institutions were geared towards maximizing yield, while they ignored its adverse impact on other spheres. The Green Revolution agriculture relied on expensive external inputs like fertilisers, chemical

pesticides and irrigation access. This allowed the intensification of specific commodity crops or 'durable' crops (John and Babu 2021; Harwood 2019).

Evidence exists around the effect of many of these Green Revolution technologies on the degrading of the productive resources and livelihoods of farmers (Gibbs and Salmon 2015; Kumar et al. 2020). This commercialised food system combined with the food system has significant impact on green-house emissions (Garnett 2011). Simultaneously mono-cropping systems also reduce the resilience of farmers in the face of extreme weather events increasing during climate change. In contrast, bio-diverse farms have been found to have greater resilience and quicker recovery from such events (Lin et al. 2008). Yet, monocropping systems have received support in terms of both public extension and marketing infrastructure even as alternative practices and knowledge systems got undermined in the process (Marshak et al. 2021). The technologies adopted through this new agricultural science establishment were mainly dependent on a standardised package of high-yielding varieties of seeds, whose success relied on the availability of chemical fertilisers and irrigation (Mc.Neill 2007). Furthermore, technological advancements and institutional arrangements in agricultural production and marketing encouraged industrial food supply chains of primarily processed wheat, rice and sugarcane at the expense of wholesome food availability and nutritional security (R. Kumar 2023; Shiva 2004). Rather than building on local agroecological contexts to choose cropping patterns, a centralised process has impoverished diverse ecologies and practices through excessive reliance on irrigated lands and fewer crops (Shah 2022).

Despite the need to move towards ecologically sustainable agricultural practices, the transition to agroecology is constrained by a limited capacity of farmers and technological lock-ins that constrain alternatives due to the perverse incentive structures within the overall socio-technical systems (Levidow et al. 2014; Prasad 2005; Vanloqueren and Baret 2009). We argue that this situation stems from the nature of knowledge generation and dissemination within the agricultural knowledge establishment. The two case studies chosen in this paper illustrate how existing knowledge institutions can be tweaked to build the capacity of young people associated with agri-food systems to achieve more sustainable ecological and livelihood outcomes. We first contextualise the problem of agricultural deskilling within an institutional perspective, and how that relates with the socio-political dynamics of youth in agrarian communities.

2. Deskilling in Agriculture: An Institutional Perspective

The Green Revolution pervaded the Global South through developmentalist visions of increased food production and prosperity through advancements in science and technology (Kumbamu 2020). Along with this came the land-grant college complex, "the scientific and intellectual father of that revolution" (Hightower 1972, p. 10). This complex consisted of a public-industry collaboration, administered through a hierarchical system with research universities at the top and the extension system at the bottom. Hightower's work on these land-grant colleges had exposed various instances where the complex had left out interests of farmers and consumers, at the cost of the mechanisation, chemicalisation and hybridisation of agriculture, benefitting only a few corporations and large industrial farmers. In India, this structure of knowledge transfer was adopted during the 1960s with the establishment of the state agricultural universities paired with the vast extension system, focussed on increasing the productivity of Indian agriculture. The Indian agricultural research system had an additional layer, centralised at the union government, which had coordinated the activities across all the state agricultural universities and regional research stations (K. Kumar 2015). This process had ensured that the agricultural education and research in the country was directed to the goals set out by the government. In subsequent years with the coordinated effort of multi-lateral agencies, philanthropic organisations and developing countries, the agricultural knowledge system became centralised at the global level under institutions like the Consultative Group on International Agricultural Research (Kumbamu 2020). Here, it is important to acknowledge while the global debate around

food security has achieved a multi-faceted character, the science and technology policy (S&T) around agriculture remains invested in the singular goal of achieving sustainable access to food (Raina 2015). And therefore, this present framework of S&T fails to solve problems around livelihoods, nutrition or ecological degradation, which are beyond the scope of this paradigm.

Through this institutional structure, a pipe-line model of technology transfer from the international research agencies to the farmers was established. This model has proved to be effective in the transfer of standard packages-of-practice to farmers. The Green Revolution package, therefore, not only led to the standardisation of agricultural produce but also agricultural knowledge (Prasad 2005; R. Kumar 2016). As a result of solely top-down nudges, constructive spaces for dialogue and learning from field experiences are almost wholly missing within formal research frameworks. Agricultural science centres, known as Krishi Vigyan Kendras (KVKs) in the Indian context, are an integral part of this system of technology transfer. The KVKs, however, lack identity, recognition and dignity within the R&D institutional landscape and are seen as temporary parking lots for scientists from universities (Balamatti 2022).

With increasing dependence on external inputs, Indian farmers have experienced a situation where farming practices have become alienated from socio-ecological structures associated with agriculture, though the work is still largely shaped by gender and caste relations (Gupta 1997). This has recreated farmers' identity as an individual economic actor, followed by a separation from both the traditional and modern knowledge systems leading to "dissonance", who is driven by fads in the market, as they compete with each other (Vasavi 2009, pp. 98–99). Stone (2007) defines this process of dependence on external inputs in terms of the loss of the ability to experiment for mitigating challenges arising within agricultural practice. The term 'deskilling' was coined by Braverman (1998) to describe the loss of workers' skills and knowledge due to the increased mechanisation of tasks. The concept of agricultural deskilling was developed to understand the impact of the industrial revolution on farmers' knowledge and practices. Stone, however, argued that the agricultural deskilling is a function of the disruption of a dynamic process of skilling rather than the loss of a static set of skills. According to him, deskilling stems from disrupting the social fabric and environmental learning that is central to farmers' ability and freedom to innovate. To make up for the lack of environmental learning, farmers' decision making is based on didactic learning processes from various agencies, along with other misleading social stimuli (Stone 2016).

Farmers' loss of autonomy and control over agricultural practices has been exacerbated by factors in the external environment such as industrial patents, large-scale privatisation and an erosion of community initiatives (e.g., seed banks, shared labour, etc.). Multi-national corporations have actively invested in patents and other forms of institutions that privatise knowledge, within the "third food-regime" (McMichael 2009, p. 158), a term for the commercialised food regime arising post-1980s. In this same period, many movements have emerged to push for alternative food systems across the world, which can restore autonomy and control over indigenous knowledge within communities through niche interventions. The agroecology movement is one such broad category of efforts, which offers a systemic response to the multiple challenges faced by farmers, through a focus on interdependencies; the primacy of soil health; adapting seeds to shifting climatic and human needs; and establishing socio-ecological resilient farming systems. The agroecology movement, however, has been alternatively interpreted as a science, or a loosely codified set of practices depending on the region and political–economic context (Wezel et al. 2009; Ewert et al. 2023).

In India, agroecology-based practices have been advocated for a long time across various geographies by individual practitioners involving Sripad Dabholkar's 'Prayog Pariwar' (Maharashtra), Natural Farming methods practised by Bhaskar Save (Gujarat), Narayan Reddy (Karnataka) and G. Nammalvar (Tamil Nadu) for decades. It is only recently that movements like Zero-budget Natural Farming (ZBNF) have emerged as a

form of the large-scale mobilisation of farming communities (Flachs 2021; Khadse et al. 2018; Muenster 2018). This movement has also found sympathisers and supporters within the government, especially among those outside the departments traditionally responsible for agricultural research and extension (Fitzpatrick et al. 2022; Veluguri et al. 2021). These powerful supporters have in fact tried to scale ZBNF as a practice through alternative agencies of the state. Nevertheless, despite efforts to mainstream ZBNF within the research and education system through a new curriculum,[1] the overall ecosystem consisting of state and market support; land-based policies encouraging agrobiodiversity; and an evidence-based analysis of agroecological knowledge is still lacking.

Carlisle et al. (2019) points out that agroecological knowledge has often been developed beyond standardised "skilling regimes", such as the extension models used during Green Revolution discussed above. Given the highly contextual nature of agroecological practices, local farmer-to-farmer networks or NGO-led training opportunities have been most effective in sustaining alternate practices. Government agencies in India have started making attempts to create community institutions through initiatives like the Indo German Global Academy for Agroecology, Research and Learning (IGGAARL) in Pulivendula, Andhra Pradesh to allow for such learning.[2] But there is a risk that they might perpetuate similar biases that have led to the deskilling among farmers; therefore, it might be essential to foreground the aspirations of learners and create a mindset shift for the skills to be sustained and applied by farmers.

3. Role of Youth in Agri-Food System Transformations

In the Global South, development researchers have pointed out that youth might be the most crucial recipient of these skills because of the rising population of young people in these regions, increasing ecological and economic instability they are expected to face and their ability to acquire technological knowledge (Glover and Sumberg 2020). While young people engage with the food system in multiple ways, our focus is on the role of youth in agricultural production. The vulnerabilities of the youth in this sphere are aggravated by the perceptions about their position in the household and community hierarchy in agrarian societies (White 2012). These have resulted in a greater inclination of young people to exit farming. However, Glover and Sumberg (2020) conclude that despite recent attention on youth to enable transitions in food systems, intersecting identities of class, gender and social groups also determine the engagement of individuals with the transformational goals of sustainable food systems in significant ways. India has the largest population of youth, with a median age of 29 years, with only 5 percent of the rural youth engaged in agriculture (United Nations 2014). Research from India highlights that rural youth have different aspirations and cater to different social expectations than their older peers. And this determines their engagement with agricultural activities—"For those staying with or returning to agricultural livelihoods, therefore, especially young men, there is a need to improve the respectability of agricultural work through gaining and applying 'skills' seen as 'modern' and 'innovative', be they new agricultural practices, new varieties of crops, or other technologies" (Iyer and Rao 2022, p. 16). The agricultural experiences and aspirations of young women were different in terms of translating their skills to social mobility, as often their labour is rendered invisible. While these experiences cannot be generalised, they act as an indicator for the openness to new agricultural skills and engaging in agricultural livelihoods among Indian youth, including entrepreneurship.

The government-led agricultural establishment in the country has been cognizant of these aspirations and formulated schemes like Attracting and Retaining Youth in Agriculture (ARYA). The scheme uses the traditional extension institutions of Krishi Vigyan Kendras (KVKs) to enable rural youth to take up enterprises in the agricultural and allied sectors. The focus is not to create any significant paradigmatic change, but to simply change the position of the rural youth within the supply chain "Youth as farmer to youth as value-chain developer" (Paroda 2019, p. 154). This is supplemented by plans of providing sophisticated technical skills like ICT-based farming techniques to the youth (Singh et al. 2017).

This approach has two major drawbacks. Firstly, in the absence of the regular capacity building of scientists deployed and them being overburdened with administrative tasks, few KVKs are able to engage with local communities and enable them to transit towards sustainability (Balamatti 2022). Even the KVKs that have shown comparatively better results in promoting sustainable practices and in leading community initiatives on sustainable agriculture have limited capacity for community outreach.[3] Because of this lack of connect with the community, they fail to empower the rural youth to tackle the structural factors that lead to their alienation from agriculture. This disjuncture from the community also leads to a failure to promote other forms of social and environmental knowledge transmission, such as inter-generational learning, which is crucial for the sustenance of indigenous knowledge systems (Cassidy et al. 2019). Secondly, the underlying principles of programmes such as ARYA are derived from neo-liberal institutional logic. Therefore, the programme is only suitable for students who are willing to engage in the process of further commodifying the food system and using more advanced technical skills for marketing or high-value production. This can lead to further reducing the scope for experimentation, which is essential to continue the skilling process, and leads to the further individualisation of young people from agrarian communities.

Meek (2016, p. 287) encourages us to realise, from the history of an agroecological movement in Brazil, that "education is both an opportunity and a constraint towards the agroecological transition". He further highlights the cultural and historical traditions in which this is entrenched. Public, formal agricultural education institutions have been embedded in the production maximizing logic of the Green Revolution (K. Kumar 2015). The students of these institutions often have very little exposure to alternative paradigms. Agroecology, despite its significant scientific standing as a discipline and field of study, is conspicuous with its absence from Indian agricultural universities. Despite its widespread use by Civil Society Organisations (CSOs) and farmers' groups, a preliminary examination of 27 state university agricultural curriculums of a four-year Bachelor of Agriculture revealed that agroecology is not seen as a discipline or domain but treated as a geographical classification (agroecological zones) by the scientific establishment. There are low or no credits on organic farming in most schools and the exposure at best is theoretical with no practical engagement or experiential learning.[4] Increasingly, these institutions have also lost touch with field-level realities, particularly because of the decreasing proportion of students registered in undergraduate courses to those registered in post-graduate courses (Rao et al. 2000).

Knowledge on agroecology in India is thus largely situated outside formal agricultural science establishments who have historically been opposed to any investments, collaborations and innovations from outside formal research (Prasad et al. 2012). Given this lack of spaces for agroecological skilling within formal institutions for reasons explained above, the youth are left to look outside for opportunities in transitioning to a sustainable agri-food system. However, such spaces need to be actively designed and nurtured for them to have any significant impact (Chebrolu and Dutta 2021). In the following section, the case studies show the following: how does the reskilling of youth take place within a non-formal and a semi-academic institutional context? And how do such processes align with or reframe the aspirations of the participants?

4. Skilling beyond Conventional Education and Extension Institutions

4.1. Approach and Methods

This study was conceptualised as an exploratory exercise into possible ways in which alternative spaces for learning can be supported with the aim of sustaining an "ecologically skilled workforce" (Carlisle et al. 2019) in rural India. As part of an action research project trying to promote sustainable and equitable initiatives in the sphere of agriculture, the two case studies are a result of the authors' various engagements in the form of the field-based documentation of agroecological practices; understanding farmers' perspectives; and connecting with different stakeholders such as development professionals, government

officials, activists, educators and researchers in the agricultural sector.[5] The larger aim of this effort is to generate scope for further experimentation in the skilling of youth through experiential learning spaces. The information for these two projects was collected through methods appropriate for the specific contexts.

The first case study is based on observational and interview data collected during the fieldwork by one of the authors in Andhra Pradesh, India and subsequent online interviews with Natural Farming Fellows from April to May 2021, as the pandemic did not allow for repeated field visits and interactions. These data are supplemented with other data collected through reviewing official documents and other textual material related to the programme. The case documents the experience of 12 (7 male and 5 female) Natural Farming Fellows within the larger context of skilling. The participants for the study were chosen through snowballing, through initial support from the Andhra Pradesh Community-managed Natural Farming Programme, which is the implementing body for the fellowship.

The second case study is the documentation of a social-design-based experiment (Gutiérrez et al. 2020) that was implemented in the form of an internship. Based on the traditions of a social-design-based experiment. The authors have been working with students from different educational backgrounds to expose them to realities of the agricultural sector by partnering with multiple organisations, through the Verghese Kurien Rural Internship programme[6] since 2020. This is part of several activities that the authors have been engaged in to initiate transformational learning pathways in the agri-food system in India. The set of activities had been planned as the learning exercise, where transformative experiences from each round were embedded in the design of subsequent activities. The third round of the internship programme was carried out over a period of 2 months in 2022. The focus of this internship was on embedding principles of social transformation and transformative learning (Vasavi 2014) in the design. The first step in the design was identifying the historic and epistemic limitations of the present learning paradigms, from the perspective of rural youth. In our experiment, we tried to understand the opportunities and limitations provided with such a learning experience, through participant observation and unstructured interviews with the participants (individually or in groups) at various stages of the process. Given the limitations of the present learning paradigm, the design of this programme aimed to rethink learning agroecological skills in two ways:

(a) Understanding multiple realities of agroecology-based practices through exposure to the socio-economic dynamics in the operation of various stakeholders.
(b) Creating scope for immersive learning through engagement with various stakeholders such as farmers, civil society organisations and agroprocessing industries.

The learnings from this exercise were used to design activities that focus on rural youth, and transformational learning through writing and reflective activities later. The recruitment, design and implementation of this study were decided based on these assumptions, and are key elements of the intervention and are therefore described in Section 4.3.

4.2. Case 1: Natural Farming Fellowship Programme (NFF)

As a fallout of Green Revolution practices, agriculture in Andhra Pradesh has one of the highest per-capita consumptions of nitrogenous fertilisers and electricity. The increased dependency on external inputs has resulted in the state having one of the highest rates of indebtedness amongst farmers (Veluguri et al. 2019). The dire state of farmers had prompted several initiatives in the early 2000s such as the Non-Pesticidal Management (NPM) of crops and Community Managed Sustainable Agriculture (CMSA) designed under the Society for Elimination of Rural Poverty (SERP). These pre-existing efforts and networks paved the way for political and bureaucratic support for the state-supported implementation of community-managed Natural Farming (CNF) (Dorin 2022). This is a part of the Department of Rural Development in Andhra Pradesh, headed by Vijay Kumar (who is now spearheading the APCNF movement). The unique community-extension ecosystem (Sulaiman and Reddy 2014) that is neither a conventional public system nor private was created over the years. This system has played a crucial role in building grassroots capacities

and leadership to sustain and scale-out NF-based initiatives. Peer-to-peer learning through constant interaction with community resource persons and young agri-graduates placed on-field as Natural Farming Fellows has played a vital role in the outreach activities. Such social innovation interventions based on on-farm, with-farmers and by-farmers/scientists/policy makers offer design principles to think of scalable, sustainable transitions.

The Natural Farming Fellowship is a programme started by APCNF in the year 2017 to bring onboard young individuals and graduates (agriculture and horticulture specifically) into agroecological farming. The programme aims to introduce these young graduates to the whole ecosystem of Natural Farming and train them as leaders to help farmers transition from conventional farming to Natural Farming[7] through an intensive field-oriented exposure, and provisions for a modest stipend. In this study, we were particularly interested in the efforts undertaken to train young agri-graduates as NF fellows and wanted to understand their perspectives as part of the movement (Dutta and Prasad 2022). A brief description of the respondents is provided in Table 1.

Table 1. Description of the NFF respondents.

Name (Masked)	Age	Gender	Area Where They Did Their Fellowship
DVR	27	Male	West Godavari
LK	24	Male	Kurnool
PS	23	Female	Nellore
PC	26	Male	Kurnool
AS	26	Male	Kurnool
DPK	26	Male	Nellore
RMS	25	Female	West Godavari
SVP	26	Female	Visakhapatnam
KLM	23	Female	Kadappa
JGD	25	Male	Prakasam
BC	28	Male	Visakhapatnam

We found their involvement to be salient because most other initiatives operate outside the formal agricultural system, thus offering students with little opportunity for relevant exposure and means for learning and unlearning from the field. Since its inception, five batches of NFFs have participated in the programme. APCNF is trying to invite students from other disciplines such as botany, microbiology and agricultural engineering to nurture holistic development in the field of Natural Farming. This approach goes against the grain of conventional ideas in agricultural universities, wherein standardised experimental plots are used, and knowledge involves a unidirectional exercise of receiving information. The idea of active experimentation and dialogue with farmers was a novel experience for everyone. The extent of immersion is evident in the description provided by a core member (JG, programme manager) of the APCNF initiative,

> *"So, till now we have five batches of natural farming fellows . . . This has been a learning journey as with every batch we realised that immersion takes time, so they were not offered fellowship right away. You work for one season, become a role model farmer. Let the community give you a tag of natural farmer because if you don't do natural farming with the community, you are of no use. So, you have to practice one season to complete the induction and then you are offered the fellowship. This eventually became part of our extension process as farmers could relate to someone working alongside them in the same area. There is a different level of conviction people get when they see the fellows working with them".* (JG)

Some themes that emerged through the conversations are described below:

(a) Unlearning and experimentation

Students had limited or no exposure to the methods and materials used as part of the APCNF programme. Their undergraduate curricula mostly focussed on chemical farming

practices and their associated methods. As a result, despite being agri-graduates, students found the experience to be novel.

> *"In graduation, we learned only about chemical agriculture. In the fellowship, we learned about nature farming at the field level. I learned to conduct field experiments and do farming as well as develop technical and communication skills".* (PC) (Dutta and Prasad 2022, p. 1007)

The students also had to unlearn aspects of knowledge that went against their experience and practices as an NFF. The constructive epistemic tension generated critical reflections and appreciation for indigenous forms of farming knowledge in terms of alternatives to synthetic chemicals and fertilisers.

> *"during graduation, we did not have practical knowledge of our own field; most of it was textbook knowledge limited to classroom lectures. During the NF Fellowship, we practiced on our own field and that allowed us to develop practical skills".* (SVP) (ibid, p. 1007)

Since students had to demonstrate the viability of NF methods practically, the learning environment had real consequences for them in terms of impacts. The approach lent a dimension of responsibility and ownership that was mostly absent in their undergraduate experience.

> *"I learned so many things through the fellowship, like how to communicate with farmers . . . undergraduate experience mostly had only theoretical knowledge, but in our fellowship, we gained ground-level knowledge from farmers like how to reduce cost of cultivation, how to take preventive measures on our field, which type of botanical extracts can be used to particular pest or disease. . ."* (RMS)

(b) Perceived impact and sense of achievement

Students narrated their experiences of convincing local farmers to adapt to NF practices and felt a sense of achievement seeing their efforts recognised by the local community. It also motivated them to challenge difficult situations and innovate based on field experiences. Many of them also indicated taking up specialised projects on seed-saving, comparisons between NF and chemical methods and crop-cutting experiments.

> *"The work done by me has positively impacted many farmers in and around the village tremendously and my story was covered in Jai Kisan events (the video has been uploaded on YouTube)".* (RR)

> *"In my early stage of farming, I started with Pre-Monsoon Dry Sowing (An innovative method developed by another NF) . . . while other farmers used green manures, I used 10 types of plants as green manure and got an unexpectedly large yield of 35 bags. This drew the interest of nearby farmers, and they wanted to know more about PMDS. When I sold my produce higher than market value, my sale drew other farmers' interest towards NF. In the next season, I started developing desi varieties and sold the seeds to other farmers, proving that the capability and high nutrient values of desi varieties as compared to hybrid varieties. Many other farmers and teachers and students visited my field to observe the diversified cropping".* (SVP) (ibid, p. 1008)

(c) Building identities in alignment with the movement

The experience seemed to have encouraged the students to pursue jobs or enterprises that allow them to build on the skills and knowledge gathered during the fellowship. This appears to be a significant shift from the usual work trajectories pursued by agri-graduates. SR, another programme manager of the APCNF, explained the following:

> *"We realised that the agricultural education being taught at universities isn't helping graduates take up farming as an occupation. Most of them some bank as agricultural officers, specially boys find higher remuneration in marketing jobs and girls either do some clerical jobs in some firms or enter non-sector job entirely".* (ibid, p. 1009)

In contrast, the NF fellows voiced their aspirations to continue being involved in the farming sector,

> *"After the fellowship I want to become a well-known farmer in my own village, I want to start my own farming in my own field in my native village, and also become an entrepreneur by marketing natural farming products, by developing desi paddy varieties and also having own poultry and dairy".* (JGD) (ibid, p. 1008)

Many other NFFs mentioned that they wanted to continue their association with RySS as Natural Farming Associates and contribute to other activities in the organisation. Some of them have taken up to setting up small enterprises too.

(d) Self-efficacy and confidence in one's efforts

NFFs recounted their experience and challenges in the field, helping them feel more confident to cope with situations in the field and share their learnings with a wider audience.

> *"We learned new methods of farming like guli ragi, PMDS (Pre-Monsoon Dry Sowing) models, SRT (Suguna rice technology) model, etc.; it increased our confidence that we can independently start our career as farmer without depending on any other job. It increased our leadership qualities and we learned how to interact with community and also how to react with situations…"* (SVP)

Most of the NFFs come from modest socio-economic backgrounds and do not have much exposure to voicing their thoughts on public platforms. However, through interaction with peers and encouragement from the facilitators, many of them took to Twitter and FB to share their experiences and popularise their work through such expressions.

"We cover soil in #NaturalfarmingAP with locally available mulch or suitable mulch material to control ET(Evapotranspiration), to develop microbial activities & to control microclimate. @APZBNF @vijaythallam @FAO @ap_agriculture @ForMicroclimate @ICRAF @icarindia @nature_org" (tweet, @farmingfellows).

At the beginning of their fellowship, SR commented that most of the NFFs wanted an 'official ID' to 'authorise' them to work in the village; however, they were explicitly told that their only 'ID' would be the trust they could gain from local farmers through their work. So, the NFFs realised that their relationship with the farmers could not be based on top-down networks and instead they had to work with them to earn their trust. This approach was a stark contrast to the 'transfer of technology' methods used by officials from agricultural extension departments.

Based on the interviews and other data collected, it seems that the Natural Farming Fellowship is enabling the fellows to engage in transformative learning in three ways. Firstly, it provides a low-risk pathway to gain exposure regarding Natural Farming through the provision of the fellowship. The exposure attuned them to observe and engage with various interdependencies contributing to farm health such as the fertility of soil, presence of animals and insects as ecosystem indicators, plant growth and disease resistance, quality of seeds produced, etc.—all these being beyond the conventional parameters of the crop yield. Secondly, the fellows are supported through trainings and workshops and are encouraged to have peer interactions, thus contributing to a sense of community learning and identity. Thirdly, the design of the fellowship that hinges on them practicing Natural Farming on a plot of land and being able to sell their produce allows them to validate what they learn and innovate according to specific contexts. In other words, their learning becomes consequential in the immediate environment with channels for tangible feedback and community approval. The practicalities and context presented to the NFFs allowed them to explore issues routinely neglected within formal knowledge systems. More importantly, they could engage with farmers as peers and co-create valuable knowledge practices instead of enforcing top-down information. In contrast to the cut-and-dried information presented in formal institutions, the participation and emerging reflections of young agri-graduates as NFFs are a subversive and potentially transformative route to democratise the knowledge generation process.

4.3. Case 2: A Research Internship for Vocational Education Students

The Verghese Kurien Rural Internships were aimed at providing college youth with an opportunity to work with civil society organisations in the field of agriculture and were based on demands for interns of the CSOs.[8] Based on earlier experiences, the authors realised that well-aligned recruitment of the participants impacts the implementation of the internship, to obtain active participation through the project and for the students to be able to apply the learnings. Working with a group of youth who are motivated to explore agroecology, but had limited exposure to the larger system and stakeholders involved. The students of the Bachelor in Vocational Education (B.Voc) programme in Natural Farming at Lokbharti University were identified to fit perfectly, after a request that emerged through their participation at a national-level event held at the Institute of Rural Management, Anand and an initial visit to the university by one of the authors. The experiment can be classified into three overlapping phases as follows.

(a) Recruitment

Lokbharti Gramvidyapith is a private state university, started by Nanabhai Patel, a renowned Gandhian scholar and educator, in 1953 at Sanosara village in Gujarat. For Lokbharti, Gandhian "Basic Education" and Natural Farming was the combination, which allowed them to create a contextually relevant curriculum for the local youth. Since its inception, the institute has had an innovative way of looking at the curriculum through an experiential learning system, which is fully residential. They have become a major institution for Gandhian studies, as well as the professional training of Gram Sevaks (Village Workers) on local governance, animal husbandry, horticulture, etc. Their focus had largely been on creating socially appropriate extension methods like street plays. With the growing agroecological movement in India through veterans like Dabholkar and Subhash Palekar (Flachs 2021), Lokbharti was one of the first educational institutions to take up agroecology pro-actively since the 2000s.

The B.Voc programme was floated in 2019. Unlike other educational programmes that are designed by academics, this is designed by practitioners. It is a 3-year course where the focus of this course is on equipping students with hands-on skills instead of theoretical knowledge, as one of the teachers puts it, "while BSc students may not be able to distinguish between seeds, our students can, even if they do not know the scientific name".

We had an initial conversation (semi-structured FGD) with the first batch of students, which consisted of 20 male students, all coming from a rural or sub-urban background from various districts of Gujarat. It seemed clear that the students had diverse interests, which went beyond the vision of their faculty.[9] Similarly, the students were trying to explore how they were located within the knowledge economy, in terms of their ability to contribute and gain livelihoods. On the other hand, they were highly motivated and demonstrated a desire to contribute to the transformational process, in their community or beyond. They believed that the skills they were gaining are very helpful in community engagement. However, they also noted transformational processes required skills beyond the knowledge of agriculture and they were looking for alternative learning opportunities.

The conversation with the faculty reflected that, institutionally, they were looking to explore different forms of exposure for the students, and the provision was available through the mandatory internships, which was part of the course design. Followed by conversation with the students, broad themes for engagement with the students were identified. Six students volunteered based on their intentions of engaging with an academic institution for socio-economic research.

(b) Design and implementation

The fundamental principle in designing the internship involved trying to create a space for co-creation. From the very first interaction with the students as part of the internship, common goals relevant for the students as well as the research team were identified. The goals were refined, and activities were planned to meet these goals over the course of the internship. The major themes that emerged out of the conversation were

around "agri-business", "rural prosperity", "exposure to other regions outside Gujarat" and "exposure to diverse professions related to Natural Farming" as their expectations. The research team presented the need for field-level data on agroecological practices in Gujarat, and the need for a survey that can document such data.

A questionnaire that could capture multiple aspects relating to Natural Farming in the state of Gujarat was designed. Representatives from a network of Civil Society Organisations (CSOs), the local chapter of the National Coalition for Natural Farming (NCNF) involved in scaling agroecology in Gujarat, were the key stakeholders in hosting the interns in multiple locations across the state. The partnership with NCNF ensured that the students would obtain exposure to different CSOs and their project areas during the internship. It was decided that the students would be travelling to field locations of the CSOs, who would facilitate the survey. The locations for the study were chosen based on the familiarity of the area to ensure they can bring in the local nuances.

Although the first draft was designed by the research team, the questionnaire went through multiple rounds of testing and revision through the experiences of the students in the subsequent meetings from field sites. They were able to share their insights about which was the most relevant information that was required. In this, they were able to gain experience of social research data collection, while also receiving an immersive experience of interacting with farmers and agri-entrepreneurs from various regions and socio-economic backgrounds.

At the end of the piloting stage, a meeting was organised, which was attended by stakeholders from academia, activist groups and the NCNF partners. In this meeting, the students presented their experiences, and their understanding of the role played by different stakeholders like the CSOs and how they are allowing different groups social, economic and ecological barriers to achieve their aspirations. Based on the discussion, a new goal was added for the participants—they would have to write an essay on any particular experience they want to reflect upon.

After the implementation of the survey/immersion, one of the key processes initiated was that of knowledge sharing between the internship participants and other stakeholders, farmers and field staff of the CSOs. They were actively engaged in speaking about formal techniques of the preparation of fertilisers and inoculants at gatherings of farmers' groups, self-help group meetings, etc. Similarly, they had very limited experience of traditional practices in various regions involving mixed farmyard manure, and local plants for creating pesticides, given the regional focus of their institution, and their adherence to a specific school of agroecological knowledge. They were able to receive exposure to these practices through this exercise. They could reflect and discuss how small women farmers were able to use manure from small ruminants like goats, instead of larger cattle.

(c) Synthesis

The final learning and skilling goals of the project relied largely on their ability to synthesise the information and contextualise the findings within the larger agroecology initiatives in the state. The students had a wide exposure to issues of gender, nuances of Natural Farming, certification dynamics, etc., through the final synthesis workshop with multiple stakeholders, where the results were shared. The workshop also created a demand for robust information from the CSOs who wanted greater granularity on the gender dimension of agroecology captured.

The internship was concluded with two main steps. The first was a reflective session based on the learnings from the interviews they were conducting throughout this period. The interns were also encouraged to reflect on the overall research process and what information was getting left out and should be collected later. The interns highlighted that their exposures had given them newer perspectives on the practices that they had picked up in class and experimental fields.

The discussion brought out the idea of transformational learning when the interns explained how this internship allowed the participants to have a renewed perspective on their position in the agri-food system. The students in the earlier discussion had indicated

their inclination towards village-based enterprises that can lead to a greater prosperity of agrarian communities. Others had mentioned the importance of working close to the soil as farm managers. After the exposure, the interns said that while CSOs are doing interesting and important work, the response time for CSOs to farmers' needs is often slow, coming from agrarian communities themselves, and they should keep working at farms. While all of the six interns received offers from the CSOs they worked with to join them as field staff, they stated that these did not align with their aspirations.

In an earlier FGD with the larger student body, the students clearly mentioned that they wanted to become entrepreneurs and make a living out of their learnings on Natural Farming techniques. However, they were disappointed to see that, among the farmer entrepreneurs they met, very few were making a livelihood out of this alone. Regarding the idea of start-ups, which resonated with them quite strongly earlier, they realised that it was missing on the ground level. Instead, they received exposure to collective enterprises like Farmer Producer Companies and different forms of collective engagement like labour sharing arrangements among tribal women, youth discussion groups for education on natural resource management, etc. While they did not explicitly compare these with the start-ups of their imagination, these figured into their reflections and their essays. They realised that many of these enterprises cannot attain scale in their present form, and would require significant restructuring. They saw the success of individual value addition exercises that are based on the access to markets and individual networks.

These innovations also figured into their final planned activity, which was the essay. The students chose six stories of six stakeholders in their native Gujarati, where they pointed out why these stories were examples of successful agri-food system interventions in their view. They chose the story of an individual small farmer and a local innovator who was developing sustainable technologies like natural pesticides and pheromone traps. They also captured the story of a farmer entrepreneur who decided to process and make value-added products from their crops and with technical innovations on irrigation systems, innovative crop establishment methods, etc. These essays, written in Gujarati, were released during the synthesis workshop.[10]

The key shift in the internship process was to move away from higher educational institutions based in cities with well-structured processes for working with CSOs to institutions in rural areas that could enable rural youth with farming backgrounds to pick up newer skills in agroecology that would help them be a part of the larger agroecological movement in the state. Youth, especially rural youth, can become important stakeholders in knowledge generation processes even as they reskill themselves.

5. Sustainable Skills to Sustainable Livelihood

The demographic dividend in emerging economies such as India is under stress with significant youth unemployment (Sharma 2022) and livelihoods characterised as 'inadequate, insecure and indecent' (Mahajan 2020). Youth are reluctant to stay in agriculture even as the non-farm sector does not provide decent work. The anticipated shift towards more 'green jobs', post the COVID-19 pandemic, has not materialised. Just transitions need to emerge from the logic of unequal relations and not just out of fossil fuels (Velicu and Barca 2020). Given the interconnections between social and ecological justice, exploring green work and just transitions in the Global South requires newer ways of thinking and acting (Nagendra 2018).

Despite the existence of schemes to attract youth in rural areas in India, like ARYA, there has been insufficient attention paid to the nature of work that can balance the scientific curiosity of trained youngsters with the requirements of a distressed community seeking to transit towards sustainability. Agroecology and a transition to sustainable agriculture, we argue, provide interesting opportunities for reskilling in agriculture. However, enabling this requires investments that are currently limited due to institutional lock-ins in agriculture. The agricultural research establishment's response to agroecology has been lukewarm and ideas and innovation from outside its fold, either from civil society or from farmers, are

often not part of agrarian futures. Green investments are most effective in communities whose workers have the appropriate "green" skills (Chen et al. 2020) and, as demonstrated in the cases of Indian agriculture, can provide youth with these green skills.

The two cases highlight possibilities for reskilling to counter the deskilling processes faced by agrarian communities during the Green Revolution. Youth who had some form of formal training in agriculture were the focus of these interventions. Designing for green transitions needs to embed collective experimentation that allows for the active co-creation of the content and processes in alignment with the goals and aspirations of the participants. Alternate educational models where agroecology was promoted outside the agriculture educational and research establishment (McCune et al. 2017) showed greater acceptance at the regime level in formal educational systems, only when there was a reliable proof of concept available (Borsatto et al. 2022). The two interventions, although working within existing institutional structures, could be designed to operate beyond conventional academic institutions. The interventions also indicate the importance of context-specific and experiential learning. Both interventions are also in some way able to create an appreciation for location-based experimentation. This is essential for what Stone (2016, p. 6) describes as "environmental learning". These are important learning outcomes that need to be recorded for the planning and design of assessment frameworks that are already around. For example, the Agricultural Skill Council of India, the body that accredits the learning outcomes of the students of Lokbharti, can incorporate parameters dealing with "environmental learning", which is crucial for students to tackle the process of deskilling in the next generation of agricultural populations.

The translation of alternative skills to decent livelihoods in this transition is a complex process with causal pathways mediated by factors in the political economy. The fact that the interns in the second case were disappointed by the absence of modern start-ups in the agroecology movement is probably owing to the nature of the production subsidies in the sector, which renders agroecology-based food production more expensive, along with other complex sets of socio-economic factors that disincentivise sustainable production (Aryal et al. 2021). Data on organic production in India show that the land under organic production in India is dominated by certified organic products, which targets niche urban markets or exports, rather than group certification for domestic markets. Such businesses are not necessarily run by farmer entrepreneurs. Young farmers and/or entrepreneurs, who are at a generational disadvantage in terms of endowments, alongside other intersecting disadvantages of caste, class and gender, would require support to utilise their skills to meet these aspirations.

The NFFs, being part of a government programme, had a better support system. Yet even they complained about delays in payments and other problems, which make working with the government less attractive (Dutta and Prasad 2022). Increasingly, support can also be available from institutional intermediaries like farmer producer organisations (Groot-Kormelinck et al. 2022). Based on principles of collectivisation, they can help their members overcome some of their disadvantages through access to a larger pool of finances and better market access because of supply aggregation. On the other hand, such enterprises in India have lacked commitments towards sustainable agriculture. Young people skilled in sustainable agricultural practices can play a major role in rethinking the business model of these enterprises (Prasad et al. 2023). This offers an opportunity for engaging rural youth in more sustainable, green employment, while making inroads into agrarian production systems. Such initiatives are critical for countering the processes of 'individualisation' or 'dissonance'.

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Notes

1 See https://education.icar.gov.in/Files/CURRICULLA%20FOR%20NATURAL%20FARMING.pdf (accessed on 2 May 2023)—the draft Natural Farming curriculum that is being introduced by ICAR in India.

2 See https://www.newindianexpress.com/states/andhra-pradesh/2023/may/02/rythu-sadhikara-samstha-11000ryots-in-andhrato-be-trained-in-natural-farming-2571330.html (accessed on 2 May 2023).

3 In the case of the Gandhinagar KVK affiliated with Gujarat Vidyapeeth, a university in Ahmedabad, they have conducted significant work in promoting sustainable agriculture, going beyond their mandate. Their story has been documented in a blog by the authors—https://www.smallfarmincomes.in/post/kvks-enable-sustainable-transitions (accessed on 2 May 2023).

4 An unpublished study guided by the authors of a Verghese Kurien Rural Internship study in 2021. See https://www.smallfarmincomes.in/post/re-envisioning-agricultural-education-needs-more-than-a-new-syllabus (accessed on 20 July 2023).

5 The study is part of a larger action research project on "Living Farm Incomes: Civic Action, Equity and Sustainability" that looks at engaging educational institutions with ongoing alternatives to agriculture in India. More details on the work on managing sustainable transitions can be found at https://www.smallfarmincomes.in/blog/categories/managing-sustainable-transitions, and other pages on the website (accessed on 5 May 2023).

6 The internship programme with many of the design principles focussed on the involvement of youth from diverse backgrounds in the agri-food system in India. See https://www.smallfarmincomes.in/post/verghese-kurien-rural-internships-creating-pathways-for-empathy-and-empowerment (accessed on 5 May 2023).

7 Elements of the design draw from experiments in inducting young professionals in the National Rural Livelihood Mission. See https://rural.nic.in/sites/default/files/NRLM_Guidelines_English.pdf (accessed on 7 May 2023).

8 The conversations with the students were recorded as a blog. See https://www.smallfarmincomes.in/post/grounded-and-practical-an-alternative-vision-for-agri-education-at-lokbharti (accessed on 5 May 2023).

9 See https://www.smallfarmincomes.in/blog/categories/stories-from-our-interns for more details. (accessed on 5 May 2023).

10 One of their stories was captured as a blog in Gujarati See https://www.smallfarmincomes.in/post/story-of-nareshbhai-radadia-natural-farming-gujarat (accessed on 5 May 2023).

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