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Methodology for designing alternative ecosystem for restoring indigenous knowledge of smallholder communities in India

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Abstract

The Green Revolution led to the introduction of the modern high yielding varieties (HYVs) of seeds during the period 1960s-1970s. It also systematically replaced the approach of farmers collectively sharing and preserving indigenous best practices with transfer of knowledge regarding industrialised farming and increased productivity being routed through agricultural extension service agents. This “expert-driven” approach systemically created a dynamic that has led to the breakdown of social networks and community safety net structures that were earlier accessible to smallholders.

This ongoing research study presents a methodology for designing an alternative ecosystem for restoring indigenous knowledge of smallholders in India, through a bottom-up model of community-based solutions that will provide them with more equitable as well as sustainable agricultural outcomes (Titzer, 2017). To demonstrate the merit of transitioning to such an alternative agricultural ecosystem for restoring indigenous knowledge we performed a multiple case study analysis on existing IEK systems.

Systems thinking helped us gain a holistic understanding of the agricultural ecosystem in its current state, pinpoint the root causes of its dynamic behaviour and identify leveraging points in the system to make it more equitable for smallholders through the restoration of IEK.

Keywords

Indigenous Ecological Knowledge, Agricultural ecosystem, Green Revolution, Extension service agents, Smallholder communities, Equity, Collectivism, HYV seeds, Systems archetypes, Systems Thinking

Introduction

For centuries, India has been agrarian by economy, with a rich cultural heritage of preserving traditional farming practices, by passing it down through generations of farmers in different communities across the length and breadth of the country. According to Vedic literature, the agrarian economy got established c. 1000 – 600 BCE and was instrumental in shaping subsequent historical developments such as territorial state formation, development of trade & urbanisation, and the introduction of coinage. The Vedic literature during this period also refers to a variety of crops, *Yava* or *Barley* being one of the chief crops. Besides Barley, the texts refer to *Godhuma* or *Wheat* and *Vrihi* in the sense of rice has been used for the first time during this time period. There is also reference to *Shashthi*, denoting a variety of rice that used to ripen in 60 days. Highly conducive climatic as well as weather conditions such as the presence of fertile alluvial soil, abundant rainfall and moist weather contributed to the flourishing of rice production in the Gangetic valley. *Charred rice* has been found from The Painted Grey Ware culture (PGW) phase at Hastinapura to c.1100-800 B.C. (Reddy et al., n.d.)

South Asia in general was the place of origin for more than 100,000 folk landraces of the Indica group of rice, which were distributed in remote villages contributing to abundant genetic diversity. These

landraces had also imbibed various resistant attributes, as they coevolved with crop pathogens, pests and their predators over centuries. Traditionally, the diversity in culinary practices and gastronomic preferences in different food cultures in the region also influenced the “genotypic selection and breeding of rice varieties characterized by wide ranges of cooking time, grain elongation on cooking, stickiness, bran colour, aroma and taste.” (Deb, 2015)

Smallholder farming communities that worked together indulged in informal innovations and sharing of best practices with one another, collectively. This was the manner in which agricultural advancement took place in most developing countries. Until the advent of a formal market for seeds and agrochemicals, young generations of farmers inherited knowledge on diverse crop varieties and farming techniques from the elders and peers in their community. This empirical body of knowledge, gathered from local experiments, innovations and observations, was time tested and validated through experiences of farmers in multiple contexts, across generations. “This informal, oral transmission of information, often incorporating local innovations, defines the traditional nature of indigenous knowledge systems, which is contrary to the formal, technology-based, centralised knowledge systems of modern agriculture.” (Deb, 2015)



Figure 1. Examples of traditional farming practices in India

- Farmers in some parts of India follow the practice of growing *Lady's Finger*, indigenously known as *Okra* or *Bhindi* as a border crop around the Cotton fields. Okra belongs to the same botanical family as *Cotton*, yielding flowers that are also very similar. However, since the Okra flowers bloom much earlier than the Cotton crop, the pests gravitate towards it. (India, 2016)
- Also, to protect the germinating *paddy* seeds from ant predation and/or fungal infection, indigenous farmers spread charcoal powder on the sown seeds in the nursery. They also mix rice bubbles with the germinating seeds before sowing them, in order to protect them from termite attack. (Deb, 2015)

However, the adoption of the Green Revolution that led to the introduction of the modern high yielding varieties (HYVs) during the period 1960s-1970s, with the sole objective of enhancing grain yield marked the beginning of the decline of this astounding genetic diversity in South Asia. For instance: About 5000 rice varieties from the Northeast Indian States, popularly known as “Assam Collection”, and about 3500 varieties of the 5500 varieties recorded to have existed in West Bengal until the 1970s, were shipped to the International Rice Research Institute in the Philippines (IRRI) during this period. Nearly 7000 rice varieties that existed in Bangladesh, were replaced by HYVs, leaving barely about 400 varieties that have survived on marginal farms. In summary, “about 75% of crop genetic diversity of the world has been lost during the twentieth century, as farmers have abandoned their heirloom varieties for genetically uniform HYVs.” (Deb, 2015)

Also the approach to sharing and preserving indigenous best practices shifted progressively since the advent of the Green Revolution, where transfer of knowledge to farmers regarding industrialised farming and increased productivity began being routed through agricultural extension service agents. This

“expert-driven” approach systemically created a dynamic that has led to the breakdown of social networks and community safety net structures that were earlier accessible to smallholder farming communities. The inherent complexity of the extension service agent’s position is that although they are expected to help the farmer, they operate within the “industrial paradigm”, where the local knowledge embedded in the farming community is not leveraged into action, and is in fact on the verge of being lost completely.

This project took shape organically, from an earlier study conducted by us, for identifying leveraging points within the rice value chain to make it more equitable for smallholder farming communities in the state of Karnataka, India, in collaboration with a partner organisation. While conducting primary research for the study, we realised these communities had developed increased dependency on extension service agents to innovate, thereby losing their capacity to innovate individually as well as collectively.

As systems thinkers, the current state of the agricultural ecosystem piqued our interest, and we wanted to dig deeper to find out why the system is in its current condition and what are some drivers influencing the behaviour of this system.

We chose to study how the transition from farming communities working collectively and sharing informal innovations with one another to their increased dependency on extension service agents to innovate, affected indigenous ecological knowledge (IEK) as well as agro-ecological sustainability. For this an understanding of different elements of the agricultural system and how they are interconnected was inevitable. Also, as part of our ongoing research, we were particularly interested in identifying leveraging points within the rice value chain to make it more equitable for smallholder farming communities.

Interconnectedness between farmer collectivism, IEK & equity:

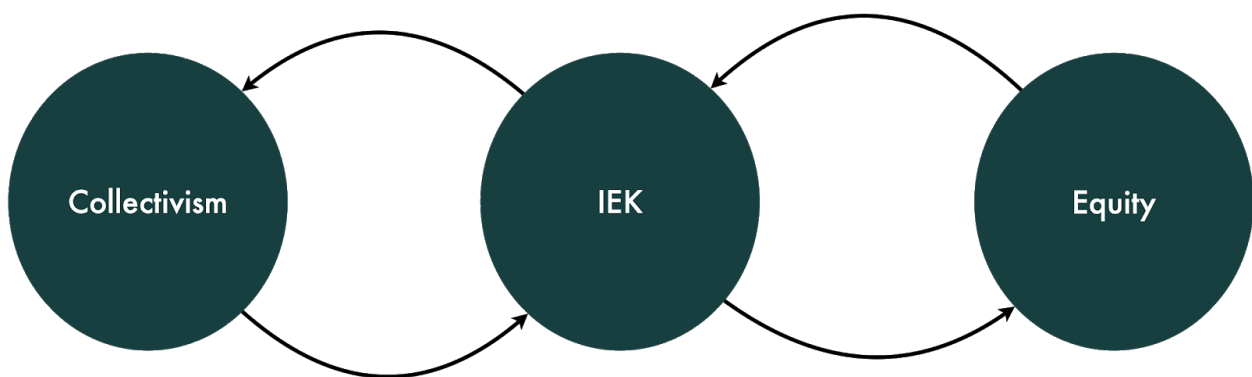


Figure 2. Interconnectedness between farmer collectivism, IEK & equity

It became evident from our literature review that the structure and process for knowledge transmission and innovation that existed before the advent of the Green Revolution was highly favourable for smallholder farming communities in that they worked as close knit collectives who had deep

understanding of both their agro-ecological context as well as knowledge of their heirloom seeds. As these farming communities started adopting HYV seeds and technology, they abandoned their traditional heirloom seeds in the desire for higher yields. However, it has become more and more evident during the Anthropocene that the modern varieties of seeds fail miserably in drought-prone areas, as well as deep-water lands that are accustomed to periodic flooding. When the smallholder

farming communities realise these conditions, they acknowledge that their traditional heirloom varieties of crops were acclimatised to their local climatic conditions and want to go back to their seeds. However, it is in vain since those heirloom seed varieties cannot remain viable beyond a stipulated time period. This is how thousands of varieties of indigenous landraces have been and continue to be lost. Thus we realised the interconnections between farmer collectivism that led to the preservation of their indigenous knowledge, which in turn was critical for ensuring equitable outcomes for them. (Deb, 2015)



Figure 3. Display of indigenous variety of seeds



Figure 4. Indigenous seed sorting for quality test

By establishing the interconnectedness between farmer collectivism, restoration of IEK and equity, we realised the need to envision an alternative agricultural ecosystem, using existing structures and processes optimally to create a repository of indigenous knowledge and best practices that have been tried and tested over time. To demonstrate the merit of transitioning to such an alternative agricultural ecosystem for restoring indigenous knowledge we studied current literature on topics related to Agroecology and IEK and performed a multiple case study analysis on previous IEK systems to understand the principal methods in their implementation, outcomes, opportunities and challenges that they present.

Through this paper we aim to present a methodology that will be useful for designers creating an agricultural ecosystem for reviewing restorative farming techniques and practices that have been

adopted across India, especially in priority areas such as access to seed banks, credit facilities, multi cropping techniques, farm to table practices, etc.

Research Objective

Through extensive secondary research, we learnt that the agricultural system had been focusing on delivering technological inputs to increase farm productivity, and over a period of time the entire state machinery in terms of policies, markets and institutions had gravitated towards incentivising farmers for adoption of these new technologies. Thus the general model has been that of continuous innovation in farm inputs, reduction in minimum support prices and externalising costs as much as possible. As a consequence, “about 90 percent of mainstream farmers have lost their entire traditional knowledge of agro-ecological sustainability.” (Abrol, 2020)

Timeline Mapping

Thus we dug deeper into the historical context of the Indian agriculture sector and plotted significant events that have shaped it, on a timeline map comprising four distinct eras:

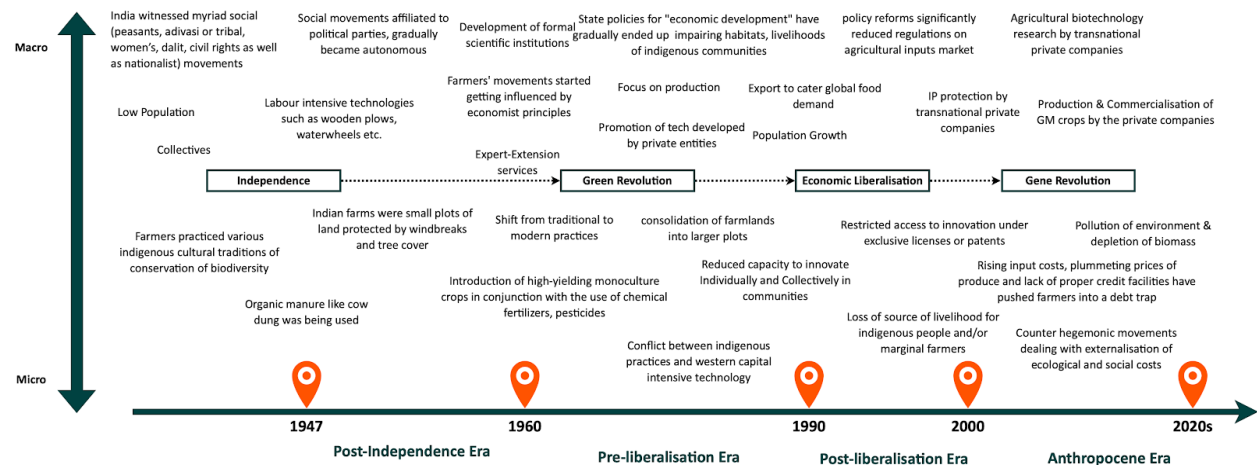


Figure 5. Timeline Mapping of significant events in India's agriculture sector

- **Post-independence era (1947-1960s)** - India witnessed myriad social (peasants, Adivasi or tribal, women's, Dalit, civil rights as well as nationalist) movements, which were initially affiliated to political parties, and have become autonomous initiatives over time. Farmers practiced various indigenous cultural traditions of conservation of biodiversity like seed conservation, multi-cropping, etc.
- **Pre-liberalisation era (1960s-1990)** - Farmers' movements started getting influenced by economist principles. Introduction of high-yielding monoculture crops in conjunction with the use of chemical fertilisers, pesticides and promotion of agri-tech developed by private entities.
- **Post-liberalisation era (1990-2000)** - Economic liberalisation reforms encouraged newer farm input technologies introduced through various market and institutional arrangements focused towards increasing farm level productivity. This eventually led to overall reduction in the minimum support price (MSP) and externalising of environmental costs.

- **Anthropocene (2000-Present)** - There is an overlap between the post-liberalisation era and the Anthropocene. Not only are marginal farmer communities continually faced with rising input costs, but they are also subject to asymmetric development, unsustainable use of natural resources and perennial poverty.

Having plotted significant events on the Timeline Map we got the insight that both the Green Revolution as well as Economic Liberalisation reforms have systematically reinforced the industrial paradigm over decades, largely influenced by the economic and political interests of a few privileged individuals, communities as well as organisations, who have gained access to resources such as large quantities of cultivable land, market linkages, favourable credit supply, etc., thereby creating and/or reinforcing structures that exploit the labour of the most vulnerable landless farmers within the agriculture system, and climate change has further exacerbated their woes.

5R Framework

We looked at the present condition of the whole system using the 5R framework developed by USAID (USAID, 2016), which is a framework used to identify key aspects of a system, in terms of understanding how it functions and identifying key leverage points for introducing change within the system, and got the following insights:

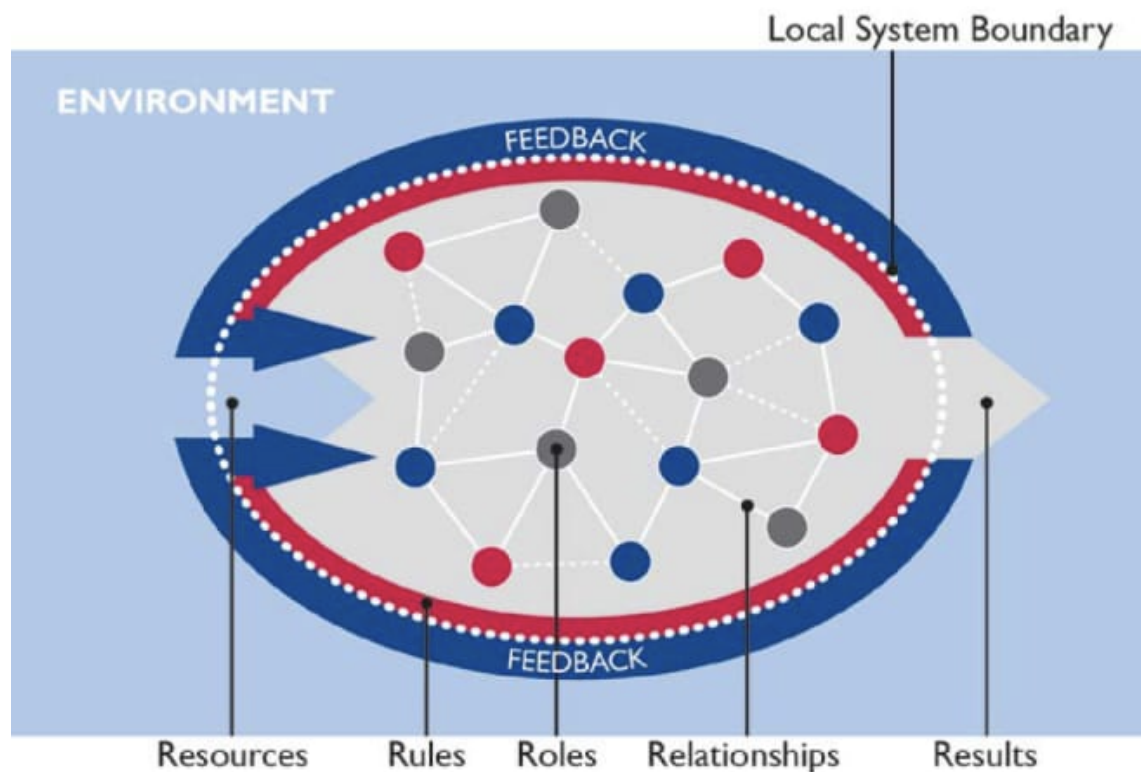


Figure 6. Source: USAID Learning Lab

- **Roles** - A farmer's role is confined to his/her field and the main role is cultivation of crops
- **Resources** - Farmers have very limited resources in terms of land holding, financial capital, technical know-how, institutional capacity, etc.

- **Rules** - The current agricultural system is predominantly governed by profit, not by sustainability and equity, thus creating centralised power dynamics that benefit a few powerful actors
- **Relationships** - Relationship asymmetries exist, wherein farmers don't have any decision making power; and the relationships among mid-level of value chain actors are strong. Existing power inequalities hinder the promotion of collective benefits
- **Results** - The system provides favourable economic results to the mid-level actors of the value chain and poor outcomes like poor fertility, food loss, high wastage, etc. for farmers. Also, the extent of poor outcomes is not adequately measurable due to lack of availability of data and transparency

To translate our insights from the 5R framework into the dynamic understanding of the system, we used causal loop diagrams (CLDs). From the CLDs also it emerged that the reinforcement of the industrial paradigm over decades, has led to the systematic breaking down of informal innovation and indigenous knowledge sharing amongst farmer communities. These vulnerable farmers have been exposed to the most inequitable and unjust consequences of socio-political transitions in the agricultural sector in India over a period of time.

Counter hegemonic social movement culture

However, it was also evident from our Timeline Map that India has also simultaneously been home to a vibrant civil society and myriad social (peasants, Adivasi or tribal, women's, Dalit, civil rights as well as nationalist) movements, since her independence in 1947.

These movements have more often than not been an attempt to reclaim agency and redefine political alternatives, newer forms of autonomous social movements, have emerged in the past three decades. They have formed networks of like-minded civil society groups and non-governmental organisations (NGOs) and tend to create political alternatives by sensitising different social groups over various issue based struggles. Besides these, there also exist peasant-based revolutionary organisations, which follow the Naxalbari path, of waging protracted militant struggles to end the oppression meted out by feudalistic landowners and moneylenders. They are nonconformists as far as the idea of building a social movement for the oppressed goes, based on 'economistic reductionism'.

Thus we see the hegemonic policies that have given rise to the industrial paradigm and its reinforcing structures and patterns on the one hand, and these counter hegemonic political programmes and strategies that have emerged out of the need to mend the rift between nature and society on the other. The following three systems archetypes depict the factors causing the dynamic behaviour of the system.

Systems Archetypes

1. Escalation

We see mutually threatening actions being taken by the private industries as well as the counter hegemonic social programmes, which gives rise to the escalation archetype. For example: While the private industries welcome the policy of buying agricultural produce directly from the farmers bypassing the Agricultural Produce Marketing Committee (APMC), the civil society organisations are protesting this move as it puts the poor and marginal farmers in a vulnerable position, given their inability to take legal recourse against private industries.

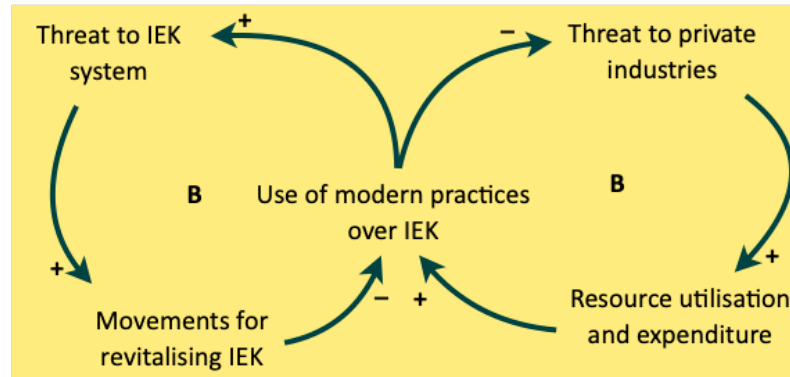


Figure 7. Escalation archetype

2. Success to the successful

Both the State machinery in terms of its institutions i.e. extension services, as well as the civil society organisations and NGOs are vying for the same finite resources to scale up operations, which gives rise to the Success to the successful archetype. However, the current policy environment is more favourable towards extension services to the detriment of civil society organisations and NGOs, which causes mutual tension and unrest.

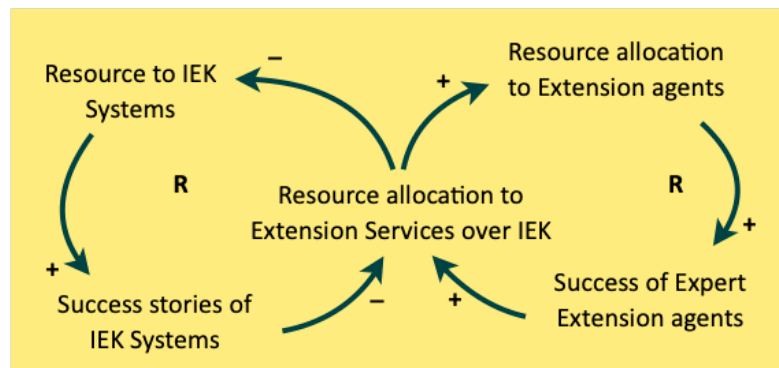


Figure 8. Success to the successful archetype

3. Growth and underinvestment

The higher yield of crops that farmers fetched for about two decades after the adoption of Green Revolution slowly and steadily started stagnating, as the HYV seeds fail to perform in drought prone and/or flood prone areas which are increasing, owing to climate change. However, due to existing institutional structures of fertiliser subsidies and extension services, farmers decided to discontinue their indigenous practices and heirloom seeds, and continued adopting these modern means leading to performance degradation and indebtedness eventually. This has also led to farmers losing their entire knowledge on indigenous restoration and many of them opting out of farming as a profession altogether. As the demand for agriculture as a profession is declining, the government perceives the sector unviable to invest in for more sustainable solutions. Thus we see the Growth and underinvestment archetype operating.

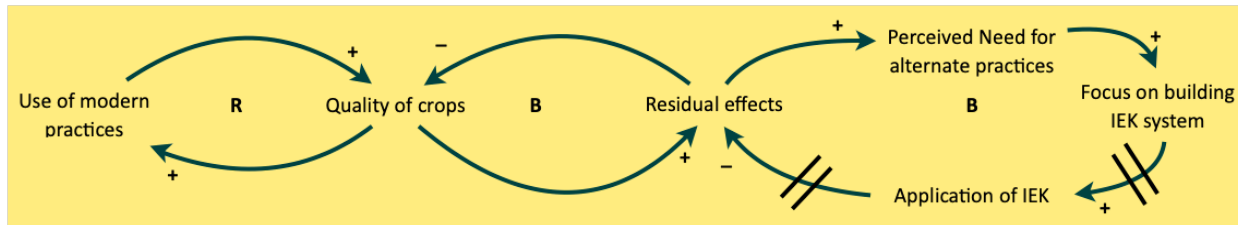


Figure 9. Growth and underinvestment archetype

Understanding the dynamic behaviour of the system through these three systems archetypes, gave us an insight that in order to intervene in this system and change it, we need a thorough understanding of existing approaches to preservation and restoration of IEK, and then evaluate how the existing institutional structures and processes can be used optimally to reimagine a bottom-up model of community-based solutions that will provide them with more equitable as well as sustainable agricultural outcomes.

Case studies' analysis

We conducted secondary research to learn about approaches that have been followed globally to ensure equity in the food supply system and came up with some basic parameters:

- Vertical as well as horizontal linkages across farmer communities & their potential to scale;
- Interventions that enable cultural knowledge transmission and climate adaptation;
- Securing indigenous knowledge as Intellectual Property
- Paying attention to power dynamics and intersectionality and
- Focus on farmer collectives' access to institutional support

Keeping the above mentioned criteria in mind, we shortlisted 6 case studies from the Indian context. We looked at implementation, outcomes, opportunities and challenges that each case study presented, especially looking at how their implementation led to certain outcomes, which contributed to the restoration of IEK. We identified certain commonalities in the implementation as well as the outcomes they generated, across the case studies, across different scales.

We reviewed case studies of IEK restoration in the Indian context, and have included in our analysis six organisations that have elucidated explicit approaches to IEK restoration in India for over three decades. We feel these case studies fit the bill from a systemic design perspective, since these organisations have attempted to understand the problem holistically and identified leverage points and designed interventions at all levels i.e. the Micro, Meso as well as Macro levels.



Figure 10. Analysis of case studies of IEK restoration in the Indian context

Case studies’ synthesis

Approach to IEK restoration	Scale of operations	IEK restoration elements addressed
Enabling cultural & contextual knowledge transmission	Local, Regional	<ul style="list-style-type: none"> P2P learning and prosumer creation Sharing of local communities’ voices and stories Intergenerational knowledge transfer Dissemination of traditional knowledge to wider audience
Securing indigenous knowledge as Intellectual Property	National	<ul style="list-style-type: none"> Knowledge protection mechanism
Establishing vertical as well as horizontal networks	Local, Regional & National	<ul style="list-style-type: none"> Citizen movements and resource mobilisation Capacity building for crop genetic diversity conservation

Focusing on power dynamics and intersectionality	Local	Mindset shift for valuing sustainability and equity
Enabling institutional support for collectives	Local, Regional & National	Raising collective consciousness on livelihood rights

Table 1. Synthesis of case studies' of IEK restoration

By synthesising approaches & elements for IEK restoration across different case studies, we gathered some critical aspects that systemic designers in this space need to bear in mind:

1. IEK is a complex body of knowledge in which empirical evidence is intrinsically linked to the cultural context comprising practices and belief systems. Also, this knowledge is situated in the social and political contexts of where it is created and removing IEK from its situated context can distort it.
2. IEK system comprises of multi scale as well as multiple level complexities; Focus should therefore be on understanding the interconnections between elements that are causing these complexities, rather than simplifying them.
3. Upholding in-situ restoration approaches and being conscious of the distribution of power and self-determination of knowledge holders is critical for IEK restoration.
4. Communities holding IEK systems are not homogenous in nature. Hence the restoration approaches need to be customised according to their needs, however there seems to be a felt need for building institutional capacities as well as monitoring the regulatory environment, across the board.

Based on these observations, we envision an alternative agricultural ecosystem framework to contain the following elements:

IEK Restoration Ecosystem Elements

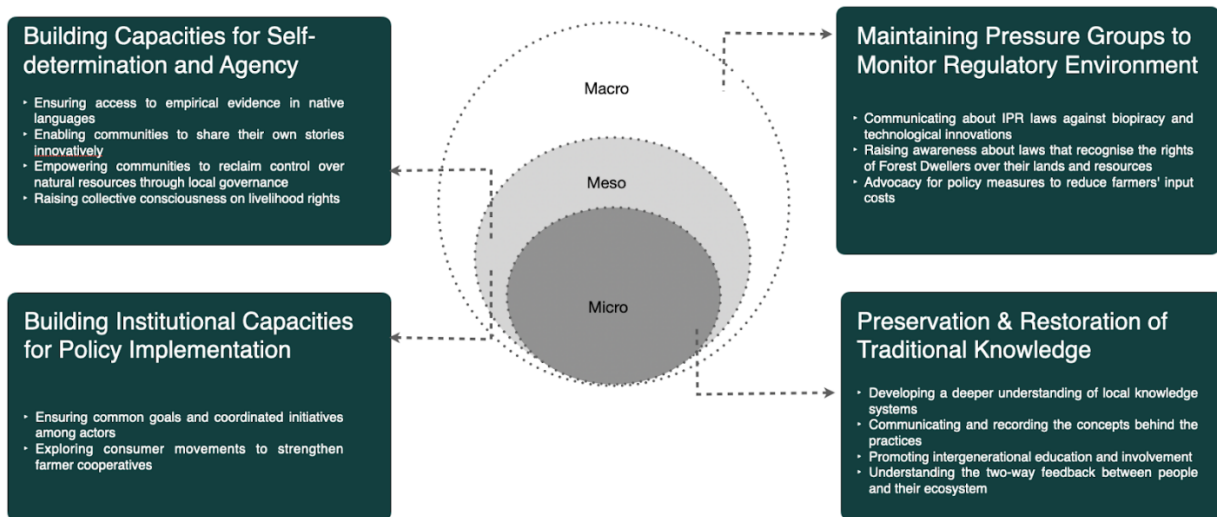


Figure 11. Elements for an alternative agricultural ecosystem

Conclusion

This is an initial attempt at presenting a methodology that can enable designers to create more holistic participatory design approaches, owing to a systemic understanding of the context of the smallholder farmer communities, in terms of caste and gender intersectionalities, economic status, etc., making the participatory design democratic and equitable in a true sense (Harrington et al., 2019). Applying this methodology to their design praxis can also provide a more sustainable way to transition towards a climate resilient agricultural economy. This paper presents a different perspective on looking at considerations for engaging in community-led participatory design engagements that provide answers to many complex issues within a system. Lastly, we look forward to co-developing the methodology for engaging in community-led participatory design based on this framework.

About the authors

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Appendix

Navdanya Trust

Approach	Element	Case study 1: Navdanya Trust
Enabling cultural & contextual knowledge transmission	Structure and processes for P2P learning and prosumer creation	<ul style="list-style-type: none"> Navdanya contributes to fair trade practices through marketing of organic agricultural produce directly from farmers to consumers through multiple outlets Organises Seed-to-Table program for building seed as well as food, sovereignty
	Structure and processes for dissemination of traditional knowledge to wider audience	<ul style="list-style-type: none"> Pioneering efforts in seed saving and extensive research on the hazards of chemical farming and the risk of genetic engineering
Establishing vertical as well as horizontal networks	Citizen movements and resource mobilisation	<p>Organises Bija Satyagraha which is:</p> <ul style="list-style-type: none"> <i>a grass-roots campaign on patent issues,</i> <i>an assertion of people's rights to biodiversity and</i> <i>a determination not to co-operate with IPR systems that make seed saving and seed exchange a crime</i> Farmers who are Navdanya members spread the movement in neighbouring villages through Bija Yatras
	Capacity building of farmer communities for crop genetic diversity conservation	<ul style="list-style-type: none"> Navdanya has successfully conserved over 3000 rice varieties, 75 wheat varieties, over a hundred millet varieties, pulses, oilseeds, vegetables multi-purpose as well as medicinal plant varieties Provides farmers training on conservation at its farm in Doon valley
Focusing on power dynamics and intersectionality	Mindset Shift for valuing sustainability and equity	<ul style="list-style-type: none"> Conducts program on sustainable living based on principles of Earth Democracy at Bija Vidyapeeth

Enabling institutional support for collectives	Raising collective consciousness on livelihood rights	<ul style="list-style-type: none"> Established community seed banks in partnership with several organisations in different ecozones of India Fair trade practices through marketing of organic agricultural produce directly from farmers to consumers through multiple outlets Established Mahila Ann Swarajs throughout India, as founding member of Diverse Women for Diversity (DWD), an ecofeminism based global movement. These are women led food processing groups that create food sovereignty by protecting livelihoods, and preserving culture, as well as women's knowledge and skills
Securing indigenous knowledge as Intellectual Property	Knowledge protection mechanism	<ul style="list-style-type: none"> Reclaiming the intellectual and biological commons by organizing Bija Panchayats, against the existing IPRs laws to articulate the peoples collective voice against the entire discussion on seed policy being influenced by profit motives of the corporate sector

Honey Bee Network

Approach	Element	Case study 2: Honey Bee Network
Enabling cultural & contextual knowledge transmission	Structure and processes for P2P learning and prosumer creation	Sattvik traditional food festival organised by Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI)
	Sharing of local communities' voices and stories	Programmes on national & international television channels as well as on radio The network's database is made available to inventors through their native language
	Intergenerational knowledge transfer	Biodiversity contests for young people and local recipe contests for women Installed computerised networked kiosks, Gyan Manthan Kendra
	Structure and processes for dissemination of traditional knowledge to wider audience	Database of over 50,000 innovations and traditional knowledge practices in several Indian languages The Honey Bee Newsletter, which includes information on inventions and discoveries, reaches people in over 75 countries Hosting seminars in partner universities for network members including farmers, scientists, researchers, etc.

Establishing vertical as well as horizontal networks	Citizen movements and resource mobilisation	Shodh Yatras to different parts of India to learn about their experimental techniques & innovative practices and document what is learned
Focusing on power dynamics and intersectionality	Mindset Shift for valuing sustainability and equity	Any income received by the network in the form of consultancy or award, some reasonable share of that income goes back to the inventor or source of that knowledge
Securing indigenous knowledge as Intellectual Property	Knowledge protection mechanism	Numerous grassroots inventions have been patented

Deccan Development Society

Approach	Element	Case study 3: Deccan Development Society (DDS)
Enabling cultural & contextual knowledge transmission	Structure and processes for P2P learning and prosumer creation	The sangham network has opened a Cafe Ethnic, an organic millet restaurant, in the town of Zaheerabad
	Sharing of local communities' voices and stories	DDS created an autonomous media, dalit women farmers trained in video production and formed a Community Media Trust (CMT). CMT has produced numerous short films on various agricultural and rural issues such as biodiversity, women and agriculture, GM crops, etc.
	Structure and processes for dissemination of traditional knowledge to wider audience	DSS commissions studies on the socio-ecological implications of ecological agriculture, adoption of GM crops, etc.
Establishing vertical as well as horizontal networks	Citizen movements and resource mobilisation	DDS is a member of several regional, national, and international network-based coalition movements DDS also works as the Regional Resource Agency, networking over 500 environmental and civil society organizations, for the government's Ministry of Environment and Forests
	Capacity building of farmer communities for crop genetic diversity conservation	Conservation of traditional varieties of seeds, during their month-long cultural campaign called the Mobile Biodiversity Festival
Focusing on power dynamics and intersectionality	Mindset Shift for valuing sustainability and equity	Deconstruction of the idea of millets as food consumed by 'lower' castes and bringing back the nutritious millet into urban people's diet

Enabling institutional support for collectives	Raising collective consciousness on livelihood rights	<p>DDS incentivises the production of traditional crops and eliminates middlemen in marketing and procures a fair price for the producers</p> <p>DDS established the Deccan Development Society Mutually Aided Credit Cooperative Society Ltd.</p>
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North East Network

Approach	Element	Case study 4: North East Network (NEN)
Enabling cultural & contextual knowledge transmission	Structure and processes for P2P learning and prosumer creation	Collective knowledge building – Agroecology Learning Circles (ALC), NEN Farm School
Enabling cultural & contextual knowledge transmission	Sharing of local communities' voices and stories	Biodiversity and food festivals, exchange learning programmes, community film screenings, exhibitions, trainings, networking, policy recommendations and advocacy efforts
Enabling cultural & contextual knowledge transmission	Intergenerational knowledge transfer	Nature Conservation Education programme of NEN facilitates intergenerational learning and reconnects young people with nature
Focusing on power dynamics and intersectionality	Mindset Shift for valuing sustainability and equity	Collective activism for stronger articulation of economic, social and cultural rights through Women Society, Women Farmers' Group engaging with women workers (agricultural producers, k, vendors, home based workers)
Enabling institutional support for collectives	Raising collective consciousness on livelihood rights	Community Seed Banks, Farmers' Market

Vrihi Seed Exchange Network

Approach	Element	Case study 5: Vrihi Seed Exchange Network
Enabling cultural & contextual knowledge transmission	Structure and processes for dissemination of traditional knowledge to wider audience	<p>Vrihi has a collection of over 900 distinct traditional rice varieties, largest in East India</p> <p>Serves as local Ex Situ seed bank for farmers</p>

Establishing vertical as well as horizontal networks	Capacity building of farmer communities for crop genetic diversity conservation	Vrihi has recovered and documented over 600 varieties of rice landraces that include flood-tolerant, drought-tolerant, salt-tolerant, as well as medicinal varieties of rice On farm research in agroecology and study of food web structural complexity and experiments with different cultivation systems like SRI, mulching, etc.
Securing indigenous knowledge as Intellectual Property	Knowledge protection mechanism	Vrihi has documented the characteristics of each variety of landrace following INGER guidelines

Vikalp Sangam

Approach	Element	Case study 6: Vikalp Sangam
Enabling cultural & contextual knowledge transmission	Structure and processes for dissemination of traditional knowledge to wider audience	Website based repository of alternative initiatives in the form of practical activities, policies, processes, technologies, and concepts/frameworks, etc. that can be proposed/propagated or practiced by communities, government, civil society organizations, individuals
Focusing on power dynamics and intersectionality	Mindset Shift for valuing sustainability and equity	Providing all possible support to existing efforts of the local communities to govern, sustainably manage, regenerate and conserve natural ecosystems, earmarked as Community Conserved Areas (CCAs)
Enabling institutional support for collectives	Raising collective consciousness on livelihood rights	Ensuring that institutions are supported to build capacity and generate resources, independence in planning, budgeting and handling of local funds, as provided for in the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA) and PESA, with social auditing and without any bureaucratic interference