Syracuse University

SURFACE

December 2017

Enacting "Technology" and Everything Else: Gendered Practices and the System of Crop Intensification

Natasha Susan Koshy
Syracuse University

Follow this and additional works at: https://surface.syr.edu/etd

Part of the Social and Behavioral Sciences Commons

Abstract

This dissertation is a qualitative examination of the functioning of a rural development project in a Himalayan region of India, with a special focus on a particular project activity centred around an agro-ecological method of crop production, the System of Crop Intensification (SCI). Environmental changes and disasters along with rapid transformations in the rural economy in Uttarakhand has engendered a renewed interest in non-mainstream farming practices. However, the success and/or failure rates of adoption of new agricultural methods and technologies remains a poorly understood phenomenon. Studies of adoption rates tend to focus on the aspects of the technology itself, rather than its social life.

Drawing from science, technology and society studies, agrarian studies, scholarship on rural livelihoods, political ecology, gender studies and practice theory, this research study examines how the discourse of SCI is articulated differently in different spaces, and the implications of these variations for extension and adoption practices. Beginning with the construction of knowledge at the institutional level, the

research study first traces who articulates what, and how and why this process takes

place, in both the national and regional contexts. Second, it examines how

contestations in discourse translate into mediated practices and outcomes. Finally, the

study focuses on the embodied identities of field development workers and the

inhibitory as well as emancipatory effects of the structuring elements of the

organisation. The study finds that SCI, and rural development projects more broadly,

are co-produced both discursively and in practice, by project planners, development

workers, and beneficiaries.

Enacting "Technology" and Everything Else: Gendered Practices and the System of Crop Intensification

By

Natasha Susan Koshy

B.A., University of Pune, Pune, 2007

M.A., Tata Institute of Social Sciences, Mumbai, 2009

Dissertation

Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in *Social Science*

Syracuse University

December 2017

Acknowledgements

It takes a not a village but a city of academic and other kinds of love to put together a dissertation. I take this opportunity to thank everyone who has made this journey possible.

Table of Contents

List of Figures

List of Tables

List of Acronyms

APL	Above Poverty Line
AWD	Alternate Wetting and Drying
BMP	Best Management Practice
BPL	Below Poverty Line
DRR	Directorate of Rice Research
CGIAR	Consultative Group on International Agricultural Research
CRRI	Central Rice Research Institute
DAT	Days After Transplanting
DSR	Direct Seeded Rice
EPA	Entry Point Activity
FAO	Food and Agriculture Organization
FIG	Farmer Interest Group
GBPUAT	Govind Ballabh Pant University of Agriculture and Technology
GDP	Gross Domestic Product
GM	Genetically Modified
GSS	Gram Swaraj Samiti

IARI	Indian Agricultural Research Institute
IFAD	International Fund for Agriculture and Development (IFAD)
IRMA	Institute of Rural Management Anand
IRRI	International Rice Research Institute
KVK	Krishi Vigyan Kendra
LDT	Livelihood Development Team
LPG	Liquefied Petroleum Gas
JICA	Japan International Cooperation Agency
MDF	Medium Dense Forest
MGNREGA	Mahatma Gandhi National Rural Employment Act
MoRD	Ministry of Rural Development
NAAS	National Academy of Agricultural Sciences
NARS	National Agricultural Research System
NCRB	National Crime Records Bureau
NCS	National Consortium on SRI

NF	Non Forest
PSI	People's Science Institute
PSM	People's Science Movement
RMP	Recommended Management Practice
RSS	Rashtriya Swayamsevak Sangh
SBI	State Bank of India
SCI	System of Crop Intensification
SRA	Système de Riziculture Améliorée
SRI	System of Rice Intensification
SRP	Standard Recommended Practice
STS	Science, Technology and Society
SWI	System of Wheat Intensification
TNAU	Tamil Nadu Agricultural University
UDP	Uttarakhand Development Project
UFRMP	Uttarakhand Forest Resource Management Project
	Uttarakhand Livelihoods Project

USAID	United States Agency for International Development (USAID)
VDF	Very Dense Forest
WTC	Water Technology Centre
XIMB	Xavier Institute of Management Bhubaneshwar
YSP	Yield Sub-Plot

Chapter One

Introduction

Magic amidst the Mainstream: The System of Rice Intensification

India's agricultural crisis has been a topic of conversation for decades, especially with climate change precipitating continuous weather disturbances in recent years, wreaking havoc on cropping cycles and consequently food production levels and farmer incomes. Discourses on agricultural technologies have however largely circled around the Green Revolution and genetically modified crops. Ecological agriculture, argued to be more environmentally sustainable, has remained on the sidelines, unable to compete with mainstream technologies on the yield horizon. In this dismal context, a relatively new technology (or method, as it is often described), the System of Rice Intensification (SRI) that impossibly mixes the demands of environmental stability with the preoccupation with yields, was potentially an exciting discovery.

SRI is commonly described as an agroecological method of crop production that paradoxically, offers "more (yields) with less (inputs)". Though SRI was "discovered" in the 1980s by a French Jesuit priest Henri de Laulanié in Madagascar, SRI made its entry onto the global stage three years after it came to the attention of Cornell University Professor Norman Uphoff in 1993. Uphoff has since pursued SRI with tremendous enthusiasm and is SRI's most committed and devoted emissary. In India, SRI was inroduced in 2002, after Uphoff convinced Dr. T.M. Thiyagarajan, a senior scientist at the

Tamil Nadu Agricultural University (TNAU), to attend the First International SRI Conference in Sanya, China. Thiyagarajan returned to India and conducted trials on the method. Since then, research on SRI in the Indian academy has been significant, even if limited to certain pockets.

With its promise of water and seed-saving practices accompanied by seemingly paradoxically with higher yields, SRI appears almost magical. What is even more interesting to those in the social sciences is the manner in which its practice has been articulated. The discourse on SRI diverges from the patterns established with respect to other agricultural technologies, and is sophisticated in terms of the literatures it is grounded in, and who does the grounding. One of the contributions of Uphoff, a Professor of Government and International Agriculture, has been to include social scientists in discussions of it. This has meant that SRI is not solely rooted in discourses of yield and cost-benefit ratios. One of the claims made of it is that it lends itself well to "interpretative flexibility" (Pinch and Bijker 1984, 409) - that is, it can be used in any way, and adapted to different contexts. Having derived from a non-traditional path of development - farmers largely - it is useful because farmers themselves have shown it to be so.

In the public domain, SRI commands near religious fervour from its advocates, though they tend to be a little more muted off the record. Its claims of increased yields have not found wide acceptance amongst more mainstream audiences, particularly agricultural research organisations - with some noteworthy exceptions. In the civil society space, SRI

has found enthusiastic takers. Its overlap with goals of sustainable and climate-smart agriculture, increased yields, organic practice, and benefits to women farmers have all resonated loudly. It is these aspects of its practice that drew me to it. I stayed because the surprises that my experiences with it threw at me.

This dissertation is an ethnographic study of the gendered, caste- and class-based manners in which this agroecological technology, the System of Rice Intensification (SRI), is articulated and practiced in different spaces across different temporal scales, whether in academic research, advocacy spaces, state policy, or a development project field site. I am particularly interested in the tensions that arise between discourse and practice, whether stemming from ideological considerations, material realities, or divergent imaginaries.

Initially, I examine the construction of knowledge related to SRI. I examine how the framing of SRI as a technology that lends itself to interpretative flexibility allows for it to be appropriated into various discourses by multiple actors with differing ideological, organisational and knowledge bases, at the national and regional level. In the second part, I focus on the implementation and practice of a specific NGO-run post disaster livelihood reconstruction project, the Uttarakhand Rural Livelihood Project (ULP) in Uttarakhand, India, paying special attention to SRI, as well as other allied project activities that articulated in unexpected ways with SRI. Finally, in the third section I focus on the frontline workers of the project, and how the specific individual and social contexts from which frontline workers hail intersect with development projects to give rise to gendered practices of emotional and physical labour.

This is not just a story of SRI though, but is also a story the things we do not usually think about when we think about what it takes to advocate for and implement an agricultural technology. These include mischievous monkeys, iron rods cannibalised from polytunnels, a footwear collection and much more.

SRI, Development and Everything Else

Though this project began as an interrogation into the practice of SRI, a few weeks at the site at which I conducted research - a river valley in the Bageshwar district of Uttarakhand - stripped me of my illusion that I would largely be spending time interviewing people about their experiences with the method, and wading around wet rice fields measuring plants and flicking off leeches. In my first week in the valley, while sowing wheat I met Bhavani Devi in whose field we dug furrows to grow wheat. I present a vignette here to indicate how understanding Bhavani Devi's experience with SRI and farming in general, must be juxtaposed with an understanding of who Bhavani Devi was, what she aspired to for her family, and the precarity of the bedrock on which they lay, and finally what the ULP offered as a development project aimed at helping stabilise livelihoods. My intention here is to offer the beginning of an argument about why a study of SRI should be grounded in a study of everything else as well.

Bhavani Devi lived in Maikili, farming the family land. She was the sixth person in the area in which this research project was located to adopt SRI with the wheat crop. I

remember sowing her field clearly, because her neighbour, also present in the field at the time, looked at those of us present with sheer disdain for practicing a method of cultivation that seemed a complete waste of time. Bhavani Devi worked with us patiently through the crop cycle, even though later in the season when her crop failed miserably, capitulating to rust, we had little respite to offer.

While Bhavani Devi is a farmer who takes great interest in the care of her crops, her family was not dependent on farming for their sustenance. Her husband Ramu Singh was a Block level employee of the Public Works Department, and was in charge of overseeing the laying of roads in the area between the Block headquarter (Kapkot, sixteen kilometres away) and the Parvati Valley. He was frequently seen during the day on his motorbike, zipping up and down the Parvati valley roads leading him to be named "bike walla" Ramu Singh. He lived in Kapkot, so that his daughter Neera could study in the school there, a vast improvement over the local school she would have had to attend otherwise. His unmarried brother, Jodh Singh helped Bhavani Devi with the household and farm work. The household functioned like a well-oiled machine. Ramu Singh often stopped by at home during the day to eat lunch, before heading back to Kapkot before Neera returned home from school. Neera was their only child, the fruit of Bhavani Devi's long and protracted fight against (unspecified) gynaecological issues. Though many would see this as a tragedy - especially since Neera is a girl - Bhavani Devi and Ramu Singh had made peace with this, and invested much of their time, energy and resources into ensuring Neera wanted for nothing. Prior to enrolling her in a school in Kapkot, they had

enrolled her in a school in Haldwani, leaving her in the care of relatives. Later they came to know that Neera was not being well cared for and was being asked to perform many household chores: a common complaint of parents who leave their children in the care of others. Neera also refused to live alone in a boarding school closer by in Almora, calling often to her mother. Kapkot was the next best option, given Ramu Singh's proximity to his workplace as well as their home. One day Jodh Singh unexpectedly suffered a heart attack while grazing cattle and passed away. Jodh Singh's premature and unfortunate death led to disarray in the household. Ramu Singh was forced to move back home to help his wife with the farm and household, and Neera moved back with him to be enrolled in the local school. When I met with them, Bhavani Devi and Ramu Singh were downcast, burdened with the twin tragedies they faced: Jodh Singh's untimely death as well as Neera's diminished future. What was most important was that Neera not be condemned to live the life that Bhavani Devi did, sowing wheat and rice as the seasons went by.

Bhavani Devi and Ramu Singh were Thakurs. Ramu Singh's job with the state allowed them a decent standard of living unencumbered by the marginalisation that persons with lower caste identities face. It also allowed them to consider enrolling their daughter in a private school far away from their village and at some personal expense. Jodh Singh's willingness to help around the farm and the house "like a woman" allowed for this pattern of social reproduction to continue, even as Bhavani Devi performed her "womanly" role alongside him. Though not having a son would be a tragedy for most families, Bhavani Devi and Ramu Singh came to accept their situation, and later spoke out

against the prioritisation of sons. On hearing that my parents had only two daughters, Bhavani Devi urged me to work hard and get a good job so that I could look after my parents when they got older. Education and a life outside the village was the future that she envisioned for her daughter. Though relatively well-off, Bhavani Devi was unhappy that her family has not been included in the list of beneficiaries for the ULP (apart from SRI).

Bhavani Devi and Ramu Singh's story indicates how individuals may embody contradictory subjectivities: wishing for a future for their children very removed from their own contexts, while wishing for benefits from NGO interventions that further root their selves in a farming system. Their identities - as a government service worker and associated family members - were located within a specific set of materialities that a government salary makes possible. These materialities were complicated by the mediating influence of space and state. The difficult terrain of the Central Himalayas - and Bageshwar district in particular - has along with a specific pattern of colonial development, reproduced a particular poorly-functioning state regime.

Their story also points towards an existence fraught with uncertainty; a misalignment in the machinery of home-making threw the whole system out of gear. Though Bhavani Devi identified as a farmer, a development project that promised higher productivity in crop outputs would not in any way diminish their troubles.

In the sections that follow I focus on the different themes that arise in Bhavani Devi's family's story that is characteristic of many stories I heard during my time in the valley, locating them within the context of a mountain agro-pastoral system that is in flux.

Identities, Subjectivities and Subjectification

Experience and knowledge are mediated by identity, making understanding it important (Alcoff 2006). We differentiate between men and women farmers, rural folk and city dwellers when we structure our assumptions and beliefs about the lives that they inhabit. How does a person residing in an area categorised as being rural come to embody in the public imagination a figure of smiling and/or withered face, "traditional" dress, perched on the edge of a field with a basket of produce? Why do farmers come to be thought of as poor/natural/woman/protector of nature? What is the political narrative mobilised around this category of person? Different identities – man/woman/farmer/labourer/citizen for example – are privileged at different points of time in different contexts, some more important than others. How do we interpret this selective privileging of certain identities? How "true" are these representations, and what are the histories that underlie them? What happens when rural-dwellers or farmers reject this identity or selectively engage with it?

Categories serve as useful markers when they do not lapse into essentialism. Identities then must be studied to allow space for the multitudes of variations that they encompass. Consequently, this project develops an understanding of the relationship between

identity, subjectivity and subjectification, because understanding how a development

project functions requires that we understand not only who its beneficiaries are, but also

who they are made out to be, and who they make development workers out to be. Here

identity links to subjectivity and the meaning-making processes people engage in when

confronted with an NGO that tells them who they are and what they should be doing

with themselves, their farm plots, their cows and their chickens.

Postmodernists are unenthused by the term identity's seemingly essentialist leanings.

They balk at ascribing ontological and epistemological relevance to it (Moya 2000). Given

the use of identity categories in emancipatory politics, though, it is not a conceptual tool

that is easily put away, and recent years have seen a renewed engagement with it.

A psycho-social approach to studying identity terms it a discursive phenomenon

established in "micro-political contexts" (Wetherell 1998), not limited to talk, but

encompassing "broader forms of intelligibility" that encapsulate value-making practices.

(Potter and Wetherell 1987, 403). These practices are constantly renewed, while also

defaulting to a pre-existing cultural repertoire. In a similar vein, ethnomethodological

takes on identity are predicated on conversational interactions between people (Garfinkel

1967). In both formulations, identity is a relational category and not fixed. Identity here

also maps significantly onto subjectivity and is hard to distinguish from it.

Post-positivist realists argue that identity is a theoretical claim that can both be

evaluated, and is epistemically significant (Moya 2000). Our identities indicate how we

see ourselves as well as how others see us. Our conceptualisations of ourselves are co-

produced with the structure of society, and are correlated with our social locations (race, class, gender, etc.). They are separate from, but also provide a link to our subjectivities. This formulation of identity makes space for the dynamic rather than essentialist constitution of the individual and intra-group heterogeneity.

Saurabh Dube's work (2017) on postcolonialism and identity approaches the question from a similar angle. He argues that identities are not mere categories of reference, but are products of "historical relationships of production and reproduction, appropriation and approbation, and power and difference" that shape perceptions, experiences and articulations (Dube 2017). Dube partially collapses identities and subjectivities together: identities portent "collective groups and particular personhoods" while also allowing for difference between them (Dube 2017). In this formulation of subjectivity, Dube leaves little room for agency. Judith Butler on the other hand, separates identity (social categories) from subjectivity (interiority), while also suggesting that identity-borne social interactions are constitutive of subjectivity (Butler 1997 cited in Alcoff 2006)[1]. If Louis Althusser drew our attention to the calling of subjects into being through interpellation, Judith Butler laid this being over a script of sociality (Chinn 2010). When we interact with each other, our selves are co-constituted. This *intersubjectivity* explains how selves are created dialogically (Brison 1997).

Though Ozkazanc-Pan and Calás (2015) suggest that such a formulation of subjectivity accords undue ontological status to place and negates the possibility of mobile

---

[1] The "psychic excess" that remains from the dissonance between identity and subjectivity is what allows for agency (Butler 1997).

subjectivities, this emplacing of subjectivity does not necessarily negate the specificities (and I would add concurrently, materialities) of the subject-space relationship. People may come to gain differential epistemic and experiential knowledge of the same space.

Returning to interpellation, I question how the fixation of ascribed identity constitutes a process of subjectification. There are two aspects of subjectification: the lens used to see, as well as what it is made to do. Critiques of "identitarian" analyses have been attentive to the role of location and sites in the process of subjectification (Williams 2005) and are especially useful in the analysis of development projects that are differently rooted in place and ideology.

The project of development requires a particular subjectivity, or a subjectivity that seemingly coheres with development as commonly understood in the current day context of neoliberal rationality: a project of self-help, entrepreneurship and empowerment. Without suggesting a deterministic, teleological reading of neoliberalism or its "hegemonic rationality" (Walkerdine and Bansel 2010, 493), I argue that the question of identity formation and subjectivity assumes a particular hue in the context of a neoliberal framework of governance that is emblematic and which holds sway today. Liz Bondi has benefitted us with a succinct explanation of neoliberal subjectivities: "As a form of governmentality, neoliberalism works by installing a concept of the human subject as an autonomous, individualised, self-directing agent . . . [i]n so far as this vision of the human subject is recognised and assimilated, people are recruited into neoliberal forms of governmentality" (Bondi 2005, 499).

The relationship of the self with the state and the market fosters a subjectivity that lends itself to co-optation by the discourse of neoliberalism: consumer, entrepreneur, seller. Of course, some subjects are able to function more autonomously than others. Choice is far more available to rich, upper-caste men than poor, lower caste women. Affirmative action in the form of reservation in government jobs has provided some members of the Scheduled Caste community alternatives other than farming. The rigidity of the now challenged caste structure remains, as upper castes converge to maintain ritual norms of purity and pollution, resentful of what they perceive to be unfair treatment. Subjectivity and subjectification are "simultaneously political, social and personal" and may be constituted "within and by the network of actors who are involved in the processes and practices through which these changes acquire meaning and are mobilised in action." (Walkerdine and Bansel 2010, 493).

Given the focus of this project on agriculture and development, I want to pay special attention to these questions in the context of those who cultivate crops and their interaction with different development agencies. With most of Uttarakhand's farming being performed by women, women become the unofficial de facto targets and by extension proponents of development work. Agricultural development projects tend to speak of the *kisan* (farmer), with a certain fixity in the imagination of this *kisan,* and an assumed ontological status of *kisan* being ascribed to residents of rural areas in India[2]. Hames-Garcia defines this kind of naturalisation of social identities as "domination"

---

[2] Vasavi and Vijayabaskar (2016) mince no words when they suggest that "The future of the nation's life lies in locating the position, presence, and representation of the *kisan* (farmer)".

(Hames-Garcia 2000). With farming practices in the past acquiring referential status with normative value, the practices of farming or farmers also acquire particular idealised ascribed identities that come up against the negotiated ones of the present day. Which is how certain kinds of discourse come to label farmers who do not subscribe to the practices that attend to these subjectifictions as "lazy".

The question of how the user-subject is constructed in the minds of the framers of technology becomes relevant in an analysis of technology representation and dissemination. A frame may prove unsuccessful if it is based on a universal model of the receiver of knowledge as an autonomous being. Moore borrows from Scott (1985) to describe the assumption of people acting as sovereign selves as being an "artifact of Western theory" (Moore 1998, 350). The belief that actors will choose those outcomes that are best suited to their interests – including that of preserving the environment (Vayda and Walters, 1999; Broad and Cavanagh, 1993) will not always prove true. Informed understandings of the presumably varied characterisations of the beneficiaries can successfully inform intellectuals' selection of technologies to disseminate, as well as the manner of representation and dissemination, allowing for a heterogeneity in representation politics (Epstein, 2003) and practice.

Going forward I pay attention to these questions: how do different actors - whether policy makers, academics, civil society or NGO workers - categorise and interpret farmers/beneficiaries? What are the assumptions that underlie project planning and advocacy? Planners draw from particular narratives based on their understandings of

farmer subjectivities. And what of the subjectivities of farmers themselves? How do these subjectifications and subjectivities index each other? Farmer-beneficiaries may accept the interpellation of them as such, but resist its seemingly totalitarian fixation of identity[3]. Rather than being forced to assume an identity with all its attendant baggage of subjectification as Butler suggests, people may creatively appropriate it to embody meaningful selves (Zea (1992) cited in Alcoff (2000)) or may use it in the form of strategic essentialism to further their own goals. Farmers may also work with particular imaginaries of planners, drawing on their own sets of assumptions and interactions with different agencies to draw the lines of interaction, knowledge and experience.

Also, much of the work on agricultural development has remained focused on the farmer, and what she does. In this project I expand the scope of analysis to encompass both the farmer and the emissary of development - development workers. Of particular importance is how development workers come to embody specific identities and practices. My aim is to interrogate intersubjectivity and intersubjectification in this context as an on-going, embodied process rooted in a specific locale with specific practices, discourses and consequently outcomes.

---

[3] Attendant is the question of the techno-regimes that are invoked in contexts of particular forms of farmer subjectification. Conventional farming calls for farmers to be rational, and concerned with productivity increases. Agroecological methods are ostensibly more focussed on questions of sustainability. Where both regimes converge is the determinacy they ascribe to what I would argue is an indeterminate term, that of farmer and the necessity of perpetuating its tenure.

Modernity, Rural Aspirations and New Ruralities[4]

Over a thousand villages in Uttarakhand have been termed 'ghost villages' with all their residents having abandoned them in search of work elsewhere as the spectre of unemployment grows. And yet, Uttarakhand also faces the contradictory phenomenon of high levels of in-migration of similarly classed migrants who fill the vacuum of labour shortage on certain labour-based works. This somewhat perplexing situation indicates a migration paradox: *pahadi* labour migrates out while non-*pahadi* labour migrates in, hinting at the drawing of identity-based and invisible boundaries across the physical landscape. Ubiquitous in the local labour markets, the terms *Bihari and Nepali* (migrants) in Uttarakhand conjure up images of low-skilled, low-class workers. While the classed and sometimes caste-based nature of work engaged in (hard, manual labour) appears to be an immediate explanation, this does not bear out under scrutiny. Individuals and households often proactively engage in state-sanctioned village-level works that require difficult manual labour and are not qualitatively different from the labour involved in working on nearby hydroelectric projects or on the construction of public roads immediately adjacent to and servicing the same villages. What seemingly "legitimises" the former kinds of labour is that these works are conducted within the spatial boundaries of the village.

In one case that I studied, residents performed manual labour for a project for a temple housing a local deity despite wages in the project being lower than in migrant-dominated

---

[4] Richa Kumar (personal communication) and the proceedings of the Conference 2014 of the Network of Rural and Agrarian Studies (NRAS) first drew my attention to some of the themes articulated here

works performed on the boundaries of the village. On the other hand, many pahadis may remain unemployed or migrate to neighbouring cities and even states to work as kitchen labour in small, roadside eateries for low wages (ranging between Rs. 4000 – Rs. 8000 per month), bypassing such employment opportunities. Like the Biharis and Nepalis, they are also "footloose labour" (Breman, 2007), as equally susceptible to precarity (Standing, 2011; Munck, 2013) as in-migrants, bearing the same burdens of difficult lives away from home. Certain avenues of work and spaces remain curiously bypassed, a phenomenon seemingly linked to certain processes of what Seamon (2014) calls "emplacement".

Exiting agriculture to transition into an urban economy is not necessarily beneficial to farmers. A surplus of labour in the market restricts the number of better paying occupations that out-migrants can access (Li 2009). The precarity of urban labour workers has been brought into sharp relief in the current context of demonetisation that is undoing the rural economy. But perhaps most important is the differential status afforded to different kinds of work within rural spaces deriving from the continuous production of the gendered, classed and caste-based pahadi identity that circumscribes whether and what kinds of labour may be engaged in, and where.

The selective fusing of power and privilege borne of class and caste with neoliberal subjectivities and their attendant bases of individualism and alleged freedom has given rise to what Sanjay Joshi in a different context termed fractured modernity (Joshi 2002). This modernity has not displaced the linked regimes of gender, caste and class that inscribe particular identities and subjectivities on people. It has, however, given it a

different form[5]. As scholars have suggested, migrant remittances are changing the rural landscape and contributing to the deagrarianisation of the rural economy (Rigg and Nattapoolwatt 2001; Bryceson 1997, 1996).

The literature on deagrarianisation has already compellingly made clear poor smallholder's growing disenchantment with agricultural occupations (Gupta 2005) and their desires to escape from the seemingly unprofitable (Li 2009; Rigg 2006; Bryceson 2000) and un*modern* life that farming offers them. Those with other options leave, even if the other forms of employment are less than ideal. Not all find ways out. Many find their attempts thwarted, because the same processes that allow the better off (whether in terms of wealth or other social identities like caste) to prosper, discriminate against those that are not (Li 2009). Rural affluence is usually made possible by the capture of urban market opportunities by certain caste groups who extrapolate their political power and privilege (Vasavi and Vijayabaskar 2016)[6]. But not all higher caste groups are able to access urban or other kinds of employment opportunities, fomenting distress and anger.

This was seen most clearly in the violent protests that took place in the period between 2015 and 2016, led by members of well-off castes traditionally described as

---

[5] Modernity is refashioning gendered ideologies, while also opening up some spaces of resistance. While male migration has increased the burden of farming on the women left behind, when migration has allowed for better educational opportunities for children, it has cracked open a doorway of opportunity for women. In better off households that are invested in the "progress" of young children, mothers (though occasionally grandparents) will move to nearby towns or cities to enable their children's acquiring a better education than that available in local schools. Though children's education is ostensibly the motivator of such mobility, women are also increasingly coming to see children's education as a way out of the drudgery that village-based life entails for a woman. In this gendered subject formation of women who live in cities for their children's education, familial obligations rest alongside individual preferences and choices, challenging family structures and norms.
[6] Li (2009) draws from Green and Hulme (2005) to point out, "Poverty, in a capitalist system, is not a static condition defined by lack of assets – it is continuously produced" (Li 2009, 634).

agriculturists: the Jat protests in Haryana, the Patidars in Gujarat and the Marathas in Maharashtra. Statistics released by the National Crime Records Bureau (NCRB)'s annual report, "Crime in India" indicated that "agrarian rioting"[7] had increased by 327 percent in 2015, though this was heavily biased towards states like Bihar, Uttar Pradesh, Jharkhand and Gujarat (Kapoor 2016). While all the overt reasons for protest were not explicitly linked to agriculture, many suggested that the protests reflect a disenchantment deriving from an inability to access educational and occupational opportunities that a generalised crisis in agriculture as well as a growing neoliberal, modern subjectivity has led them to demand.

This sense of deprivation, and of having been cheated is linked to (Kumaoni) people's imaginaries of what they would like their lives to be. These ideas come up against the lives that development projects set out for them, forcing them into two complementary yet distinct identities: of residents of rural areas who may farm, and of an outward-oriented citizenry.

Just as economic remittances influence production and consumption patterns, so do "social remittances" that may not only further entrench a desire for modernisation within the rural economy, but also an aspiration to live within the spaces that modernity inhabits (2006). The consequent interpenetration of rural and urban spheres has changed the way in which both men and women in Uttarakhand continuously re-imagine their roles and aspirations in agrarian society. For many Kumaoni youth, farming is an

---

[7] What constitutes an "agrarian riot" is admittedly not clear, and as Srivastava (in Kapoor 2016) suggests, the causes of such a phenomenon need to be disaggregated.

occupation pursued by those who have no other options. Many look to the plains and the promises it seems to hold. These dreams are held by parents of youth as well, especially those from more privileged households who look to education as a way out. I asked Paruli Devi, a middle-aged Thakur woman from one of the better-off households in the village what had convinced her to send her daughter to live and study in the district headquarters, given the common disdain for unmarried women living away from their natal homes. She responded:

> At home it is not possible to study. There is a lot of work, day and night. The right atmosphere is also not there during the day. We thought let's see what happens by sending her to do regular[8]. She will see society too. How do they live outside. How do they go. These are pahadi children. They never go outside from here. Even by reaching Bageshwar she will learn how to walk, how to talk, how to sit, how to eat. Wherever they go, our children don't know how to eat, how they eat in hotels. They don't know how to eat. Which spoon to use, how to hold the fork. Is that not true? At least they will get some idea. They will learn good things too. Now it depends on the child too. Some children will learn bad things too. Depending on the environment they are in. Let's see what happens. (Interview with author. Transcript. Bhadkot, July 30, 2015.)

Paruli Devi's "Let's see what happens" was shot through with hope and expectation, both of which are extended to the development initiatives that find their way to this valley.

Rigg (2001) perhaps a little controversially points out that we may need to separate what we think is best for agriculture from what we think is best for the rural population. But we also need to separate out what we think best for rural populations from what they think best for themselves.

---

[8] As opposed to a long-distance correspondence course.

Farming and farming initiatives gain meaning in development practice through collective subjective processes of meaning making about farming and development, and the intersubjective play of ascribed identities and practices. Stacy Leigh Pigg describes development as "an ideological encounter in which universalist notions of progress and modernity meet locally grounded social visions" (Pigg 1992, 46). The development apparatus is a desiring machine comprising diverse and potentially contradictory desires: of development providers and beneficiaries. As noted previously, in the dominant development narrative, villagers are primarily thought of as being farmers, good or otherwise, with other occupations and identities discursively holding secondary status – even though "villagers... live in a space that is shot through with modern narratives" (Pigg 1996, 180). On the other hand, a desire for "middle-class" consumption hinging on individual and family mobility (see Kumar 2016; Osella and Osella 2000) is shaping the emergence of new family forms and new subjectivities, with mobility being the new instrument of self-formation.

Farmers may consequently make choices that contradict goals articulated by social movements and non-profit organisations about social and ecological justice. A nationwide survey of 0.286 million persons carried out in 2003 found that 40 percent of them wanted to quit farming (NSSO 2005). Another survey pegged this figure at 76 percent (CSDS 2015). Most of these farmers were resource-poor smallholders.

New ruralities pose significant challenges for the development paradigm and planners. Projects are designed for the rural spaces and rural farmers, usually thought of as being uneducated and lacking in worldly knowledge. But many Kumaonis would only

partially recognise themselves in these characterisations. Scholars of agriculture and livelihoods in villages or areas not classified as urban are increasingly being confronted with the question: what do we mean by rural[9]? How is the term operationalised and to what effect? What is its normative value? Assuming that rurality is not a static concept[10], there is an increasing need to challenge and re-theorise the idea of the rural, even as new forms of rurality burgeon in the country[11]. Gupta (2005) points out that the changing agrarian landscape within the rural requires that we adopt a new analytic.

With the idea of the rural itself being deeply enmeshed in the idea of the village, the coherence or the analytical value of the concept of the village needs historical (re)examination. The production of knowledge through particular categories of thinking and representation, specifically "the village" and "rural" has been characterised as strategic and imbricated in the practice of colonial power, or the "epistemological violence of the British rule (Dirks in his foreword to Cohn 1997: ix-xii). Cohn is incisive in his critique of this practice, denouncing it as colonial "investigative modalities" (Cohn 1996, 5). For the Indian nationalist movement as well, the village was the site that represented the hope and promise of a revitalised India, built on the premise of traditional-development. We have to look no further than Gandhi for an exposition of the self-reliant Indian village, as well as a characterisation of villagers as being unencumbered by intelligence (Gandhi 1962 cited in Wadley 2008). This power was not only practiced by colonial authorities or

---

[9] Scholars of the urban pose similar questions about urban spaces.

[10] Many agree that the urban-rural gradation is shrinking however (Kumar 2015), and a substantial majority of the labour force in India straddle both sides.

[11] In a different vein, consider Li Tana's (1996) findings in Hanoi, Vietnam, where rural migrants suggested that rural spaces are not urbanising, but rather Hanoi is ruralising.

the later nationalist government, but also by sociologists and social anthropologists who were (unwittingly) complicit in the reproduction of these representations (Thakur 2014; Jodhka 2015)[12].

With the rise of "peasant societies" in scholarship, peasants were represented in the literature as traditional, in-ward looking folks, attached to their land and livestock (Jodhka 2015). The poor in general were argued to reproduce their marginalisation through a "culture of poverty" (Lewis 1966, 19). At the same time, the idea of the self-sufficient Indian village, inhabited by farmers or peasants, was fetishized, and the virtues of village life extolled (Dumont 1970). People who lived in the village (farmers) were both romanticised and pitied, though their own subjectivities were denied (Wadley 2008). It was only later in the works on the Hindu woman by scholars such as Gloria Goodwin Raheja and Ann Grodzins Gold (1994), Doranne Jacobson and Susan Wadley (1977) amongst others did residents of rural spaces come to inhabit voices in the scholarly imagination (Wadley 1995)[13].

The term village functioned in much the same way that the term villager or native did[14]; conceptually static, even if factually dynamic (Thakur 2014). Niranjana (1991, 377) traces the intellectual history of the term as employed within academic discourse to highlight its persistent grounding in locale:

---

[12] Baden-Powell's (1908) work on village communities in India was seminal in its descriptions of the origins of, and the cataloguing of different kinds of villages (though it has since been critiqued for its Orientalist overtones (Breman 1997)).

[13] I draw from Wadley's (2008) analysis of this scholarly trajectory in this analysis.

[14] See Akhil Gupta's discussion of the "spatial incarceration of the native" (Gupta 1998, 176).

It must be re-emphasised that the 'village' is not just a domain of study, but also the outcome of sociological discourse. This recognition demands an examination of the village as a discursive space which constitutes the meeting ground of political/administrative strategies, while serving to contest several socio-cultural representations of Indian society. Most studies of the village community have adhered to the norms of scientific discourse in sociology, that is, the fact of the existence of the social world has not been queried. Even those who claim that the village in itself is not as important as the processes, for which the village is a site, assume the objective status of the village.

Not all subscribed to this view. As early as 1957, Dumont and Pocock denied the idea of a village as locality (Dumont and Pocock 1957). In 1988, Jan Breman's *The Shattered Image* refocused attention on the manner in which the idea of village India had been constructed to represent a static, homogenous system and subsequently deconstructed to reveal its inherently dynamic, linked nature. Mobility, he argued, was "an essential part of the rural system under the *ancien régime* in which the village, as a social formation, played a subordinate role only" (Breman 1988, 27).

More recent writing on the topic, while urging for a return to a focus on the village[15] (defined variously as a "structure of feeling" (Mines and Yazgi 2010, 11) and also as simply as an administrative unit (Shah 2002)), has however been more alive to the juxtapositions of the rural with the urban, while differing on the extents to which both bleed into each other (Gold 2017)[16].

The research presented here examines the contours of one specific development project, from inception to implementation, while considering its own conceptualisation

---

[15] A literature that was deemed passé by many after the 1970s (see M. F. Patel, cited by Mines and Yazgi (2010, xii)).
[16] Ann Gold for example cites Heitzman (2008) to demonstrate how marketing regimes and administrative structures necessarily link both spaces.

of the village and rural spaces and the promises it is holding out to participants. It pays special attention to the question of the role of a development project in a space that does not entirely conform to models of rural change, as well of the kinds of occupations and livelihoods and development that it privileges.

Knowledge, Practice and Knowledge Practices in Agriculture and Development

The role of agricultural technology in India must be located within the context of India's broader trajectory - and fetish - with science and technology in general. The Nehruvian focus on big science and technology in the making of modern India aside (Raina 2012), later years have seen a more textured interaction of various actors with science and technology. In the realm of civil society and technology, the discourse of the 1990s combined NGO expertise with a healthy focus on science and technology, exemplified by the work of Anil Gupta (Phillip 2008). A slightly different formulation of the focus on science for development was found in the People's Science Movement (PSM), most notably in the work of the Kerala Sastra Sahitya Parishad. Many of the PSMs were driven not just by "higher order intellectuals" but also by the rural intelligentsia who Kannan (1990) terms "organic intellectuals" following the work of Antonio Gramsci (Gramsci 1971). What characterises PSM work is the infusing of science in social activism, and a commitment to the unity (and not compartmentalisation) of knowledge. PSMs put science and technology squarely on the NGO agenda.

Agriculture occupied a different discursive space, though it overlapped with the science and technology discourse with the onset of the Green Revolution. Food security itself was placed prominently on the development agenda based on early debates within policy circles about which issue was politically expedient to highlight rather than on an evidence and knowledge-base[17]. As mentioned previously, agriculture came to be associated with the rural, and eventually came to occupy a fixed location in the register of science and technology. Though sections of civil society came to privilege alternative forms of agriculture (traditional/sustainable), chemical farming remained the preoccupation of the state. In such a context, what space can SCI occupy? To delve into this question requires a short tour of how technologies such as SCI - that can inhabit the space of both modern and traditional agriculture - are made and practiced in different spheres[18]. The history of the mainstreaming of composting provides some clues.

The practice of composting was introduced to a Western audience through the work of Albert Howard, who conducted field trials in Indore, India (Lies, et al. 2016). Howard drew inspiration for these trials from peasant practices in the areas in which he worked, thereby challenging the existing orders of chemical-based agriculture as well as scientific practice (Jamison and Perkins 2010). After an intervening period that spanned decades, organic farming - in which composting was later located as prescribed practice - finally achieved some kind of acceptability, as a result of sections of organic farming advocates

---

[17] See Esha Shah's (2009) contribution towards understanding knowledge and society debates in India.
[18] Technology in the SRI formulation is not anti-modern or anti-traditional. It lends itself to both narratives.

co-opting science as it is commonly understood into the mix (Lies, et al. 2016). The (practice of) compost(ing) functioned as a "boundary object", lending itself to both the traditional and scientific realms (Gieryn 1999, 235). This example belies common patterns in boundary work conducted by experts on the space inhabitable by themselves and laypeople (Gieryn 1999). It is this bridging of science with what was previously considered non-science that has occupied scholars of science and knowledge production.

Does the epistemic location of knowledge matter more than the professional legitimisation of its perceived source (Desai 2006)? The identity of the expert - and by extension, the non-expert - creates a framework within which the value of knowledge is perceived. Scientists and higher officials seen to hail from outside an area may enjoy a legitimacy not available to non-scientists and locally born individuals. The agricultural extension worker may be differentiated along the lines of who she is associated with. The government extension worker occupies the position of an official of sorts, but is seen as much lower in the knowledge hierarchy than trainers and scientists in an agricultural extension department. She may also be perceived to be a local but an authority when in the field (Desai 2006). Extension workers from non-governmental spaces might enjoy less legitimacy on account of their not being attached to a government body and also hailing from the area. Knowledge is wielded by these sources who function as elites, interpreting local realities to fit global science (Desai 2006). The directionality of the knowledge process indicates the degree to which co-production takes place.

There is also the question of practice, and who may practice science and how[19]. Though from different theoretical traditions, Karin Knorr-Cetina (1999) and Stefan Timmerman (2006) both operate within the idiom of co-production, and have drawn our attention to the practice of science outside the laboratory. Both emphasise the extra-science nature of science production - enabling organisations and social interactions to be taken seriously in the analysis. Knowledge production is not just a product of internal scientific processes, but is a very human, and, as Pierre Bourdieu has demonstrated, an embodied one (Bourdieu 1988). Bourdieu's work has significantly drawn attention to "fields" or the contexts within which knowledge is produced and practiced. Bourdieu's formulation of fields has been interpreted with a certain amount of coherence that many have remained unconvinced by (Benzecry and Krause 2010).

In this dissertation, I draw from the practice turn in STS, which has expanded the framework of knowledge production to interrogate the practices that are undertaken in knowledge production. Instead of taking SRI as a given, or solely constituted by discourse, a practice approach would trace how SRI comes to take the form that it does.

To extend the framework of knowledge practice, agricultural methods like SRI are created *in practice*. They come into existence at the point at which a farmer picks up a hoe and begins to make furrows in the soil. Speaking of them without accounting for the very embodied manner in which they are enacted is to miss out on their very essence. The act of practice actualises possibilities of the various ways in which a method take

---

[19] These questions have been particularly attended to by scholars interested in the sociology of knowledge.

form. At the same time, variations in the practice of the method may not be accounted for by standard measurement practices that create particular forms of knowledge by privileging homogeneity and standardisation. In addition, the privileging of practice over cognitive processes necessitates a reconfiguration of what we mean by knowledge. Knowledge becomes a collective entity, grounded by the materiality of the contexts in which it finds itself (Schatzki 2001).

Though I will focus on how knowledge about SCI came to occupy a particular form and shape in later chapters, here I want to tease out these nuances of the embodied, inter-subjective processes of knowledge production and practice through an analysis of how "knowledge" about the beneficiary population covered by the ULP was created and put into practice. Given that the funds available to the project did not allow for universal coverage, the project team had to identify those beneficiaries most in need of help. It did so through the use of a household survey and a Participatory Rural Analysis (PRA) exercise in each village that, amongst other things, was the basis for the creation of an Above Poverty Line (APL) and Below Poverty Line (BPL) list. The APL and BPL lists were efforts to recognise class and account for differences. Inaccuracies borne of negotiations at PRA meetings and misrepresentations by residents of their own financial status contributed towards a very contentious atmosphere in which benefits were assigned. Efforts were made to correct lists and cross-verify them once the project had begun and LDTs had become somewhat familiar with local residents, but inaccuracies remained. Unwittingly, the project may have created new divides within a community already divided along caste and class lines.

Brokering became an inevitable consequence of this sometimes artificial class division, with those in the APL category showing their "support" to try and corner benefits. APL category members often signed up to participate in the village committees instituted by the NGO. Contradictorily, many BPL households who received benefits were not represented at meetings. This anomaly was not easily explained; and staff members, some of whose families belonged to those BPL households, suggested that APL households were far more interested in participating in project activities. Deeply frustrated about having to engineer attendance at meetings when many attendees had been left out of beneficiary lists, Sneha's staff worker Govind articulated his frustration and helplessness:

> But if there are no directions from above about this, in this situation the LDT[20] will work according to his own mind. He has to live in that village, do work in that village. Raise the members. Get them to come to meetings. So he will give them poultry coops and polytunnels, whether there are orders from above or not. Think about Mohan. He is retired, he has everything. If you call him he gathers everyone, makes them sit for the meeting. Then how will we not team up with him? LDTs have to make their way. See in Chohar: Vimla Devi and the teacher are the President and Vice President. Lower in the village Sikri, Paruli Devi is the President. She is APL. In Pashin Kavita Devi Ramesh Takuli. APL. Bhavan Singh APL. Bhadkot Raju Singh APL. Here Harsh Panda, APL. Jeevan Singh was APL. So why are these people joining if they are not getting anything? These people must have started out thinking that they will get something. They've made a scheme for the village. Filled forms in each house. If the staff had known the objective (of the project) in the beginning, they would've filled the forms accordingly. They were just told to fill the forms. Not what was planned for the area. No training for the LDT, nothing. Radha and Priya did not know what was to be done. Or Rekha. These girls went to each house and asked, what will you do, will you raise chickens? Will you raise fish? Or do ironmongery? These kinds of questions they asked... In three years you've added so many things, dogs, cats. When the quarterly report comes there are 24 slides. There are 24 kinds of works going on. Two or three workers are doing all this... we

---

[20] Livelihood Development Team member.

didn't think about people's needs, we threw things at them[21]." (Interview with author. Transcript. Bangaon, June 20, 2016.)

Govind's frustration stemmed from the constant play of interpersonal conflict that arose between him and project beneficiaries and amongst themselves. Not surprisingly, the categorisation of households into APL and BPL was a source of contention, aided by perceived favouritism. For their part, field staff knew that beneficiaries who cooperated had to be "raised" to ensure that future works would be taken up. How the project was implemented rode on the manner in which knowledge about its beneficiaries was created - and who it excluded.

Given the predominance of Thakurs in the area - with the exception of the Brahmin dominated hamlet of Bangaon - excising the effect of caste identity on project functioning is a difficult task[22]. Caste also interacts in complex ways with economic status. In Bhadkot, two households were reported to belong to the Scheduled Caste community. One household faced economic deprivation. The breadwinner in the second household had secured a government position in the district headquarters and was better off financially. Both faced social marginalisation that is pervasive irrespective of economic status: they cannot enter temples, cannot eat with higher castes nor share food cooked by their own hands, cannot intermarry with higher castes[23]. Nevertheless, the upward

---

[21] I pointed out that PRAs had been conducted in all the villages, which should have accounted for people's needs. He responded, "But in the PRA there is no polytunnel. In the PRA they found out how far is the health centre, panchayat ghar, road from the village. it was that kind of PRA."

[22] Though I have indicated how caste privilege is slowly consolidated in my discussion of horticultural production in Chapter Six.

[23] The strict enforcement of caste-based marriage norms co-exist alongside a weakening in patriarchal control over the selection of marriage partners. It is becoming increasingly common for men and women to identify their own marriage partners. Given the preponderance of the Thakur caste in the area, "love marriages" are largely restricted to this caste. Bangaon, home to the Brahmins, is the sole Brahmin village in the vicinity, making love marriages amongst Brahmins an improbability.

mobility that reservation policies have made possible for a few is a source of great consternation for those belonging to the general castes, who believe that they are being unfairly left behind.

Adopting a wealth ranking to determine access to benefits includes those of lower socio-economic status amongst the lower castes into the scope of the project, but fails to challenge caste hierarchy. The acute absence of a caste-oriented lens in the project plan and in its implementation meant that benefits provided to marginalised castes were accidental. There is a large set of literature on the emancipatory role that economic advancement purports to offer castes that are discriminated against. Economic development does not necessarily challenge patterns, and caste blindness only reifies them. The two Scheduled Caste households in Bhadkot were located on a different hillside than the main village and its neighbouring hamlet. In addition to the two Scheduled Caste households, three Thakur households also inhabited the area[24]. Parkatiya, as the area is known, lacks proper access to drinking water. Irrigation is a scant possibility. An irrigation tank has been built in the main Bhadkot village and is likely to contribute positively towards increasing yields. For the households in Parkatiya, no such possibility exists, making horticultural production for sale a currently unviable proposition.

---

[24] I was unable to conclusively ascertain why these households were located where they were, and not in the main village. The story goes that the forefathers of the SC families migrated to the area, and were given land by some of the Thakur households out of generosity. Given how pervasive caste distinction is even today, it is likely that ritual norms of purity and pollution undergirded this generosity. This does leave unexplained why the other three households chose to settle there.

A failure to explicitly account for caste configurations was also demonstrated in Sikri, where staff realised belatedly and to their consternation that the irrigation tank that was installed was likely to benefit a certain caste since the homes and fields of other castes were located away from the ambit of the pipeline attached to the tank. Insufficient funds meant that the pipeline could not be extended to include other areas. While the castes in question were all Thakur, this is an example of how categories and identities can in unexpected ways become magnified (as we will see is the case with women practicing SWI)[25].

The juxtaposition of individual beneficiary lists - created as they were, at PRA meetings - alongside community-based groups indicates a polyvalence in strategy. The individualization of benefits and the individualisation of the effort and responsibility to ensure a household's economic development is seemingly in line with a neoliberal strategy of governance which individualizes problems and their solutions. A failure to capitalise on benefits provided at the individual (household) level is viewed as an unwillingness to work hard and lift oneself up. This is not to devalue the role of ecologically sustainable agricultural technologies, poultry rearing and the like, but to situate them as project activities that turn on particular kinds of subjectifications and knowledge of intended beneficiaries.

---

[25] A perpetual challenge in the Parvati project area is the reproduction of caste by the women project staff, one of whom is not averse to consuming food prepared in a Scheduled Caste household in general, but all of whom are reluctant to consume this food in the project area for fear of inviting censure. Though the men staff were staunchly against this practice, they were unable to move the women to defy these norms. In only situation did caste unintentionally favour households listed as belonging to the Scheduled Castes.

Methods

I came to the System of Crop Intensification (SCI) quite accidentally. I became curious about it when I came across a poster describing it when I was in an NGO field office in Chattisgarh on a rural immersion visit for my first job at the Office of the Commissioners for the Right to Food. Over time I grew intrigued by the dynamics of this seemingly revolutionary turn in agricultural technology that held much promise, having taken classes on agriculture and development during my Masters programme, and seeing little hope for the future of agrarian India then. Convinced that SCI checked the right boxes for the future of farming, I sought and received summer funding[26] in the first year of my doctoral programme at Syracuse University to conduct preliminary research in India on SCI. The weeks I spent speaking with different people and observing SCI fields dampened some of my enthusiasm for the method, even as I grew more curious about how different people's perceptions of the method were. When writing up my dissertation proposal however, I found that much of the research I came cross seemed very rooted in particular disciplinary biases - even within the agricultural sciences not surprisingly - and very production centric. Social science research on the topic was also very Science Technology and Society (STS) oriented. It raised important questions and was and is excellent, but did not sufficiently attend to the specifics of class, caste, gender, subjectivity and the

---

[26] From the Bharati Memorial Grant.

environment. I positioned my research to make a small contribution to fill in this gap, following these themes to see how the discourse of SCI was articulated and practiced in different spaces.

SCI or SRI as it is more commonly known is a method of crop cultivation that comprises a "menu" (Glover, 2011) of techniques that includes early and immediate transplantation of seedlings, wide spacing of single seedlings transplanted in squares, early and frequent weeding and the addition of (largely organic) nutrients to the soil. The result is argued to be more tillers per plant, stronger roots, and higher quality grain in comparison with produce from conventional farming methods. Some suggest that SRI is unique because it lends itself well to interpretative flexibility. SRI is believed by its advocates to be particularly useful for resource poor farmers, and farmers in areas with limited access to water.

Not convinced that SCI was quite as protean as it is made out to be, and also curious about where and why the discourse solidifies and where it is more fluid, I finally decided to study how the discourse of SCI is articulated differently at multiple levels and consequently maps differently onto different and uneven geographies. To shape my question, I drew from science technology and society studies, political ecology, agrarian studies, practice theory and feminist studies. To shape my methods, I turned to ethnography.

To address my first set of questions pertaining to discourse, I drew up a list of the most prominent names in SCI advocacy or research in India, and set out to interview them.

These were largely members of the National Consortium on SRI (NCS), and included agricultural research scientists, academics, and members of non-governmental organisations (from Orissa, Himachal Pradesh and Bihar), some of whom were themselves conducting research on SCI in India. I spoke with scientists not actively associated with the NCS from across India, including at the Tamil Nadu Agricultural University (TNAU), the Central Rice Research Institute (CRRI), the Directorate of Rice Research (DRR), the Water Technology Centre (WTC), Indian Agricultural Research Institute (IARI), G.B. Pant University (GBPUAT) and the International Rice Research Institute (IRRI). I also spoke with representatives of the National Bank for Agriculture and Rural Development (NABARD) who work on SCI.

To address my second set of questions on practice, I chose to study the field-level implementation of a development project that looked at SRI in Uttarakhand. I chose Uttarakhand primarily because I wanted to do research in a state whose residents were reasonably conversant in Hindi (a language I speak), and where SRI was reported to have a decent reach. My options were Bihar, Madhya Pradesh, Chhattisgarh, and Uttarakhand, and the personal call of the mountain state was too strong to cast aside. The organisation I wanted to work with, the Uttarakhand Development Project (UDP)[27] is highly regarded in SRI circles, and some of its members are prominent participants in the discourse-making practices of the SRI network, making identifying linkages between discourse and practice a meaningful exercise. In previous meetings with members of the SRI network,

---

[27] The organisation requested that I conceal its identity, and consequently UDP, the name of the project, the names of employees and some identifying characteristics of the site are fictitious.

many encouraged me to contact the UDP about doing fieldwork in one of their project sites. Dr. Panda, The Deputy Director of the UDP at the time,[28] was very welcoming, and had extended much support to me even before I had thought to approach the UDP for my dissertation research. I believed his attitude stemmed not just from personal characteristics, but also a deep commitment to the advocacy of SRI aided by a strong research base.

A month prior to commencing fieldwork, Dr. Panda and the then Director of the UDP requested that I share my dissertation proposal with them. While hesitant to introduce bias into my research, I understood the need for trust-based cooperation, and shared an abridged version of it. At the time, Dr. Panda suggested that I work with one of their field partners in Himachal Pradesh rather than Uttarakhand, since SRI had a better record of success in that state. I was, however, very reluctant, given that it would mean covering two states (the UDP is based in Uttarakhand) and also because the partner organisation in question was a religious (Hindu) one that prescribed strict Hindu norms for visitors to its organisation. Having spent two days visiting them in 2013, and belonging to a minority community, I was certain that I would not be comfortable spending a year at the institution. The UDP then acceded to my request to limit my research to its sites in Uttarakhand.

It was decided that I would divide my time between the head office in Dehradun and one of the field sites of the Uttarakhand Rural Livelihoods Programme that it had

---

[28] He is now its Director.

initiated in 23 villages spread over three river valleys of the state. At Dehradun, I spent my time interviewing staff members involved with SRI in different capacities, as trainers, researchers, as well as young professionals hired to help implement the ULP. I had initially hoped to maintain a 1:3 time ratio, but quickly found that travelling back and forth on a regular basis was a tedious affair requiring 24 hours be spent in transit one way, eight of which were on mountain roads. After three and a half months of being located at Dehradun, between July and October 2014, I moved to a project site as the SWI sowing process got underway. The site was located along the banks of the Parvati river in Bageshwar district, and comprised nine villages and their attendant hamlets. I picked the field site based on my evaluations of which organisation seemed the most committed to the project[29], and Sneha, an organisation working on gender issues in Almora district stood out. I spent close to a year at this site, visiting Dehradun to attend important meetings or to conduct interviews. Renting a room in the same building in which the local office was located (and where staff workers from outside the site resided) allowed me the opportunity to participate closely with and observe project functioning. It also allowed me the opportunity to spend a great deal of time with staff workers outside work hours, sharing meals and relaxing over tea. During work hours I would shadow both the LDTs stationed at the office as well as the three local field staff members (Radha, Rekha and Priya) all of whom resided in three different project villages. During the initial days of the project when wheat was being sown, I accompanied them to farmer plots and

---

[29] I only seriously interacted with one of the other partner organisations. After spending two weeks at their field site and observing its operations, I was certain that I would not learn much about how to grow wheat the SWI way since I didn't think much wheat would be sown to begin with.

participated in the preparation of fields, digging of furrows, and sowing of seed. Later in the season, I participated in the preparation and adding of manure as well as weeding. Prior to the harvest of the crop, a senior SRI expert at the UDP and I conducted crop-cutting experiments together. In addition to participating in the SWI meetings, I made sure I was in attendance at as many ULP activities as possible, ranging from meetings on the identification and categorisation of beneficiaries into different poverty groups, horticulture production, poultry rearing, apiculture, village workshops,[30] the formation of Gram Swaraj Samiti (GSS)[31], Mahila Mandals [32] and Farmer Interest Groups (FIGs), the construction of village-level works (such as irrigation tanks) as well as monitoring and evaluation visits from other staff. In addition to UDP meetings, I also attended meetings conducted by other agencies operating development projects in the area, namely Gramya[33] and the Japan International Cooperation Agency (JICA). To get a sense of farmer and other beneficiary perceptions of the project - and SWI especially - I conducted formal and informal interviews with adopting and non-adopting farmers, government representatives in the area, village representatives (*sarpanches* and *pradhans*), residents hired to participate in the Gramya project as local-level workers and shopkeepers.

To get a sense of how the UDP's approach to SRI had varied temporally - that is, account for its previous experiences with the project - I also visited some of its former

---

[30] A detailed workshop where the village-level project plan, prepared on the basis of the Participatory Rural Appraisal (PRA) exercises conducted was presented to village residents along with the budget for feedback.
[31] Village Self-Rule Committee.
[32] Women's Groups.
[33] A state sponsored development project.

partner organisations in the state, and interviewed their heads and/or staff members. On a few occasions I met with former LDTs as well. I supplemented this data with an analysis of all the documentation that I could find of its previous projects in its head office. Unfortunately, despite the best efforts of a number of helpful staff members, I was unable to fully reconstruct the document trail, though what was available provided some insights. I also accessed some of the reports filed by Sneha to the UDP during the course of the project, which allowed me a glimpse into practices of representation of project activities and the relationship between both institutions.

Though my account of my research methods so far might appear straightforward, it was anything but. Most of the SRI actors I contacted with requests for interviews were very welcoming, and readily participated in my project. While my status as a PhD candidate had some role to play in this, I believe their enthusiasm stemmed from my association with SRI (especially in the case of its advocates). A few of the people I interviewed sought out my opinion of SRI to find out to which camp I belonged, but both those "pro" and "anti" SRI met with me. I held a less credible subject position at the project site.

My presentation of myself was self-conscious (Goffman 1959), and I attempted to carefully present myself as a "good" young woman. In terms of my professional identity, I introduced myself as a doctoral student studying agriculture in Uttarakhand. The fact of my being unmarried, beyond the ideal marriageable age, and not being paid for what looked like wandering around in wheat and rice fields and muttering to myself was a

source of consternation for many. Being confused for NGO staff was a source of great frustration for me. I went through a description of my role on a daily basis, attempting to make clear my identity seemingly to no avail. Even people I spent a significant amount of time with "forgot" that I was independent of the NGO, sometimes over a time period spanning less than 24 hours. After a year of this, repeating myself proved tiresome and I could not understand how, with a few exceptions, most people conflated me with NGO staff and repeatedly asked me what my salary was. My identity as a researcher ebbed and flowed, often merging with the NGO staff. I was frequently stopped as I walked down a road and asked by concerned residents where their chickens were, or when I was planning to distribute the pods of ginger promised to raise a ginger crop. It took a long time for me to comprehend that this was in fact an indication of the illegitimacy of my status as an unmarried, outsider woman "studying" but not attending classes.

After hanging around long enough, staff members also appeared to forget I was a researcher, there with the explicit intention of studying how the project was working, what did work and what didn't, often speaking openly about sensitive topics. The trust staff had in me was as with most researcher-respondent relationships, equally both real and contrived (Coffey 1999). Though I believed that we shared as real a friendship as is possible under the circumstances, I was certainly not entirely the person I made myself out to be.

In *Return to Laughter,* Elenore Bowen's[34] fictionalised account of her life amongst a bush tribe in West Africa, Bowen constructs herself as a stranger and an alien. Coffey (1999) describes Bowen's introductory paragraphs about her site in the book as being suggestive of a "distant and remote" site (19). For all practical purposes, my field site was also "distant and remote". Travelling there takes about eight hours by road from the nearest railhead Haldwani, assuming there are no landslides on the way to break progress. About 50 kilometres north of the field site is the beginning of the middle Himalayas. Having previously only been to the state as a tourist traversing a trekking route, I entered the area with a framework of villages and village life based on my experiences of rural fieldwork in Chhattisgarh and Maharashtra, and to some extent Tamil Nadu. Uttarakhand's villages are located within certain now precarious geophysical contexts, but none match the images of poverty I had expected.

It took me a while to come to terms with this upending of my assumptions about the place. Despite a common nationality, I was certainly no "insider". In fact, "regardless of my individual motivations, in terms of world power relations, I work(ed) from within a dominating and colonizing discourse which imposes western, first world values on others", not the least by defining them as non-western or third world or in my case, as rural (Jacka 1994, 667).

My ascribed identity as a member of the Syrian Christian community also had implications for my positionality as a researcher. The identity of Syrian Christian is an

---

[34] Her real name was later revealed to be Laura Bohannan.

identity I have long since disavowed. Yet the privilege it has enabled me is not something I can easily dissociate from[35]. It is this caste privilege that led me on the educational trajectory I enjoyed, gave me the opportunity to enrol in a PhD programme at Syracuse University, and venture into Uttarakhand despite being a minority in a predominantly Hindu state to conduct research. It is this caste privilege that allowed me an identity of privilege, and the ability to rent a room in a building owned and occupied by some of the wealthiest Brahmins in the area - even though I refused to admit to any caste. I was aware that the ability to make such a statement also came from a place of privilege: if threatened, I could always count myself amongst the "general" castes. I was always aware that I was and am myself implicated in the Brahmanical patriarchy that subsumes much academic research and development work in India. Though I made efforts to challenge my own understandings of what I was observing and seriously account for caste in my analysis, this project falls short, and much work remains to be done to understand how caste is both explicitly and implicitly a part of how a development project plays out.

I include this not to affect self-flagellation or out of narcissim/exhibitionism (Lofland and Lofland 1995), but rather to draw attention to the need of scholars, academics, policy makers and doctoral students to be self-reflexive and also to pay attention to privilege. But it is insufficient to identify privilege without identifying how it makes possible certain actions, interpretations, and recommendations. In laying myself out bare I know I

---

[35] Syrian Christians perpetuated the ignominies of the caste system by violently appropriating Dalit land in Kerala (Mani and Anirudhanin 2013). Though many Syrian Christians of the current generation (especially those that live outside Kerala) are blissfully (and it could be argued, wilfully) unaware of injustices on which their current privilege is built, I am myself implicated in this: so great was my privilege that it took masters-level courses at the Tata Institute of Social Sciences to make me aware of caste as being more than acronyms filled into official documents.

make myself vulnerable to direct critiques of my ethnographic self. But I would suggest that self-knowledge has epistemic value. I was astonished by the dualism that existed between my academic mind and the mind that was taken aback to see pictures of married women from the village residing in Delhi wearing shorts. While initially shocking, it also revealed to myself the distance between "us" urban researchers and "them" villagers, fetishising almost, this imagined rural identity. I do not argue that differences do not exist, but that this surprise when confronted with modernity betrays the basis of our constructions of rural and rural projects. This process of understanding was transformative, and consequently transformed my analysis.

Outline of the Dissertation

In Chapter Two I trace the evolution of the discourse around SRI, focussing largely on the Indian context. Actors in the SRI network participate in very sophisticated discourse-making practices, exhibiting a very high level of reflexivity in their articulation and re-formulation of the SRI discourse over time. The question remains if they are as self-reflexive about the practice of SRI. This chapter lays the groundwork for the chapters that follow where I interrogate how the practice of SRI translates from this (heterogeneous) articulation of it.

In Chapter Three I highlight the specific constellation of state power and capital that has worked to create the relatively new state of Uttarakhand as a site of resource exploitation rather than economic investment. Unequal geographies mark the changing landscapes of the state, sometimes leading to unexpected outcomes. For example, while official data indicates that forest cover is decreasing at the state level, it is increasing at the site of this research project, much to the chagrin of residents. Concurrently, the area of land under cultivation is decreasing, with implications for the introduction of a new cultivation method in the area. These phenomena are puzzling when not viewed through the lens of a changing Kumoani subjectivity that privileges certain forms of modernity and new environmentalisms alongside a more static adherence to religious sentiment.

In addition to hydel projects and migration, simian encounters propel most conversations in Uttarakhand today, with this region not deviating in any way from the norm. The first part of Chapter Four details the many hindrances to farming in the region, locating these within the context of a growing disenchantment with farming and changing farmer subjectivities. This forms the bedrock on which the introduction, sense-making processes and practice of SWI is read. Following the chain from the initial training imparted to field staff to sowing, fertilising, irrigating, weeding and harvesting, I highlight the gendered implications of recommending a method such as SWI in this particular socio-cultural context and its attendant mountain farming practices. I also explore how the ULP's attempt to produce willing farmer-beneficiary-subjects was met with unanticipated subjectification-brokering (processes) that unexpectedly worked to the benefit of field staff chasing targets.

Chapter Five is devoted to the experiences of the field staff and I while collecting wheat production data. In May 2015, the staff and I joined forces to conduct crop-cutting exercises in 60 sample fields. In this chapter I detail what the exercise entailed in terms of survey design, data collection and data interpretation, and how our efforts were often foiled by errant monkeys, curved sticks and unhappy farmers. While the exercise did not provide me with as much evidence with which to evaluate the claims of SWI as I had initially hoped, it did provide insights into how data and knowledge about agricultural technologies may be produced, including messy, contingent and inter-subjective processes. The chapter also questions the seeming stability of production statistics when read against the mutability of technology/method design and practice. I question the usefulness of the adoption of particular metrics of success - namely yield - in the context of the gendered interests of cultivators. Finally, I also position responsibility for my own enabling practices that led to the data taking the form that it did - in terms of inclusions and exclusions, practices and knowledge - highlighting how ethnographers and researchers themselves reproduce particular ways of knowing.

In Chapter Six I examine how two other project activities, specifically horticulture production and poultry farming, were carried out in the case of the ULP as well as a similarly situated government project named Gramya. Two very different and contradictory sets of moral imaginaries and economic frameworks were mobilised to promote foodgrain and vegetable cultivation, leading to disruptions in the ideological frames employed by the project. The argument for horticulture, particularly, attempted to discursively revalue space vis-a-vis SCI and foodgrain production more generally through

an appeal to altered socio-material realities of production. Acceptance of this varied spatially, socially and temporally, hinging heavily on a the visual, and had the surprising effect of blurring the lines between both agencies. The differential practices and outcomes of both projects gave rise to a continuous reformulation of the idea of the state versus the idea of the NGOs. Beneficiaries read projects against each other, which themselves interacted to produce new subjectivities of development as beneficiary-subjects and development agencies came to be co-constituted.

In Chapter Seven I borrow from Bourdieu's theory of habitus to examine how the identities and specific habitus that women in the mountains of Uttarakhand are endowed with circumscribe the practice of development. I draw from my time accompanying and living with staff members to focus on the specific structuring context of the space, the materialities of their existence in a difficult geophysical context as well as their linked identities as pahadi women or girls who exist in spaces that disrupt middle-class notions of embodied gender and femininity, while maintaining the inequality of a hetero-patriarchal system. Privileging the embodied experiences of women who are both "farmers" and staff workers, I argue that we have to look at how the pahadi woman is constituted to understand how the NGO staff worker is constituted. Identities, subjectivities and subjectification combine to reproduce hierarchical practices of the body within the NGO.

Chapter Eight is a summary of my key arguments and vision for future research.

Chapter Two
Interpreting Science "At the Margins"

Introduction

> Like most advocates of nonsense, Stoop and Kassam (2004) suggest that it is
>
> the role of scientists to seek verification and confirmation of the SRI. They
>
> seem unaware that every genuine test of a theory, or a hypothesis, is an
>
> attempt to falsify it (Popper, 1989). (Sheehy, Sinclair and Cassman 2005,
>
> 355)

The debate around the acceptability of SRI as method of rice cultivation has been

acerbic at best, even before the "rice wars" of which Sheehy, Sinclair and Cassman were a

part. While SRI has made significant inroads in practice across the world, it has not yet

been made inroads into some of the most prominent agricultural research institutes across

the world. While some suggest this is because of the poor and dubious science that

undergirds SRI, others have attributed this reluctance to politics and interests.

In this chapter, I trace the evolution of SRI as a method, from its "origins" as a largely

two component method of cultivation in 1983 in Madagascar to the now significantly

more sophisticated articulation of it in terms of an "interpretatively flexible" method of

cultivation hinging on root and soil science coupled with climate-smart agriculture. I

argue that we must understand what SRI is, why SRI, as well as who does SRI, to understand why it has eluded more wide-spread acceptance. Finally, I draw from the work of Anne Marie Mol (2002) on "coordination" to interrogate the role that activist social scientists play in the maintenance and interpretation of the choreography of the SRI discourse.

The "Whatness" of the System of Rice Intensification

"What is SRI" is a question that has gripped advocates and dissenters of the method alike. In one of his first writings on SRI, Norman Uphoff, widely considered to be its Messiah, described it as a "strategy" rather than a "technology or a package of practices" (Uphoff 1999, 297). In describing it as a "strategy", Uphoff differentiated between agroecological methods (such as SRI) and technological innovations. Agroecology he argued, "is not a technology, but rather a family of production strategies that draw on principles such as those set forth by Altieri (1995), Gliessman (2007)"[36] and Uphoff (Forthcoming). In terming it a "strategy", Uphoff made a distinction between strategy and the more common input-based means of increasing crop yields. In doing so, he disavowed the tendency towards the paradigm of "technology transfer" attributed to static technologies[37]. He was also aware that SRI departs from the norm.

---

[36] See Altieri (2005) and Gliessmann (2007) for more on the topic.
[37] See Norman Uphoff, 2010, "Introduction to Opportunities with the System of Rice Intensification (SRI)", Presentation made at the CNNRI Workshop, Hangzhou, available online at

Acknowledging that "many proponents of 'modern agriculture' have looked upon agroecology as something atavistic, as a retreat from the cutting edge of science and technology", Uphoff described this as being "an insular view". In fact, he suggested,

As scientific advances continue in the fields of microbiology, ecology, soil biology and soil ecology, and epigenetics, the emerging synthesis of cutting-edge theory and practice which can be characterized as *post-modern agriculture* -- which lies beyond 'modern agriculture' -- will... make agroecology the *most modern* agriculture. (Uphoff, Forthcoming)

In this characterisation of agroecology, Uphoff firmly rejected ascriptions of traditionalism to agroecology, creating space for it to be treated on par with the technologies of the Green Revolution.

The System of Rice Intensification - also now known as the System of Root Intensification (SRI) and the System of Crop Intensification (SCI) - is described as a low external input agroecological method of rice/crop cultivation (Uphoff 2002). To understand what SRI is we have to consider SRI's origin story, faithfully provided in abbreviated form in most written work on SRI, a reminder of its non-establishment origins. As the story goes, SRI was developed by a French Jesuit priest and agronomist, Fr.

---

https://www.slideshare.net/SRI.CORNELL/1020-introduction-to-opportunities-with-the-system-of-rice-intensification-sri.

Henri de Laulanié, in the 1980s in Madagascar. Laulanié developed the method over a period of time while working with local farmers to increase paddy production levels.

Persisting for years, Laulanié "serendipitously" "synthesized" the SRI method in 1983, when a delay in the onset of the rains caused fifteen-day old seedlings to be transplanted in local fields (Stoop, Uphoff and Kassam 2002, 250). Unexpectedly, the young seedlings gave rise to shockingly high yields that season. Yields crossed seven tonnes per hectare and went up to fifteen tonnes per hectare at a time when the national average in Madagascar was two tonnes per hectare. Laulanié and the farmers around him took notice of what had transpired, and so the story began. But this abbreviated version of SRI's discovery - or synthesis - does not do justice to its origins in theory and practice.

Dominic Glover's 2011 article "A System Designed for Rice? Materiality and the Invention/Discovery of the System of Rice Intensification" details the manner in which SRI came to be solidified into the form it now takes in official descriptions. As mentioned previously, in 1983, late rains in Antsirabe, the area in which Laulanié worked, meant that the rice nursery being used had to be sown with seeds twice in one month. The short time span available meant that Laulanié had to ask his students to transplant fifteen-day old seedlings rather than 30-day old ones as was the practice. The profuse tillering (more than 80 on some occasions) that followed inspired Laulanié to experiment with seedlings of even younger ages, sometimes as young as eight days old. A discovery of the concept of

phyllocrons[38] or growth cycles, developed in the 1960s by a Japanese researcher, T. Katayama added some pieces to the puzzle [39].

Along with young seedlings, Laulanié also spoke of the practice of sowing single seedlings as being an essential aspect of SRI, acknowledging that single seedlings had been used in the area since 1965, but that the practice had not become popular - possibly because the use of older seedlings negated their effects or because the seedlings were sown deeper than three centimetres. In addition, Laulanié continued the practice of wide spacing of seedlings. He described the spacing requirements as being between 25 to 33 centimetres[40] based on Madagascar's conditions, but left it to farmers to decide for themselves what the optimum spacing would be for their fields.

One of Laulanié's efforts under the rubric of SRI was to transform irrigation practices. This was especially important in the area in which he worked, where soils were characterised by high levels of iron toxicity. Inundation of soils makes plants susceptible to toxins such as iron and arsenic. Laulanié' found that the high iron content of the soil along with the cool temperatures provided by the altitude required that the crop be irrigated without inundating it. During the tillering period, Laulanié prescribed irrigating the crop daily with one to two centimetres of water in the afternoon or evening to form a protective layer over the soil, and drainage in the morning. Other detailed prescriptions pertained to the maintenance of a garden-like nursery, preparation of the seedlings for

---

[38] The time interval between the emergence of two successive leaves on a tiller.
[39] Laulanié read about Katayama's model in a GRET edition of Didier Moreau's book, entitled *L'analyse de l'élaboration du rendement du riz: les outils du diagnostic.*
[40] Both of which he argued offer the same grain output.

transplantation, ploughing. He was however careful to note the contingent applicability of his recommendations:

> We can see that this kind of recommendation is still only approximate, especially as there are still many variables which are difficult to assess: the quality of germination (it is not the germinative power in the seed, but the actual conditions surrounding germination compared to the best possible ones that shape growth), nursery conditions, transplantation, weeding, rice field conditions, the length of the phyllochron, etc. (Laulanie 1992, 30).

In keeping with the exploratory nature of his work, in November 1993, Laulanié revised some of his recommendations of 1992, calling for single seedlings, changing spacing requirements (25 centimetres by 25 centimetres above 1200 metres above sea level, and 40 centimetres by 40 centimetres at sea level, with altitude being a proxy for temperature), and focussing on irrigation practices hinging on the minimum use of irrigation[41] (preferably rain water) and soil aeration (Glover 2011; Laulanié 2011). Laulanié also drew from the work of scientists Yoshida and Tanaka at IRRI in this exposition on SRI to begin to make connections between root systems and panicles/grains (Glover 2011).

---

[41] Laulanié differentiated between irrigation in the vegetative phase (where he recommended that the water be drained) and the reproductive season (where water use was to be based on climactic conditions). Laulanié admitted to the need for water use in the latter period to be studied more.

Glover reproduces Laulanié's work to show how one of the reasons Laulanié advocated square planting was the use and compatibility of the rotary weeders also in use by the "improved system of rice cultivation" (Système de Riziculture Améliorée, SRA) in practice in the region for 60 years, as well as their coincidence with an IRRI recommended practice. In 2002, Sebastien Rafaralahy, a member of the Association Tefy Saina (ATS) who worked with Laulanié, attributed square planting to the consequent ability to more fully use a rotating hoe (Rafaralahy 2002). Other practices such as sowing a garden nursery, "fully dressed"[42] seedlings and an early round of weeding after the first week Laulanié described as being "complementary" and "not essential" (Laulanié 2011, 185).

As Glover goes on to point out, practices such as specific nursery practices and regular and mechanical weeding of the soil and the preferable use of organic manure, solidified in later writings by Willem Stoop, Norman Uphoff and Amir Kassam (Glover 2011). Uphoff separated out the planting of young seedlings with wide spacing, treating them as two different elements of a four/five/six point "menu".

Laulanié was aware that some elements of what he constituted the essential and complementary aspects of SRI had echoes in the past. The *dapog* system of nursery cultivation from the Philippines bore resemblance to SRI in that the seedlings were very young, though he distinguished between the two methods to point out that the dapog system did not specify the use of single seedlings. In a presentation made at the 2014 SRI Conference in New Delhi, Dominic Glover extended his analysis to include the works of

---

[42] Where the soil - four to five centimetres - is carried with the seedling from the nursery to the field.

many actors who have made recommendations that echo some or all the SRI principles. These included Dobelmann[43], Dumont[44], the Demchintsky method of Russian agronomists[45], the Masana/Margate method[46], single seedling[47], wider spacing[48] and sparse irrigation[49] recommendations in India amongst many others. Elements of SRI had already found favour in the past.

Locating "Interpretative Flexibility"

The similarity of certain principles of SRI with pre-existing practices has led some to critique SRI for being simply "good agronomy" (Uphoff Forthcoming) and nothing new. Another critique of the method has been that the "interpretative flexibility" accorded to SRI makes it very difficult to pin down and evaluate. While I attend to the question of evaluation in the next section, I want to focus on interpretative flexibility here given its implications for both practice and evaluation.

---

[43] Dobermann made the following prescriptions: "Tillering is thus favoured: 1. by the transplanting of young seedlings 2. by transplanting of one or two seedlings [per hill] 3. by spacing distances that are rational according to the variety and the richness of the soil 4. by early weeding in order to avoid competition between the rice and adventitious weeds 5. by the richness of the soil in nitrogen" (cited in Glover 2014).

[44] Dumont advocated the use of harrows to lift and aerate soil thereby facilitating weeding the crop with a rake soon after.

[45] In the period 1909-1911. The agronomists recommended wider spacing, and laid emphasis on root development and tillering amongst other things. This attracted the attention of German, French, British and Dutch agronomists.

[46] From the Philippines. Focussed on young seedling, single seedling per hill, wide spacing, limited irrigation, compost, early and regular weeding.

[47] In the period 1905-1928, with recommendations coming from Burdwan, Bengal.

[48] Spacing distances up to 61centimetres and 76 centimetres, published in the Indian Agriculturist, from Tamil Nadu.

[49] Reported in Lonsdale (1909).

The degree of interpretative flexibility legitimately accorded to SRI varies, as do the reasons accorded to it. A scientist I spoke with at the Water Technology Centre (WTC), Bhubaneshwar, was dismissive of the rigidity with which some scientists stick to the original prescriptions:

> Many scientists are getting caught up in 25 or 30 by 30 because that was the initial recommendation. But they must try… others… it depends on the variety, soil conditions etcetera. It must not be fixed… We shouldn't say fixed spacing, single seedling… in some conditions go for two seedlings. If five to seven centimetres in water when transplantation, seedling age should be more. It depends on seed and environmental condition. If you put two or three seedlings, yield will be same, but condition will be different. If field conditions very harsh put three (seedlings). If optimum put one. (Interview by author. Transcript. Bhubaneshwar, August 6, 2015.)

The scientist echoed what other people I spoke with argued about localising research on agricultural methods so as to make it more relevant to climate adaptation practices and needs[50]. Another scientist at the Central Rice Research Institute (CRRI), Cuttack, was incredulous about the attempts of NGOs to promote wide spacing in saline soils along the coast of Orissa, indicating that saline soils would require denser spacing of seedlings. However, "T", an NGO head and scholar with whom I spoke was suspicious of variations in practice because of the politics and interests that lay behind them:

> The agricultural university came up with this idea of modified SRI. Modified SRI. In the name of modified SRI they are saying that labour is an issue and all that, let us use SRI but basically using transplanters and weeders and all that. But anyway weeders are not successful. None of their weeders are successful. Mechanical

---

[50] Not just the location specificity of inputs, but also the ecological contexts in which agriculture is practiced: soil and water systems, temperature changes, and the like (Rajeswari Raina, personal communication, Delhi, 23rd September 2014).

weeders. Cono weeder is spreading in some places... but this mandua weeder has picked up... but these two have relevance in their own locations. Some locations mandua is good some locations cono weeder is good. Fairly standardised. So this... so they pushed mechanised SRI. But basically they're saying line transplantation. That was the initial push. In the name of SRI they pushed that. Second... later on this direct seeding came up. The fancy direct seeding. So they call... they're not using the word SRI but they're saying direct seeding. You know it's easy, leave it, nothing that you need to do. So they're saying farmers are taking it up well. Extension people are happy research people are happy. But we don't know really what problems it solves. (Interview by author. Transcript. Hyderabad, December 30, 2014.)

This narrative is complex. T was not against the use of mechanical weeders, but was perturbed by the limiting of SRI to line transplantation - provoked by the actions of the agricultural university and extension teams. He was, however, aware that SRI does not/cannot follow rigid prescriptions. When asked a little before this exchange about his own definition of SRI, he responded:

See when we say SRI this means early seedlings, and then er... very less preferably single seedlings if they go for two... see what we insist is that our communication must be clear. What farmers do is their business. In our communication we insist on single seedlings, less than fourteen, preferably ten to twelve, but less than fourteen (days old), some kind of light tilling, not deep tillage, wider spacing with marker, we suggest doing with marker is better than ropes because ropes may not give you a correct line for weeding, at time is might make weeding difficult, and then weeding at least twice, we don't say third and fourth weeding mandatory and all that. If someone has problem they can do... initially land preparation and other investments. They have the option of NPF where they can spray botanical spray... Initially we were very strict on wanting a single plant, wanting everything. But later we're not sure... we... I mean we see the whole system settling on line sowing. Not having rows on both sides. There will be a row on one side. Plant density comes down. But other side may not be the same. That enables people to move towards transplanting with rows. Transplanting with marker is a problem because lands are not level. And then you have to coordinate with the land preparation, labour demand, marking and transplantation... that becomes very difficult to operationally manage. And then if you mark fields by the time labour is available marks are gone and fields are dry. Because you can't

inundate. So whatever is the moisture level you can...so we see people settling into the row. And also helps them to avoid two row weeding. Only weed on one side. So that also they find it convenient. Also it *might* be true that weeding on both sides might not give an additional advantage so high compared to this... so this is a compromise... of the farmer to choose... whatever they choose. (Interview by author. Transcript. Hyderabad, December 30, 2014.)

His mention of the age of the seedling was interesting if unremarkable given that prescriptions of the age of transplanted SRI seedlings are colloquially spoken of in terms of days after sowing. This however departs from Laulanié's original recommendation of using phyllocrons to determine transplanting dates[51]. While Laulanié recommended transplanting during the second phyllocron - which in turn varied depending on temperature (altitude) - the date of transplanting is now represented by the age of the seedling, and less commonly but more accurately by the two or three leaf stage[52]. But as T's narrative shows, decisions about how to practice SRI are both acknowledged to be taken along multiple axes: ease of practice, labour availability, soil conditions, farmer preference. His concern with vested interests merged uneasily with the realities and exigencies of practice, becoming less and more prominent as different actors' experiences of the method converged and diverged in different locations.

Vested interests are a common refrain in discussions of how SRI comes to be practiced, though the interpretation of them varies. In an interview I had in September 2014, a former economist with the Indian Agricultural Research Institute (IARI)

---

[51] Laulanié himself attempted to teach farmer's Katayama's method of tillering.

[52] A scientist at the WTC, Bhubaneshwar pointed out that the two or three leaf stage normally occurs between ten to fourteen days, but with cooler temperatures in the winter, may take place at fourteen to sixteen days after sowing. In the Himalayas, he suggested, it may take sixteen to twenty days.

similarly put down the push for Direct Seeded Rice (DSR)[53] and zero tillage to vested interests. Contradictorily, on the same day, a senior agronomist at IARI who conducts research on SWI spoke of advocating for direct seeding of wheat, sowing two seeds. By 2015, there was increased talk of practicing SRI with DSR, with Pradan, one of the first NGOs to adopt SRI working towards spreading DSR. Prior to this, in 2012, a Krishi Vigyan Kendra (KVK) in Chittoor District, Andhra Pradesh also reported having practiced DSR using SRI principles[54]. Spacing was kept at 20 centimetres[55], and the seed rate 25-37.5 kilograms per hectare as with SRI (depending on the size of the grain). Alternate wetting and drying was also practiced, the specifics varying across soil types. However, pre- and post-emergence weedicides were used. These trends are in line with those in Indian agricultural research and extension work that is increasingly propagating line sowing *and* DSR given the increasing water crisis in the country.

The flexibility and mutability accorded to SRI has not always been well received. A senior scientist at IRRI expressed frustration about how the term has been rendered seemingly meaningless. When I asked him what SRI with DSR would look like, he responded:

> You should ask them what is SRI with direct seeding. I mean SRI has become a known term so they will link it to anything they do. They do it. If you ask them what is SRI means and that's what you should ask and that would be very revealing. And I tell you that's what a lot of NGOs would not be able to answer they would

---

[53] In DSR, transplanting is eliminated from the process of cultivating rice, with seeds being directly sown in the main paddy fields either manually or mechanically. DSR is challenged by the excess of growth of weeds owing to the non-inundated nature of fields, with implications for yield. An old technology, it has received more attention in recent years as the availability of water for agriculture recedes.

[54] In this method, a drum-seeder and a modified cono-weeder is used. For more details, see http://sri.ciifad.cornell.edu/countries/india/AP/In%20AP_DST_KVK_Drumseeder_Rpt2012.pdf.

[55] Reported by practitioners in the area as being different than SRI's 25 centimetres.

look left and right. Ask them. (Interview by author. Transcript. Delhi, September 24, 2015)

He too attributed some practices to vested interests, reiterating the undesirable flexibility of the term.

> People talk about SRI but they don't know SRI. And I don't know how much you have picked up talking to some of the NGOs. There is also subsidy in our country. And subsidy is just misuse of resources fortunately or unfortunately. And farmers get it by saying I'm doing SRI. I've visited personally some of these farmers in Andhra Pradesh and Tamil Nadu. Farmers have no clue what is SRI. But let me tell you what is SRI. SRI is another name of rice intensification, system of rice intensification. But it is another name of best management practices. Just like you and I think about our health so we follow good practices. Also something for crop. That is not new for scientists and any international scientist would know it and be telling farmers. The component in SRI is young seedlings. They say ten days fifteen days, they keep on making it flexible. Young seedling and one or two seedlings. Close spacing and densely planted. Sorry sparsely planted. And then lot of organic manure. These are the four elements of SRI which originally kind of came out. Then of course Norman keeps changing it as he was receiving a lot of feedback from those people who have been working on rice for a number of years so he kept changing it. Now I think he included one more thing alternate wetting and drying. So these things keep changing.

Alternate Wetting and Drying (AWD) is increasingly becoming a crucial element in the articulation of SRI. While SRI as it was originally conceived (by Laulanié) included water-saving methods, it was not described as AWD, and was articulated to the different climactic conditions of different regions of Madagascar[56]. The primary aim, however, was to capture oxygen and nitrogen from the atmosphere by aerating the plant roots - a necessity given iron toxicity in the soil then. By 2002, the framework had expanded to

---

[56] See Laulanié (1992) for more detail.

include mention of the reduction in greenhouse gas emissions by aerated soils in rice cultivation based on the work of IRRI scientists[57] (Uphoff and Randriamiharisoa 2002).

During the early days of SRI publications, many scientists spoke of versions of AWD though the nomenclature varied. In 2001, Ceesay et. al. published a paper based on experiments on SRI and repeated wetting and drying. Dr. Thiyagarajan, then Director of Tamil Nadu Agricultural University (TNAU), along with a team conducted experiments on SRI that involved limited irrigation up to two centimetres depth after surface crack development up to the flowering stage, after which the plot was irrigated with five centimetres of water (Thiyagarajan, et al. 2002). In the same book in which Thiyagarajan had written up this work, a chapter by Uphoff and Randriamiharisoa cited Rabenandrasana (1999) to detail two kinds of water managements practices:

> "Maintain moist but aerated soil during the vegetative growth phase, either (1) by regular applications of small amounts of water daily that keep the field moist but never saturated, with some periods of 2–6 days in which the field is not irrigated and allowed to dry out to the point of surface cracking, or (2) by alternate wetting and drying (AWD) of the field for periods of 4–5 days each during the growth period." (Uphoff and Randriamiharisoa 2002, 77)

Despite its practice, AWD was initially spoken of cautiously. While there was consensus within the SRI community of the need to aerate the soil, more research was called for about the exact manner in which it needed to be done. In 2001, a former

---

[57] See Roger and Ladha (1992).

director of IRRI Bas Bouman along with T.P. Tuong published a paper pointing to the yield reductions AWD imposes while acknowledging an increase in water productivity (Bouman and Tuong 2001). In more recent years however, IRRI has cautiously acknowledged the use of "Safe Alternate Wetting and Drying", indicating that in certain circumstances AWD may not cause a yield penalty. Interestingly, while IRRI attributes some AWD practices to SRI[58], "T", also an SRI researcher, reported trying to integrate "their" (IRRI) technology (AWD) into SRI to increase its acceptability to IRRI - with according to him, limited result.

While SRI was first introduced as a water-saving rather than a yield-increasing method to the scientists who first experimented with SRI in India, it has since been re-worked to encompass many other concerns. The trajectory of the SRI-AWD-DSR story points to the (sometimes strategic) co-evolution of SRI alongside other on-going research and developments in the field, including that of its detractors. It also points to the role that the emerging consensus for climate-change mitigating cultivation strategies may have on the articulation and perhaps consequently acceptance of SRI.

[58] For more information see IRRI's resource on AWD available at
http://www.knowledgebank.irri.org/ewatermgt/courses/course1/resources/presentations/CopingAWD.pdf

Of Fantastic Research and Where It Can be Found

A story that catapulted SRI into the public imagination in India and elsewhere was that of Sumant Kumar, a young farmer from Bihar whose yields from his SRI crop were reported as being 22.4 tonnes per hectare. An article posted by the Guardian pointed out that this was a world record, beating not just those of the World Bank scientists at IRRI, but also Chinese scientist Yuan Lingping's record of 19.4 tonnes (Vidal 2013).

Predictably, Sumant Kumar's story provoked a fair amount of controversy, with many unwilling to accept that the reports were true. In the furore, many details were obscured. For one, as Achim Dobermann, a scientist with IRRI pointed out, the figure 22.4 tonnes corresponded with the fresh yield of the crop. After drying, with a reduction of moisture content between fourteen to fifteen percent, the yield dropped to 20.16 tonnes - still very high (Dobermann n.d.).

Kumar's story brought to the fore two underlying and persistent threads of critiques of SRI. One, the measurement and research practices more generally of SRI advocates, were flawed and inaccurate. Two, and related, the interpretative flexibility of SRI along with an alleged irreverence for science on the part of advocates made it impossible to evaluate SRI's claims.

In the case of Sumant Kumar's story, Dobermann echoed a concern raised by others: how was the yield of the crop verified after harvest? Continuing, Dobermann invoked the need for fact-checking, pointing out that people who report such extraordinary claims must exercise "more caution when writing about areas that are outside a person's area of

knowledge and expertise" (Dobermann n.d.). Dobermann also pointed out that in the

original article published in the Indian magazine *Agriculture Today*, the authors had

detailed the mineral inputs that had been included in the cultivation process, while the

Guardian article had hinted that organic methods had been used. Including a detailed

analysis of what it would have taken to produce such a yield from assumed soil and other

ecological conditions, Dobermann concluded that such yields must not have been

possible, and that Kumar's yield must have been closer to ten to twelve tonnes.

Dobermann's reaction to SRI is one that SRI advocates have critiqued, for drawing

boundaries around who may or may not conduct science. The question of scientific rigour

was relevant not just for the practice of SRI in Bihar, but also its measurement. Curious as

well about the yields reported, I discussed Sumant Kumar's case with a scientist at the

Central Rice Research Institute (CRRI), Cuttack[59]. The scientist indicated that the crop

had not been fully harvested when news of the record broke. Hearing of it, a colleague

from the CRRI went to the site where the yields had been recorded to also record yield.

On arriving, he found that the farmer had used an old traditional (and inaccurate) scale to

measure the yield. The colleague's own measurements, after accounting for moisture,

indicated a yield of seventeen to eighteen tonnes. State-level monitoring teams also

collected data and were astonished by the yields (though it is not clear how the yields

were measured or what the results were). The measurements of different actors were

sufficient to establish that the yields - whatever they were - were extraordinarily high. In

---

[59] Conversation with CRRI scientist, Cuttack, August 6, 2015.

the flurry of attention the case received, the finer details were obscured, and the spectacle of the number 22.4 tonnes overshadowed all else[60].

Anil Verma, the head of the NGO Pran under whose aegis Sumant Kumar's yields were made public, reminded me in conversation that Kumar had harvested 40 quintals of wheat, at 22.4 tonnes a hectare[61]. Verma pointed out to me that surpassing the China record, Kumar's case had attracted much media attention, with news agencies such as the New York Times, the Guardian, China's Central Television as well as agencies from Austria and Germany, all visiting the area to interview Kumar and Verma. Subsequently, Verma informed me, Kumar was hired by an organisation abroad to live and work there for five years, teaching people how to practice SWI[62].

However, when I shared some of my writing on SRI[63] with Shambu Prasad, a social scientist who writes prolifically on SRI in India, he cautioned me against being swept away by talk of world records, pointing to the need to focus on averages instead. Others in the SRI network had similar reactions, even though publicly Sumant Kumar's story is held up as a beacon of success by many. Interestingly, by fomenting more controversy, the Kumar story detracted attention from the more general practices of and debates around SRI.

---

[60] A study conducted in 2012 showed that in the project area comprising 1,03,328 farmers, rice yields went up by 86 percent (Behera, et al. 2013).

[61] Interview by author. Transcript. Gaya, January 12, 2015.

[62] Verma could not recall the country, but stated that Kumar was hired by an organisation working in West African countries, at the rate of Rs 50,000 per month, with a bonus depending on yields achieved.

[63] The piece began with Kumar's story.

The Sumant Kumar story is only one of many disputes in the SRI debate, though it highlights a persistent critique of it. In a series of articles later termed the "rice wars", several dissenting scientists indicated doubts about the veracity of the claims made by some of SRI's advocates (Uphoff 2002; Stoop et. al. 2002). A significant objection, again, was to the rigour of the experimental methods used - echoing feedback IRRI scientists had provided to Uphoff at meetings on SRI early on[64]. SRI advocates responded by arguing that dissenters were unwilling to conduct research on the method before dismissing it. Other scientists who do conduct research, they argued, were lax with SRI recommendations, adopting only some of them in their trials (and later reporting uninspiring results).

It is important to realise that not all the individual elements of SRI (the principles) are found to be disagreeable. As we have already seen through the work of Dominic Glover, many principles of SRI have been in use for a while now. Even the previously less favoured practices such as AWD have received cautious acceptance. What is more contentious is what is argued to distinguish SRI from previous practices. SRI advocates make a case for the "synergistic" effects of the practice of a combination of four or six principles (the number varies across reporting actors). It is these synergistic effects that separate SRI out from other individual elements or input-driven technologies, most notably, in one telling of it, varietal improvement, and external inputs (Stoop, Uphoff and Kassam 2002).

---

[64] Interview by author with IRRI scientist. Transcript. Delhi, September 24, 2015.

In the two written works by Laulanié on SRI that I was able to access, Laulanié never spoke of the synergistic effects of the different practices he had laid out. The closest he came to implying synergy was his statement - "We can also reply that very high yields show that the rice plant is more effectively using its natural possibilities and operating then with maximum efficiency to meet a minimum of needs" (Laulanie 1992, 17).

The first mainstream publication indicating the possibility of synergistic effects of the principles of SRI is an article written by Norman Uphoff in 1997[65]. The first study of synergistic effects between different elements of SRI was found the work of two then graduate students, Jean de Dieu Rajanaorisan and Andry Adriankaja, at the Faculty of Agriculture (ESSA) at the University of Antananarivo in Madagascar. Conducted between 2000 and 2001, the research was a complex set of trial evaluations of six factors that affect rice production. The students were supervised by a faculty member Robert Randriamiharisoa, who presented their work along with Norman Uphoff at the International Conference on Assessments of the System of Rice Intensification (SRI) held in Sanya, China in 2001-2002[66]. The four SRI practices originally included for evaluation were the use of young seedlings (eight days versus sixteen days), water management (aerated soil versus continuous flooding), plant density (one versus three seedlings per hill) and fertilisation (compost versus NPK). Spacing was not tested because both the spacings used fell within the range prescribed by SRI (25 and 30 centimetres). Weeding was excluded because it would have doubled the number of trials to 576 and 480 which

[65] See Uphoff (1997).
[66] See Randriamiharisoa and Uphoff (2002) for more details. The research was funded by CIIFAD, and given Uphoff's co-author status in the paper, it is possible that Uphoff offered intellectual support to the research project.

was not feasible. The study reported finding evidence of synergy. Further studies by Chapagain and Yamaji (2010), Dhar et al. (2016), and Thakur and Uphoff (2017) examining amongst other aspects, the synergistic effects of the principles of SRI/SWI on yield also indicated positive results. But other research has been less encouraging. A study conducted on saline soils in Bangladesh found no such effects (Menete, et al. 2008).

Negative results have not gone unchallenged. In a provocatively titled article "Critiquing SRI Criticism: Beyond Scepticism with Empiricism", scientist Amod Thakur called for more research to be conducted on SRI before dismissing it, while referring to research papers that had questioned the differently claims of SRI. For example, Thakur responded to the Bangladesh study by pointing out that it was well known that AWD cannot be practiced on saline soils because of the increased concentration of salt (A. Thakur 2010). That this is known amongst scientists who work on SRI was evidenced by the CRRI scientist who also indicated the need for closer spacing in saline tracts (ten to fifteen centimetres). The CRRI scientist also expressed concern that NGOs were promoting SRI in coastal regions with the same spacing requirements of non-saline soil, with detrimental effect. More recent research situated in coastal areas (amongst others) in Indonesia has found that SRI when practiced with deep furrows may be beneficial (Ferichani and Prasetya 2017). What has made this debate difficult to pursue, is the reluctance since then of detractors to pursue research on SRI.

These debates also tie into the role that interpretative flexibility is accorded to SRI, as well as who interprets SRI and how in the space of research. While Laulanié, for example,

argued that transplanting two seedlings would mean that the method was not SRI (Laulanié 2011), the interpretation of SRI in its early days and the interpretative flexibility accorded it later has meant that even spacing and the number of seedlings per hill may be changed to suit local and other conditions[67]. This has implications for a trend of research that compares SRI/SWI with "Best Management Practices" (BMPs).

Much of the research on SRI has been comparative, with SRI largely being evaluated against conventional methods of cultivation. One of the critiques of SRI is that yields in SRI plots are likely to be relatively very high in comparison with local practices when local practices are poor. Critics have argued that BMPs[68] on the other hand are likely to be more or at least as productive as SRI, and should form the basis of comparison. A detailed review article of different studies authored by Achim Dobermann concluded that BMPs on average produce eleven percent higher yields than SRI[69]. Uphoff et. al. responded to the article by critiquing Dobermann's analysis, identifying it as a "selectively" assembled "desk study" (Uphoff, Kassam and Stoop 2007, 109). Thakur pointed out that SRI versus BMP trials have not always met the authors own criteria for either or both categories of treatment, and very often have not met the general specifications laid out for SRI, making evaluations inaccurate (Thakur 2010)[70]. These

---

[67] One scientist at the WTC pointed out the need for different spacing regimes for different varieties of seeds: for short duration 18 by 18 centimetres, for long 25 by 25 centimetres.

[68] Interestingly, interpretative flexibility has allowed the Indian Council of Agricultural Research to term SCI a "Best Management Practice", a source of consternation for advocates. Representatives of the Central Government have argued that if the method allows for a yield of 22 tonnes, it should spread like wildfire on its own, without the need for subsidy.

[69] McDonald et al. (2008) have argued that there are no significant yield advantages of SRI over BMP except in Madagascar.

[70] Thakur pointed out that the SRI trials included high levels of mineral fertiliser use, negating the effects of soil biota on plant growth.

critiques notwithstanding, what is especially interesting is what the BMPs studied actually are, and the implications for comparisons of SRI with location specific practices.

With the onset of the BMP debate, some researchers expanded their evaluative frameworks to include "Best Management Practices" or "Standard Recommended Practices" (SRP) in their research. BMP protocols predictable varied across studies, as BMPs themselves are recommended according to a region's agro-climatic situation. In a study conducted by Gopalkrishnan et al. (2013), BMPs called for 30-day old seedlings, plots inundated with five to six centimetres of water during the vegetative stage, and hand weeding twice, at 25 and 40 days after transplanting (DAT)[71]. A study by Latif et al. (2009) in Bangladesh was designed in such a way that SRI and BMP varied on two counts: age of seedlings (fourteen to fifteen days versus 35 to 37 days), and number of seedlings (one versus two). Spacing was less distinguishable: SRI being 25 centimetres by 25 centimetres and BMP being 25 centimetres by 15 centimetres (triple and double-cropped area) and 25 centimetres by 20 centimetres (single-cropped area). The management of water, nutrients and weeds however was similar in SRI and BMP plots, making it difficult to separate out SRI and BMP treatments - except perhaps under Laulanié's original framework. Contrasting both cases indicates more and less correspondence of BMPs with SRI, making cross-comparisons of a similarly interpreted technology without account for its specific context difficult.

---

[71] A similar study was conducted by Thakur et al. (2010), except that the Recommended Management Practice (RMP) in this case called for ten-day old SRI and 21-day old RMP seedlings.

At the same time, critiques of BMP and SRI interpretation do not correspond well either to the claim of interpretative flexibility, given the specificity of the critiques made (improper spacing, not practicing AWD). SRI advocates are caught in a double bind: A scientist at the Water Technology Centre (WTC) in Bhubaneshwar called for a standardisation of SRI according to location-specific characteristics in an interview[72], but a common understanding of SRI - if achieved - may collapse some of the differences between SRI and BMP. While this reasoning perhaps lends credence to the frustration of dissenters who are unhappy with their inability to pin SRI down to a readily recognisable set of practices, it also lends credence to the need to call for location-specific research to make it more meaningful. Apart from the incommensurability of SRI versus BMP evaluations, the BMPs reported in different papers are not comparable either, since they may or may not be specific to the site where the study is conducted, often being recommended at an all-India/national level. To make the studies more relevant in general would require that both location specific BMPs and SRI practices be evaluated.

At a larger level, BMP versus SRI studies succumbed - even if unintentionally - to the productivist paradigm. Rajeswari Raina has argued that the epistemology of the product is entirely different in the SRI paradigm than that of conventional methods, given its focus on soil, the weight of the root, and systems productivity more generally[73]. The fault of SRI advocates, she argues, has been to subject themselves to the yield-dominant paradigm of

---

[72] Interview by author. Transcript. Bhubaneshwar, August 6, 2015.
[73] Rajeswari Raina, personal communication, Delhi, September 23, 2014.

crop production in studies that counter dissenters, while simultaneously making

arguments elsewhere for a more holistic, system analysis of agricultural production.

Due to a perhaps unintentional focus on yield, members of the SRI group (loosely

defined) have worked hard in sometimes contradictory ways to facilitate the spread of

SRI. Their work has been countermanded by SRI's tenet of interpretative flexibility as

well as the research establishment and research practice. Despite this, SRI has made

tremendous inroads in certain parts of the country, and has captured the imagination of

much of the development sector. In the section that follows, I will consider the

"coordination" that has allowed for this success.

Coordination and Performance

In her work on atherosclerosis, Anne Marie Mol (2002) makes mention of the

coordination work that (members in) different spaces - the pathologist's laboratory and

the doctor's surgery - have to perform to enact atherosclerosis. Mol takes a different

approach to her analysis of how atherosclerosis comes to inhabit different meanings and

forms in diagnosis than does the common discourse surrounding SRI. Rather than employ

the framework of interpretative flexibility, Mol describes it as a form of enactment. I will

return to the usefulness of enactment as an analytic to understand the practice of SRI in

Chapter Four. For now, I want to outline the "coordination work" or "choreography"

(Cussins 1996) performed in the SRI network.

In a choreography, different actors perform different roles as is deemed acceptable. The location of the SRI debate - since it has become a debate and controversy - within the agricultural sciences has precipitated boundary work. Boundary work is conducted not just by individuals, but also by professional groupings and associations. Gieryn (1983) has laid out the parameters for who might legitimately participate in the evaluations of a science – here SRI. Even Uphoff, though he commanded a great deal of respect from SRI advocates, was bracketed outside the confines of the scientific community by a scientist with the Govind Ballabh Pant University of Agriculture and Technology (GBPUAT):

> Research on SRI is being conducted by those persons who are not technically sound. They just talk about SRI. You know Uphoff. Actually he is also a social worker. He is a political scientist. He has an interest in continuing his NGO work. Because of this SRI has become popular around the world. (Interview by author. Transcript. Pantnagar, September 29, 2015.)

Recognising the critiques that were to head their way - which began early on in the SRI story - advocates of SRI sought to redraw the lines of participation[74] to increase the acceptability of SRI as a scientifically cognisable method of production. Early on, some realised the need for publications in high quality journals. Many Malagasy and IRRI scientists located in the area were reported to have been incredulous about the yields claimed in the early years. Efforts were therefore continuously made to get *agricultural* scientists from the mainstream research centres to get involved[75].

---

[74] Formerly attributed largely to local farmers apart from Laulanié.

[75] The tireless work of Norman Uphoff - who in India itself has met with high ranking members of ministries as well as eminent scientists such as M.S. Swaminathan - played a critical role in jumpstarting the process of spread.

Dr. B.C. Barah, for example, is an accomplished economist formerly with IARI who has devoted much of his time towards the spread of SRI in different forums. But by virtue of being an economist, his identity as *social* scientist was insufficient to fully legitimise his views on the science of crop production (though Barah has been instrumental in garnering a great deal of support for SRI both within and outside the establishment). Consequently, advocates spent time cultivating the interests of agricultural scientists.

Engaging scientists has always required great effort, and stories of "converted" scientists bolster the acceptability of SRI. Their inculcation into the fold has been the outcome of the specific efforts of different sets of SRI actors to bring them on board because of the epistemic validity their identities offer. One example is Dr. P.S. Bisht, a now retired scientist from GBPUAT, who was unenthused and sceptical about SRI when he first heard about it. A study conducted by the university found the claims about SCI's increased yield to be untenable. However, the People's Science Institute (PSI) in Dehradun reported a different experience with SRI. After including 10,000 farmers in their project, the management realised that scaling up the method would require government intervention. Intervention was likely to be acceptable only if recommendations were made by the university. PSI then chose to form a Programme Advisory Committee (PAC) that would visit field sites every six months and provide inputs about the functioning of the project. After two years of witnessing SRI on the ground, P.S. Bisht "converted". A similar story is told of Dr. Shiva Dhar Misra, a principal scientist in the Agronomy Department of the Indian Agricultural Research Institute, who undertook SWI trials, but only became convinced about SWI's validity after the second

year when climactic fluctuations laid waste some trial plots even as the SWI crop

remained upright. As a member of an NGO engaged in the trials candidly admitted,

> Misra took it on. Best part is now he is champion of SRI. He is writing papers,
> deliberating on SRI. Within the scientist community, which we actually wanted.
> We wanted someone to speak on science of SRI. Dr Barah was part of IARI but he
> was not a scientist. Misra is a senior scientist. (Interview by author. Transcript.
> Delhi, November 7, 2014.)

More generally, when the National Consortium on SRI (NCS) was formed, it was set

up to focus on research policy and practice. The research aspect was to be taken care of by

scientists from different parts of the country and different recognised institutions, an

alliance of the "hard" and "social" sciences[76].

The inclusion of agricultural scientists in the network attended to the question of

boundary work around "science", "non-science" and "nonsense"[77]. Scientists such as IRRI's

Dobermann were unhappy about the seeming disregard SRI advocates had for newer

technologies. Speaking of SRI after the Sumant Kumar story spread, he noted,

> The apparent attraction of SRI and similar agroecological movements is that they
>
> seem to suggest that large yield increases could be achieved by the poorest farmers

---

[76] The NCS reiterated and consolidated the many inter-weaving threads of issues highlighted by different actors and groups within the fold. A statement of their recommendations includes the following: "The National Consortium on SRI through a series of dialogues with NFSM, ICAR, IARI and the Planning Commission recommends the following for a pro-active policy that recognises the potential of innovations such as SRI for three policy pivots focused on (a) food security (at household and regional 2 levels with implications for poverty reduction), as (b) a much needed input and possible strategy for furthering irrigation sector reforms in canal and borewell irrigated areas experiencing high levels of water stress and conflicts; and (c) ensuring sustainability of stressed rice ecosystems with focus on ensuring sufficient soil biota to revive soil health. While these pivots have differing objectives, geographical locations, actors/ departments, programs to be converged and research needs, the extension requirements are common requiring knowledge, capacities and action that are location specific" (Sanghi and Prasad n.d.).

[77] See "Curiosities, Nonsense, Non-science and SRI" by Sheehy et al. (2005).

of the world just by paying a little more attention to managing their fields: no need

for biotech, no need for chemical inputs, no need for big machines, no dependence

on multinational companies, etc. (Dobermann n.d.).

Though many speak out against Green Revolution technologies, SRI advocates are not

uniformly characterised by an antipathy towards "modern" science. Rajeswari Raina, a

scholar of science and technology, indicated a need for involving plant breeders, though

her concern was prominently with doing things differently so as to get dissenters to bite[78].

Norman Uphoff has also suggested that even genetically modified (GM) seeds may be

compatible with SRI – even if SRI makes the need for GM seeds irrelevant[79]. In informal

conversations I had with others, especially those outside the research establishment, it

became clear that a suspicion of current day agricultural science persists.

At the same time, what constitutes science remains contested, and competing

narratives exist side by side. Practices relating to the treatment of seeds with cow urine

and cow dung, as well as the use of panchgabya remain contested. The CRRI scientist

spoke of seed sowing practices and remarked,

> And then cow dung and they are claiming... because it is an emotional thing for the
> farmers also. And for NGOs also... It's mostly from some ancient times some books
> they are collecting some literature. That's what I... in Kanpur there is some
> organisation doing research on this cow urine but they are not looking at the
> scientific thing behind it. I don't er... I don't find anything. There should be a

---

[78] Personal communication, Delhi, 23rd September 2014.
[79] See "The System of Rice Intensification: Responses to Frequently Asked Questions" by Norman Uphoff, available online at http://sri.cals.cornell.edu/aboutsri/SRI_FAQs_Uphoff_2016.pdf

scientific mechanism before that. (Interview by author. Transcript. Bhubaneshwar, August 6, 2015.)

Shiva Dhar Misra, while doubtful of its effects, included farmer practices in his trials. His SWI trials included seed treatment with cow urine and fertilisation with panchgabya[80] in an effort to replicate the practice of SWI as articulated by the groups he has worked with faithfully. Acceptance of these elements within the scientific establishment is another question altogether.

What has also become relevant to the debate on the science of SRI is the interpretative repertoires of different scientists. Willem Stoop (2011), for example, has argued that principles left out by intensification paradigms (soil, organic biota, roots) are important to the SRI question. The focus on soils, especially, is increasingly becoming a primary focus on research on SRI. A sub-group formed to address questions of technology in the Twelfth Five Year Plan located SRI's higher yields in root growth and activity, canopy development and light utilisation[81]. While the social and ecological aspects of SRI along with a call for a "knowledge, skill and management centric approach" as opposed to an "input centric approach" were important in the discussion of new cultivation practices, science "from the margins" (with soil science and farmers constituting the margins) was a cornerstone feature of them.

---

[80] An organic manure. For more details see Chapter Four.
[81] For more details see the minutes of the Round Table Discussion, found online at http://www.sri-india.net/Round_Table_Discussion/Documents/DrShambuPrasad_NCS.pdf

Ironically, SRI advocates also held the same interpretations of IRRI research and its regard for science as did dissenters. T described IRRI's reluctance to promote SRI as being unscientific:

> In their experience it (SRI) doesn't work, it doesn't spread, so it doesn't give so much benefit, it is very difficult, labour intensive, all those sorts of reasons. But none of them are scientific reasons. (It's) just because they have issues... it (SRI) hasn't come from them. They have research. They have organised trials and all that. With varied kinds of results. Some good some bad. We don't know what they did and how they've done... we don't know much." (Interview by author. Transcript. Hyderabad, December 30, 2014)

I would argue that the ability of this advocate to dismiss IRRI's stance on SRI is at least partially the outcome of a very sophisticated intellectualising of the debate. Though science and scientists dominate the discussion on SRI and its' in/validity and spread, arguably what has allowed SRI to proceed is the productive role that social scientists versed in the field of Science, Technology and Society (STS) studies have played in its dissemination. The framing of the System of Rice Intensification as being "interpretatively flexible" lends it a degree of theoretical sophistication removed from the "science" of the debate and unavailable to treatments of other agricultural methods. Much of the social science oriented writing on SRI emanates from Norman Uphoff, scholars at the Wageningen University (including the work of Dominic Glover (2011) and Harro Maat, and Gathorne-Hardy et al. (2016) amongst others). In India, scholars such as Shambu Prasad (formerly of the Xavier Institute of Management (XIMB), now at Institute of Rural Management Anand (IRMA)) and Debashish Sen (People's Science Institute) have also written prolifically on the topic.

Unlike in the genetically modified seeds debate where social scientists (amongst many other groups) have worked to challenge the claims of genetically modified seed technology, in the SRI debate social scientists have worked constructively on a number of fronts[82].

One, they have critiqued existing frameworks of agrarian change to destabilise standard positions[83] while building a case for SRI. This has included a critique of not just technologies, but also the methods of their propagation and the trajectory of the discourse and its politics. This deviates from existing patterns of technology dissemination, where dissemination has largely been concentrated around mainstream channels, including research and extension spaces.

Two, they have positioned SRI along multiple axes. While in the initial days SRI was promoted as a method of water conservation and later yield, in recent years it has been receiving attention under the rubric of climate change conservation technologies, being touted for being "climate-smart agriculture", reducing greenhouse gas emissions. It is also of course positioned as an agroecological method of cultivation. These are not new discourses within the SRI fold. What is important is the positioning of the SRI discourse alongside these events and discourses that have found acceptability amongst mainstream organisations, including of course some of those of the CGIAR that espouse similar aims[84].

---

[82] I recognise here that many of these actions are not always concerted efforts, and sometimes are the happy outcome of individual yet linked efforts in a network.

[83] For more on the role of social scientists intervening in controversy, see Martin (2016) and Zuiderent-Jerak (2016).

[84] Barry points out that the specific focus of a controversy is not sufficient in an analysis of it, but must be positioned in relation to what he terms a "moving field of other controversies, conflicts and events, including those that have occurred in the past and that might occur in the future" (Barry 2012).

Arguably, the acceptability of *what* is SRI hinges on the acceptability of *why* SRI. Coordination work has to bridge both arenas to work.

What is also significant about their contributions is that research is not just conducted *on* the SRI debate, but also *for* it. Debashish Sen of PSI, for example, decided to pursue doctoral research on SRI because of his experiences with disadoption in project activities he was involved with. Both Sen and Prasad are active members of the NCS, contributing towards its development both in terms of advocating for expansion of the coverage of land under SRI, but also making sense of its social practice for a wide audience.

Though Shambu Prasad's work for example, is written in the STS vein, it is accessible to a mixed readership[85]. Prasad also notably performs the critical work of translating how the discourse around SRI has evolved. At a presentation[86] made in New Delhi at conference, for example, Prasad traced how from the early phase between 1999-2003 when SRI slowly began to spread, the discourse shifted during the "rice wars" of 2004-2008 between Uphoff and other advocates and IRRI scientists[87], to the debate in 2009 about socially constructed controversies, and finally to a realignment of the focus on science in SRI, focusing on "science from margins" and "creative dissenters", so far ignored by rice scientists. Of particular interest were the Rice Wars of 2004-2008. Through an analysis of the time taken by the journal that published these papers - Field Crops

---

[85] See Prasad (2016) and Prasad and Basu (2005) for example. The CGIAR has however, often been *perceived* as being uninterested in issues outside the strict domain of agricultural sciences (such as environmental and social issues) (Feldman, Biggs and Raina 2010), a view held by many in the SRI fold. This is true of perceptions of the Central Government of India as well.
[86] See Prasad (2014).
[87] See Sheehy et al. (2004), Sinclair and Cassman (2004), Sheehy et al (2005), Stoop and Kassam (2005), Mcdonald et. al (2006), Stoop, Uphoff and Kassam (2008) and Mcdonald et al (2008).

Research - Prasad indicated the asymmetry in time taken to review and accept papers challenging SRI (ranging from six days to four months) and those in favour of it (ranging from three to six months). Prasad went on to demonstrate how a socio-technical study conducted by Wageningen University changed the contours of the debate, even as the "technical debate" died down with dissenters no longer choosing to address questions of science. Interestingly, scientific research on SRI then began to emerge from the "margins", with China and India contributing 63 percent of all research (between 2000 and 2013), and India itself contributing the most after 2007. In his presentation, Prasad demonstrated how 35 papers could be categorised as good going by the National Academy of Agricultural Sciences (NAAS) science journal rating system[88]. While validating the contribution of research papers on SRI, Prasad also went on to outline the institutional contours of research and the need for different sections of the National Agricultural Research System (NARS) to invest in and coordinate SRI research.

   With this and other presentations, Prasad performed synthesis work, helping make sense of how the debate had evolved and how scientists (present at the conference) could position themselves within this debate. Prasad also highlighted the politics of the debate, a David and Goliath theme that has resounded in other descriptions of it. An interview I conducted with T shed light on what is commonly perceived to be the view and practices of certain mainstream international research and development organisations.

   T: The research establishment is negative. No doubt about it. Except Tamil Nadu.
      And Tripura. Rest of the departments take a negative view. ICAR takes a

---

[88] The highest score attainable is 20.

negative view. Other (thing is) they're forced to take a negative view because in several international publications SRI is not allowed to be mentioned.

Natasha: Is not allowed to be mentioned?

T: FAO publications. So the recent publication...after lot of lobbying

Natasha: There was one sentence or something?

T: One sentence. So that's the kind of politics behind it.

Natasha: But why is it not allowed to be mentioned in a research publication? I mean that doesn't... who stands to lose from this?

T: They think they should not acknowledge SRI... because if they acknowledge SRI then... See there's this issue of science and all this nonsense. I don't know what it is. Basically there is this strong CGIAR lobby. IRRI. IRRI doesn't want to talk about any of this... I tried to bring them and integrate their what is it called alternate wetting and drying, their technology into SRI... Lot of resistance at IRRI. IRRI is the problem. If IRRI acknowledges then I think everyone will come. You will see at least double the literature about SRI.

Natasha: So one organisation can hold the whole thing up?

T: IRRI is basically holding the world against SRI.

Natasha: But what about the last Rice Congress[89]?

T: Rice Congress is hardly anything. You have to do a lot of lobbying to get the SRI papers. SRI papers are not very much represented. And the structure of the conference is itself like that SRI cannot be presented anywhere. I'm not saying they structure it to keep out SRI, but it's not an integrated view na if they compartmentalise everything so much. Now days there were some papers but not many. Last conference had many papers than this conference.

Natasha: So there's a fall in the numbers. Because I mean three or four people from India presented. So I mean that's just a India presence I assume other countries…

T: Other countries also presented a bit, but not much.

Natasha: So then there's a shift in topics...the topics must have been shifted to whatever their current concerns are. OK. I didn't know you're not allowed to mention SRI in publications… (laughs)

T: See they speak *very* carefully about it. If they mention it they mention it camouflaged into something or mention it in a negative tone.

Natasha: Uh huh. But I thought FAO had some degree of independence from the CGIAR?

T: No.

Natasha: Not at all?

T: Ultimately these are the people who vet, they're in committees and all so it will go through their desks. (Interview by author. Transcript. Hyderabad, December 30, 2014)

---

[89] An IRRI sponsored conference.

While T invoked politics and interests as a source of the boundary work being conducted, we have already seen that ideas of what constitutes "science" and knowledge offers one explanation for it. We also see that despite this alleged reluctance to include SRI in its spaces, a number of researchers did present their work on SRI at a large and important conference - no small feat. The reluctance of different groups - including the state - notwithstanding, SRI has made significant inroads into major development projects in India. Smaller projects apart, Jeevika (or the Bihar Rural Livelihoods Programme) is a 73 million dollar project being implemented by the government of Bihar, funded by the World Bank (a donor frequently viewed with suspicion in some circles). The International Fund for Agriculture and Development (IFAD), the United States Agency for International Development (USAID) are some of the other large, recognised organisations that include SRI in their project plans. This in itself is testament to the concerted efforts of a very motivated group to spread the method.

Epistemological Concerns, Gender and Technology

Wajcman (2000) points out that the standardisation of a technology requires that the experiences of those that are not standard be nullified. These may include women farmers as pointed out in Chapter One, but also all other categories of seemingly non-standard and non-consequential actors. How do we gender our accounts of the epistemological trajectories of technologies to pay attention to who and what is included and left out?

One strand of thinking argues that the different forms of patriarchy inherent in the functioning of Big Science perpetuate this very same patriarchy in the formulation and propagation of a technology- whether in terms of discovery/invention or practice. Chadha and Achuthan (2017) argue that the absence of women and other marginalised groups in the pyramidal structure of science indicates the social hierarchies both within science, as well as what science reproduces. Consequently, we usually find men, generally belonging to the upper castes in science-based institutions of eminence in India. The SRI network is not very different – or for that matter, the Indian agricultural research institutions. At the 2014 SRI conference in Delhi, one of the first things I observed upon settling into my seat was how few women were in attendance. Perhaps that is why the so-called softer or subjective elements of SRI have found scarce mention in the discourse, despite the admission by many that the number of adopters in many parts of India are falling. One noteworthy exception is the work of Sabarmatee Tiki, a PhD scholar at the Wageningen University who conducts research on SRI in Orissa. Her work has focussed on the bodily implications for using SRI. She has found that the smaller nursery sizes, smaller plants (as transplanted seedlings are younger than those in the conventional method), less exposure to the elements, in the case of organic SRI entails lowered risk of exposure to chemicals have all contributed to higher bodily well-being amongst those (largely women) engaged in these operations by reducing the risk of infections and the severity of pain (Tiki 2015). Tiki's work is exceptional, not just in terms of its content, but also its focus on aspects of SRI's implementation that are largely unexplored, and that do not enter the imagination of most purveyors of a technology. This brings me to my

second concern, that the general epistemological pre-occupation with the method rather than the people who practice it precipitates a research focus on the more "objective" elements of a technology. Not paying attention to people is in itself a gendered way of looking at a technology, given the focus on what appears to be easily controllable and consequently masculine.

The bias in science towards men by sheer virtue (to begin with) of their occupation of the spaces considered to be "big science" may also negate the more mundane considerations of "routine science" (Wajcman 2000, 453), in this case technology (or "method") users, extension workers, other sources of cheap, "unskilled" and expendable labour. Casper and Clarke's (1998) study of the pap smear diagnostic tool widened the usual lens of analysis to include the women "downstream". They argued that the gendering of the low paid work of cytological screening contributed to the mainstreaming and standardisation of the pap smear method. By including the women who conducted examinations in their analysis, they were able to chart the trajectory of the method's acceptance, a trajectory the technology itself would not have accounted for. Casper and Clarke make what may seem an obvious point – that taking into account actors who do not seem relevant initially may have an "analytic payoff" (Casper and Clarke 1998, 278).

Many actors in the SRI discourse push back against rigid, positivist conceptualisations of science and who may engage in it by intentionally according special value to the knowledge making practices of farmers. In these accounts, the validity of science hinges on the relationships between science actors and farmers both of whom may theoretically

form part of a network. Farmer trials and experiences feature prominently in informal and journalistic accounts of the method. But farmer standpoint/s do not figure in spheres of influence – in the writing, analyses or at public meetings - except as voices from and still at the margins. This is partly because scientists and other scholars must constantly negotiate academic spaces that privilege particular forms of "rigour". These plural positionalities do not always allow for a harmonious co-existence between different political and ideological objectives. Also, as I pointed out in Chapter One, the farmer remains an abstracted category, often with insufficient appreciation of her intersectionality. With gendering being encoded both in the design of technologies as well as their propagation, there is a need for a feminist study of science to make visible these spaces and practices.

Conclusion

In this chapter I have traced out the manner in which SRI has come to be known as a method of production that is fixed yet mutable, diverging in some ways from its "origins", but emerging consequently as a "postmodern" method born of current day concerns. I have also located research on SRI at the confluence of epistemologies, interests, politics, discursive paradigms and science, strategically co-evolving with developments in the field of agricultural science and practice. Of particular interest has been the framework of

interpretative flexibility, the maintenance of which is a choreography performed by actors across the spectrum.

I have shown the so-called interpretative flexibility of the method to be both SRI's strength and downfall. It seems to falter as do Best Management Practices when juxtaposed against each other. But this analysis also reiterates what SRI advocates have long called for - localising research on it, and texturising the method by bringing in science at and from "the margins".

Would SRI be any less controversial if it were *not* described as protean but rather as fixed and immutable? Would it lead to outright rejection? Would the state accept it more if it were accepted as being a BMP by the SRI group? I can only conjecture at this stage. But I cannot but help raise the chicken and egg question: does interpretative flexibility allow for variations in practice or do variations in practice precipitate the invoking of interpretative flexibility? While not necessarily questioning the general paradigm within which SRI is situated, the question of how practice may shift or infringe on the enactment of SRI is pertinent to the design of research experiments and the general articulation and evaluation of SRI. And it is to the practice of SRI (or SWI, as it were), that I now turn.

Chapter Three
The Spatialities of Uttarakhand's Development Trajectory

Introduction

Over a period of 48 hours in June 2013, Uttarakhand experienced what appeared to be unprecedented rainfall in multiple parts of the Himalayan state. Many areas experienced cloudbursts that caught people and whole villages unawares. The events were cataclysmic. Thousands were washed away; some were found as far away as the banks of the Ganga in Uttar Pradesh. The number of lives lost was disputed, though official figures pegged the number of missing people presumed dead at 5700 (The Indian Express 2016). Many perished trying to ascend steep mountain sides to escape the deluge of water coming their way. Bridges, dams, statues of gods, all fell to the rain.

Heroic tales of daredevil rescues by the Indian military splashed over the frontpages of national dailies added an extra element of the spectacular to an area that has been captive to romantic idealisations of pristine, virgin beauty. Anyone who has traversed its landscape is likely to have fallen under the majestic spell of the grand mountainscape, especially as she nears its grander countenances. Nandakot, the home of the Hindu goddess Parvati makes shy appearances at different points of the Kumaon Himalayas as

you make your way down the road that snakes its way through the terai into the Middle and later the Greater Himalayas. Travel brochures inviting residents of the "plains" to Uttarakhand are quick to highlight its lofty and mystical charms. But in the absence of "development" work as it is popularly understood, life is becoming increasingly difficult for residents of the state, and a number of factors threaten disrupt its outwardly seeming idyll.

Uttarakhand has never been a hub for development work in general, though a number of prominent organisations working on environmental issues such as Chirag, the People's Science Institute and Aarohi have a longstanding history of work in the area. Its mountainous terrain ensured that it was largely neglected by the state machinery in the years following India's independence. Since the state's early days after the region achieved statehood, the prominent development agenda was that of hydropower, manifested in the Tehri dam. The opposition to the Tehri dam, led in part by Sunderlal Bahuguna who was also one of the faces of the Chipko movement cemented a growing if dispersed trend of ecological activism. The specifics of the terrain of Uttarakhand - unstable and mountainous - alongside a specific history of extraction initiated by the British and faithfully continued by the Indian state precipitated the establishment of non-governmental organisations in the state.

Environmental destruction is a steadily growing phenomenon, sometimes visible to the untrained eye when it takes the form of a massive landslide, and sometimes less easily deduced when inches of a farm plot adjoining a river gets washed away every year. The

twin concerns of forest destruction alongside the proliferation of hydroelectric plants has meant that Uttarakhand's 'anti-development' manifesto turns on the environmental question (as perhaps increasingly do most or more and more development questions today). A history of migration from the area since the British conscripted men into the army has meant that livelihoods eked out from the land and forests have long since been supplemented with cash incomes. A rapid rise in migration rates in recent years has engendered an agrarian regime in flux. While migration has poorly impacted agricultural practices, it has paradoxically facilitated the spatially limited expansion of forest cover, owing to the changing subjectivities that social and economic remittances have sparked.

In this chapter I will trace the fragile and tenuous relationships between the environment, people and state and non-state development projects in the rapidly transforming state of Uttarakhand, keeping in mind their implications for agriculture. First, I look at the inequality in the spatial development of Uttarakhand, paying special attention to the constellation of colonial and state power that is responsible for the underdevelopment of the mountainous regions of the state. Next, I look at the changing landscape of the state, paying special attention to forest spread and composition, as well as the effects of climate-change on mountain environments and livelihoods. I focus primarily on the natural context of the Parvati Valley where the Uttarakhand Livelihoods Research Project (ULRP) is based, to lay the groundwork for a more detailed discussion of the conceptualisation and functioning of the ULRP in the chapters to follow. Finally, I draw from the theory laid out in Chapter One as well as Arun Agrawal's well-known conceptualisation of environmental subjectivities to briefly point attention towards some

aspects of subjectivities - primarily the mediating influence of religion. I do not however suggest that this represents all inhabitants of the mountains, but merely highlight the (sometimes manufactured) intersection of religion and the environment.

Uneven Development

While the productivity of most crops grown in Uttarakhand is low, the geographic specificity of the mountains offers climatic conditions that makes them suited to vegetable and fruit farming (unlike foodgrain cultivation). Higher altitudes tend to be cooler than lower altitudes, and temperature differences at different points in the season make it possible for crops like tomatoes to be grown in the mountains when they are not viable in the plains (assuming soil and slope conditions permit). Despite these spatial and temporal logics, agricultural production in Uttarakhand is noticeably unevenly distributed, with the plains exhibiting much larger areas under cultivation, and a markedly different acceptance and usage of "modern" technologies.

In Chapter One I have already discussed the affective relationships residents of the mountains regions have with the plains. Here I would like to briefly comment on the specificities of the historical and political landscape on which these relationships are built, looking at it through the lens of agriculture. Pahadi representations of the terai today lie in direct contrast to Jim Corbett's description of it as an area inhabited by "forest-dwelling tribals, free-roaming dacoits... and beleaugured cultivators" (Strahorn

2009, 19). Not to mention more famously, the "man-eaters"[90] of the region. The terai of the past was an "exotic" area, hardly associated with development. When the British arrived in the area that is now known as the southern part of Nainital district, they found it to be uninhabitable, infested with malaria and wild animals. Barring two tribes, very few groups occupied the area. If they did, it was solely in the winter months. Finding it in their interests to clear out the vegetation and get rid of the swamps, the British regime continued onwards to transform the region into a site of productivity amenable to resource extraction. This pattern was continued by the Indian state in the post-Independence era.

Strahorn (2009) draws our attention to three factors that sped up this process. First, in 1944, the swamp, wasteland and barren land was offered to demobilised soldiers from the army, in the hope of containing social unrest. Second, a Grow More Food campaign was launched in the 1950s, bringing areas of the Uttar Pradesh terai under programmes that encouraged better farming practices including the distribution and use of "better seeds", the use of irrigation, demonstration of agricultural machinery, and expansion of area under cultivation. Third, Sikhs and Hindu refugees from Pakistan arrived in the area post Partition in 1947 and were settled in the region.

The change in the physical landscape of the terai-bhabar - from that of malarial, uninhabited swamps to the cleared out cultivated regions - engendered representations of new cultural landscapes that persist today. G.B. Pant and others expressed an interest in

---

[90] Tigers.

improving and modernising the government estates in Nainital. At the same time, specific

efforts were made to promote the cultivation of certain fruits in the area. Apple

cultivation - one of the fruits the region is famous for - has a very long history in the area

(Tripathi 2008)[91]. British residents in the area and Christian missionaries introduced new

varieties of apple cultivars when they planted them in their kitchen gardens in the 1850s.

The first apple orchard was set up in Ramgarh, and orchards were later set up in other

parts of the state. Apple production in Nainital district distinguished itself from apple

production in other regions in the state because of a well-developed road and rail

network that gave impetus to area under coverage. In the Ranikhet area of the district, an

army cantonment area ensured a steady demand for the apples.

Demand was matched by institutional support. With the spread of orchards, the

British government set up a Hill Fruit Research Station in Chaubattia, Ranikhet in 1932

that continued to serve the area post Independence. These stations were aided later with

the establishment of stations at Jeolikote (Nainital) and Srinagar (Pauri Garhwal). In 1953,

a Directorate of Fruit Utilisation was established to enable the growth of horticulture in

the region in the form of fruit belt, especially alongside roads. The first fruit belt was

developed on the newly constructed Mussorie – Chamba road in 1964. Its success spurred

the spread of fruit - and especially apple - cultivation, with 35 new belts being set up in

other hill districts. In 1976, the G.B. Pant University of Agriculture and Technology,

Pantnagar started a hill campus at Ranichauri (Tehri Garhwal) to promote the cultivation

---

[91] This section borrows heavily from Tripathi (2008).

of apple and other temperate fruits. In the 1980's, the Directorate of Horticulture (Hills) was established in 1980's with its headquarters at Chaubattia (Ranikhet).

Figure 1: Map of Uttarakhand in India
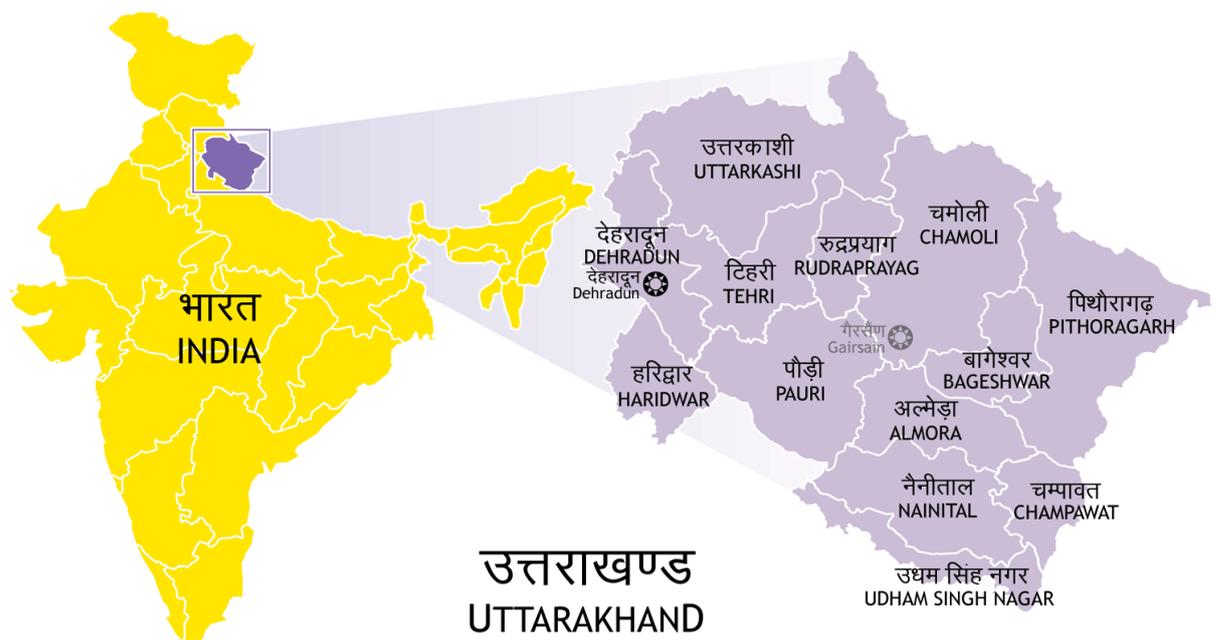
Source: TehriGarwhal Online

Previously feared terrain was cultivated with fruit orchards when large swathes were deforested and the land distributed to different groups[92]. Land consolidation was effected and similar varieties grown next to each other to make monitoring easier. Mobile teams

---

[92] According to an Agriculture Development Officer (ADO) currently based out of Bageshwar, but previously in Nainital.

comprising a supervisor, an inspector, revenue department staff and labourers oversaw the functioning of the orchards, a much higher level of involvement of the state than is currently known in the region. Processing facilities were set up in places like Ramgarh in Nainital District, reducing post-harvest loss attached to fruits like pear[93].

As with the terai region, political and administrative machinations laid upon Nainital's geographical landscape a cultural landscape, that of an area abundant with fruit orchards. The long history of commercial and state supported fruit cultivation in districts like Nainital (parts of which have been labelled the "Fruit Bowl of Kumaon") stands in stark contrast with other regions of the state where fruit cultivation did not receive this impetus, despite residents growing a variety of fruits such as peach, plum, apple and walnut. A specific pattern of development has had an accumulative effect in this area, whereas development projects in other areas have tended to be spread out. Though away from the main seats of power, Nainital's[94] proximity to the region ensured that it remained in the eyes of the administration.

Much like Himachal Pradesh, apple cultivation in the area has acquired a near-mythic value, even as fruit belts are now shifting upwards as mean temperatures rise. Unlike the plains where agricultural development work was undertaken as part of the state-making

---

[93] Ramgarh has attracted interest in fruit processing since 1920 when Norman Gill (a horticulturist and botanist who was Superintendent of Kumaon Government Gardens at Jeolikote in Nainital) persuaded the Indian government to contribute Rs. 8000 towards setting up a fruit processing facility. This plan did not come to fruition as the machinery could not be imported from the US (Shah 1996). Gill's premature death in 1922 meant that much of his intended work could not be carried out (Shah 1970). In 1955, a processing plant was set up by the Directorate of Fruit Utilisation UP Hills, but had to be shut down in 1970 because of poor management (Shah 1996).

[94] Nainital falls in the bhabar region. The bhabar begins in the southern part of Nainital district and extends south of it to continue into the terai.

and later to further it, many parts of the hills of Kumaon (and Garhwal) remain the terai's "dark twin" (Scott 2009, 326). These areas of the state have not fared as well in terms of colonial and government intervention. Bageshwar for example - where one project site is located - is symptomatic of uneven geographical development in the hill districts of Uttarakhand arising from poor prioritisation in government planning with respect to agriculture as well as development work in general. A few eastern districts in the Garhwal region received some funding for community development and to set up a few village-level cooperatives in the first and second Five Year Plans (1951-55, 1956-60). In recent years attempts have been made to institute and implement "chakbandi" or land consolidation[95] - the absence of which many residents hold to be responsible for a decline in interest in farming - to little effect so far.

The unevenness in development continues today, and is reflected in production figures. After three decades of little growth, in 2005-06, the share of horticultural crops in agricultural production grew by twelve percent, consequently reducing the share of cereals and pulses. The contribution of horticultural crops to the Gross Domestic Product (GDP) of agriculture, 0.58 percent in the year 1952-53, rose to 18 percent in 1991-92 (and later to 30.4 percent in 2007-2008) (Tuteja 2013)[96]. Productivity rose from 2.8 to 4 for fruits and from 10.8 to 11.5 for vegetables respectively between 1991-92 and 2013-14[97] (ENVIS Centre on Himalayan Ecology 2015). The obvious implication of these figures is

---

[95] See Sharma (2015).
[96] Amongst fruits, mango, banana, papaya, pomegranate, sapota and gooseberry registered the highest contribution. Amongst vegetables, onion and potato had the largest area under cultivation followed by aubergine and tomato.
[97] In Metric Tonnes/Hectare.

the increase in farming income overall. There are however, variations in which districts exhibited higher levels of area under fruit production and output than others (such as Dehradun, Almora, Pauri, Tehri and Nainital). In terms of vegetable production, in the period 2010-11, Dehradun, Tehri, Nainital, Udham Singh Nagar districts far exceeded the others in terms of area under vegetable production[98].

The plains symbolise the success of the developmental state and are the place of progress, whereas the mountain areas of the state remain decidedly less so in the public and official imagination. A history of state neglect has contributed toward an outward orientation of the subjectivities of mountain residents. Though never exemplary, the further decline of village-based education that exists alongside a strong institutional state presence has meant that residents are also aware that "money makes everything possible" (Sturgeon 2011, 207) and leaving the mountains is the only choice available. It is in this context that we must examine the materialities of the current situation of the *pahad* and its residents.

Changing Landscapes

Sometime towards the end of January 2015, I happened to be in Bhadkot when I chanced upon a "party" of four women heading to the forest to collect firewood. Laughing, they suggested that I join them. Still relatively new to the area, I agreed with some trepidation.

---

[98] See Gunwant (2012).

I wasn't sure how steep the path would be, and whether I would be called upon to participate in the felling of trees or lopping of branches. My participation in agro-forestry activities so far had been limited to sowing wheat and cutting grass for fodder. While appreciative of the usefulness of such skills, I was not particularly enthused about this kind of participant observation. Ethnographic accounts of participant observation that involve hardship sometimes come close to glorifying both the hardship and the researcher. After half an hour of attempting to cut grass on a steep hillside under a hot sun with a blunt sickle, there is little glamour and/or glory left in the mind of a researcher. Instead, I was pressed to re-examine why pahadi women were still being forced to engage in such activities that causes many of them to lose their lives when they lose their footing.

This particular journey was not eventful in that sense. We walked down the village path from Bhadkot to the main road, and then walked a half kilometre ahead to a path snaking up the hillside. We then proceeded to climb up, scrambling over bushes and mud over a roughly hewn path. After fifteen minutes of climbing, we arrived at a small clearing. The women sat down in a circle, and begin to chat about their lives. Shortly after, three women headed further up the slope, cautioning me not to follow them since the overhanging dry grass had made the path difficult to navigate. Instead I sat down and watched Sita Devi climb up a ten-foot high tree that curved outwards and over a sheer drop at a 45 degree angle. Slowly and surely, she hacked at its branches. Neighbouring it but rooted in the hillside 30 feet below, was a vertical pine tree, stripped of all its branches by someone preceding us. Once the women's work was done, we headed back.

While loading the firewood into their backs, one woman sighed audibly, looking unhappily. She was troubled by their cutting down of "green" branches. Another woman snorted dismissively, saying "so what"? Clearly there was no one type of human-environment relationship that could said to characterise the area[99].

Just before we reached the road, the women suddenly started murmuring nervously and slowed down. "*Bahman! Oouija*!"[100]. Two men who taught classes in the *Shishu Mandir*[101], dressed in stark white clothes and the familiar markings of Brahmins passed by on the road. They stopped when they saw us. The Brahmins asked who was taking *kacche lakdi*[102], and half-jokingly threaten to write to the *pradhan* of Bhadkot. One man told the women that they were destroying the forest. The women slipped by laughing, and hurried forward. Later I was told that the forest belonged to Bangaon, the village the Brahman men are from, and that residents of Bhadkot were forbidden from accessing it. Enforcement of this rule by Bangaon's *van panchayat* is not strict however, and since residents of the Brahman dominated hamlet of Bangaon access a different forest, strife is less common than it otherwise would have been.

When I returned to this very same spot in June 2016, I saw a wall being constructed to block the forest off. The wall was being funded by a new government project, the Uttarakhand Forest Resource Management Project (UFRMP) which is run by the Forest

---

[99] See my later discussion of the "new traditionalists" and perceptions of women's environmental behaviour in Uttarakhand.
[100] Brahman! Oh my god!
[101] Primary school run by a Hindu religious group.
[102] Fresh wood (from young trees).

Department. The project is funded by a Rs. 807 crore[103] donation from the Japan International Cooperation Agency (JICA). I was told then that when this wall is completed, residents other those belonging to Bangaon and its main village Parkatiya will need a permission pass (acquired at a fee) to access the forest. In March 2017, I found that residents had simply broken down parts of the wall to access the forest, though the expectation that access would be regulated monetarily persisted. What the monetisation of an environmental resource that was previously free will mean for what Arun Agrawal terms "environmental subjectivities" is something that remains to be seen (Agrawal 2005, 3). This shift – while not unheard of in other parts of the state and even this river valley – portents a shift in economic and non-economic valuations of Uttarakhand's natural resources, that pushes back against utopic ideations of Uttarakhand or the *pahad*[104] as a site of ecological harmony.

Haripriya Rangan (1996) draws our attention to the temporal shift in Uttarakhand's narrative of state identity during and after agitations for its separation from the state of Uttar Pradesh. From a privileging of Uttarakhand as the birthplace of the Chipko movement that ostensibly symbolised an ecological consciousness, after attaining statehood in 2000 the narrative shifted decisively to that of "modernization-as-development". In a way this shift was inevitable. The premise for statehood was the treating of the Garhwal and Kumaon regions of the then mountainous region of Uttar Pradesh as sites of resource exploitation rather than economic investment (Rangan 1996).

---

[103] Roughly 1.2 billion dollars.
[104] Mountain. A term commonly used by residents to refer to the mountainous regions of Uttarakhand.

Uttarakhand was born out of a particular political imagination. Since its birth, Uttarakhand has embarked upon a specific trajectory, that has moved decisively in the direction of "development", though the classical questions remain more pertinent than ever here: whose development? And development for whom?

Having already considered the political context of the state's path, in the following section I interrogate the environmental context and consequently constraints alongside which the ULP was implemented. While I do not want to fall prey to environmental determinism, I do want to acknowledge the real role that different soil conditions, altitudes, slope conditions and the like play in facilitating the development of horticulture on a large scale.

Forests in the Pahad

In 2014, the Japan International Cooperation Agency (JICA) partnered with the Uttarakhand Forest department to set up the Uttarakhand Forest Resource Management Project (UFRMP). JICA's donation aims at aiding 750 *van panchayats*[105] (with a coverage of 37,500 hectares) in the state combat forest degradation. More specifically, the UFRMP aims to engage in forestry works, livelihood interventions and income generating activities. Field NGOs fill in the gaps left by the forest department. Their main responsibility is that of "social engineering" (UFRMP 2015). The project covers seventeen

---

[105] Forest Council

divisions in all. Of these, thirteen were selected to be covered under the ambit of forestry and livelihood works, and include the Alaknanda Soil conservation, Civil Soyam (Pauri), Tehri Dam I, Narendra Nagar, Lansdowne Soil, Ramnagar Soil, Ranikhet Soil, Civil Soyam (Almora), Nainital Soil, Bageshwar, Champawat, Pithoragarh and Mussoorie Forest Division. Six forest divisions were selected for inclusion because of their vulnerability to disaster, and include Uttarkashi, Rudraprayag, Chamoli, Bageshwar and Pithoragarh districts. Bageshwar and Pithoragarh appear in both lists.

Local attitudes towards the UFRMP and its activities were evident when the boundary wall for the forest belonging to Parkatiya village and its hamlets, including Bangaon began to be built. Trilok Joshi, the contractor-resident charged with ensuring that the wall was built, expressed difficulty in finding people from the village to work on it as wage labour. The rate offered by the project, he said, was Rs. 180 per day, higher than the rate offered by the Mahatma Gandhi National Rural Employment Act (MGNREGA) even if not a princely sum. Unable to find takers, he offered to raise the rate to Rs. 300 a day (with some manipulation of the records) to attract workers. After an initial surge of 10 people, only three to four male residents remained. The contractor-resident later informed me that he had called a "team" of Nepali labourers to fill in the gaps in participation.

When asked why people were unwilling to participate when a common refrain in the area is the lack of employment opportunities, he responded, "*sab sampan hain*" ("everyone is wealthy"). It is certainly true that the hamlet he was speaking of is well to

do (with a few exceptions including the men who agreed to work on the wall). The majority of inhabitants are Brahmins who engage in *jajmani*[106], which provides a substantial income. They had little need for extra cash. Even though the project was open to all residents of the area including surrounding villages, there were no takers. For one, residents of the valley in general exhibited an apathy when it came to participating in works that were seen to be outside the domain of village activity despite a constant refrain of poor employment opportunities pervading conversations on work and labour. The line drawn between village and non-village based employment in projects involving manual labour is stark. Again, despite a shortage in employment opportunities, most residents refuse to participate in manual labour that is not closely linked to village welfare. People would work on constructing a safety wall within the boundaries of the village, but would refuse to work on a road that passes by its boundary, pointing towards complex embodied ideas of legitimate and illegitimate work.

More importantly, the residents of neighbouring villages who used the forest without permission would have the forest closed off to them. The village's *van sarpanch*[107] believed that they did not participate in the hope that the wall would not get built, since after the wall came up they would need paid permission to access the jungle. The JICA project was effectively erasing the informal relationships of patronage that existed, as a new consciousness or subjectivity born of the UFRMP and other government manoeuvrings arose. This was corroborated by conversations I had with residents the

---

[106] Economic arrangements between different caste groups that are inherited. In this instance, Brahmins perform priestly functions for members of other castes for generous fees.
[107] Head of the Forest Council.

previous year, before the project even entered the area. Residents of a neighbouring village expressed sympathy when speaking of residents of Bhadkot which has a very small forest that can be accessed for only a few months a year to ensure it is not degraded. The residents of the first village also hinted towards a changing scenario, and the possibility of a fee being imposed to access their forest. As under the new JICA project, a *chowkidar* (guard) would need to be employed to ensure there were no violations of the rules. Both these incidents point towards a changing regime of consciousness that is growing with increased and concentrated interventions by private and government development projects. Understanding why these shifts are taking place requires that we take a few steps back to look at the historical evidence for ecological and political consciousness and change.

Many academic discussions of Uttarakhand's ecological heritage begin by invoking Ramachandra Guha's work on the effects of the British regime on the forests of the then United Provinces. *Unquiet Woods* is a sharp critique of colonial forest policy that was responsible for unconscionably depleting the forests of the region that is now Uttarakhand. Guha's work spawned a body of scholarship that pushed back against his seemingly romantic reading of Uttarakhandi consciousness and presented a slightly more nuanced account of the effects of colonial legacy on what is now Uttarakhand's Himalayan region.

Critiques of colonial policy often remain closed off to critiques of the forest practices of local residents. A critique of fuel and fodder gathering practices of residents

exposes a scholar to condemnation for being anti-people (Sinha, Gururani and Greenberg 1997). Environmental change has occurred both during and after the colonial period. What has changed is its form. Tradition and modernity simply lie on opporite ends of temporal spectrum; substantively the implications for forests remains similar. In a later section I will examine the rationalities and subjectivities that have intersected with this change. Prior to that I would like to outline these changes themselves at two scales: the fieldsite and the region.

One of the most popular themes in discussions of Uttarakhand's environmental issues – other than that of hydroelectric projects – is of its forests. Loss of forest cover is a worldwide phenomenon. In 2015, the India State of the Forest report published by the Forest Survey of India reported that forest and tree cover had gone up by 5,081 square kilometres, though the majority of this increase was seen in Open Forest[108] areas. Uttarakhand's story is also interesting. In the 2015 State of the Forest Report, the total area under forest cover was reported to have fallen from 24,442 square kilometres in 2013 to 24,240 square kilometres in 2015. The disaggregated statistics offer a more complicated picture.

---

[108] Area with tree canopy density of more than ten percent but less than 40 percent.

Table 1: 2015 Forest Cover Change Matrix (Area in km²)

Class	2015 Assessment					
	Very Dense Forest	Moderately Dense Forest	Open Forest	Scrub	Non Forest	Total ISFR 2013
Very Dense Forest	4,754	19	0	0	122	4,785
Moderately Dense Forest	0	13,543	318	0	250	14,111
Open Forest	0	40	5,458	20	94	5,612
Scrub	0	0	0	262	0	262
Non Forest	0	0	108	25	28,580	28,713
Total ISFR 2015	**4,754**	**13,602**	**5,884**	**307**	**28,936**	**53,483**
Net Change (from 2013)	-31	-509	272	45	223	

Source: State of the Forest Report 2015.
Note: The last column represents figures from the 2013 report. All other columns represent figures from the 2015 report.

In Table 1, we see that the greatest reduction in forest cover in the period 2013 and 2015 is in the category of Moderately Dense Forests (509 square kilometres), followed by Very Dense Forests (31 square kilometres). We see an increase in forest cover in the categories of Open Forest (272 square kilometres), Scrub (45 square kilometres) and Non Forest (223 square kilometres).

Between 2005 and 2015, the area under Very Dense Forest (VDF) went *up* by 752 square kilometres and under Medium Dense Forest (MDF) went *down* by 794 square kilometres. The area under Open Forests went down by 160 square kilometres, Scrub by thirteen square kilometres, and Non Forest (NF) by 215 square kilometres (in the latter two instances, it indicates that they were converted to forest cover at an aggregate level). The 2015 Report attributes the main reasons for change (between 2013 and 2015) being rotational fellings and diversion of forest land for developmental activities. While there is certainly a fall in forest cover, the disaggregated picture indicates a great deal of complexity. Incidentally, the net area sown fell from 13.64 percent of total area in 2005 (GOI 2005) to 12.45 percent in 2012-13 (GOI 2013), which is a piece of the forestry puzzle.

Rajesh Thadani, the Executive Director of Centre for Development, Ecology and Research (CEDAR) in Dehradun believes that forest cover is *increasing* in many parts of Uttarakhand, though this is a place and situation-based phenomenon[109]. Anthropogenic factors shape this change, and impact forest quality differently for different kinds of forests.

While total forest cover has certainly decreased, there are spatial variations, requiring nuanced and in-depth interrogation. Consider for example the pictures below.

---

[109] Rajesh Thadani, personal communication.

Figure 2: Bhadkot over 20 years ago

Figure 3: Bhadkot in 2015

Figure 2 is of the forest opposite Bangaon around 30 years ago. The mountain side is conspicuous in its barrenness. Now consider Figure 3 of the same location taken in 2015. While the angles differ slightly, the jump in forest cover is visible. When asked if forest cover had decreased, a few residents argued that it had. Most on the other hand argued that it had increased. This has meant that there is no shortage of forest cover to meet fodder and fuelwood needs, though the composition of the forest has changed with implications for the time it takes to collect forest products (more on that shortly).

Liquefied Petroleum Gas (LPG) cylinders have made some inroads in the state, but even this is spatially concentrated in towns and cities. LPG is often too expensive to constitute a viable alternative to fuel wood. Its supply is also erratic, compounded by the topography of the area and inadequately serviced mountain roads. Manure-based biomass remains another alternative, but with declining livestock holdings and competition from farming and its need for organic manure, organic waste comes at a premium. Residents are then left with few options. Even a forest official during the course of informal conversations, while initially decrying the effects that women's fuel wood gathering practices had on forest ecology[110], displayed multiple relational subjectivities when he later on pointed out forcefully, "People need wood. They absolutely need it. There is the cold. And gas cylinders are not distributed for three to four months at a stretch. Gas is also expensive. If there is no earning man in the family, what will people do?"

Fuel wood apart, forests are also accessed for fodder to feed livestock. Livestock form an integral part of the agro-pastoral system, given their use in ploughing fields and in providing manure. This explains the efforts of livelihood, forest and animal husbandry programmes towards promoting the extension and spread of the Napier grass (*Pennisetum purpureum*) a form of high yielding fodder[111] that also prevents soil erosion[112]. During the course of the Uttarakhand Livelihoods Rehabilitation Project (ULP), the valley witnessed

---

[110] Since women are the ones primarily responsible for fuel wood gathering, they also shoulder the blame for forest degradation.

[111] Napier grass is widely acknowledged to boost milk production rates. It however tends to be water-hungry, and does best during the monsoon.

[112] The Department of Animal Husbandry promotes Napier grass as a source of fodder, while the Forest Department promotes it to prevent soil erosion.

a profusion in Napier grass plantation activities[113]. During the course of the project implementation period, 6,585 roots in all were planted. Survival rates of roots varied between 53 percent to 76 percent, indicating that Napier constituted a significant source of fodder at certain points in the year.

Forests then clearly play a significant role in maintaining agricultural systems. Martensson, Ives and Messerli (1990) suggest that between one and four hectares of forest is required to sustainably support one hectare of land, though this is an average figure that fluctuates depending on altitude and the nature of the agricultural cycle. In a system based entirely on agro-pastoral farming systems, conflict may not be a consideration. Ecological tensions arise when forest usage practices clash with other non-livelihood based anthropogenic factors. Predatory deforestation, the employment of incorrect resin[114] tapping methods, forest fires (exacerbated by resin tapping practices and the widening reach of the *chir* pine tree (*Pinus roxburghii*), discussed later in this chapter) are some of the causes of reduced forest cover in Uttarakhand (Peritore 1999)[115].

While human intervention has played a big role in the transformation of the Himalayan region as described above, there is an analytical need to consider both the

---

[113] Successful cultivation of Napier requires that after every two years, a new root be planted. Most people however do not re-plant new roots. According to since people do not replace plants and consequently face low yields, they explain away their reluctance to grow Napier by pointing out lack of access to water.

[114] Incisions made in pine trees to tap resin must be least three feet above ground. This ensures that a ground fire doesn't become a crown fire. However, many tappers make incisions close to the base of the tree, only 1.5 feet above the ground. The resin is then at higher risk of catching fire.

[115] The construction of hydroelectric projects has also had a significant impact on Uttarakhand's mountain ecology. The blasting of rock to create tunnels and clear lands weakens soil structures, making them prone to landslides and consequently reduction in tree cover. The debris from blasting fills up river basins, causing rivers to change shape and path, and often to overflow and cut into existing agricultural fields along their banks.

spatial variation in forest cover and the conceptually separate groups of people involved here. There is also an analytical need to separate out the linked but separate issues of forest cover decrease as a whole versus changing forest composition. Local residents have frequently been held responsible for forest degradation, though anecdotal evidence on this topic is mixed. The effect of livelihood practices such as fodder and fuel wood collection on forest composition is clearer. A conversation with Parvati Devi echoed what many other women pointed out:

> Natasha: Do you face a shortage in fodder and fuel wood compared to before?
>
> Parvati Devi: There are as many trees as before. No shortage. The jungle has increased. If you don't cut it it grows and grows and grows… 100 people must be going to the jungle to cut (trees). We have to go every day. The jungle is big. This ridge here, behind that as well there is a jungle. It is enough. There is no shortage…Trees grow on their own. Who will plant new trees? No one will.
>
> Natasha: When you got married 30 years ago, which tree was most available in the jungle? What is available now?
>
> Parvati Devi: Before there was banj. Now there is banj, chiral utheesh. Chiral and utheesh have increased. Banj has reduced. Don't know why. We cut banj. No one cuts down chiral and utheesh trees. Chiral grows on its own. But there is enough banj to feed the animals. Because now we have two oxen, two buffaloes one cow. Before we had four oxen, two to three buffaloes, four to five cows. Now we have fewer animals.
>
> (Interview by author. Transcript. Bangaon, 2015.)

Almost all agreed that the prevalence of evergreen broadleaf trees like the *banj* or Himalayan Oak (*Quercus leucotrichophora* A. Camus) (as well as others) had reduced, while that of the *chir* pine had increased. In part, this can be attributed to the natural

regeneration properties of the trees in question. At the altitudes at which it is generally found, the banj or Himalayan Oak is susceptible to anthropogenic pressures such as overgrazing, with implications for regeneration rates (Singh and Singh 1992; Thadani and Ashton 1995)[116]. The chir pine on the other hand, spreads quickly[117]. The shift in species distribution follows from the uses of these trees. Residents in the field site noted a preference for trees such as the *banj,* the *kweral* (*Bauhinia purpurea L.), malu* (*Bauhinia vahlii*) and the *kanaul (Acer caesium)* which provide good fodder and burn better[118].

Like the *chir*, the *utheesh* (*Alnus nepalensis*) is also suggested to have increased in comparison with other trees, given its lack of value for livelihood activities. In the absence of concerted tree plantation activities, and given continued anthropogenic disturbances, forest quality may degrade, with implications for water sources and soil erosion.

---

[116] Other determinants of regeneration rates include overstory basal areas, canopy coverage, sapling regeneration (Thadani and Ashton 1995).

[117] While the *banj* has livelihood implications, the *chir* pine is a valuable source of timber. The *chir* pine has a chequered past in Uttarakhand. It stands tall as a testimony to the poor forestry practices of the British. One forest officer posted in the area termed it "*angrezo ka den*"[117]. It was introduced by the British for revenue generation through timber and resin extraction, at cost to then standing broadleaf forests. In the Garhwal Himalayas, during the period between 1850 and 1880 when reserved and protected forests were created by demarcation, a substantial number of trees were felled for timber. In the years that followed as well, forest policy was geared towards ensuring profit to the Crown. In the 1900s for example, on average 6,333m³ of timber was sent to the plains from Dehradun to be used as railway sleepers and building timbers. 27,088m³ of forest areas was also licensed for fuel wood and charcoal by the Forest Department during this time. Illicit cutting of the forest continued post the 1900s, and continue to this day (Martensson, Ives and Messerli 1990). The *chir* is also a convenient scapegoat in the current day discourse on forestry. 26 percent of Uttarakhand's forested area is currently dominated by *chir* pine forests, accounting for 6455 sq km of area (Forest Survey of India 2015) Foresters are quick to point out its lack of contribution to biodiversity. In fact, *chir* forests expand quickly, stamping out other species of trees and also reducing the understory. Pine forests make the soil they stand on susceptible to erosion. Getting rid of a chir forest is not easy however. To cut down a single tree in a reserve forest requires permission from the apex court. In 2015, Principal Chief Conservator of Forests (PCCF) S.K. Chandola spoke of having put in a proposal to the Union Ministry of Environment and Forests (MOEF) to cut down 300 chir pine trees to their roots[117] and later grow broadleaf trees in their place. It is very unlikely that such a plan will come to fruition. This also means that residents cannot get rid of *chir* forests or clear swathes of area if they wish, even as its spread increases.

[118] The *chir* pine on the other hand, is said to emit very dense black smoke when burnt as fuel wood.

Just how much human interventions affect forest regeneration rates bears scrutiny. Moench and Bandyopadyay's (1986) now somewhat dated study of the village of Munglori situated at a height of 1700m on the slopes of Nag Tibba (3200m) near the Mussorie ridge indicated that the total biomass productivity of the forest exceeded human consumption, and yet there was evidence of a progressive loss of forest cover. They referred to this as peripheral degradation or "nibble effect". The nibble effect is an outcome of the expansion of forest use into the forests, causing its margins to recede. Women (usually responsible for collecting fuel wood) collect forest produce from south-facing slopes, at low elevations, and where the need is high. With increased lopping in an area, the forest canopy begins to open up, stimulating the growth of grasses and fortes. Grazing is then encouraged, and the risk of forest fires increases. This pushing back of the forest margins is what they call the "nibble effect". Sarkar's (2008) more recent study of 45 villages in the Garhwal and Kumaon Himalayas somewhat corroborates this proposition, with the reported time taken to collect firewood having increased by 1.3 hours in the 25-year period before her study was conducted. Residents attributed this change to the increase in time needed to look for firewood because of forest degradation. Spatial variations within forests in terms of forest composition is important here. This also suggests that residents may move deeper into forests even when the treeline itself does not shift substantially because of a preference for certain kinds of trees for certain purposes.

Paradoxically, the increase in tree cover was also often described as a source of people's woes. Given the preponderance of the rhesus macaque in many areas of people's

lives, many residents articulated unhappiness with the increase in forest cover, especially within the settlements. Monkeys, they argued, now have a place to run to and remain undisturbed when people chase them from the fields.

> Because the trees have increased in numbers. Where will we chase them? If we chase them also they will climb the trees. Who will chase them that far? See that house there? Before there used to be a lot of trees. Malta, orange. Now there is nothing. The monkeys have not left anything. If you chase them from the fields, they will run to that big tree. Who will chase them from there? Also they are not scared of us (women). They are a little scared of men. The men will chase them a little, from there to there, and then they'll go home. (Interview by author. Transcript. Bhadkot, March 4, 2015)

Trees within the village offer monkeys a haven, ensuring that they can never be fully removed from the vicinity. Fruit bearing trees also function as a pull for the macaques. Trees also provide fodder and fuel wood to residents. No resident could or would cut down a tree. Government restrictions apart, trees within villages symbolise the trade-offs between farming and livestock rearing since even within settlements, they are a significant source of fodder and fuel wood.

The discussion so far has not accounted for the mitigating effects of human livelihood practices. Uttarakhand has always, and even more so now, been characterised by the migration of individuals and increasingly whole families out of the mountain regions, thereby reducing the burden on forests. Human migration apart, changing ruralities and rapid modernisation is causing families to choose livelihoods that diverge from traditional agro-pastoral systems. As Rawat, the Deputy Director of Sneha pointed out, while human-livestock ratios were more or less equal two decades ago, livestock

holdings have almost halved since then. Despite the efforts of the Department of Animal Husbandry to motivate people to move away from cultivation[119] (a trend that is on-going irrespective of their efforts) and move towards animal husbandry intensive livelihood practices, most households are choosing to maintain a minimal number of livestock, primarily to meet household milk consumption needs. All the women I asked about this responded, "*kaun karta hain*?[120]". Especially in households with one or less daughters-in-law, the chances of having a substantial livestock holding are low. Many have also abandoned their farm plots that are situated at a distance from their houses, especially those on neighbouring mountainsides. In the project village Chohar, the 150 odd households residing there have abandoned around 100 hectares of land, farming on about 30 hectares of it occasionally, in certain seasons. Over time, trees have taken root in these plots and forest cover has increased. Tree cover increase does not usually take place due to conscious efforts. Many residents shy away from planting trees since to do so would be a conscious acknowledgement of the abandoning of cultivable land. The Deputy Director of the partner NGO Mr. Rawat pointed out that there is no practice of sowing trees to expand forests, even when formerly agricultural plots are abandoned. Residents may plant fruit trees for domestic consumption and occasionally for sale[121], but not with the intention of increasing forest cover (though with increasing development agency participation, more trees may come to be planted as the project demonstrated). People are

---

[119] Chief Veterinary Officer, Bageshwar, personal communication.

[120] Literally, "who does this or "who will do this"?

[121] I came across only two instances of residents of project villages setting up orchards of fruit trees. One household has a thriving fruit orchard with a variety of fruits, and sells them commercially. The second household reported having sown 30 fruit trees, only to have them all stolen from their fields.

also increasingly abandoning cultivable land closer to their homes, choosing to plant grass there to be used as fodder instead of food crops. This has reduced the burden on grass found on hillsides, decreasing damage to soil structure and chances of erosion. It is also a practice some members of the project hope will contribute towards greater fodder availability once they begin to promote dairy farming.

The abandonment of cultivated land (and the attendant settlements) to culturable wasteland (and to forest land with the spread of the fast growing *chir* pine) signifies shifting social and agroecological boundaries. The increasingly selective abandonment of particular plots of land by particular households in the midst of otherwise cultivated land harks back to Rangarajan and Sivaramakrishnan's (2014) description of changing landscapes that resemble patchwork quilts rather than grids. Abandoned land stands out haphazardly amongst otherwise cultivated areas - though many areas exist where most of the land has been abandoned. As the affective pull of land shrinks, while also complicated by the economic pull of increased commercial farming opportunities, the landscape may be reshaped in unpredictable ways. How does this tie in with the ULP? The ULP prioritised forest regeneration and associated livelihood activities. Forest cover has direct implications for women's work in livestock rearing and consequently agriculture, one of the reasons the ULP focussed on it. The question of forest regeneration was very close to Rawat's heart especially given his past work on other environmental projects.

Staff workers in the field site worked hard with Rawat to ensure that the project's plantation activity was successful. Field staff received calls on a near daily basis during

peak plantation season, with calls for updates on how many saplings were alive in nurseries, how many trenches had been dug, how many saplings had been distributed, how many trees were still alive, and the like. Challenges took a number of forms, mountain topography always presenting a significant one. The geomorphologic structure of mountain slopes selected to be included in plantation efforts shaped reforestation efforts in predictable ways. The spatial dispersion of the project villages along the river valley as well as the spatial dispersion of plantation locations within these village boundaries meant that plantation and monitoring efforts were time and energy intensive, especially given the high monitoring requirements of the senior management[122].

Reforestation and afforestation projects can become especially challenging and expensive when physical barriers have to be erected to keep people and livestock away from small seedlings - challenges that the UDP faced as well. In the village of Chohar,

---

[122] Errors in planning and short-sightedness were other contributors to reforestation attempts. In the neighbouring river valley, another partner NGO in the project was engaged in planting saplings. One of the locations selected was a mountain slope that had experienced a large landslide spanning over 200 metres. After the saplings had been raised in nurseries tended to by village women[122], on an appointed day, two staff members, a few village women and I made the trek up the landslide to plant the saplings. On our way up, we crossed the school that had been destroyed by the landslide, its rooms filled almost to the ceiling with gravel and mud. Residents narrated tales of it advancing every year. Our trek up the landslide was steep, hindered by rainfall. It was not an unknown path for the women, many of whom cross it frequently when they go in search of fodder. Even so, the task was much harder for the resident women accompanying us, who carried saplings in baskets fashioned out of bamboo on their backs. On reaching the top, post a few rounds of photo-documentation, the women fanned out to dig pits and plant saplings, making their way down the landslide. It was only when we finally congregated in the verandah of the office later that day and we stared out at the expanse we had traversed that the staff member with me pointed out that the saplings most likely would not last long if the landslide advanced further. This is apart from the regular care that the saplings would need for a few years before they could have been deemed to have survived. Plantation efforts in such areas are directed not just at increasing sources of fodder and fuel wood, or even just forest regeneration, but are also rightly directed at preventing further soil erosion and strengthening soil stability. Decisions about where to plant trees then become crucial, and even when taken by local residents involve processes of negotiation. On some occasions sowing had to be abandoned when plantation sites were disputed by particular influential members of the village. In Baicholia, one resident opposed the planting of trees in the location selected by village consensus because his livestock would no longer be able to graze there, derailing the effort. Different groups clearly had very different perceptions of the value of the activity. Non-human interlopers also played different roles in mitigating the success of the activity.

livestock were found to have uprooted newly planted saplings, necessitating the construction of a fence to protect the young saplings. When reforestation programmes only make arrangements for planting trees and not for ensuring their maintenance and survival, they often fail. For example, the relative success of the Nepal-Australia Forestry project is viewed as being a success because these aspects of the project were accounted for by participation by the people of the villages where the project was implemented: residents made day-to-day decisions including those about the choice of species and choice of location (Ives and Messerli 1989).

Through the ULP, 454 fruit tree saplings had been distributed by the end of 2015 to 119 (largely Below Poverty Line or BPL) families to be planted on private lands. These trees were raised in seven nurseries maintained by women from the project area for a fee. Sold at highly subsidized rates, farmers were often enthusiastic about buying one or two walnut or apricot tree saplings. In June 2016, 5,050 saplings of both fruit and non-fruit tree had been distributed or were in the process of being. Saplings included species such as the *malu*, Himalayan oak, *kweral, deodar, shehtut, majhina, padam, walnut and peach*.

In addition, the government has its own initiative, *Hamara Ped Hamara Dhan*[123]*,* intended to incentivise planting tree saplings. Under this scheme, an individual may buy saplings provided by the Forest Department, and tend to it until it reaches ten years of age. On completion of ten years, she will be entitled to a Fixed Deposit amounting to Rs.300 per tree. The scheme aims at increasing tree cover, but also reducing the ratio of

---

[123] Our Tree, Our Wealth

pine to non-pine trees. Trees provided fall into three categories: fodder, fruit-bearing and medicinal. According to Forest Department records, over 100 trees were distributed in the villages Bangaon and Parkatiya in 2015. Whether these trees have survived or are being maintained is unknown. The ULP's own monitoring of sapling survival rates are fairly optimistic. A monitoring exercise conducted in 2016 indicated a 68.77 percent survival rate. While Mr. Rawat was not entirely convinced about the monitoring procedure because different trees require different monitoring methods. Assessing whether a tree can be deemed to have "survived" is also a temporally specific activity, and a year's span is usually not enough. By June 2016, there were signs that some of the trees were not coping well with their environment. Rawat's estimate of survival rates came close, at 61 percent. A conclusive estimation can only be made after a ten-year period has elapsed.

A final point must be made about the partially co-produced nature of forests and mountain environments more generally. Geologically speaking, the Himalayas are ecologically fragile and unstable. Much of Uttarakhand area falls under the ambit of the Main Central Thrust (MCT), making it especially vulnerable to large as well as medium and micro seismic activity. In early 2015, experts predicted that the Western and Central Himalayan region is due to experience an earthquake of a very high magnitude (between eight and nine on the Richter scale) as strain energy has accumulated (Farooq, Sharma and Khan 2015) and sufficient slip is now available. An earthquake of this nature in an ecologically sensitive zone made even more vulnerable by human interventions such as

mining and the creation of dams would most likely be catastrophic, with incalculable implications for local livelihoods.

A glimpse of what such a catastrophe would look like is already visible in the area. In the Revati river valley that runs parallel to the Parvati valley, the landscape is marked by monstrously large landslides at almost 100-foot intervals. The creation of tunnels to funnel water to service a hydroelectric project further downstream has caused some locals and visitors to attribute the blasting of rock for the creation of this tunnel to allegedly increased incidences of landslides with implications for forest cover loss. Similar stories emerged in the Parvati valley as well. A hydroelectric project located at the periphery of the project site has caused instability in the surrounding hillsides. A weakened soil structure compounded by natural disasters has caused instability in buildings, and some of wall faces of mountains to collapse. In 2013, there were 98 hydropower projects operating in the state. 83 more had been proposed at the time (SANDRP 2013). Hydropower projects in the state have raised concerns because of their ecological and social impacts, poor governance practices and the increased risk of flooding due to the heavy siltation of rivers that they cause (Expert Body 2014).

Climate Fluctuations and Fluctuating Livelihoods

Unstable morphodynamics are complicated by changing weather patterns. Climate change in the Himalayas and other mountain systems has been associated with degradation of permafrost, glacier retreat and decreasing snow cover, with implications

for biophysical systems in the area (Singh, Shickhoff and Mal 2016). Glacier retreat is often posed as a significant indication of global warming. While less relevant for my research field site but important for habitations higher up in the Himalayas, the melting of permafrost is associated with changing morphodynamics of rock faces, resulting in slope instability and other natural hazards. It is difficult to predict hazards since geomorphologic processes in areas of high relief are outcomes of interlinked factors such as slope angle, slope aspect, weathering, land cover and slope moisture supply (Meadows and Lin 2016). Even so, a very real risk of disaster persists. A reduction in snowfall-rainfall ratios and snow melt has been observed in different mountain regions including the Himalayas, with implications for ecosystems as well as economic systems in the downstream regions and lowlands (Singh, Shickhoff and Mal 2016; Beniston 2006).

Uttarakhand enjoys a temperate climate, notwithstanding seasonal variations. The extent of variations is difficult to assess however. Systematic recordings of climatic data are difficult to find in the area. There are no stations of the Indian Meteorological Department in the northern regions of the district (Singh, Shickhoff and Mal 2016) making it difficult to track weather patterns in the valley. By extension, there is no accurate source of data for the Parvati valley. In 2015, the ULP began tracking rainfall patterns in one village in the project area, though it will be some time before that data is sufficient to make definitive claims about variation in precipitation. There is in the meanwhile enough evidence to indicate that weather patterns have changed. An analysis of the data from a meteorological station in Bageshwar district indicated that the annual temperature in Bageshwar has increased by 1°C between 1901 and 2010. This is a very

significant increase, its significance made clear by a comparison between global mean temperature trends and those of Bageshwar: the global mean temperature increased by 0.85°C between 1880 and 2012 (IPCC 2013).

Temperature increases are more pronounced at higher than lower altitudes within the Himalayas. At higher altitudes, mean temperatures have risen by 1.2 °C since 1980. Though these trends are spatially heterogeneous (Hasson, Böhner and Lucarini 2017), they remain alarming. Macro level data provided by Singh et. al. who use microwave satellite observations that ground observations of air temperature movements shows spatial and seasonal gradients in the region that comprises the Western Himalayas specifically, and the Tibetan-Himalayan region more generally. Both the monsoon and the winter have been associated with higher temperatures, especially in the Central and Western Himalayan region in India (Singh, Shickhoff and Mal 2016). In the Pindari region neighbouring the Parvati valley, the season wise annual maximum temperature has been observed to have increased over the summer, monsoon and winter seasons in the period between 1998 and 2007 (Singh, Shickhoff and Mal 2016), offering some clues about weather fluctuations in the project area.

Also noticeable is seasonal variation in precipitation. Winter precipitation for example, has been observed to be decreasing, though again, spatial variations exist within the state. At higher altitudes, a negative rate of annual precipitation has been recorded (Singh and Mal 2014). In general, winter rainfall has demonstrated higher variability compared to monsoon rainfall (Singh and Mal 2014), with implications for the growth of

winter crops. Rainfall patterns are also associated with water flow patterns in streams. In the field site for example, fluctuations in water levels in the river Parvati were evident. Variations in climate patterns, especially precipitation, has also escalated the number and frequency of natural hazards.

Increased precipitation triggers various geomorphic processes such as landslides and floods (Keiler, Knight and Harrison 2010). In the last few years especially, cloudbursts[124] have become a frequent occurrence. The catastrophic conditions witnessed during the cloudbursts of June 2013 itself had implications for tourism and other livelihoods in the years that followed, even as cloudbursts and loss of life continued to be reported every monsoon following it.

The Parvati river valley's exposure to calamity during that period was limited. While some houses were damaged, and some cattle perished, there was no loss to human life. But the fear of disasters had been imprinted earlier, in 2010. A cloudburst concentrated in the region where a primary school was located resulted in 18 children being killed when a landslide caused the walls of the school to cave in. On the same day, massive landslides in Bhadkot as well as Pashin caused great damage to property. In Bhadkot, residents ran into fields and camped there for a few days until the danger had abated. Some residents had to be extracted from mountainsides where they had been when the rain began. In Pashin, the landslide ripped through the village, forcing gravel and mud into houses. People in Pashin managed to escape with their lives just in time.

---

[124] Extreme precipitation concentrated in a short period of time. Cloudbursts take place without warning, and may cause rapid flooding and trigger landslides, causing loss of life.

The 2010 incident is imprinted deeply into the hearts and minds of those affected. Pashin especially reported families leaving behind family homes and migrating out of the region in fear[125]. In Parkatiya, the mother of staff member Radha who lost her son in the landslide at the school expressed her deep sense of loss and the fading of attachment to the place she called home as we walked together to her village:

> He was so beautiful. Radha and Rahul are nothing compared to that son. It is because of the disaster that we have all these problems. Now we're managing to live here (in this village). Before we couldn't even think of living here. We were so upset and distraught. During the monsoons I'm always worried. Every evening when the children come home I sigh in relief because they are home. I am always worried about them going here and there in the rain. (Personal communication with author. Bangaon, June 17, 2015.)

The fear of disaster is not something that makes its way into everyday conversation. It lies low, out of sight, appearing when the rain is heavier than normal. Heavy rains often mean nights of disturbed sleep. In the neighbouring project area, staff reported spending one night of heavy rainfall in July 2014 running between one end of their house to the other, flashing a torchlight at both the river and the hillside behind them, to make sure neither crossed their boundaries. Many residents also reported similar fears, spending nights peering at nearby streams with flashlights. Alertness is a constant state of being in the monsoon.

Disasters apart, fluctuations in climatic patterns also impact more everyday concerns such as the ability to work. Unusually high temperatures towards the end of the monsoon

---

[125] Pashin also experienced out-migration in 1957 when the village was hit by a flood.

in 2015 saw many men and women fall ill, even as they struggled to finish harvesting the rice. Humans apart, crops and other forms of vegetation are also affected by these changes.

The link between mountain vegetation and climate is best demonstrated in the use of vegetation belt typologies to denote climatic zones (Beniston 2006). Climate change induces changes in species distribution, as well as changes in genotypic and phenotypic configurations of existing species, though to differing extents in differing species depending on their internal traits (Singh, Shickhoff and Mal 2016). Range contractions in temperature and precipitation affect most species of plants (Xinhai, et al. 2013). Lack of moisture in the soil has also been associated with the drying up of citrus trees (Beej Bachao Andolan 2011). The cultivation of fruits such as apples, peaches and apricots has shifted vertically as fruit belts move to higher altitudes (Beej Bachao Andolan 2011), with implications for livelihood and farming patterns. On the other hand, fruits such as the litchi, mango and guava are believed to be thriving as temperatures rise (Beej Bachao Andolan 2011). Meanwhile in the terai region of the lower reaches of the state, state officials in the Horticulture Department are campaigning to increase area under the production of citrus fruits (The Tribune 2016), though by their own admission changing weather patterns have negatively affected horticultural production patterns in general[126].

Changing climatic conditions also affect cropping patterns. Shrestha et al (2012) used satellite data to show how the growing season in the Himalayas had both advanced

---

[126] Personal communication with officials from the Department of Agriculture.

and lengthened between 1987 and 2006 by 4.7 days. A report prepared by the Save the Seed Campaign in 2011 used qualitative research to indicate years of weather induced droughts and famines. This includes 1963-64, 1967, 1986-87, the summers of 1998 and 1999, and 2009 and 2010 (Beej Bachao Andolan 2011). Weather disturbances in the form of heavy unseasonal rainfall and frost were also responsible for the loss of the winter wheat crop in 2014-2015 and consequently poor perceptions of the usefulness of SCI.

Changing weather patterns have changed growing seasons, though much is yet to be understood about these changes. When asked about changes in agriculture, many residents responded that yields of different crops had decreased significantly in recent times. When asked about the reasons for this they appeared perplexed about the mechanism of it, but pointed towards changing "*hawa paani*"[127] as being the cause. The question of fruit trees that did not flower or dried up remained a concern as indicated in the Beej Bachao Andolan report, though most were unable to explain why this was happening. In the summer of 2016, unseasonal rain caused the mango crop to be destroyed. In the previous year, delayed rainfall resulted in lowered productivity rates for some fruits and vegetables.

---

[127] Literally, wind and water, indicating the environment. Climate change as a construct is not yet part of the local lexicon.

Religion and Environmental Subjectivities

Woven through the story so far without focussing explicitly on it, has been the role of governance in shaping or providing the contours for environmental change. To draw from Arun Agrawal, technologies of governance are linked to the creation of subjects, or "people who have come to think and act in new ways in relation to the domain being governed" (Agrawal 2005, 7). Agrawal extends this framework to provide an intricately detailed analysis of how the functioning of the British colonial forest policy created what he calls environmental subjects. Agrarwal also clarifies that not everyone becomes an environmental subject, making the need to pixelate the mechanisms and technologies used to produce subjectivities evident. In the following section, I will examine how current day Kumaoni subjectivities have been forged. Changing imaginaries, driven by the ubiquity of neoliberal subjectivities is shaping the formation of a new Kumaoni identity and subjectivity. Like Agrawal, I do not mean to suggest that everyone embodies a Kumaoni (or Uttarakhandi) subjectivity. Variations abound, split along the axes of gender, caste, class, age, place and religion. Nor do I suggest that facets of identity such as gender or caste or class map neatly and immediately onto a Kumaoni subjectivity. Instead I conceptualise subjectivity as deriving from ascribed identities and practice.

Environmental subjectivities, climate-change induced weather conditions, capital-backed pulls and classical Foucauldian biopolitics and governmentality converged in the summer of 2016 when over 4,000 hectares of Uttarakhand's forest erupted in flames. In May 2016, forest fires erupted in many parts of the state. Trees burned quickly in an air thickened by the smoke of hurtled accusations that flew thick and fast. High

temperatures, a faulty colonial forest policy that privileged the *chir* pine whose needles are highly combustible[128], incorrect resin tapping methods, the timber mafia[129], real estate mafia[130] and mischievous villagers all took turns sharing the blame for what was universally acknowledged to be a tragedy. Residents in the field site reported a thick blanket of smoke over the area, high levels of particulate matter, and difficulty breathing, even though the nearest fire was over 40 kilometres away. Everyone was shocked and bewildered about what was going on, and how it had spiralled out of control. As allegations were flung about, the former director of the Uttarakhand Development Foundation (UDP) suggested that it was the hot summer as well as non-devious anthropogenic factors that had caused the calamity. What everyone agreed on was that it was calamity of terrible proportions. As I anxiously followed the news over the week that the fires raged, I received photographs from staff members of fires burning in the valley, on the mountainside facing the office. When I returned to the valley in June, I found swathes of forest that appeared brown, evidence of trees having been burnt. These swathes were spread across the project area, brown patches that appeared in the midst of green forests. I ventured to ask the husband of the pradhan (village head) about why this had taken place, who shook his head and admitted that people had intentionally set fires this year to clear grass in fields. When I pointed out that the high temperatures as well as evidence of the destruction that fires were causing in the state should have been reason

---

[128] Increased chir pine concentration is associated with the fuel loading of pine needles on forest floors.

[129] The timber mafia was argued to have set the fires, having vested interest in clearing forests for timber. Whether this may have been the best way to acquire timber is debatable. Fires tend to scorch the bases of trees, resulting in butt logs that are defective (Rawat 1999).

[130] The real estate mafia are claimed to benefit from a burnt down forest on the grounds that the area can be diverted to construction.

enough not to engage in this practice, he responded that while he and other officials had recommended that the practice be ceased, people had not heeded their warnings. Later conversations with residents in Parkatiya indicated feelings of anger towards the setters of fires. Residents reported having run to extinguish the fires before they got out of hand.

Lighting fires to clear fields is not a new phenomenon, and takes place on a yearly basis despite warnings by the Forest Department. Changing forest composition, high temperatures and the as-yet unproven roles of different interest groups made the incidences of fires this year exceptional. A government official provided a view refreshingly different than the official Forest Department-led discourse on residents' relationships to forest (fires) and claims that they had intentionally started them by pointing out that residents sustain their livelihoods with forests, and it is their disadvantaging over the years that has created the situation they are in now. Both sets of views, of the husband of the pradhan and the forest official pixelate dominant discourses on villager[131]-environment relationships. But there is also a mediating role to be ascribed to religion.

In Uttarakhand, or *Dev Bhoomi*[132] as residents staunchly refer to it, the environment and environmental concerns are often easily co-opted into religious discourses. There is some literature that has dealt with the religious considerations that have driven conservation efforts of geophysical areas such as mountains, hilltops, rivers

---

[131] I use the term villager or *gaon wala* as it is used in Hindi and common official discourse, with all the connotations of rurality that come with it.
[132] Abode of Gods.

and streams that are often associated with the sacred and divine[133]. A number of regional

deities with explicit links to agriculture and forests are venerated[134]. Aggarwal (2010)

points out that the literature has also been attentive to efforts to conserve specific species

of flora and fauna (Natadecha and Ruttanadakal 1998), and the beneficial effects that the

protection of sacred groves and temple forests have had on the protection of forests in

general, whether by design or unexpectedly (Arora 2006; Dhaila-Adhikari and Adhikari

2007). Different species of trees command different ascriptions of value. The *pipal* (fig)

tree and the *bargad* (banyan) trees are believed to retain water and contribute towards air

purification. They command social and religious value. They provide shelter during

outdoor assemblies, and are also considered to be sacred (Aggarwal 2010). Some trees like

the *chir* pine on the other hand are not as popular, given their drying effect on local

ecological conditions (Aggarwal 2010). Environmental governmentalities (Agrawal 2005)

are then complemented or even contested by religious subjectivies.

Religion has demonstrably been useful in that it has successfully undergirded

political organising around environmental issues. Religion is often refracted back into the

sphere of environment and development, and makes its presence felt in most spaces, even

official. On the other hand, the form that religious environmentalism takes is not even.

Recent trends in the Brahmanisation of the Hindu religion away from animistic and

pahadi Hinduism in Uttarakhand has led to specific configurations of religiosity and

---

[133] This section borrows heavily from Aggarwal, 2010.
[134] For example, the *Ksetrapal Devata* or *Bhumiya* is worshipped as the god of the fields. *Mul Narayan Devata* and his two sons *Banjyend* and *Nauling Devata* are also important. *Banjyend Devata* lives in oak forests and *Nauling Devata* in water sources. The intimacy of the family relationship between the gods extends to the relationship between forests and water as well, and both are believed to coexist.

reshaped the landscape of religion-nature understandings (Aggarwal 2010) while also leading to conflict[135]. The internalisation of a very specific form of (*pahadi*) Hinduism and its relevance to Kumaoni (and Uttarakhandi more generally) identity is evident in the clash between Hindu residents in the mountains and their Hindu counterparts or self-proclaimed ideologues, the Rashtriya Swayamsevak Sangh (RSS) from the plains, when it comes to animal sacrifice, a deeply entrenched practice in the pahad (Govindrajan 2014)[136].

Alley (2000; 2002) and Nelson (1998) suggest that some aspects of Hindu belief can even be damaging to the environment. Mass religious tourism to temples for example, has had the opposite effect of depleting surrounding forests (Aggarwal 2010). Others suggest that religion and/or culture are insufficient frames with which to mobilise conservation efforts (Nanda 2002; Tomalin 2002) For example, I returned to Bhadkot after a seven-month hiatus to find that a Hanuman temple had been newly constructed in the village. Upon enquiring, I was told that it had been constructed by the *sarpanch*[137], as a developmental activity. Bhadkot was in dire need of many amenities. Residents were in

---

[135] While there was still evidence of a strong reluctance to adopt a Sanskritised version of Hinduism amongst members of the Thakur caste in the Parvati valley, Brahmans on the other hand generally eschew eating meat. Even so, common to both categories of Hinduism in Uttarakhand, or *Dev Bhumi*, is a strong sense of being *Hindu*, whatever its contours. This has been the impetus for the instrumental use of religion in conservation efforts. Aggarwal (2010) on the othe hand points out in contradistinction, that a conservation ethic may not naturally flow from religious convictions. Instead, "Where a conservation ethic *is* embedded in the religious philosophy, religious rituals may take precedence over the conservation ethic" (Aggarwal 2010, 148). She further states that as people move away from the animistic to the material aspects of religion as is being witnessed increasingly in the Kumaon region, as nature and religion become increasingly dissociated and the ritualistic aspects of religion are prioritised.

[136] The RSS is a right wing Hindu fundamentalist group bolstered by the Bharatiya Janata Party, in power at the centre. The RSS is resolutely anti-Westernisation in ideology, and has attempted on numerous occassions to stop what it views as being Western infringment on what it perceives to be "Indian"[136] values. Mawdsley goes one step further to suggest that environmental issues have been used by the RSS to promote what she describes as being a "chauvinist Hindu nationalist agenda" (Mawdsley 2010, 151) through her analysis of the tropes invoked to promote opposition to the Tehri Dam in Uttarakhand (Mawdsley 2010).

[137] Village head.

need of fodder and fuel wood, often needing to slip into forests belonging to other villages to meet their needs. The new pradhan had decreed that the village forest would be blocked off for a significant portion of the year to allow it to regenerate, meaning that they had even less access to their daily needs. Bhadkot was also in need of various infrastructural improvements. The path up to a satellite settlement on the opposite mountainside was narrow and treacherous at the best of times. It had been damaged when the hydroelectric project was constructed there because of the blasting of the rock face. It skirted a river bank and then rose somewhat sharply up the mountain face. Carrying a load up it as women are often forced to, makes traversing it difficult, even when the path is not slippery with rain and snow. Its water pipe had dried up. Only six families resided there, three of whom belonged to the Scheduled Caste community - a factor they themselves attributed to the pradhan's reluctance to improve upon local amenities. The choice of temple over a road, a safety wall or water pipeline is puzzling, since their absence is a common complaint. What explains this dissonance between environmental, development and religious concerns? How and when do these concerns coalesce and when do they diverge? What are the overarching logics and subjectivities that drive and are driven by?

Such logics as demonstrated in the example above are in opposition to widespread beliefs that 'eastern religions' like Hinduism are conducive to environmental protection (Mawdsley 2010). This also stands in direct contradistinction to the environmental activism of 'new traditionalists' (Sinha, Gururani and Greenberg 1997) such as Vandana Shiva who tend to refer to an idealised vision of the Hindu (and Uttarakhandi) past,

replete with romantic constructions of social and ecological fellowship (Mawdsley 2010). In many ways, the environmentalist Left spearheaded by activists such as Vandana Shiva is most critiqued for their invoking of traditional conceptualisations of women-in-environment. Shiva invokes *prakriti* or the feminine principle when speaking of women and their relationship with nature. In Shiva's telling of human-nature relationships, women choose to chain themselves to trees[138] out of in-built fervour[139].

Mawdsley (2010) draws from Varma (1998), Gupta (2000) and Osella and Osella (2000) to offer a scathing critique of the 'new traditionalists' as being unwilling to engage with a rapidly changing India, the rise of the industrialisation and urbanisation, alongside the concurrent rise of consumer desires including those of the poorer classes. Kavita Phillip (2001) refers to such conceptualisations of rural residents as Orientalist and colonial systems of thought and not just because of their essentialist ideas of human-nature relationships. Such scholarship assumes that "native" populations while deeply entrenched in these relationships, cannot abstract from them to recognise their embedding in larger contexts and are supposed unable to convert these embodied relationships into productive knowledge (Phillip 2001). I suspect that the real environmental story of Uttarakhand today is the story of modernity's clash with the differing takes on environmentalisms, from energy companies seeking to make profits

---

[138] As during the famous Chipko movement.
[139] In fairness to Shiva, she straddles two sides in her denouncement of poor environmental practices, by invoking scripture on occasions as well as referring to more materialist arguments against misdemeanours in the environmental sector (Phillip 2001; Mawdsley 1998). While the RSS is characterised by a "metaphysical politics of authenticity", environmental Leftists such as Vandana Shiva root much (not all) of their critique in "materialist anti-imperialism" (Phillip 2001, 29). As Phillip astutely points out though, globalisation tests the limits of their similarities. Romantic and nostalgic harking to past glorious days of commune between humans and nature are increasingly resonating less and less amongst the communities that these ideas claim to represent.

through the construction of hydroelectric power projects, project planners with specified development goals to meet, to officials from the Forest Department charged with maintaining forest cover, to young Uttarakhandi men and women who want the modern comforts of life promised by globalisation to a pahadi woman who needs firewood to cook dinner. The environment means different things to different actors in the area. There is an analytical need to move away from demonising residents driven by differing and contradictory subjectivities, who may not necessarily want to be custodians of nature, while also recognising the need to protect the environment against further damage in an already vulnerable and fragile context.

Conclusion

In this chapter I have outlined the context within which the ULP was implemented. First, I drew the contours of colonial and state policy that caused a previously shunned area - the terai - to acquire a reputation of progress, grounded in certain material realities. Next, I have focussed on the environmental factors that have underlined project functioning. Understanding the spatial variation in changing forest cover is important to evaluate how a project that hinges on particular interpretations of rural needs is affected by a context wherein forest cover is increasing, but forest composition is changing for the worse. I also look at changing climatic conditions such as frequency and intensity of rainfall, change in the length of the growing period, mean temperature and range fluctuations that demonstrably both affect the practice of agriculture and associated livelihoods as well as precipitate natural disasters in this particular morphological context.

Finally, I draw from Arun Agrawal's work on environmental subjectivities in Uttarakhand to intersect environmental subjectivities with a changing religious subjectivity. I suggest that while environmental conservation constitutes an imperative for many in the area, they are not always explained and may be contradicted by religious and other concerns, thereby contradicting popular conceptualisations of Uttarakhandi residents as unflinching stewards of nature.

Chapter Four
Enacting "Technology"

Introduction: Framing the System of Crop Intensification (SCI)

On the morning of the 28th of April 2015, Reena a young woman from Bhadkot sat obediently in her bedroom as a makeup artist from a nearby town meticulously adorned her with makeup, jewellery and other accessories in preparation for her wedding later in the day. In addition to the usual makeup, bridal facial makeup includes the application of tiny red and white dots alternated in semi arcs over the woman's eyebrows. Previously painted on, current day brides usually have tiny red and white bindis[140] take the place of paint. Rekha[141] and I watched intently as the makeup artist painstakingly placed one bindi after another on Reena's forehead, forming perfect arcs, moving bindis fractions of millimeters to align them. I turned to Rekha and murmured "that looks very complicated". Rekha turned to me, eyes widened and guileless. "Yes. SWI!".

As we saw in Chapter Two, during a discussion with a senior scientist at the International Rice Research Institute (IRRI) about the intricacies of the forms SRI takes, I

---

[140] A mark/dot worn on the forehead by Hindu women. Red dots signify married status.
[141] A staff worker from that village and a close friend of Rekha's.

brought up the increasing trend amongst different NGOs in India of linking Direct

Seeded Rice (DSR) with SRI. To this he responded:

> People talk about SRI but they don't know SRI... I mean SRI has become a known
> term so they will link it to anything they do. They do it. If you ask them what SRI
> means and that's what you should ask and that would be very revealing. And I tell
> you that's what a lot of NGOs would not be able to answer. They would look left
> and right (Interview by author. Transcript. Delhi, September 24, 2015.)

While I cannot speak of other NGOs, it was very apparent to me that both the current

and former directors of the UDP were very well-versed in the literature on SRI, being

members of the National Consortium on SRI (NCS), with one director having conducted

rigorous research on the topic. While deeply committed to SRI, the director was also very

candid about its drawbacks. Equally important, the director was finely attuned to the

current context of livelihoods in the state, and saw SRI as filling the livelihood gap that

smallholders face.

88 percent of Uttarakhand's farmers are marginal[142], owning less than one hectare on

average. In Bageshwar district, 90 percent of households possessed marginal landholdings

in 2006-07[143], accounting for a little over 69 percent of the total area (Surabhi, Tripathi

and Sethi 2008). Resources are also limited in terms of access to external inputs such as

chemical fertilisers and irrigation. Being an agro-pastoral system, fodder is as important

(or, *more* important than) agriculture.

---

[142] As defined by the categories employed by the National Sample Survey.
[143] The average landholding is 0.51 hectares.

SCI is claimed to address these gaps - lack of access to land and other inputs - while simultaneously allowing for higher yields in terms of grain as well as fodder (by providing greater stalk volume with implications for access to fodder and consequently farmyard manure and dairy products[144]).

Self-sufficiency is one of the stated goals of the method according to senior management, though the degree of self-sufficiency SCI is claimed to allow is articulated differently in different spaces. At a training for project staff, the trainer Bisht suggested that if the method could increase the family's access to wheat by one month, it would be a "big change" and would contribute towards their food security. Predictions about the yield potential of the method were generous in public tellings of it, varying from one and a half times to double the average yield. In more private conversations, opinions were more circumspect, and estimates went as low as fifteen percent. Constant across different articulations of its potential was its general claim: more yield with less seed.

What has set the UDP's approach to SCI apart from earlier implementation efforts, is its proactivity in advocating for flexibility in the adoption of SCI, and its narrative commitment to adaptation to local conditions. A presentation made to one of its funders in June 2012 states as much, noting: "Farmers should be provided flexibility for adoption of different principles under SCI"[145]. Other organisations have also made room for adaptation of the method, though they tend to see deviations from prescribed practices as aberrations. To assume rigidity in the practice of SCI is untenable as this chapter will

---

[144] Presentation made at a donor meeting in June 2012.
[145] Presentation made at a donor meeting in June 2012.

demonstrate, although this has of course opened SCI to critique from groups that suggest that variability causes SCI to lose its identity as a specific and isolated set of practices. Yet flexibility has allowed the UDP to adapt SRI to other crops, especially wheat, finger millet and kidney beans. The UDP has also adapted SRI (SCI with rice) to rainfed conditions, making it more accessible to parts of the country where irrigation in scarce. And yet, Rekha's innocent interjection is indication of one way in which SWI takes shape in practice.

To recapitulate from Chapter Two, SWI is claimed to be subject to interpretative flexibility, as articulated not just by Pinch and Bijker (1984), but also by proponents of the SRI method. In this formulation of the practice of SWI, the method is seen as being *translated* in practice, influenced and interpreted according to the context in which it is places.

I prefer to think of the practice of SWI/SRI through a different lens offered by the ontological turn in STS. Rather than think of SRI being mediated by its context, I think of SRI as being *enacted* in practice, "crystalliz(ing), provisionally, a particular reality, (and it) invoking the temporary action of a set of circumstances" (Woolgar and Lezaun 2013)[146]. Its particular form is sedimented in practice, thereby addressing the question of what is SRI? However, I depart from Woolgar and Lezaun's reluctance to accord agential power to the material, aligning with Actor Network Theory here. I also do not accord primacy to any one or kind of actor (or "actant" (Latour 1996)): actors may move in and out of the

---

[146] Woolgar and Lezaun admit to this as being the "re-specification of the analytic role of context" (Woolgar and Lezaun 2013, 324). Also see Callon's (1986) study of scallops and the fishermen of St Brieuc Bay.

core and periphery becoming relevant (or not) at different points in the crop (and project) cycle.

The questions of what is SCI/SRI/SWI and what sets it apart from other methods or practices are contested, and are raised by the practice of SCI/SRI/SWI in the Parvati Valley. Even more interesting is how and why "adaptations" of the method take place – and whether they should be termed SWI at all. I am consequently interested in the multiplicities of forms that SRI takes though ordering practices (Law and Lien 2012) and how these forms both inform further articulations of SWI, and also allow it to act (Mol 2012). Separate but related, I am also interested in how the claims of SRI as being beneficial for women (Resureccion 2008)[147] holds up against a feminist theory of science (Wajcman 2000) in these alterities.

Below, I focus on how SCI/SRI/SWI is framed and practiced, within the context of mountain agriculture in Uttarakhand by looking at how staff workers and farmers were trained to understand SWI, and later sowed, added manure and weeded the wheat crop in a multiplicity of ways. I show how ecological and labour issues, the ones most prominently fore-grounded in challenges to the adoption of SCI compete with the proclivities of both the staff and farmers tasked with ensuring the success of the spread of the method.

---

[147] Sabarmatee Tiki, a PhD candidate of Wageningen University has also conducted excellent research on the effects of SRI adoption on women's work in rice farming, focussing on the lessening of weight burdens and pain (personal communication).

The Practice of Agriculture in Uttarakhand

A paper by Niti Ayog[148] identifies five causes for low productivity rates in agriculture (Niti Ayog, Government of India, 2015).

- Low output per hectare caused by insufficient and incorrect use of inputs, and a lack of modern technologies.

- The inability of farmers to receive remunerative prices for their produce because of low Minimum Support Prices (MSP)[149] and the generally low prices offered by the agricultural marketing system.

- Small farm sizes that make farming unviable or unremunerative[150].

- The disruption of farming by natural disasters that are not properly recompensed[151].

The paper reflects widely accepted understandings of the many problems facing Indian agriculture. While insufficiently attentive to loss of soil fertility, soil contamination and access to water, the concerns are dismal reminders of the poor state of agriculture in India. Yet they betray a rootedness in particular geographies and landscapes of agriculture, namely that of the lowlands.

---

[148] Formerly the Planning Commission of India.

[149] Minimum Support Price or MSP is the price offered to farmers for offtake of their produce through the government procurement system.

[150] The paper suggests that small farm sizes coupled with the riskiness associated with leasing land out has meant that many farmers have abandoned their farms and sought employment elsewhere.

[151] Its final point attends to the specifics of agricultural production of the eastern region of India and is not relevant to this discussion.

As pointed out in Chapter Three, agriculture has demonstrated a chequered performance in Uttarakhand. One cause for this is poor levels of state involvement in the hilly districts. The mountainous regions see little evidence of government support, even in terms of inputs and technologies from the Green Revolution that began in the 1960s in India[152]. Perhaps the clearest indictment of the absence of the agriculture department in the hills is people's unfamiliarity with the term "The Green Revolution". During one interview I asked a well-travelled and retired subedaar[153] if the Green Revolution had come to the area to which he replied, "the Green Revolution came here for one year, that's all. They distributed some trees. Some people planted them. Story finished". Mohan Singh mistook the term Green Revolution to mean a forestry project. His confusion did not indicate poor knowledge of government schemes necessarily, but pointed toward a very nebulous understanding of government-initiated development programmes - as well as the stark lack of them. None of the farmers I spoke with could recall visits by agricultural extension workers. The store maintained by a local resident employed by the department to sell seeds, fertilisers and equipment was usually shut, and only once during my time there did I see it open for business. The most visible presence of the agriculture

---

[152] One of the most prominent critiques of the Green Revolution in India is a critique that has been extended to agricultural technologies more generally: that of exclusionary tendencies. While the Green Revolution succeeded in increasing yields substantially, its success was limited to large farmers in certain geographic regions. The Green Revolution also relied on sufficient funds to access improved varieties of seeds, tools and irrigation facilities in a timely fashion. It was less relevant for resource-poor farmers, and for whom its practice made little sense. In the Parvati Valley, most farmers are reluctant to use chemical fertilisers, suggesting that a lack of access to irrigation causes the chemicals to "burn" the soil. Chemical fertilisers and insecticides are only slowly making inroads, even as farmers find themselves having to cope with new and unknown diseases, but remain for the most part deeply suspicious of it. At the same time, indigenous methods documented in other areas of the state are not utilized here[152].
[153] Junior Commissioned Officer in the Indian Army.

department was during the "*Krishi Mela*" (Agriculture Festival), held in a school in one of the project villages right before each crop season[154].

Not surprisingly, Uttarakhand's advantage in terms of food grain production has been limited to what is termed its "default" organic status. Most farmers do not use chemical fertilisers and pesticides in the production of cereal crops or in homestead vegetable farming. The lack of access to irrigation causes the soil to "burn" when chemicals are added to it. Hoping to capitalise on a growing urban consumption preference for organic food, in 2003 the government of Uttarakhand set up the Uttarakhand Organic Board, aiming to be able to label hill agriculture "100 percent organic" by 2020. Its spread has been limited to certain areas however. The Board also operates in contradiction with the Agriculture Department. The Agriculture Department offers information about organic alternatives to chemical fertilisers and pesticides, but these tend to be appended at the tail end of presentations. Since officials only visit certain villages in an area on average of twice a year for the *Krishi Mela*, their influence is very limited. Even so, many farmers aspire towards newer and *easier* innovations, seeds and "medicines" that promote higher yields. A few farmers with a keen interest in farming or with linkages to persons living in larger towns and cities might source new seeds from government offices; the rest continue with the seeds they have and manure from livestock. These patterns are only seldom broken by visiting relatives or the odd outsider passing through the area.

---

[154] The *mela* is staffed by members of the agriculture, horticulture and animal husbandry departments who sell products such as seeds and tools and implements and offer advice about their proper usage. Larger products such as mechanized weeders or power tillers are alluded to but not displayed. While power tillers are unwieldy items to transport, their absence also betrays a lack of optimism of demand for them. Uneven terrain dotted with the stones that heavy rains cause to drift into fields every monsoon make using a power tiller a painful exercise.

In addition to the failure of the state and the specificities of production in the mountains[155] that restrict agricultural expansion and growth, I want to especially focus on two aspects of agricultural practice that farmers reported as being the main causes of limited area under coverage and output: simian encounters and access to irrigation.

Monkey Business[156]

The major challenge to agriculture articulated by actors across the board is that of monkeys or the rhesus macaque and the "unruly environments" (Beinart, Reflecting on Unruliness 2015) that they engender. Monkeys are a frustrating and yet entertaining diversion from the other deep-rooted problems facing Kumaoni agriculture. Since the export of the rhesus macaque was banned in 1978, simian populations are argued to have increased (Saraswat, Sinha and Radhakrishna 2015). A new entrant to the area might be incredulous about the threat they are claimed to pose. In the urban imagination (or the imagination of cities that don't experience simian contact on a more daily basis like Delhi and Dehradun), the rhesus macaque is a loveable creature. In the pahad, the rhesus macaque is both hero and villain. It embodies the Hindu god Hanuman as well as the common thief.

---

[155] Elaborated in detail in Chapter Three.

[156] The emphasis placed on the rhesus macaque is in direct proportion to the emphasis residents and farmers place on it in discussions of farming.

Resident-farmers are quick to point out that monkeys cannot be killed[157]. Their double-protected status, both by the people as well as the wildlife departments ensures them some immunity[158]. So widespread is the problem that it has begun to dictate farming practices, further exacerbating the divide between agriculture in the plains versus the mountains[159].

Over time people have come to espouse commonly held (if sometimes conflicting) perceptions of monkey behaviour and preferences. While comical at first glance, human-wildlife-crop conflict has had implications for which crops are sown, which varieties of seed are preferred, and how "plotting" is performed to achieve a patchwork of negotiated cropping patterns on mountain hillsides. When I asked Hansa Devi which wheat varieties she sows, she replied:

> Hansa Devi: Where the monkeys come less, over there we sow the seeds from the block[160]. In which soil the monkeys come, the red soil, we grow wheat with seeds from our homes.
>
> Natasha: Why?

---

[157] This is contrast with Radhika Govindrajan's findings in other parts of the state where residents are far more noncommittal about their relationship with the monkey-god. This is not true in all areas of the pahad. Radhika Govindrajan pointed out that Hanuman is not venerated in the same manner as gods more frequently associated with Kumaon, such as Golu and Isht Dev. On the other hand, in the Bhadkot, Hanuman was transformed into more than just a deity who animated the spiritual imagination when the village Pradhan used government funds to build a Hanuman temple in 2016. Interestingly, her research conducted in the lower reaches of Uttarakhand also indicates that monkeys have lost their status as gods, and frustrated farmers are more willing to advocate their culling (or were it legal, kill them themselves) hinting at the spatiality of Hindu religiosity as well as a spatial reconfiguration of what Radhika Govindrajan terms pahadi Hinduism. (Radhika Govindrajan, personal communication, Madison, October 18, 2016)

[158] In 2010 Himachal Pradesh, public frustration resulted in the state government permitting monkeys to be culled by farmers who were affected. Public displeasure resulted in this decision being revoked by the state high court (Chauhan and Pirta 2010). Other species of macaques, specifically the bonnet macaque in Karnataka, have not been so fortunate, with cultural and religious significance being subsumed by frustration over their crop-raiding activities (Kumara, Kumar and Singh 2010).

[159] Stories of monkeys being rounded up in cities by mercenaries and dumped at the fringes of villages are corroborated by both village residents and forest officials.

[160] Agriculture Department.

Hansa Devi: The monkeys eat it up. They eat the wheat from the block, not the wheat from our homes. That's why we use it.

Natasha: So when you broadcast do you put a lot of seed or less?

Hansa Devi: More. Because the monkeys eat them. So we put a lot.

(Interview by author. Transcript. Ghasoli, 11 November, 2014.)

Kavita Devi on the other hand expressed a very different seed selection logic. Local varieties promised a sweetness in taste, compared to the seeds of market varieties, which were fat but not as flavourful. In her telling of cropping patterns based on monkey preferences, she expressed a preference for sowing home-grown varieties of wheat in far-flung fields less visited by monkeys, sowing market varieties in more popular areas. The cost of loss of seed/grain from a field populated with a home-grown variety is less (in monetary terms) than that of market varieties that are often entirely bypassed because of the cost of the seed. Some indigenous varieties also produce tall plants, favoured because of the extra straw they provide in comparison with short varieties[161]. Those that use market varieties sow them at a distance from the main cultivated areas of the village to minimise financial loss. Both these narratives foreground the choices people make about seed selection that hinge on the perceived behaviour of monkeys as well as their own perceptions of what characteristics of the wheat seed are valuable. Productivity is less of a concern than protection[162]. Not only do monkeys dictate seed choices, their raiding of

---

[161] Former GBPUAT scientist, personal communication, Pantnagar, September 29, 2015
[162] Monkeys do not always dictate seed choices. Consider this extract from an interview with another farmer about how she selects seed varieties to sow:
    Natasha: So do monkeys prefer the short wheat or the long wheat?
    Indra Devi: The short wheat.
    Natasha: Why?
    Indra Devi: I don't know. Maybe because this has big grains and the other one has thin grains.
    Natasha: They prefer this? If monkeys prefer this why have you've sown this variety and not the other wheat?

crops necessitates that extra seeds be sown so that their damage in terms of individual plants destroyed is minimised[163].

Many farmers are choosing to farm less and less, a trend attributed by many to the increased presence of monkeys. Few efforts are being taken to limit their spread. Some villages have taken up the *baari* system, in which groups of families take turns every day to send one household member for guard (against monkeys) duty but these groups disband quickly as people lose interest. Farmers with larger or many plots of land were unhappy with "other" smaller farmers[164] who did not see value in spending time protecting just one or two plots. The monkey problem has been dissuading people from farming more plots, and the smaller number of plots being farmed now does not pose sufficient reason to chase away the monkeys[165].

The monkey narrative is not limited to local residents. Development workers also allude to the problem, though they are often reluctant to bring it up as a focal discussion topic in conversations about farming. Even so, everyone present at a meeting that pivots on agriculture knows that the topic is inevitable. For staff workers charged with meeting targets, the monkey problem is one that is intensely frustrating, and a stated inability or

---

Indra Devi: The other variety breaks with the wind. It is very tall. It spreads out. Then it becomes difficult for us to cut it.

[163] Monkeys are not the animal non-human species affecting cropping patterns and choices. Grains like kaun, finger millet and sorghum previously popular in the area are now fading out. Dietary preferences are one reason. These crops are also vulnerable to being destroyed by birds that peck off the grains and leave the stalks behind. Reduced acreage devoted to the cultivation of these crops has also seemingly made the loss by bird consumption starker, a phenomenon that residents have only begun paying attention to in the last few years.

[164] Farmers usually did not admit to non-participation in the baari system.

[165] Many farmers point out that the fragmentation and consequent wide dispersal of plots makes farming a logistical headache (choosing which plot to chase a monkey out of while or moving livestock across spread out plots to plough the land are some examples).

unwillingness to farm because of monkeys is publicly put down to the "laziness" of

farmer-residents.

   This narrative does not always go down well with resident-farmers. Hansa Devi who

once threatened to hound me out of the village if I did not find a way to rid the area of

monkeys expressed intense displeasure when speaking of one of the meetings.

> There was a meeting the other day and they (staff workers) were saying "how many monkeys come here anyway? People just keep talking about the monkeys". They said that the village people keep saying the monkeys are coming, the monkeys eat everything up. People say because of the monkeys no one wants to work hard. But how many monkeys can there be coming here (voice raised)? (Addressing me) when you people see the monkeys you will know. But so many monkeys come, we don't get one minute also to eat. I will sit over here, and they will climb on the tree. They eat it all up, quietly they sit and eat it all up. (Interview by author. Transcript. Bhadkot, December 19, 2014.)

   To make matters worse, the rhesus macaque has been joined by the Himalayan langur

in its marauding adventures. While the rhesus macaque does not usually live in close

proximity to the langur (the two are old enemies)[166], in the Parvati valley they have come

to live together in harmony. Crop considerations apart, simians now pose additional and

more threatening challenges given increasing stories of attacks on humans[167]. Concerns

about monkey behaviour is no longer limited to crop loss; it has taken on a form (physical

danger) that is becoming more and more difficult to ignore as Deepa Devi pointed out.

---

[166] The Himalayan Langur was actually employed by the Delhi government to chase away the many rhesus macaques that were causing disturbances at the Commonwealth Games held in the city in 2010.
[167] Many children have reported being attacked or fear of being attacked. Monkeys also enter homes, open cupboards, and run away from utensils of food and groceries. Dwelling spaces are increasingly being guarded with increasing vigilance.

They are coming inside the house now. They hit my mother-in-law. I had kept fenugreek in a vessel inside that cupboard. They took it and went. The other days I'd kept seeds over there, radish. They went over the fridge and looked at that. They went to the cupboard and were staring at it. I said (imitates noise) kwaaaah! and threw a blanket over the monkey. Then it started coming towards me. I took out a stick and said (grits teeth) "I'll hit you!". Now we can't keep anything in our hands, plastic bag or anything. They snatch it away. A woman from Palna was walking, carrying something, maybe tomatoes. The monkey attacked her and tore the plastic. All the tomatoes fell down. It is because of our deficiencies that these monkeys are acting like this. If we villagers got together and chased the monkeys away they would get scared. We don't do anything. (Interview by author. Transcript. Bhadkot, July 2015)

Irrigation

The lack of irrigation facilities is one of the most commonly recorded challenges farmers face, even if in Uttarakhand water plays little role in wheat production systems. Irrigation in the hills is limited, and few if any farmers attempt to irrigate wheat fields. Some see value in irrigating wheat, but is not clear that many practicing wheat cultivation in the hills would irrigate fields even were water available. This does not detract from SRI's potential, and even partially following SRI recommendations has been demonstrated to increase productivity (Palanisami, Karunakaran and Amarasignhe 2013).

In hamlets like Siyali, residents find ways to divert spring water to irrigate their fields during the *kharif* season, by taking turns preparing their fields to sow irrigated rice. Most others practice rainfed farming, with the exception of those households fortunate to have fields located close to natural water sources. Attempts to build *guhls* (canals) in villages like Bhadkot and Maikili have usually failed, with shoddy construction work and poor

maintenance practices rendering them quickly unusable. Many Kumaoni farmers attribute the perceived success of farming in the plains to its irrigation facilities amongst other reasons. Lack of access to irrigation is also held responsible for low levels of vegetable cultivation.

Growing Wheat, the SWI Way

In a paper by Erica Styger and Norman Uphoff that appears on the International Rice Research Institute website[168], the authors make a case for why farmers might be interested in SRI:

> Farmer interest in SRI is often driven by a desire to cut back on the volume of water, seeds and agro-chemical inputs that they require, reducing production costs while achieving higher crop productivity and achieving more crop resilience against climatic and other stresses. (Styger and Uphoff 2016).

> These tenets coming as they are from Norman Uphoff, are widely accepted as gospel, and form the basis of SCI/SWI/SRI efforts around the country and perhaps the world.

---

[168] Erica Styger and more prominently Norman Uphoff are widely acknowledged to be the most enthusiastic proponents of SRI, heading the SRI International Network and Resources Centre at Cornell University's College of Life and Agricultural Scientists. Norman Uphoff has spoken at many forums about IRRI's strong discomfort with the promotion of SRI. The paper referenced is one of the few instances where IRRI has acknowledged SRI as a separate method of cultivation.

Some practices of SCI are not quite as new to Uttarakhand as they might initially appear to be.

Government records from the colonial era indicate that inter-cultured wheat experiments were conducted as early as 1914, where wheat was sown in lines ranging from five inches to one and a half feet apart (United Provinces of Agra and Oudh (India) Department of Land Records and Agriculture 1914)[169]. In the Parvati valley, two farmers described methods like SCI being practiced by older family members in more modern times. Seema Devi, an enthusiastic participant in SWI and SRI, described her own beliefs about the best way to grow wheat and rice, derived in part from her own grandfather's farming practices:

> We used to do work in the field, take out grass, wheat, put water in the wheat. Then good ears of wheat would form. They would be tough. But no one does this anymore. My grandfather used to sow wheat in this manner. First you levelled the field. Take out all the grass. Then you made lines and sowed the wheat. We don't do it but he used to tell us the correct way of doing it. (I ask about the distance between seeds.) This much only, one to one and a half feet. (indicating with her hands a distance that approximates six inches.) By growing the wheat together it becomes weak. By growing it at a distance it becomes tough. (Interview by author. Transcript. Siyali, June 23, 2015.)

Another farmer also spoke of the manner in which her father-in-law would sow rice in lines for better yield. Since then, no one appears to have attempted line sowing of wheat in the area.

---

[169] Gujja and Thiyagarajan (2009) note similar findings for Tamil Nadu in the early 20th century.

In more recent times, one of the first trials of the System of Wheat Intensification in northern India were conducted by the UDP in 2006. Trials conducted in the first year indicated 18-67 percent increases in grain yield and 9-27 percent increases in straw yields, establishing the value of SWI as a productivity enhancing method to members of the UDP. Ensuring its uptake on a larger scale proved to be challenging however, especially without sufficient state support.

The UDP attempted to work with the government to ensure the spread of SRI and SWI. After a few successful meetings and holding training sessions for government officials, the state government agreed to fund an SRI project, appointing UDP the lead agency to run it. Once the project was well underway, the state government withdrew support, transferring only half of the Rs. 30 lakh budget promised to the UDP[170]. Discouraged, the UDP moved away from future agreements with the government concerning SRI, though constantly maintaining that for SRI to spread widely would require policy support.

Despite this setback, bolstered by the research conducted by senior management and staff of the UDP and aided by new insights and engagement with the National Consortium on SRI, the UDP continued to include SRI as a significant component of its projects. Prior to the UDP, SCI/SRI was included in a number of its projects from as early as 2006. According to its current director, from twelve farmers in 2006, the numbers rose to 600 by 2007. By 2008 UDP's projects covered 10,000 farmers who were practicing SRI. Some of the current staff who were also on these projects were circumspect in their

---

[170] The agreement had not been formalised on paper.

discussions of numbers covered, and urged me to be very cautious while interpreting the figures. Even if the numbers do not match entirely, SRI did enjoy some success, however limited in scale. It was enough to prompt the UDP and its funders to include SRI in the projects that followed, including the Sustainable Mountain Livelihoods Project that ended right before the beginning of the ULP and an ongoing livelihoods project in an economically impoverished region of Madhya Pradesh.

In 2013, the UDP initiated the ULP. The livelihood component of the project was rolled out in 2014, after an intensive livelihoods survey was conducted in early 2014 to ascertain the state of people's livelihoods and ask households what kinds of livelihood activities they would be interested in. After the survey was conducted in all the project villages, the ULP team worked together to draw up detailed Village Plans. Each village plan identified the scope and state of livelihood activities in the village (area under farming, kinds of farming being done, livestock rearing, bee-keeping and the like, while carefully avoiding cannabis production which is a significant source of income to certain households and in certain villages). The plan generally went on to estimate resource gaps, propose activities to cover these gaps, and outline community based institutions to be set up to implement and monitor project activities alongside project staff. Common themes that emerged from the surveys were the lack of employment opportunities, poor educational facilities, low agricultural productivity, crop damage caused by errant wildlife, lack of access to irrigation, poor access to fodder and consequently dairy products, natural hazards such as landslides and inadequate or distant health facilities. Village Plans were presented to village residents in publicly held village meetings to

present them, crosscheck figures, as well as solicit feedback and suggestions. Notably, in the interests of financial transparency, plan budgets and their breakup were also displayed.

UDP's "Entry Point Activity" (EPA) was the plantation of napier grass in the different project villages. The EPA was meant to alert residents to the project with what was meant to be a visible activity. The UDP also began sowing tree saplings in different villages. The next activity that the UDP took up was the System of Wheat Intensification (SWI). The UDP chose not to attempt advocating for SRI in the *kharif* season of 2014, realizing that it was much too soon to be effective[171]. Instead, after selecting farmers based on their categorisation into Below Poverty Line status to be introduced to SWI[172], a two-day training workshop was conducted in October 2015 for staff members and select farmers.

The Training

The training was conducted at a hotel in Bageshwar by two senior staff members (including the previously mentioned Mr. Bisht) with many years of experience with the method, while another senior staff member sat in attendance. Attendees included (most) project leaders and project fieldworkers of the three partner NGOs, as well as five "good" farmers from two of the projects located in Bageshwar district[173].

---

[171] In the Parvati valley, two farmers were encouraged to try SRI during the kharif season. A hastily provided training with poor follow up resulted in the crops doing very poorly, and earning the ire of most of the family members.
[172] See Chapter Five.
[173] The third NGO was located at some distance from the training centre. It was reported that convincing farmers to travel the distance for the training would be difficult.

The training was divided into two components: a classroom section as well as a "practical" session in the field. The classroom session was led by the two senior staff members after a few "ice-breaker" sessions to allow attendees to mix with each other.

During the classroom section that took up most of the first day, the trainers made their arguments for SWI and detailed its principles, using the aid of a Powerpoint presentation. As described by the trainers, the method required that one to two[174] seeds be sown at the intersection of lines measuring eight by eight inches, known as square planting. Holes were to be dug at these intersections, and usually two seeds dropped into them, later covered by mud. The trainers also allowed that in practice, line sowing (with lines eight inches apart from each other) be practiced along with what was termed the "seed-to-seed" or square planting method. The trainers called staff workers to demonstrate the two methods on a single, large plot, alongside a traditionally sown area (using the broadcast method) in villages so that farmers could see the differences between the two methods themselves.

Following the classroom training session, on the second day all of us were taken to a large plot belonging to a local resident of Bageshwar to "practice". The trainers took us through each step of sowing process. We quickly realised that sowing seed using the SWI method can be a time-consuming task, in comparison with the broadcast method practiced in the region. To draw lines, two persons must hold a rope, while a third digs furrows alongside it. During the training, Bisht had attached smaller pieces of rope to the

---

[174] While the method only requires that one seed be dropped, two seeds are recommended in case one seed is damaged/fails to germinate.

main rope at eight-inch intervals to indicate where the seeds must be planted. As one person dug a furrow, a fourth person followed behind her, dropping seeds at the intersection of the smaller and larger rope. Once a line was done, the two persons holding the rope moved to the side to begin a new line. The distance between lines was indicated by small twigs broken off to approximate the eight-inch distance. This process was seemingly straightforward, if tedious and tiring.

While attendees were expected to and participated in the process of sowing, as time progressed, most of the men began to move to the corners of the field, seeking shelter from the relentless sun. Women and one male team member from the Parvati valley - Aadarsh - continued tirelessly in the field. This set the stage for a gendered division of work that would continue in the implementation phase as well. The process was especially onerous on this first occasion since the movements and rhythms of sowing were very different than what most were used to. Lacking muscle memory and rhythm, each furrow dug and each line of seed dropped required that people learn how to hold their bodies in different ways. In the square planting section of the plot, measuring out two seeds per intersection increased the time taken to move down the line[175].

After the sowing, the trainers also facilitated the demonstration of the preparation of the recommended organic manure panchgabya. Instructions were provided with respect to how it was to be prepared and in what quantities, with the trainers calling out

---

[175] Later in the season as staff members gained experience and became accustomed to dropping seeds in furrows from the sowing they did in beneficiary fields, they commented on how the wheat seed was more amenable to the method than the finger millet seed which is tiny, and difficult to control.

directions and a few women attendees performing the actual labour. Inter-cultivation was not demonstrated, and staff learnt to work the weeders later in the season in farmers' fields.

SWI was enacted as a productivity enhancing technology, its yields reportedly significantly higher than the conventional broadcast method. While trained in the details of the practice, most staff workers new to the method were unable to internalise it. SWI remained strange, unfamiliar and impractical. Staff workers who were more familiar with it were already aware of what the method entailed, but were unconvinced that they would be able to propagate it widely. Some of the reasons for this were mundane: one complained that the trainer spoke too quickly, another that a trainer spoke of too many different things making it difficult to follow him. In between the training on the first day, an employee with the State Bank of India (SBI) requested permission from the trainer to hold a meeting with the team to explain a new scheme being implemented along with the Ministry of Rural Development (MoRD), the Grameen Swarozgar Prashikshan Yojana. At the end of this meeting a banner was unfurled and photographs taken. This performance - while routine for development projects - added to everyone's sense of bewilderment and impatience. The choreography of the training session imbued SWI/SRI with an otherness that was difficult to shake in the first season as staff members from across the state went back to their sites to begin work[176].

---

[176] See Law and Lien (2012) for more on how entities are "othered".

In the sections that follow, I will focus on the practice of the three main components of SWI that were laid out as components to be included in the demonstration of SWI and included in reporting sheets created as part of the monitoring process: sowing, adding manure, and inter-cultivation. Specifically, I will contrast the practice of these operations against the recommended practices, to demonstrate the different forms SWI took. Time constraints, limited person-power, relative inexperience with conducting extension work, the positionalities of field staff and their intersubjective relationships with beneficiaries all contributed to SWI taking different shapes in different fields.

Sowing Wheat

Staff who had prior experience of SCI outreach work were aware that convincing farmers to adopt the method would be an uphill task. Newer staff members were apprehensive about people's reactions to a method that seemed so very out of the ordinary. Unluckily, with the exception of a village-level training held in Maikili a few days after the staff training, the rapidly approaching sowing deadlines forced staff members to do away with formal training meetings. At the same time, two of the Livelihood Development Team (LDT) members (who resided in the field site and were senior to local staff workers) Govind and Aadarsh were called away to a meeting held at the UDP's headquarters, leaving field staff in charge of ensuring that the method was adopted by the specified number of farmers. With little experience of work in development projects, the local field staff struggled to assimilate the knowledge they had received from the training and match

it with farmers' own knowledge of growing wheat: a situation attenuated by the visual and very visceral reactions farmers had to the method once the sowing got underway.

The initial plan was for staff members to conduct trainings for "selected" farmers. Farmers were "selected" on the basis of their categorisation into Above Poverty Line (APL) or Below Poverty Line (BPL) households on the basis of a household survey that was conducted by the NGO and its partner. The SWI activity was directed at BPL households where it was assumed to have more value, though there were no real restrictions on APL households joining in. In practice, anyone who staff were able to convince to adopt the method participated in the activity.

Sowing wheat seeds in accordance with SWI practices predictably took more effort than that required of the commonly practiced broadcast method. Added to the situation was the complete unfamiliarity of resident-farmers with the method. With a handful of notable exceptions mentioned previously, this method was entirely new and went sharply against the grain.

The first challenge staff workers faced was seed treatment. Seed treatment is performed to prevent diseased seeds from affecting the entire crop, and to isolate poor or "empty" seeds. The prescribed practice of seed treatment states that specified quantities of seed be soaked in a mixture of milk and cow urine[177]. After removing the spoilt seeds that

---

[177] 400-500 grams of seed are required to sow wheat in the square formation in a plot of one nalli. The treatment requires that one kilogram of seed be soaked with 150ml of cow urine, along with water. After letting it sit for 15-30 minutes, the seeds that float to the top of the surface are removed. The water is drained out, and 50-100 grams of jaggery is added to the mix, along with one kilogram of vermicompost or farmyard manure. This mixture is dried away from sunlight overnight or for about twelve hours.

floated to the top, the water is drained and the seed mixed with a mixture of jaggery[178] and vermicompost or (in its absence) cow dung. Some staff members believed that adding manure to the seed mix would ensure that while sowing seeds in lines, less seed would fall from the grasp of the hands of the person sowing. This practice required access to both cow urine and cow dung, as well as early planning, since the seeds were meant to be dried in the shade for at least half a day. Cattle did not always oblige to demands for urine, and time and lack of access to resources often meant that some "ingredients" had to be dispensed with.

The second challenge to sowing SWI came with prescriptions about how a field should be prepared. The proper practice of SWI requires that fields be levelled, and ploughed two to three times prior to sowing. It is also recommended that wherever possible, fields be irrigated ten to fifteen days before sowing. Ploughing the field post irrigation allows for the weeds that sprout up after irrigation to be uprooted and mixed into the soil, enhancing its organic matter composition. In the Parvati valley and the mountainous region of Kumaon more generally, wheat fields are ploughed once prior to sowing, the seed is broadcast, and the field is ploughed once more to drive the seeds deeper into the ground. The field may then be levelled to even out the soil. Clods of earth may remain in the soil, and decayed plants from the previous crop may not be removed unless very large.

---

[178] A traditional form of cane sugar.

In the ULP, staff did not choose to address this question. Very often, fields were prepared manually, especially in cases where farmers did not have their own livestock to do the ploughing and instead depended on other farmers to plough their fields for a fee. A delay in sowing SWI fields meant that farmers – and usually field staff – had to manually dig up fields, breaking clumps to prepare it. Time constraints meant that staff members reached fields before they were sufficiently prepared, making drawing furrows to sow the seeds a tedious and exhausting affair. Sometimes staff members themselves – most often Rekha - would set to work preparing the field.

Encouraged by the diktat issued during the training that a plot comprise all three methods: seed to seed, line sowing and a broadcast patch to enable farmers to be able to compare for themselves the value of all three methods, SWI quickly came to take the shape of line sowing after the sowing of wheat in Mohan Singh's plot, one of the first plots to be sown with wheat the SWI way in the project area.

Mohan Singh's plot was large, and provided enough space for demonstration purposes. The second and third plots adjoining his were smaller on the other hand, and left less room for experimentation. The two plots sown after Mohan Singh's plot were also owned by his extended family, who quickly grew suspicious of this method (aided by the loud protests of this wife) with its very modest consumption of seed. Rekha, Radha and Priya continued working nonetheless. Similar to in the training programme, two of them took turns holding a rope while a third staff member bent over the top of the line with a hoe, burrowing about three to four inches into the soil to form a line as she moved backwards.

Having done that, one of them would move down the line, bent over, dropping seeds slowly into the furrows. In the area of the plot where square planting was practiced, intersecting furrows were first created before one to three seeds were dropped into the intersections. The three women quickly began to tire, the hot sun relentless. With so many lines to be dug out, in an especially large field, the act of bending over and digging caused both back pain and tiredness in their arms. Mohan Singh stood by the side, shouting instructions to the increasingly frustrated women.

As the day progressed, tired by the process and unable to forcefully persuade farmers to allow them to sow the wheat seeds in the recommended square formation, fieldworkers capitulated and sowed wheat in lines in the two other plots in Maikili that were owned by farmers who expressed a willingness to adopt the method[179]. Even the term line sowing came to exhibit some flexibility in practice.

Research on SRI and SWI indicates different optimal spacing norms. For SRI, estimates vary between 20 to 25 centimetres (though this also varies depending on soil type and seed variety according to some scientists as we have already seen). For SWI, less research exists, though there is agreement currently that eight inches is optimal. Experiments conducted by the UDP and presented at the team training also indicated differences in the yields of crops sown at six and eight and ten-inch intervals, with and without intercrops. There is theoretically sufficient gain to be made from following the

---

[179] The low number of adopting households (three out of 27) is partially attributable to the spatially circumscribed recruitment efforts of Mohan Singh who pointed out that some households were too far away to bother with, as well as the limited outreach efforts of the project team on that occasion.

eight-inch norm. On the other hand, practical considerations were instrumental in determining what constituted an SWI field.

A discussion of what came to count as an SWI plot vis-a-vis the prescribed practice is important for this analysis, and takes us back to the training workshop. As mentioned previously, during the training of the trainers' session, staff had been instructed to maintain a distance of eight inches between each seed, maintaining the prescribed seed rate of 300 to 400[180] grams per nalli[181]. When seed to seed sowing was abandoned later in the field, staff still attempted to maintain an eight-inch distance between lines. The *interpretation* of what constituted an eight-inch gap varied. When demonstrating the sowing of wheat using SWI principles, the trainer had referred to eight inches using his handspan as a visual indicator of eight inches. Knots were then tied on a rope at this distance, each knot meant to indicate where a new line would begin. This is the method that field staff used initially during the sowing process. Complicating the situation was the unavoidable reality of the handspan of staff members varying, some being much smaller than the trainers. While knots/secondary ropes tied on to the rope served as initial markers of distance, as the knots/secondary ropes shifted (or the rope was forgotten), handspans became the preferred way of estimating what constituted eight inches. As the sowing got underway in full swing, time constraints (as well as the somewhat tedious nature of the process) led to staff members visually estimating the distance between rows. In addition, while a rope was held from one end of the field to

---

[180] Assuming two seeds are sown at each intersection. When only one seed is sown, 160 to 200 grams is recommended/used.
[181] The unit of measurement in Uttarakhand, equaling 200 square metres or 0.4 hectares.

the other to indicate the line along which the furrows were to be made, if there was a shortage of staff at that plot, or if there were time constraints, staff chose to dig the furrows by visual estimation, causing uneven spacing among rows and irregular lines. As a result, many fields did not in practice exhibit the norms laid down even for line sowing at the training[182].

Occasionally, to make the process of sowing easier, oxen with were used. Staff members or a family member would walk behind the plough, dropping seeds into the furrows created. Because oxen moved around, and because the plough was also unsteady, the lines tended to be crooked, and at the ends of the field where oxen turned around, lines were sometimes erased. In a few fields, a "*patta*" or leveller was dragged over the field (whereas in other fields, the furrows were manually covered up). The implications of using a patta became clear only later, when families, staff and I realised that the patta had caused seeds to shift, erasing lines.

While such aberrations may seem frustrating, field staff received little help from farmers who thought of sowing as being the prerogative of staff members. They were left with no choice but to hurry through the process, the sowing dates passing by rapidly and the possibility of plots being sown before they could get to them a pressing reality.

---

[182] Farmers are not unused to line sowing. Finger millet, kidney beans and some crops like green chilli, cabbage, maize, radish and potato are frequently sown in lines because it allows the plants to grow quickly and become big, and prevent them from breaking easily. The practice of wheat cultivation even requires that some wheat plants be removed from fields to allow the stronger plants more space to grow bigger.

Additional challenges arose during the sowing process. Since the "classroom" training sessions had to be dispensed with, many farmers were not clear about what the method involved, becoming cognisant of its practices as the sowing process got underway. Many expressed dismay about the distance between seeds, often exclaiming, "*you've left our fields empty*". Field staff were quick to repeat the mantra, "more benefit with less seed", arguing with farmers that this seemingly counterintuitive process would lead to greater yields (while remaining unconvinced themselves). Their verbal formulations paled in comparison with the near viscerality of the visual image of empty fields and farmers were unconvinced. SRI disrupted the visual pattern regularity of the of the broadcast method. The spaces or gaps in the fields triggered instinctive cognitive processes. This is a common refrain in the early days of SCI extension work, and one echoed by farmers around the country. Later in the year when SRI was introduced, as saplings were being transplanted, farmers who took a more active role in the process were sometimes seen to deliberately reducing the gap between lines. This would provoke a negotiation between staff and farmers, with some lines being spaced closer to each other than others[183].

For their part, staff members who were also from the same villages in which they were working and farmers themselves, also displayed a great deal of ambiguity about SWI and the value they saw in it. The redrawing of the contours of SWI and the fluidity of

---

[183] The unhappiness with seeing an "empty" field was something that the UDP realised early on. In the early SWI plots, UDP staff found that farmers were insistent on growing mustard in-between lines of wheat, a practice that is not uncommon with traditionally sown wheat. This led the UDP to conduct research in 2014 in two districts, Rudraprayag and Tehri Garhwal. The research study paid attention to when and in what line formation of intercropping (of mustard, peas or masoor) would allow for the best results. In taking this step, the UDP took very seriously concerns about the acceptability of concerns about fields looking barren, acknowledging that a yield reduction in wheat was necessary to make the method more acceptable to farmers.

their perceptions of its practice derived from the inability of the training to familiarise the less experienced staff workers sufficiently with the method, as well as their own pre-existing knowledge and beliefs about what constituted good farming. Senior staff members/trainers also allowed for fluidity in practice, their own accommodations deriving from prior knowledge of the unacceptability of some aspects of the method.

Consider this (somewhat long) exchange between Bisht, one of the senior trainers, Hari the young professional in charge of this project area, Rekha a local fieldworker from the village where this exchange took place and me on April 7, 2015. The four of us had congregated around a large SWI field and were discussing its progress.

Bisht: There won't be that much difference between two fields, one in which there is line sowing and one in which it is traditional.

Natasha: Why should line sowing should be done then?

Bisht: The plants will be bigger, panicles will be bigger. But they've messed up the spacing. They shouldn't have done eight inches. Line sowing should be four inches. With eight-inch spacing they've lost the field. When farmers see the field they see the space left bare. They think the space has been wasted. They'll see that there is not much difference between traditional methods and line sowing. Then they will say, why do line sowing, no use.

Natasha: How much distance should there be for seed to seed (square) planting?

Bisht: Six inches.

Natasha: What about eight inches?

Bisht: It depends on the land. Varies in irrigated and unirrigated land. There is no irrigation here. In an irrigated area there is a difference in yield[184].

Natasha: What about in previous projects, how much space did they leave?

---

[184] When I cross-checked with Harender, another SCI expert from the team, he disagreed.

Bisht: This is the first time line sowing is being done, in SWI they only used to do seed to seed… In one area they tried line sowing with a zero-power tiller they. There it (the distance) wasn't more than four to six inches. You also have to consider how the field was prepared. Whether it has manure or not. The eight principles that are there... (gets distracted and starts counting tillers). The distance is more here, that's why the plant is doing well.

Hari: SWI should be like this.

Bisht: Yes because it is SWI.

Hari: This is not (because of) SWI, here there is manure[185]. That's why it's doing well.

Bisht: There are two meanings of SWI. One is distance. It's got manure as well.

Hari: (pointing to another corner) See this distance. It is dense...

Bisht: If there was eight-inch distance it would be line sowing and SWI. We can't call it SWI because there is a method for SWI as well.

(We then head to Rekha's field)

Bisht: See in that field (the field we were in previously) there were 40 tillers

Rekha: It's because there was manure.

Bisht: As though you won't put manure in the other fields.

Rekha: It's like this, there is always dung over there in that field. The dung was moved and wheat sown there. The dung was very old (composted) too.

Bisht: Okay. The meaning of manure is that... it will need to be added here too.

Rekha: Will that much need to be added? There has been manure in that spot for five years…

Bisht: If you see there that putting so much manure has a good effect on it, then you will need to put some here too…This is the meaning of SWI, that you did line sowing or kept distance. Of the eight principles, four principles must be adopted. That is inter-cultivation, irrigation, adding the manure panchgabya at the time of tillering. If there is no inter-cultivation the tillers will not develop. That is why there are so few tillers. The inter-cultivation was done after tillering. There are just eight or ten tillers (on average) in this field. So how do we select our plots? We have to consider how much manure was added to the field in the past. Nitrogen. Potassium. If you compare the SWI and the traditional fields will there be any difference? Also, this variety and that variety are different… (and) there should

---

[185] There is a large pile of manure near the crop.

not be a distance of more than four inches… No one will do it (sow SWI). The NGO should do research, they should do from two to ten inches. Then you will understand the effect of four inch spacing, etc. If so much distance is left between lines then there should be a crop in between the lines, like mustard. The field should not look empty to the farmer, whether it is traditional or SWI.

Hari: Then there has been a mistake here. There is no other reason. In the research priorities.

Bisht: Whether you do organic or not, yield will be that much only… Farming is backbreaking work. That is why no one will adopt SRI or SWI. Rekha is doing it because it is the organisation's work. Her family wouldn't do it on their own… Man wants to see a filled up field, not an empty one. Even if there is more yield in this field (than in a traditional one), they will not agree (to adopt SWI).

During the training, Bisht had not distinguished between spacing requirements for irrigated and unirrigated plots. Since most plots in the mountainous region of the state are unirrigated, and very few if any farmers irrigate their wheat plots even when they have access to water, it is safe to assume that when Bisht described the spacing requirements during the training, he was speaking of unirrigated plots. It is very unlikely that Bisht forgot these norms, having conducted similar trainings and engaged with SWI for years prior to this. Instead, this interaction is symptomatic of the many contradictions and negotiations that individuals tasked with spreading a method like SWI that is narratively allowed flexibility grapple with and also perpetuate. While stating that SWI by definition required a spacing of eight inches, he simultaneously called for spacing to be reduced to four inches to make it acceptable to farmers – thereby making it non-SWI. This somewhat confused interaction also highlights how different actors legitimate and bring into being different iterations of a method. What constitutes SRI, and what constitutes an

acceptable method of production to be propagated is continuously remade, and very much a product of inter-subjective relationships and processes.

The unhappiness with seeing an "empty" field was something that the UDP realised early on, and was something I observed not just in Uttarakhand but Himachal Pradesh as well. In the early SWI plots, UDP staff found that farmers insisted on growing mustard in-between lines of wheat, a practice that is not uncommon with traditionally sown wheat. This led the UDP to conduct research in 2014 in two districts, Rudraprayag and Tehri Garhwal. The research study paid attention to when and in what line formation of intercropping (of mustard, peas or masoor) would allow for the best results. In taking this step, the UDP took very seriously concerns about the acceptability of concerns about fields looking barren, acknowledging that a yield reduction in wheat was necessary to make the method more acceptable to farmers.

Challenges notwithstanding, field staff workers exhibited great determination and fortitude while engaging in sowing. Not only did fieldworkers have to convince farmers to adopt the method, differences in sowing schedules across villages, plots and households meant that staff were scrambling to meet sowing deadlines, a task unaided by the terrain and lack of access to easily available public transport. While not unaccustomed to covering large swathes of mountain terrain in a single day, the long hours of this accompanied by the physical exertion that sowing entailed meant that the method placed a significant burden on staff workers; perhaps much more than the farmers in whose

fields the method was adopted. In the process, some operations like seed treatment were often neglected.

Similar issues followed SRI practiced in the following season (Kharif 2015). With the exception of a few dry-seeded plots, most SRI plots were transplanted. Maintaining adequate distance between crops during transplantation became problematic. Like with SWI, the using of ropes was quickly discarded, and seedlings were transplanted using visual estimation. Unlike with the wheat crop, transplanting is a group activity, and groups of ten to fifteen women may transplant rice seedlings in a single plot, moving in tandem as a line[186]. Monitoring each woman was impossible, and each woman brought her own ideas of what constituted ten inches (the recommended distance with SRI) to the field. Field staff often had to negotiate with owners of plots, and on more than one instance found that owners would plant rice seedlings in between lines sown by staff members. SRI was in one way preferable to SWI in that furrows did not need to be dug, which meant that relative to the traditional transplantation method, SRI did not entail extra effort barring the careful treatment of young(er) seedlings[187]. With transplanted rice quickly giving way to *saindha* or dry-seeded rice across the project area[188], SRI came up against the same challenges that SWI did, driven by people's perception of the tediousness

---

[186] The sociality of rice farming is not replicated in wheat farming. It is a largely solitary affair. In the month of October an observer would find a woman or man alone in a field, holding a basket in one hand and broadcasting wheat onto the field. The process is quick, and involves little manual labour, though the field is (unevenly) levelled and clumps broken up prior to this. Rice is a different story. By June, fields are levelled impeccably, a noticeable contrast to the previous season where dried rice stalks still poke through the soil.

[187] Insert info about how many fields had younger/recommended age plants. Most were older plants.

[188] Many farmers have completely stopped growing transplanted rice, with many more following suit. Transplanted rice requires more work in terms of weeding than dry-seeded rice. With farmers taking their cue from other farmers about the continuation of agricultural practices and farming itself, it is likely that this labour and water-intensive practice will be discontinued in the area.

of sowing (even through SRI in rice is very different when dry-seeded versus transplanted)[189]. SWI and SRI must therefore be considered in tandem, despite the crops being very different and being rooted in very different material and seasonal contexts. Similarly, new agricultural methods like SCI/SWI/SRI will have to be situated alongside old ones to evaluate how they come to acquire particular forms and attract particular evaluations of their validity.

Panchgabya

SWI recommends the use of fertilisers such as *panchgabya* and *matka khad*[190]. While *matka khad* was dispensed with, staff workers worked with farmers to make a manure *panchgabya,* made of items like banana, curd, ghee, cow dung, cow urine, jaggery and vinegar. Though *panchgabya* is meant to be sprayed on crops 20 days after sowing (and takes about two weeks to be prepared), competing priorities meant that staff workers were only able to prepare the manure after the appointed distribution date.

The manure itself evoked mixed responses, though it is a manure recommended by the Department of Agriculture as well. Some farmers viewed the manure with interest, others with scepticism. But all had very different interpretations of it. One farmer who attended the training pointed out that she'd rather eat some of the ingredients than use it

---

[189] Dry seeded SRI requires furrows to be drawn in the dry soil, unlike with transplanted rice where saplings are pushed gently into the wet mud.
[190] An organic manure made in earthern or plastic pots.

as manure. Another farmer grew appreciative of the manure, noticing that the crop that had received the manure had plants with darker leaf colour than the crop right next to it that hadn't. A third farmer (and one of the "interested" ones) applied the manure but later remarked that its value lay in its ability to attract ants (because of the jaggery in it) that on their journey upward through the soil created holes in it, causing it to be aerated. Many were unable to conclusively distinguish the effects of the manure since in this particular season many crops were affected by rust, a disease that spreads quickly and causes yield reductions[191].

Inter-cultivation

According to SWI principles, to facilitate better tillering the wheat crop must be inter-cultivated at least two to three times, on the 25th, 35th and 45th day after sowing[192]. Inter-cultivation is qualitatively different from weeding, and is a process of turning up the soil and allowing the organic matter (such as weeds) to remain in the soil rather than discarding it. Scientists like Dr. T.M.Thiyagarjan who study SRI believe that inter-

---

[191] Yellow rust is a relatively new phenomenon in the area according to VPKAS, and attributable to a changing climate. Other stressors on the wheat plant include the increasing temperatures and hours of sunshine during the month pf February in recent years, to the detriment of production.

[192] In practice staff did not emphasise the possibility of intercropping the SWI plots, though some farmers who had attended the training were aware of it. Most farmers left the fields mono-cropped, with the exception of Lakshmi Devi who sowed radish in between her wheat in one of her SWI plots because she didn't want to leave the space empty. Intercropping has implications for inter-cultivation, a potential downside to it. Inter-cultivation implies that a mechanical weeder cannot be used to weed the crop, and weeding must be done manually. Though farmers do nirai (cutting of plants above the ground with a sickle) to use the weeds as fodder, gudai (digging up of the soil and plants) is not performed on the wheat crop, and is an energy intensive activity though would not be welcomed during the wheat crop season. Women prefer to work less during the winter crop to recover from the exertions of the monsoon crop.

cultivation changes the internal environment of the soil in addition to aerating the roots, leading to dramatically higher yields[193].

In the Parvati area, weeding the wheat crop is limited to *nirai* (cutting of plants above the ground with a sickle) to use the weeds as fodder. *Gudai* (digging up of the soil and plants) is not performed on the wheat crop, and is an energy intensive activity that would not be welcomed during the wheat crop season[194].

Convincing farmers to practice inter-cultivation was not always easy. This was not because farmers did not see value in weeding (nirai) in general. During the weeding period, farmers thin the crop, taking out weeds as well as thin wheat plants. Thinning is believed to ensure that the wheat plants are given space, and develop better and stronger panicles. Inter-cultivation had slightly different ramifications. For one, it was an additional burden in terms of the physical activity to be performed. Second, weeding would cause the weeds uprooted to become muddy, and unfit for animal consumption. Third, the process of inter-cultivation appeared to be challenging and tedious, since it was performed using a mechanical weeder provided by the organisation, and requires a different kind of strength and dexterity than that required by the normal process of nirai-gudai. SWI paradoxically contrary to the aims ascribed to it increases the burden of weeding on women in the mountains of Uttarakhand, even if it does not elsewhere.

---

[193] A UDP presentation suggested that one weeding results in eight to twelve tillers, two weedings in fifteen-two tillers and three weedings in twenty-twenty five (at minimum) tillers per seed.

[194] Women prefer to work less during the winter crop to recover from the exertions of the monsoon crop.

When pressed to weed their plots, many argued that they did not have the time. In households where the only current residents were elderly, the weeder posed an even bigger challenge since manoeuvring the machine in rocky, hard soils was an activity people were unused to[195]. The mechanical weeder did not always work well. The natural and ecological contexts in which it found itself were not always amenable to proper inter-cultivation. The rocky soil was often difficult to navigate, and the weeder frequently got stuck. The stones in the soil also quickly blunted some parts of the weeder, making it even more difficult to operate.

Imprecision in maintaining distance between lines meant that some sections of plots could not be weeded since the weeder could not pass through without cutting into wheat stalks. The weeder then had to be physically lifted, over that patch, a clumsy manoeuvre that added to the distaste some farmers felt for it. The weeder also did not remove weeds found between wheat plants that had been sown in a line. These weeds had to be removed manually. Despite these drawbacks, weeding the plots with a weeder - once farmers developed some familiarity with it and the movements required to keep it moving smoothly - took less time than weeding the crop by hand.

For their part field staff offered farmers the choice of weeding the plot on their own terms, they themselves not sufficiently acquainted with the yield-distorting differences

---

[195] In other parts of the state where SRI has been practiced by the People's Science Institute (PSI), the height of the weeder was reported to have been a constraint for women with shorter stature (Debashish Sen, personal communication, June 2013).

between *nirai-gudai* and inter-cultivation. Since farmers weed wheat crops anyway, recording the weeding of a plot for monitoring purposes did not pose an issue.

The proper recommended practice of inter-cultivation of SWI as it interacts with the sowing practice may also be less acceptable. The SWI method prescribes reduced plant density. These gaps signalled to women lesser access to both green and dry fodder from the wheat crop. While women weed the crop to remove weeds, many will also thin the crop by extracting wheat stalks themselves to allow the plants to develop better as well as to add to the available green fodder. Plant density apart, inter-cultivation means that weeds are left in the soil and cannot be used for fodder. Though SWI may increase the amount of straw fodder available, this does not compensate for the loss in green fodder which is scarce during the months in which the wheat crop develops. One woman pointed out that weeding is done when the stalks become large enough to feed cows and buffaloes, in February, so at least ten to twelve weeks after the plant has been sown. The SWI method requires that the crop be first weeded after 25 days, when the weeds are too young for them to be fed as fodder since they are small, and close to the ground with the mud attached to them making it difficult for livestock to consume them. This poses a challenge for women who must then source green fodder from elsewhere. This was well known to everyone on the project who had worked with SRI previously, but against a more universal demand for food grain the specificities of women's experiences were less attended to[196]. When the rice crop was sown the SWI way (that is, SRI), many women

---

[196] Wajcman (2000) suggests that in science networks men's experiences are placed at the centre, with women's realities receding in prominence.

were seen to reduce the gap between lines, with some furtively planting seedlings or seeds after the staff workers had left the area. This disruption of the recommended practice was seen as the inability of women to understand the method. We could also see these acts as a resistance to what many women saw as the hegemonizing influence of the UDP. While there were reasons to accede to adopting SWI and SRI (as we will see shortly), many women did not see value in the method, and did not see why they should participate in it, with the fodder question also remaining a matter of concern.

Despite a declining interest in livestock rearing, products like milk, curd/buttermilk and ghee are not easily sourced. The persistence of livestock farming in the face of reduced access to fodder and inclination to collect it is partially explained through this often repeated anecdote. During the initial days of the project, a few field and office staff workers visited different villages. In one village, they stopped to have a conversation with a resident about their plan to open a dairy centre in the village. The resident grew excited, exclaiming: "this is excellent, excellent!" Staff workers were greatly encouraged by his enthusiasm, and made approving sounds. They spoke generally of the benefits that would accrue from this centre. The man nodded in agreement, reiterating, "this is excellent!". He continued on to say, "this will be very good. We will get milk. There is a shortage in the area". The staff workers stopped in their tracks, stupefied. To their chagrin, it dawned on them that rather than being excited about selling milk to the dairy centre which would form a part of a larger supply chain, the resident was hoping to be able to buy milk from it, given the poor productivity of the local livestock varieties. They

retreated sheepishly after correcting him, later identifying the gap between people's expectations and hopes and the project's plans.

Another farmer explained to me in careful detail why farmers choose to focus their energies on livestock rearing - and consequently collecting fodder - instead of farming. People, he argued, don't have much use for farming. They farm because they feel they must. They have more interest in growing fodder for cattle. They think about meeting their families' daily needs rather than progress. I argued in turn that if a cow gives just half or one litre of milk in a day, why do women do so much work for such small quantities? What if we compared the cost of one litre of milk and one litre of rice? Wouldn't rice be a better focus of time and energy? Bishan Singh turned around and recommended that I consider the total area of cultivable land available. He told me to assume that in one year a person harvests 20 kilograms of rice from one plot. If one kilogram of wheat costs Rs. 20, that's Rs. 400 saved. On the other hand, if you get one litre of milk a day, and each litre costs Rs. 40 in the market, in one month you save Rs. 1200. The corresponding difference in savings for six months is then considerable. "So people have thought about this in fine detail. This method you're talking about (SWI) is better for people in the plains, with chakbandi. Farming is systematic there. But here it takes too much time."

Fodder considerations apart, the adoption of SWI in the manner in which it was propagated in the hilly areas of Uttarakhand entailed an additional workload for already heavily burdened women. Women were de facto called on to play a significant role in

this transition between cropping methods, a role many eschewed. The increasing feminisation of agriculture means that it is the women who are now responsible for ensuring the revival of agriculture and functioning as keepers of the future.

Unseasonal rain and hail caused lodging[197] and worsened the crop outcomes. Pre-existing soil deficiencies and spatial variability in plots confounded the already ill-specified evaluation of the output. This, amongst other reasons had implications for the number and nature of farmers who agreed to grow rice in the following kharif season using the method.

Changing Perceptions

Though many farmers formed strong opinions of SWI even before they witnessed a plot being sown, others found their perceptions changing. Over the course of the season, judgments of the method vacillated, and different people came to occupy very different positions on the value of the method. In the absence of a formal evaluation of the method (the evaluation was conducted only during the harvest period), staff as well as farmers derived their opinions from visual cues, "knowing by seeing". Observations of tillers, disease, grain counts at different points of the season in different areas invoked different opinions, complicated by variations between plots in the same village.

---

[197] Collapse of the cereal stem.

Consider Mohan Singh's[198] experience of SWI. Mohan Singh attended the training workshop held for staff and "progressive farmers". Mohan took a very active interest in the method during the training, interjecting frequently while trainers spoke. When he returned to his village, he functioned as an enthusiastic emissary for SCI, almost browbeating extended families into adopting the method. Any ambivalence they might have had was subsumed by his insistence that they do SWI. Snide comments passed by his extended family members as he marched around the different plots did little to dampen his enthusiasm. On the day we went to his village to sow the wheat, he even "convinced" the young women from the hamlet where members of the Scheduled Caste community lived to aid us in sowing wheat, pointing out that if a Brahmin staff worker could work so could they.

Mohan's opinion about the method fluctuated over the course of the season, and often rapidly as his crop began to develop. On one of the initial visits to his field to check on the status of the crop, while walking to his field he narrated to the staff worker and I that while the part of the field where the wheat had been sown in lines was doing well, the seed to seed bit was not. When we arrived at his field, he reversed his stand altogether and suggested that in fact the seed to seed crop was doing better. To evaluate it, he began counting tillers of what was supposed to be one plant (though it may have been two or three). After counting up to 35 tillers, or what appeared to constitute half the density of the profusion of tillers he gave up, estimating that there must have been 70 in all. The

---

[198] The retired army Subedaar referenced earlier.

line sowing section was not faring as well. He counted five in one place, unhappy about what he perceived to be a low number.

Perplexingly, when he went on to his brother Jodh Singh's field, he counted three to four tillers per plant, and suggested that it was a favourable outcome, arguing that under the traditional method one plant would have yielded just one tiller. Encouraged by this exercise and motivated by the training, after this exercise, Mohan arranged to have all three fields irrigated with connecting a pipeline to his field: a practice almost unheard of in the area.

> Ok we will know about the yield only later, but looking at it... at the panicles, I feel like it will depend on the panicles. Bisht was saying there will be eighteen, nineteen, twenty tillers. I had a plant in a canister last year. Single plant. It had many tillers, and many panicles. It sprouted by mistake. I used to water it. It was a seed from the agriculture department. But thinking about that I feel this eight by eight (square planting) will be a success. But we will need to keep irrigating it in between. And the weeder is needed. Tell Bisht or Aadarsh. Because if we add water the soil will become tight. The plant won't spread. By using the weeder it will open the soil up. (Personal communication with author. Field notes. Maikili, March 28, 2015.)

Mohan quickly internalised the discourse and narrative of SWI during the training, and seemed convinced of its efficacy, his conviction bolstered by his own experience with the single wheat plant he grew in a canister. As the season progressed and yellow rust began to spread in the area, his crop became diseased and started faring poorly. Barring a few patches in the area with square planting, the plants remained short and the tillers thin and scarce.

Other priorities and demands meant that staff workers were unable to return to his field to ascertain what the problem was. Eventually Mohan grew dissatisfied with the method and the UDP, as much of his crop yellowed and withered away. Chastised by his wife, Mohan finally gave up, harvesting the wheat before it was ripe, and refusing to grow rice the SCI way. When we went to his field to collect samples for a crop-cutting exercise, we found that he had harvested it despite our request that it be left standing for evaluation.

Was Mohan's reaction to the method based solely on his experience of the crop? At different points of time, Mohan offered contradictory perspectives on the method. His final evaluation of it on the other hand took place in conjunction with his wife's opnion of the method as well as his opinion of other aspects of the functioning of the ULP.

After the first inspection of his diseased wheat plot, I asked Mohan if he had had trouble with the rice crop that preceded the wheat crop in this field. It turned out that he had, and the crop had faced some kind of disease as well. Mohan then suggested that it might have been excess irrigation that had destroyed the crop (he had irrigated his and the other SWI fields with water from a nearby water source, and some of the water had settled in troughs in the different fields). Mohan pointed out to us that rust tends to be exacerbated when there is excess rainfall. Mohan was clearly aware that while the method might have had its flaws or might not have been able to live up to the promise of yields one and a half times the normal, the problem the crop was facing - rust - did not derive from the method.

There was another reason for his frustration with the ULP. Mohan had not received one of the polytunnels being distributed to BPL households in the project area (Mohan was well-off). Instead, Shanti Devi, a woman belonging to the Scheduled Caste community (and by his description, a woman of limited means) had received one. Caste discrimination is very real in Uttarakhand, and protests by upper caste residents that members of the Scheduled Caste community are taking all their jobs are frequently heard – along with warnings not to eat their "polluted" food. Mohan's grouse with a previous NGO intervention was that it had focused on the Scheduled Caste community:

> Ajeevika searched for Harijan people. They found those people and women. They had no idea about them. they brought some stuff. We were watching them. My brother was linked with them (the organisation). We said instead of them give it to us. They brought some stuff and sold it in black… So much money comes for poor people here. Vimarsh. Ajeevika. Before them other schemes also came. That's why the poor are not being uplifted. Actually the things don't reach the poor. The poor also have become like that: let it be, we are getting it anyway. Because of BPL APL, people's attention has shifted away from land. Means why are people becoming (detached) from land. Before today I saw myself when I was a child, seven, eight, nine, ten till twelve years of age. We used to eat at home. We used to be embarrassed to eat at the shop. We used to eat grains from home. We ate everything… maybe APL people are not worried about whether they will get rations or not. But the BPL people are worried. The government sends rations for them. That's why they don't take initiative in farming. They are more involved in collecting grass (for fodder). (Interview with author. Transcript. Maikili, March 28, 2015.)

Competition for resources distributed was an ever-present theme, and it rested closely with caste and sub-caste alliances across the project area. Mohan also felt a sense of betrayal as he believed that he had supported the NGO and was not properly accorded recognition for that through inclusion in the appropriate beneficiary lists. This added to the discontent his wife frequently expressed about the method.

Significantly, later in the project cycle when Mohan did receive a vermicompost pit and later a polytunnel, he conceded that the excess water added to the plot must have been the reason for the poor yield and that neither the NGO nor the method were at fault for the poor yields that season.

Other farmers also changed their opinions of the method over the course of the season, though some of their opinions were driven by crop outcomes rather than other interests. In Pashin, an initial survey of Bhupal's Singh's crop conducted along with his sister in attendance was not encouraging. The crop had been sown near a cowshed, and livestock had trodden over the section of the plot near where they were tethered. The stalks were short in comparison with other fields[199] and appeared to be maturing very slowly. Though maturation rates in SWI plots cannot be attributable to the method, failures in SWI plots irrespective of the cause were often partially or wholly attributed to the method by many farmers. Later in the season the crop did very well surprisingly, and Bhupal's family attributed the success of the crop to the method.

Bhavani Devi's field on the other hand exhibited a significant amount of spatial variability. Early in the season, while some plants appeared to be thriving, a number of bare spots were visible in the field. These spots may not have been noticed in a traditionally sown (broadcast) field, since farmers could or would assume that they had broadcast insufficient seeds. A field sown in lines leaves less room for such conjecture, and the visibility of gaps is heightened. Later in the season the crop thrived. Bhavani Devi

---

[199] They had sown a local tall variety of wheat.

was circumspect in her evaluation of the crop, admitting that the yield was good but that it had taken (too) much work to enable it.

The strongest reversal of opinions came from staff worker Radha, who initially demonstrated a great unhappiness with SWI, stating in no uncertain terms her unwillingness to help in the sowing and spread of SRI in the following season. With the maturing of the wheat crop in her SWI plot however, her opinions changed completely, and she became one of its most enthusiastic emissaries - even though the yield increase in her plot was by her own admission not significantly higher than normal yields. By her estimation, the increase in the size of the panicles and grain were sufficient to convince her of the merits of this method. Clearly, SWI meant different things to different people.

Producing Willing Subjects

Local staff workers were uncertain about the value and feasibility of targeting 150 farmers in the first round of extension work for SWI. Their own relative unfamiliarity with the method as well as the difficulty associated with reaching out to and convincing 150 odd farmers to adopt it was daunting. Rawat, the deputy director of the partner NGO Vimarsh himself was circumspect about the approach.

> We should get 40 kilograms (of wheat), distribute it to five good farmers. Not distinguish between APL and BPL. Next year if the result is good, it will spread. After getting seeds the first time, a man will do it on his own the next time. (Interview by author. Transcript. Bhadkot, October 1, 2015).

Many staff members who had seen SRI's potential in previous projects were aware of its productive potential; they were also aware of the pitfalls associated with convincing reluctant farmers who had little need for increased productivity. In moments of despair, dinner conversations sometimes veered in the direction of the seeming irrelevance of the project's goals for the residents of the area, who seemed to be rich rather than in need of it. SRI was irrevocably an important part of the project given its potential contribution to the stated project goal of livelihood security however, and eliminating it from project activities was out of the question.

As the winter season progressed, SWI became a strong indicator of the divergence between local and project priorities. Some women resented being asked to do SWI at all. After an SHG meeting at which a senior staff member exhorted the women present to adopt SWI, women muttered as he was leaving that they had been farming wheat for years, and did not need to be told how to.

Components of SWI such as the addition of *panchgabya* were not in themselves objectionable. Since *panchgabya* is an organic manure it was easily accepted by all, even if its efficacy was questioned (unlike chemical fertilisers that many are wary of). The other components of SWI were less palatable. For many farmers, since agriculture is not their mainstay and is not a livelihood they would prefer, their notion of good farming or useful innovations in farming is the kind that allows for more yield with less effort. SWI requires less inputs (seeds) but more effort than the traditional broadcast method.

There have been a number of studies that have considered the question of increase and reduction in labour contribution in SRI. This is unlikely to be relevant to the case in Uttarakhand where the effort involved in wheat farming is extremely minimal to begin with. Though the UDP's priorities are in keeping with a larger political project of self-sufficiency and food security, there is some dissonance between the UDP's ideas of self-sufficiency and farmers ideas themselves.

Extraordinarily or sufficiently (not easily specified) higher yields might tip the scales in favour of SRI, a topic I turn to in the next chapter. SWI's promise is not predicated solely on the basis of productivity though. SWI and food security and food sovereignty discourses turn on the axis of a moral economy of sustainable farming.

Not only are most residents of rural areas called to perform the roles assigned to them (farmers), they are called to be good farmers: as invoked by the developmentalist framework of nation-building instituted in India's Five Year Plans certainly, but also as defined by progressive advocacy and activist networks that challenge mainstream formulations of agricultural growth. Both narratives collide with the changing subjectivities of farmers.

That their proclivities lie elsewhere is hinted at in the rapid growth of urban centres such as Dehradun, Haridwar, Haldwani, Rudrapur and Roorkee (Mishra and Chaudhuri 2015; Gupta 2013) where many of the households in the valley are represented. Dehradun alone saw a population increase of over 33 percent between 2001 and 2011 (Census of

India 2011). The poor performance of the wheat crop did little to foster confidence in the eyes of people who were called upon to adopt SCI with the rice crop[200].

Despite this, 41 farmers almost inexplicably took up SRI. In the winter of 2015, 108 farmers were reported by field staff to have taken up SWI. To understand why, we have to look at who took up SWI/SRI: what were their connections with the staff workers and their project?

Good Farmers

In the initial stages of the project, local field staff identified farmers widely perceived to be "good farmers" to target their SWI extension work towards in addition to the other farmers they hoped to be able to convince. There were certainly some farmers who wished to farm and who took an active interest in pursuing new methods, the benefit of their commitment extending to other farmers in the area who may watch and adopt. These farmers tended to form crucial elements of development project success. The good or progressive farmer stood in stark contrast with the "lazy" farmer who was seemingly uninterested in or incapable of making improvements in farming. Once identified, these farmers continued to figure in the reproduced category of good farmer[201]. By virtue of being identified as the progressive farmer, he[202] became a reliable figure to be approached

---

[200] For more details on the crop see Chapter Seven.
[201] Kumar argues that the idea of the "good farmer" is an extension of the colonial construct of the progressive farmer who unlike his indolent peers, is proactive in terms of making efforts to improve farming practices (Kumar, 2016).
[202] I use the term "he" because despite women being the people most involved in farming, it is men who are often approached by development initiatives or who have the time to attend meetings.

for other farming interventions. This continued seeming favouritism may exacerbate existing divisions in the village.

Take for example Manish Singh's case. Manish was a "good farmer". His ability to be a good farmer was predicated on a number of factors, a significant one being the three daughters-in-law who live in his house and provide plentiful and free labour. Manish was also a good farmer because he came from a privileged background. His father was a well-to-do trader, and Manish profited from the networks and opportunities that his background allowed him. Manish was frequently approached by ULP staff for different initiatives first in the village (such as SWI, polytunnel and vermipit construction) and himself participated closely with staff. One morning Manish found that a rock thrown by a passer-by had pierced the plastic sheet that covered the polytunnel provided to him, an occurrence he attributed to envy.

Good farmers are useful in development interventions, since they are believed to be reliable and also reproduce this identity over time. For their part, this identity is useful since apart from their own interest in farming, this identity makes them more likely to be able to access future gains from a project. In the ULP as well, over time a few farmers known to be good farmers demonstrated their interest in SWI, making them sought after in future interventions including vegetable cultivation and rice. They served the dual purpose of showcasing success both to their neighbours but also understandably in project activity appraisals.

Beneficiary Farmers

As opposed to the 68 farmers who agreed to sow wheat in the first season, 36 farmers agreed to sow transplanted rice and five farmers agreed to sow dry-seeded rice the SRI way. An examination of the list of farmers along with interviews was indicative of a seeming shift in motivation. In the second round of SCI extension, many participants in two out of the five villages[203] were close family or friends of the staff worker, indicating that personal ties had a strong role to play in accounting for adoption rates, in contrast to productivity claims. Staff workers cannot be faulted for mobilising networks that were most accessible to them in the face of difficult to meet targets. At the same time, with staff workers themselves occupying particular locations in the gender, caste and class hierarchy of the villages from which they came, the networks they tapped into by default were in danger of being exclusionary, and limited to familiar circles. This is true of the functioning of development projects more generally of course, but raises the question of which groups of people – and in the Indian context, which castes – find themselves on the fringes of projects. While few may have resented being left out of the SWI work, the other project activities were the focus of more attention in the area (for more on this, see Chapter Six).

This left the question of why the other new (SRI) farmers were willing to try it. For one, in villages that had not experienced a lot of crop lodging, the SWI crop had often

---

[203] One village was not included in the second season. All three farmers from this village experienced inexplicably dismal outcomes, including Mohan Singh the organisation's main advocate in the village. Without his support, continuing SCI was nearly impossible, and local field staff quietly chose to focus on other project activities in the village. Significantly, after vacillating about his feelings about the organisation's work after being denied a polytunnel, the following year Mohan Singh "accepted" that the fault of the poor crop did not lie with the method.

done better than the traditionally sown one. Though gains were modest, a few examples (usually one or two) stood out in the public consciousness, piquing the interest of others who had not attempted SWI either for lack of interest, or because the contingencies that surrounded the sowing period made it difficult for all farmers to be contacted. For others, participating in the SRI crop was a way to signal interest in the project to the ULP staff, in the hope that they would be considered for other benefits, especially items such as polytunnels and vermicompost pits which were in the process of being distributed and built at the time. While aware of this posturing, it enabled staff to meet some of their targets.

Accidental Farmers

When I returned to the project area in June 2016, I was surprised to hear that 108 farmers had sown wheat in lines (line sowing had firmly been established as SWI/SCI). This did not make sense to me, and participation in the anticipation of spill-over effects did not sufficiently explain the numbers, especially since on the whole, the wheat crop had done poorly in the previous season when the project just started. Discussions with Rekha, Priya and Radha revealed that the fortuitous confusion in people's minds between the government-sponsored livelihoods project Gramya being implemented in the valley at the same time and the ULP had contributed to this result. Gramya had distributed wheat seeds in the villages, recommending that the wheat be sown in lines. Not sufficiently aware of the differences between the two organization (Rakesh Bahuguna, employed by

the UDP was frequently seen in the company of the Gramya teams on their visits), Rekha, Priya and Radha were often able to convince farmers that it was imperative that they sow wheat in lines if they received wheat seeds from Gramya. This added to the different compulsions aiding people's adoption of SWI. On the part of the staff workers, this directive made their jobs easier, since farmers did not expect them to participate in the sowing to the same degree. The women would demonstrate to new farmers how to sow wheat in one or two lines, leaving them to finish up the rest. This practice continued with the winter wheat crop of 2016, where Radha pulled the Gramya representative of her village to assist in sowing wheat in lines (arguing that the representative took photos and should therefore contribute her effort). Radha reported the process of convincing farmers becoming easier, with her role being limited to dropping seeds in the furrows rather than digging furrows themselves. The sowing of wheat in lines - the permitted enactment of SWI and SRI - also made it more likely to be adopted by farmers, especially when lines were spaced at a distance that farmers and staff workers found acceptable (or accepted). Rather than see this as "not SRI" or a failure, adaptation as the UDP recommends in other spheres of discourse (removed from the ULP fields) is a more promising outcome. Whether this relegates SRI to the category of "Best Management Practices" is less relevant than the higher yields that presumably accrue and find acceptability across the board.

Conclusion

In the following chapter I will go into further detail about the practice of SWI when I discuss the issues that arose while measuring the crop. For now, it suffices to point out that the practice of SWI did not meet the criteria laid out by a more rigid conceptualisation of it. Through a detailed description of all the agricultural operations involved (seed preparation, sowing, preparation and addition of manure, and inter-cultivation) I have demonstrated how the practice of SWI was ordered by competing demands, interests and practicalities, allowing it to inhabit a number of shapes. The enactment of SWI in the UDP brought into being different SWIs, but also did not realise SWI as outlined in the training. An expectation that it would would also be misplaced.

Also of interest is why farmers chose to interact with SWI in the way that they did. Many farmers who remain in villages farm because of a certain social expectation that as long as they are in residence, farming will continue. Those who have other sources of income (usually migrant remittances) are even less compelled to farm. For this social class, farming is a social obligation more than a necessity. For others whose incomes are more precarious, farming is a sometimes (but certainly not always) distasteful yet unavoidable reality. During an interview about SWI, Ramesh Singh, well-known to be a "good" farmer who takes an active interest in new methods, quickly dismissed farming as a viable occupation, indicating it to be one he pursued because he had no choice.

Choice is increasingly and unsurprisingly being seen as a function of education. Education - or its lack - is a big divider (of families dependent or not dependent on farming) but also a unifier: a young farmer Chandra whose husband earns a decent income working as a taxi driver lamented that because she was not educated she could do nothing else but farm. Though she did not need to farm, she did because to be a default farmer who does not farm is not a desirable subject position to occupy. Women who belong to poor households are most likely to remain farmers, and articulate that as the reality of their futures. More privileged women who belong to better off households often escape, by taking their children to study in the district headquarter or cities like Haldwani so that they and their children can both escape a future of farming that the sociality of residence in a village society entails. After a long exposition of the many ills that plague farming in the area, I was compelled to ask a farmer why she continued farming. She replied, "how can I leave it? But if everyone else stops farming, I will stop farming too". That farming is becoming less about production than an act, indicates the problem of low yields or even low adoption levels is not about a technological mismatch, but a social and ecological one.

Nevertheless, the increased productivity that the SWI method afforded was envisioned as being the reason why farmers would adopt it in the seasons to come. The crop itself was the argument for it and was to speak for itself. In the next chapter we will listen to what it said.

Chapter Five

Good Data/Bad Data: Evidence Making Practices in SCI

Introduction

"My lord, facts are like cows. If you look them in the face hard enough, they generally run away" (Knorr-Cetina 1981, 1). Karin Knorr-Cetina quotes Dorothy Sayers to set the stage for her book titled *The Manufacture of Knowledge*. She continues with this illustration to make a philosophical and methodological point about facts:

> The philosophical point is that facts are not something we can take for granted or think of as the solid rock upon which knowledge is built. Actually, their nature is rather problematic – so much so that confrontation scares them off. The methodological point is that the confrontation has to be long, hard and direct. Like cows, facts have become sufficiently domesticated enough to deal with run-of-the mill events. (Knorr-Cetina 1981, 1)

As Knorr-Cetina later points out, the word "fact" derives from the Latin word *facere* which means to make (Knorr-Cetina 1981, 3). The major burden of the field of Science, Technology and Society (STS) studies has been to demystify "facts" by shunning objectivist avowals of them and instead uncovering the processual elements that underlie their coming into being.

In this chapter I examine the practices of 'fact' collection in STS, and apply it to the production of knowledge about the value of SCI for farmers in the ULP. I focus on

yields[204]: how ULP staff and I defined yield and appropriate data collection practices, how we endeavoured to collect crop production data in the face of many pitfalls, how we often failed, and the meaning and implication of both the data and our data collection practices for the advocacy and implementation of new agricultural methods and technologies. Drawing from our experiences, I argue that data collection and consequently knowledge production is a messy, contingent, and inter-subjectively produced process.

"Scientific Knowledge"

In *Epistemic Cultures,* Karin Knorr-Cetina makes a case for the machinery of knowledge construction being constituted by the empirical, the technological and the social, all of which feed into the creation of particular epistemic cultures and consequently particular and unique epistemic subjects. Like Bruno Latour and Steve Woolgar (1986), Knorr-Cetina bases her analyses on the laboratory, the site of knowledge construction where texts acquire legitimacy and stability, even if, as Latour and Woolgar suggest, "*all* texts are stories" (Latour and Woolgar 1986, 284).

Technologies themselves ways of building order in the world (Winner 1980). And data functions in a similar manner, making coherent what seems ambiguous. It can wipe

---

[204] This is very particular story of SCI. As I have described in Chapter 2, SCI has taken many forms, and its logics vary across the country and the world. I also do not mean to imply that the discussion of SCI in general is limited to yield: research on SCI has included a wide range of disciplines spanning agronomy, microbiology, plant breeding, and, of course, the social sciences as we have seen in Chapter Two (topics of research include nutrient management (Suresh 2006), greenhouse gas emissions (Gathorne-Hardy, Reddy, et al. 2013), seed selection (Lokanadhan, et al. 2010), weed management, to name just a few). My decision to focus on yield in this chapter is based instead, on the UDP's focus on yield in training and field-based articulations of it in project sites, and for what it tells us about what kinds of knowledge we come to privilege, and how it itself comes to be.

up the messiness of practice and allow it to coagulate into a simplified whole. Data's form itself may depend on what the data artefact is actually used for. Its use may change over time (Garforth 2012), and with the change in use the manner in which it is created and deployed.

This has implications for what comes to be known as scientific knowledge. Scientific knowledge is internally structured by the process of its production. Science is made, argues Gooding, not just with explicit knowledge, but also with instruments (often invisible) and observer agency (often not even thought of) (Gooding 1990). These actors allow data to congeal into a clearly demarcated and transparent block of knowledge/evidence easily sliced up and distributed. Arun Agrawal points towards the heart of statistical data by pointing out that "Statistical representations abstract objects from their context by forcing selection of features that can be numerically stated... and is (also) a function of what is easy to represent" (Agrawal 2005, 51). Numbers function as representational idioms for social facts as well as "imagined wholes", without temporal specificity (Knorr-Cetina 2001, 182). Knorr-Cetina counters these very imaginaries, suggesting instead that objects are "endlessly unfolding project(s)" (Knorr-Cetina 2001, 182). Data is thought of less as comprising hard, irrefutable facts and is instead acknowledged to be outcomes of scientists' interests, perceptions, biases, instruments, knowledge and location (Kelly 2008).

While scholars such as Carl Hempel (1970) advocated the use of scientific methods to filter out researchers' perceptions, sensations etc. to leave behind "directly observable" and "intersubjectively ascertainable" observations that could be treated as facts, later

scholars have been more cautious about making such claims. The "practice turn" in the philosophy of science that began in the 1970s emphasised the processual elements of data creation, which is why it is to the data creators that I now turn.

People in Practice

In this chapter, I draw from the practice turn in STS, which has traditionally focussed on "what scientists actually do" (Pickering 1992, 2) and "science in action" (Latour 1987) to unravel how an agricultural method like SCI comes to acquire a particular public form and (non)acceptability. Rather than privilege cognitive processes that often appear inaccessible, I will focus on the process of science-making: a very locally, materially, and inter-subjectively grounded process.

To continue from the previous chapter, I argue that agricultural methods like SRI are created *in practice*. They come into existence at the point at which a farmer picks up a hoe and begins to make furrows in the soil. Speaking of them without accounting for the very embodied manner in which they are enacted is to miss out on their very essence. The act of practice actualises possibilities of the various ways in which a method could be practiced. At the same time, variations in the practice of the method may not be accounted for by standard measurement practices that create particular forms of knowledge by privileging homogeneity and standardisation. Simpson and Sariola (2012) point out that variables, instruments, measurements, etc. have to be calibrated and standardised so that, much like randomised control trials, they may become a part of a

chain of "immutable mobiles" (Latour 1987): things that effect change without being changed themselves. I submit that production data collection techniques are a kind of immutable mobile: they are standardised methods of data acquisition that confer a stability and collapsibility to practices that may diverge significantly from each other. They fit well into a framework in which a particular definition of a problem (for example, in this case, insufficient food, ecological degradation, income or a combination of all of the above) is transformed into a particular statement of a problem (the need to increase yields).

Success when applied to agricultural technologies acquires a specific meaning, its rationality usually finding expression in the form of increased yields and increased adoption rates. Good agricultural practices and methods are represented through the "travelling rationalities" (Mosse 2007, 1) of production-oriented approaches that are easily understood across contexts.

As Kelly suggests in a different context, the designers of research experiments (and here, development project monitoring data) make efforts to "transform evidence *of* "everyday practice" to evidence *for* "everyday practice"" (Kelly 2008, 101). Statistics about SCI are hotly contested and have given rise to an acerbic debate that spans national and international government agencies, research consortiums, universities and non-governmental organisation. In Uttarakhand, the NGO People's Science Institute (PSI) reported differences in yields amounting to 21 kilograms per hectare in the period 2006-07 (People's Science Institute 2009). In 2009, in a presentation made by the Director of

another NGO, WASSAN, SRI was argued to have covered 2.5 lakh hectares[205] or 0.6 percent of the rice growing area in India, demonstrating a yield increase of fifteen percent[206], with a 30 percent saving in water (Ravindra 2009). As we have already seen in Chapter Two, some agricultural scientists are unconvinced by these claims, but are unwilling to engage in research to prove them otherwise.

Critiques of SCI also stem from the source of data: only particular science-makers are legitimate (S.K. 2017). Since many of SCI's advocates stem from civil society groups of various kinds, many SRI success stories are also derived from field experiments and monitoring results attributed to NGO projects. The credibility of these results is often questioned for being biased and unscientific.

Yield is a significant concern in discussions of SCI, though advocacy for SCI is not limited solely to yield gains. The usefulness of SCI is eloquently argued in various forums by pointing towards its value for the environment, resources, or smallholders. But in the ultimate analysis of an evidence-based policy framework, and certainly in the eyes of funding agencies and donors, it is data that elevates a technology to a policy discussion, extension package or even a research project. And yield data is especially important. Practices of data collection are therefore usually well specified, and seemingly leave little room for speculation or manoeuvring. As argued previously, statistics then acquire an immutability that replicates the legitimacy of, in this case, SCI. A practice-oriented approach to knowledge deconstruction, however, makes the case that it is the endless

---

[205] Out of a total of 4,30,00,000 hectares.
[206] A 0.5 tonne increase on average, and a 0.5- one tonne increase over subsistence systems.

negotiations and micro-decisions, the seemingly insignificant details that are left out of published accounts of scientific experiments, that make up science practice. As Karin Knorr-Cetina plainly states, "[de]tailed description deconstructs" (Knorr-Cetina 2001, 148 cited in Garforth 2012). Let me therefore turn to a description of what it is I am seeking to deconstruct: the design and collection of agricultural yield data. As further sections demonstrate, seemingly irrelevant features such as the vagaries of weather (a too hot day, too much rain), a breakfast eaten late[207], farmer household composition, the absence of a suitable stick of wood are equal contributors towards the production of data - and knowledge - whether scientific or otherwise, as are the training of data collectors, sampling strategies, and the like.

The Speaking Object: Making the Wheat Crop (and Others) Talk

The dominant indicator of success in agricultural extension projects is that of adoption rates and yield. Econometric studies of agricultural methods tend to focus on productivity as an indicator of success; such an exercise tends to be labour intensive and requires some degree of monitoring and calculation of inputs. Yield data is relatively easier to obtain, and ostensibly also easier to observe and calculate when direct measurements are taken.

Crop-cutting experiments comprise the collection and measurement of output from one or more yield subplots (YSP) in the plots of the farmers being evaluated. One of the

---

[207] Bodily states also play a significant role in knowledge making.

many methods that may be used to estimate yields, it is frequently used in India. Crop-cutting experiments are admittedly contentious for several reasons, including academic differences about the size and shape of the plots to be measured[208]. They are prone to bias when there is within-plot variation, especially in mountainous regions where the gradient of mountain slopes and surface run-off intrinsic to mountain farming creates spatial variability in soil cover.

The acceptability of the method hinges on data collection practices. Norms exist with respect to how the plot location must be identified within the field. Enumerators are required to approach the plot from the south-west corner of the field. A specific process of counting the steps taken to cover the length and breadth of the field and further calculating the number of steps to be taken into the field to mark out a plot is then embarked on. Once a point has been established, pegs are placed at that point, and then at a distance five metres from the peg to form a line perpendicular to the unmarked line used to step inside the field. A square of five metres is then formed, pegs placed at each corner of the square, and a well-stretched string is attached to all the pegs and lowered to

---

[208] The demarcation of crop cutting plots has been a source of contention since early post-Independence experiments. Pioneering work on subplot estimation was conducted in India by P.C. Mahalanobis for jute and paddy rice crops and P.V. Sukhatme for paddy and wheat crops (Poate and Daplyn 1988). Others since have been less enthusiastic about crop cutting to assess yields, arguing that they lead to overestimation of yields and are prone to bias (Casley and Lury 1981; Verma, Marchant and Scott 1988). The YSP based crop cutting method also estimates biological yield rather than economic yield. The method was then adopted by the FAO as the preferred method of estimating crop yields (Fermont and Benson 2011). In two studies in Asia crop cuts were found to be strongly correlated to farmer estimates (David 1978) cited in (Fermont and Benson 2011). A later study in India found similar results in the case of wheat ($R^2 = 0.87$) (Singh 2003 cited in Fermont and Benson 2011). Experiments were conducted in 1944 to assess the reliability of different plot sizes for yield rates (Singh n.d.). The first experiments to assess the relative efficiencies of plot sizes for the wheat crop were conducted in Moradabad, Uttar Pradesh in 1944-45 (Sukhatme 1946, 1947 cited in IASRI n.d.). Results indicated that plots that were less than 30 square feet in area provided biased estimates favouring higher yields. Consequent to this more experiments were conducted to test different plot sizes and shapes. Once again, small plots were found to produce overestimates (Singh n.d.). Currently, a square plot of length five metres, breadth five metres and diagonal 7.07 metres is the norm.

the ground. This is the sample plot. From within these subplots, samples are collected. A description of sample collection procedures is included in a later section of this chapter; for now, it is enough to remember that the length of the panicle, the height of the plant, the weight of the grain harvested are some of the parameters of production success.

What is the process through which these indicators of productivity are converted into data? Walford suggests that raw data lies between meaning and lack of meaning (Walford 2013). And yet the selection of these indicators as evidence of particular characteristics places them firmly within networks. Who chooses to determine what counts as an indicator? Which indicators are important and which are not? What is the framework of knowledge and evidence making and the particular methodological canon that is favoured?

Latour (1990) argues, becomes real only when it is expressed in a visual vocabulary. Whether a data table or a photograph, visual representations are powerful communicators. The visual is a technology of power. Data becomes real at the point of transformation of form, from a tiller or a grain-laden panicle to a cell in a spreadsheet and a graph on a Powerpoint presentation. There is a separation between the 'hard' materiality of plants and panicles and their digital visualisation and form. Data makes possible what practice may not. Collecting data is then an important aspect of extension work, especially in the face of reluctance to accept methods and technologies that inspire incredulousness. SCI data and the facts it makes/creates also feeds into the larger political project of promoting sustainable agricultural practices: good and believable data is then key, even if sometimes elusive and messy. End-data is animated by the processual

elements of data collection, and the practices of the data collectors. In this instance, as I will soon detail, both the NGO staff and I collaborated to collect the data to varying end results. The ethnographic process and the monitoring/research process coalesced in practice. Both the staff and I depended heavily on each other, both participated in each other's work, and both produced the other. But we diverged in reporting and interpretation. Through a (somewhat excruciating!) detailed presentation of the process of data collection and *data formation,* I hope to strip bare not only the manner in which we produced monitoring-scientific data but also how I produced ethnographic data: in a heavily contingent and often accidental manner.

The Social Life of Data

Research Design

The design of a data collection format is contingent on considerations of the designers; in this case, apart from my own considerations for my research project, senior staff and/or management. For the monitoring process, the two staff members appointed to collect data from all three project areas were employees well acquainted with the cropping method, and had seven to eight years of experience. They had worked on SRI/SWI projects in the past, with dissemination as well as monitoring. They had also been involved in research projects on SRI/SWI and had the opportunity to interact with high level scientists who visited research and project plots. As a result, both exhibited tremendous knowledge, as

well as an interest and curiosity in the method that extended beyond project considerations, even if they did not always get the opportunity to actualise some of their ideas. On my part, I consulted with a senior agronomist conducting research on SWI at an ICAR institution about the proper manner of collecting crop statistics, being new to the process myself. When staff members and I compared notes, we found the processes we hoped to follow to be very similar.

The monitoring process was divided into two main stages. For the ULP, in the first stage monitoring, staff were required to identify three categories of SWI plots: good, average and bad. Plots were required to be more or less proportionally distributed across the adopting villages. The assessment of the plot was based on some measurements, visual assessments as well as (in the case of some villages that were not accessed during this exercise) field staff (and my) assessments and suggestions. Measurements were taken of plant height and panicle length. Most often three measurements were taken per plot: of the tallest/largest plant/panicle, the shortest/smallest panicle, and average sized plants/panicles. In addition to these directly recorded assessments, observations about plots in which the plants looked diseased or sparse were also taken into consideration. Based on these assessments, Ramesh, and the staff members assigned to collect data from this valley drew up a list of 30 plots: ten good, ten bad, and ten average. Out of the 68 plots recorded as having been sown using the SWI method, field staff agreed that only 41 could be considered SWI plots.

Independently, I had also decided to collect production data for crops from 30 plots, hoping to conduct a basic statistical analysis of the data to evaluate at a very crude level

how the yield claims of SWI stood up to scrutiny. While my sample was also designed to be proportional to the number of adopting farmers per village, I took into consideration the variety of seed used, since farmers had planted both local and commercial varieties, as well as the location of the plot in the village, since soil varieties varied across each village's farm area. I was struck by the difficulty associated with stratifying my sample along the lines of these categories, given that the sample size itself was so small. Even so, collecting production data for 30 out of 41 households meant that I (as well as Ramesh) would be covering 73 percent of the total population of farm plots. The UDP team and I had also decided to collect samples from 30 additional wheat fields that had been sown using the traditional broadcast method, to function as a control group, and compare those with the SWI plots. I maintained the same considerations for the selection of the control (village, seed variety, soil type) while the NGO protocol required that the plots be near the SWI plot and preferably of the same seed variety though this was not imperative.

Ramesh and I decided to pool resources and collect the data together to make the whole process easier. There were several reasons to do this, apart from familiarity, increased person-power and social ties. It turned out that our list of farmers overlapped by 56 percent (or 23 out of 30 farmers). It made little sense for us to collect the data separately, especially since many of the plots were too small to allow for two crop-cutting exercises. There was also the added burden we would be placing on farmers by making separate trips to their plots.

To my advantage, the UDP also provided a digital electronic scale to weigh the produce, thereby reducing the expenditure I would have to undergo and allowing for a

degree of accuracy that a spring scale bought locally would not. In return, I reduced the labour burden on staff by substituting one of them with myself.

Kelly (2008) analyses the work of Hans-Joerg Rheinberger and Bruno Latour to draw our attention to the epistemic significance of the mobility of data as well as labour's role in making it possible. As Kelly further highlights, this shifts the focus of attention from traditional enquiries led by philosophers of science from the relationship between data and claims to the labour-researcher who produces this data. In the section that follows, I focus on how the labour-researchers in this exercise - both staff members and I - attempted to provide a stability to crop data by transforming very disparate cropping patterns to reflect a singularity of outcomes.

Collecting Data

In an ideal scenario, researchers charged with collecting crop cutting data arrive upon the scene (having previously informed farmers about this activity), demarcate the three subplots being harvested[209], randomly select five wheat plants to measure plant height and panicle length, have the crop harvested, weigh the crop immediately (fresh weight), have it dried for a day or two, weigh it again (dry weight), have the crop threshed to separate the chaff from the grains, weigh them separately, and finally weigh 1000 grains

---

[209] Usually five subplots are considered; on the advice of a senior agronomist associated with the project, we decided to harvest only three. Some plots were not large enough for us to collect data from five plots without harvesting the entire crop. Another scientist I spoke with after this exercise informed me that the norm is to collect data from a five square meter plot rather than five individual one square metre plots.

of wheat randomly selected and counted. If that appears to be a relatively straightforward process, it is deceptively so.

In the end, most of these considerations turned out to be redundant, and we chased data against time. The local field staff often forgot to inform the monitoring team (and I) that a farmer was harvesting an SRI field, being deeply absorbed in competing project activities. To our dismay, some farmers harvested their plots before we could collect the sample data. This was despite their having been informed previously that a monitoring exercise was to be carried out to ascertain whether there had been any yield gain from adopting the method. This caused our sample to change, as we replaced those on our list with the next best match. At the same time, people were harvesting their crops much faster than we could keep up with them. The field area (for SWI crops) extended along the sides of a seven kilometre stretch of road, though most villages are set away from the road, and accessing them usually required an uphill trek of anything between one to four kilometres. Though many villages were also accessible by road, lack of transport facilities (public and private) made the trek inevitable. We often found ourselves in the unenviable position of being in one village to collect data, and being told to make haste towards another one at least an hour away before the plot was harvested. Since the field staff were largely not trained to collect the data and were also busy with many other competing tasks, we were left with no choice but to ask farmers to hold off on harvesting the crop until we got there, and hope that the burden of waiting would not become too much. In some instances, insufficient communication on our part as well as an incredulousness

207

about the value of this exercise on the part of the participating farmers meant that crops were harvested before we could get to them.

Differences in embodied skill, judgement, interests, and perceptions of what constitutes data and dimensions, as well as tacit knowledge, pushed those of us involved in data collection in different directions during the actual measurement process when we experienced difficulties following norms. We quickly dispensed with separating out and counting 1000 grains of wheat. After two attempts I myself found it not just tedious, but also cutting into precious time. Collecting the sample itself posed challenges of a different sort. We first experimented with using wool attached to sticks to demarcate the area to be cut, but found the procedure to be tedious, with the wool often getting irretrievably entangled with the plants. We then decided to collect four broken wooden branches measuring about one inch in diameter, cut them into one metre long sticks, and place them flat on the ground in the shape of a square, their ends touching. Given that the sticks were pieces of tree branches, they were not always entirely straight, but slightly curved. The ends were also roughly hewn, meaning that when the square was assembled, there was some small (though not inconsequential) degree of leeway.

As a result, when we placed the four sticks to measure the wheat, each placement of the stick was a negotiation. Given the low density of plants, including even one extra plant at each end of the line was a substantial increase, leading to higher calculated yields. We did not intentionally try to include or exclude extra plants: the imprecision just ensured that at every placement of the sticks, a decision was made. These decision-making processes varied based on who was placing the sticks. We all took turns placing

the sticks, cutting the crop and recording the data, and at no point was one person solely responsible for any one activity. This introduced variation in the measurement practices, since some staff members were more generous with their estimation of where the sticks should lie. An added dimension was lodging in the wheat crop itself. Hail and other weather disturbances had caused the wheat to fall and lie almost parallel to the ground. This made ascertaining where the lines began and ended difficult. Placing the sticks under fallen wheat also proved challenging, given the limited visibility of ground space, obscured as it was by fallen wheat[210]. Many plants lay entangled in each other, and when cutting the wheat we were never entirely sure to which plant a tiller belonged. Lodging of the wheat crop added another dimension of uncertainty about the accuracy of the sample data. Our experiences with the wheat itself made it clear that we were not the only contributors towards the data that was being slowly collected and constructed: the wheat itself played a role too. Antonia Walford (2013) draws on the work of Isabelle Stengers to suggest that not only do subjects intervene, objects object as well. But after this enters the political. What do we want the object to say?

Weighing Wheat

After harvesting a sample, samples must be weighed, dried to remove its moisture content, and weighed again. With differences in harvest timings and consequently stages

---

[210] A wheat crop that has lodged should ideally not be counted; a lack of substitutes made their inclusion necessary.

of the crop, ascertaining that all the samples are of the same moisture content is challenging.

Since we only had one weighing scale between us, we initially opted to use a spring scale to weigh samples. I soon noticed that the spring scale was not sufficiently sensitive to accurately weigh the samples of wheat, since it was meant to weigh objects five kilograms and above, leading us to abandon it. This meant that we could not split up into two teams to collect data without compromising the weighing procedure. On the few occasions that we did, the sample that was not weighed had to be accessed that day or the next. A delay caused a reduction in the fresh weight, since the harvested wheat was prone to drying, thereby skewing the results. The spatial dispersion of villages, oppressive temperatures, and rush to get to sample plots before farmers harvested them increased delays. When we did manage to weigh samples, issues often arose because of the lack of an even surface on which to balance the scale while weighing the sample. Uneven surfaces caused variations in the weight taken, and we had to weigh the same sample multiple times to arrive at what could serve (sort of) as the correct figure. The weighing scale also became "enhanced" and "enlarged" (Knorr-Cetina 2001, 179) in the activity script of the crop-cutting exercise, when in fact its use and role would normally appear unremarkable.

An especially tiresome exercise, for both farmers and the data collection team, was the preservation of the wheat samples from wildlife, livestock and an assortment of pests while they were being dried. One visit to a farmer to record the dry weight of the sample was met with the response, "the ox ate it". There was very little that could be said in that

situation, either to the farmer or the ox. On another occasion, a monkey escaped with a bundle of wheat that I had placed on a terrace to dry. On a third occasion, a farmer, deeply apologetic, informed me that rats had consumed the wheat sample. Post-humanist accounts of practice (most notably Andrew Pickering's[211]) call for a recognition of the manner in which material and human agency are co-constituted. "Unruly environments" (Beinart 2015) interject in unanticipated ways.

Decoding the Data

At a methodological level, I believe that my own participation in the production of this data allowed me the privilege of closely observing how it is constructed - not just by ULP staff, but also myself. The final ULP monitoring report was, however, produced in my absence. While I had access to most of the conversations and activities that took place at the field site, I was not present at the head office when the data was collated, presented and discussed. I could only say with certainty that "my" data - meant to comprise the results from 60 plots - was incomplete. With many gaps in the data - and many intervening variables - I was not able to state conclusively whether the SWI crop had fared better than the conventional one. I was later informed that the monitoring reports indicated a favourable outcome, an observation that I was unable to reconcile with my experiences in the field. I was deeply frustrated about my inability to come up with a preliminary analysis of whether the method had offered farmers comparatively higher

---

[211] Andrew Pickering (1993) uses his notion of the 'mangle of practice' to demonstrate a dialectic of resistance (by instruments) followed by the scientists' acquiescence or accommodation to sustain a fact.

yields. The whole process of data collection had, on the other hand, offered me an insight into what those numbers - even if complete - would really signify.

Most of the SWI fields (with the exception of four of them) were fields in which line sowing had been practiced. While the reports were written up as SWI yields, most SCI actors differentiate between SCI and line sowing narratively. In addition, the actual distance between lines varied[212]. I was not to sharpen my analysis of the practice of the method until later, and at the time, it was difficult for me to accept that the crop sown was an "SWI" crop, no matter how much interpretative flexibility I accorded the method. At best, the numbers from our data collection process signified to me yields for line sowing, with or without inter-cultivation and the recommended addition of organic manure usually ascribed to SCI/SWI. By the end of the two weeks, the numbers themselves did not mean very much to me in the context of the purpose they were originally meant to serve.

Farmers seemed to share the same opinion, and most did not see much value in the exercise. I was later told after a grain counting exercise[213] that people found my activity extraordinary, and unable to decode what I was doing, were labelling me *pagal* or mad[214]. Not surprisingly, hearing about this incident did not have a salutary effect on my crop-cutting experience (or my mental health). But this incident also bears witness to the lack of exposure of farmers to government extension and data collection efforts. In only one

---

[212] See Chapter Four for more on how the wheat was actually sown.

[213] In the exercise I separated panicles from the stalks, and then proceeded to unwrap each individual grain covering to examine each grain for defects and then count it. This process was performed for five panicles, from each of the three bunches. Each panicle comprised between 15 and 50 grains.

[214] See Husain et. al. (2003) for similar experiences with SRI.

household was the exercise recognised. The village *sarpanch* or headman from whose plot we collected data recollected that the *patwari* [215]had also been around to another of his plots to collect similar data, albeit for another crop. In most other households, the exercise was met with derision of murmurs of it being *babala*[216] or a waste of time.

Apart from collecting production data, a concurrent purpose of the crop-cutting exercise was to 'show' farmers how much yield benefit they had obtained by adopting this method. This practice was not always followed, since farmers very often left us with the samples and returned to other activities. When present, we made it a point to let them know how much grain and chaff the samples had yielded. But since the samples did not comprise the yield from the entire field and only three square metres, the weight of the grain and chaff from the samples made little sense to farmers. They had already made their own evaluations of the method and its usefulness through their own practices and patterns of sense-making.

Field staff members were equally unenthused. As one field staff member emphatically pointed out during a crop-cutting exercise when we were debating the correct method of collecting the sample, "this will make no difference to anyone". The social and professional distance between both senior and junior management and staff sometimes resulted in strained relationships, and placed an unequal burden on field staff during the entire season. Not only did they not understand fully why certain methods were used, even what they did understand they thought of it as being pointless.

---

[215] Block Land Record Officer.
[216] Useless.

Hine (2006) builds on Galison's (1997) concept of the "trading zone" to suggest that laboratories are staffed by persons belonging to unequal hierarchies and different interests. While she suggests that learning in her study took place even in the absence of the breakdown of professional and institutional boundaries, I would suggest that it was a clear consciousness of the rigidity of these boundaries that inhibited learning and consensus. For one, power shapes knowledge (Foucault 1982), and power shapes both who may claim to have knowledge and who believe they do not. Second, both groups operated with different "logics of action" (Callon and Vignolle 1977, 150). Logics of action are principles that shape actors' behaviour. Within an organisation there may be a multitude of logics of action. Logics of action presuppose comprehensible relationships between the actions of individuals and/or groups and organisational goals that derive from different "systems of orientation" (Callon and Vignolle 1977). I depart from Callon and Vignolle's privileging of economic and science-based logics of action given this specific context, and focus instead on logics of action underlined by embodied identities, as well as practical considerations (though I admit that practical considerations are themselves driven in part by science considerations.)

Data collectors embodied different rationalities than senior staff members. Ramesh, for example, enjoyed the research aspects of SRI work. He had had the opportunity on various occasions to meet the most prominent and influential scientists and advocates of SRI, and spoke frequently of the discussions he had had with them about the finer aspects of the method. Ramesh had even considered enrolling in a PhD programme in a local university (though he was unable to pass the qualifying interview). But there remained a

tension between his interest in research, the pressures of data collection deriving from material, topographical and environmental contexts, and the organisational environment within which he found himself. In the case of the fieldworkers, they did not see value in the data, its claims, or the method the data was making claims about. Their own evaluations of SRI[217] made the data collection process irrelevant to them. Counter-claims held by staff about the method were made a priori, before the data collection process. Their a priori counter-claims made the data collection exercise irrelevant in their eyes, and not in need of prescribed measures of "accuracy". Their evaluations of the method therefore shaped the data collection process.

There were two sites of knowledge production, then, though only one form of the knowledge produced reached the formal realm through the act of documentation. There were the whispered and direct conversations held at the field level, where locally grounded observations and assessments were made, deeply imbricated in the local cultural, ecological, political and economic logics. Then there were the official conversations that alluded to the former but dispensed with some of their details and built upon others. It is easy to think of this as mere fabrication of data, but I would suggest otherwise. Knorr-Cetina invokes constructivist interpretations of fact making to point to its fabricated nature (Knorr-Cetina 1981). Fabrication here does not necessarily imply deceit, but a "chain of decisions and negotiations through which... outcomes are derived" (Knorr-Cetina 1981, 5).

---

[217] See previous chapter. Fieldworkers began the SWI activity in trepidation: it required a lot more manual effort than the prevalent broadcast method of wheat cultivation, and went against common beliefs about how wheat should be grown. The burden of convincing an unwilling beneficiary pool to practice it added to their unhappiness about the method - even if by the end of the season one fieldworker came to believe it to be worth pursuing.

For example, while staff and I discussed the quantity of *busa* or chaff collected from the samples with farmers, this did not figure in discussions staff held with senior management. Green and dry fodder is a very important consideration for farmers growing wheat in Uttarakhand: its value rivals that of the wheat crop itself. Farmers themselves - largely women - were far less concerned with the yield of the crop than the fresh and dry fodder it offered[218]. And yet, in the final analysis, the data was expected to stand in for the crop. For example, when a farmer complained to Ramesh during the data collection exercise that her crop looked poor, he responded by stating that while it looked poor now, she would come to see how good the crop was once we collected the data[219].

It is not that the senior management did not appreciate the value of fodder: they were well aware of it and it was an important concern for them as well. It was not, however, the primary consideration in the evaluation of the method within the project. This dissonance between the interests of farmers and the interests of the project meant that the method had limited appeal and value on its own, with implications for uptake in following seasons[220]. This dissonance also speaks to what we privilege in our valuations and evaluations of an agricultural method, without being sufficiently cognisant of the embodied, contingent ways in which technologies come to be stabilised in a limited lexicon of outputs.

---

[218] As a reminder, during the process of weeding, wheat plants themselves are removed along with weeds. This is for two purposes: thinning the crop to facilitate better growth, and more importantly, acting as a source of green fodder in a period where it is difficult to source. The absence of sufficient fodder in an SWI field places great physical burdens on women who must climb mountains to get green fodder.

[219] Not surprisingly, the figures for her plot were not encouraging.

[220] As we have seen in the previous chapter, the changing subjectivities of Kumaoni farmers and their shifting affective relationships with land and place have all contributed towards a diminishing association with agriculture in and of itself.

Conclusion

Walford (from whom I borrow a heading in this chapter) alludes to the "social life of data" (Walford 2013, 30). Knowledge is embedded in social relations, and is "produced in dialogue, tension, and interaction with other groups", being "enacted and networked" (Escobar 2008, 43). But much of development (and other) work centres around data because of what it can signify (success/failure) and what it can make legitimate. The designers of research experiments (and here, development project monitoring data) make efforts, to repeat Kelly (2008, 101), "to transform evidence of "everyday practice" to evidence for "everyday practice"". In the context of this, I want to make two concluding points:

One, *agricultural data is mutable*, even if in theory, production statistics as a concept are immutable: scientific, objective and unbiased. In this case, authority over the production of data passes out of the hands of the scientist who publishes in a journal about the agronomic principles underlying SCI's high yields to the hands of a field worker who steps away from a supervisor, into a field of wheat with a bamboo stick in one hand and a sickle in the other. It passes back to the supervisor who records numbers in a notebook - my notebook - and back to senior management who present the data to donors. During this process the method acquires a polyvalence that is quickly muted once it is crystallised in an Excel sheet. For those left with the threshed grains of wheat, a higher yield may equally be attributed to a large pile of compost as the method.

Two, *data has political value.* The data collection process makes the method intelligible to policy makers[221] who decide where funds must be allocated. What does it mean then for me, a doctoral researcher, to challenge the promise, advocacy and value of an agricultural method that is claimed to be low external input, beneficial for small farmers, and "climate-smart"? Does this (and the previous) chapter challenge the value of SRI as a method of cultivation? I think not. A groaning planet can ill-afford to continue on its current trajectory of resource intensive agriculture. Like many SCI advocates, I claim solidarity with the principles that underlie its imagination. In seemingly "exposing" its claims, I may be seen to be guilty of weakening the fight against unsustainable agricultural practices. I see this project instead, as a challenge to the legitimacy ascribed to well-intentioned scientists, extension workers, non-governmental organisations and researchers who decide the agenda for agriculture without sufficient cognisance of what agendas people wish to lay for themselves. What this project also does is challenge the data-making practices of well-intentioned groups. A fixation with yield in advocacy efforts actually serves to control interpretative freedom (Collins 1985), when in fact interpretative flexibility is one of SCI's key tenets. The unintended downside of a failure to account for this, is the vacuum left by a failing agrarian regime that is pushing households towards new and uncertain futures. It is to this I turn in the next chapter.

---

[221] Admittedly, yields are not the only points of reference in policy discussions. The 2012-13 Committee on Agriculture report presented to the Lok Sabha curiously referred to alternate wetting and drying (AWD) and leaf colour charts (LCC) based nitrogen management in the brief section of SRI, attributing value to its low cost of cultivation and making no mention of yield. A closer examination of the report makes this less curious: higher yields are attributed to high yielding varieties rather than to improved methods. To compete with the discourse of high yielding varieties and the strong Plant Breeding centres that back them, agro-ecological methods must be boxed into the same enclosure of speech and evidence.

Chapter Six

Polytunnels and Chicken Coops: When Food Security Met Lakshmi Devi

Introduction

By the monsoon of 2015, I was buying vegetables from farmers from Bangaon, feeling a palpable sense of relief about being able to access home-grown and fresh vegetables courtesy the ULP. The many hours field staff spent in the hot sun helping assemble polytunnels and vermipits was finally paying off. I took down recipes in between interviews, and began to look forward to meals that did not comprise instant noodles for my final months in the area. Though I enjoyed some relief as interest in vegetable cultivation blossomed, I returned two years later to find a seriously diminished enthusiasm for it. Though the bright blue tarpaulin sheets of the constructed vermipits still fluttered in the wind, and the clear plastic sheets of the polytunnels still adorned their iron frames, I found myself once again eating lunches and dinners comprising potato and soya chunks. The brief magic of the summer-monsoon of 2015 had disappeared.

Horticultural production was advocated in the field area with much pomp and show, and in certain quarters found a willing audience - unlike its unfortunate counterpart SCI. The dualisms inherent in their propagation and acceptance is my starting point in this

chapter. In the sections to follow, I point towards a seeming dissonance between the message provided by the consultant charged with promoting horticulture in the region and that of SWI advocates. The consultant urged residents to stop wasting time cultivating crops like rice and wheat, even as local field staff struggled to increase SWI and SRI adoption rates. Field staff found themselves in the contradictory position of advocating for both, making different claims and appealing to different imaginaries. Variations in knowledges and ideologies between and amongst the different organisations and groups involved further complicated the picture. Even more confusing for residents was who was doing what, and what could they expect from the different players in that space: the state and the NGO. In this chapter, I explore the tensions that arose as a result of different and competing narratives and actors, focusing on how horticultural practice was shaped in the project field site.

Horticultural Production: Filling a Gap

Promoting vegetable cultivation in the Parvati Valley - or elsewhere in the mountains - requires far more than monetary logic. Unlike rice and wheat that are both available at a subsidised rate through the Public Distribution Scheme (PDS), the market for vegetables in the valley is underdeveloped. In the two kilometre stretch between Bangaon and Siyali that catered to four villages/hamlets, only four shop owners sold vegetables, and supply was limited, narrow in range and infrequent. The ULP household survey indicated what is evident to anyone who lives in the area and scrambles to cook a whole meal: vegetables

are hard to come by. Residents were quick to point out a paucity in access to vegetables in the market. While most households grow vegetables in homestead plots for self-consumption, residents themselves claimed that it was not sufficient to meet their needs.

Meals in the mountain regions are conspicuous in their relative simplicity. Even in restaurants, lunch offerings are usually the rice and lentils variety common to most households. It is the far more expensive "full meal" that offers a vegetable side-dish. Vegetables are usually only served at night with *roti* (bread) and buttermilk. The lack of vegetables in pahadi diets is easily observed in physical signs of micronutrient deficiency: spoon-shaped nails point to very high levels of anaemia, and brittle brown and thinning hair indicate a possible Vitamin B12 deficiency. Recognition is countered by a near normalisation of food habits possibly engendered over time by the limited offerings of mountain agriculture. Even office field staff who did not have access to kitchen gardens felt the burden of poor market access, meals often being khichri[222] or the "vegetable" for the day, that is, potato or soya chunks[223].

Including horticulture in the project then seems a worthwhile and unremarkable decision, even if perceptions of its role varied. On one hand, for the former director of the UDP, vegetable cultivation was largely a means for farmers to achieve some degree of self-sufficiency in vegetable consumption, given the severe deficiency that existed. On the other hand, the expert consultant hired to promote it in the project, Rakesh Bahuguna, envisioned a substantial role for vegetable cultivation in the region. Bahuguna

---

[222] A spiced preparation of lentils and rice in which tomatoes and/or potatoes may be added.

[223] When the Project Coordinator would visit, it was customary for him to bring with him a sack of vegetables to meet the team's needs. Field staff also ate two meals rather than three because of work demands that required them to be out for most of the day. This was a source of consternation for visitors.

had an extensive background in vegetable cultivation in the now well-known and widely cited project areas of the NGO HARC (where one of the senior staff members of the UDP was previously employed).

The impetus for the development of horticulture in HARC's area derived in part from large retail chain Mother Dairy's decision to diversify its supply chains away from Solan in Himachal Pradesh (HP), as farmer federations in HP became stronger and themselves began to move away from a dependence on Mother Dairy for sales, asking for higher prices as their options expanded (Sharma, et al. 2013), a "spatial fix" (Harvey 2010) of sorts. For their part, farmers in Uttarkashi were happy to partner with Mother Dairy, which offered them a better deal than private traders[224].

Contrary to concerns that their plots were too small for commercial farming to be viable, in Uttarkashi, another retail chain in the area, Safal, actually preferred to buy from smallholders making the venture more feasible for both sides (Singh and Singla 2011)[225]. There appeared to be sufficient reason to believe that a similar initiative would work in this region as well, though with, as Bahuguna later implored, "hard work"

There is no denying that some residents of the Uttarkashi region have profited from the venture. To foster interest in vegetable production as part of its own outreach programme, the government project Gramya[226] arranged a tour of this region, sending a

---

[224] Bahuguna openly points out that enthusiasm for Mother Dairy stemmed from their provision of plastic crates in which to supply vegetables, as against the wooden ones farmers were using which were 70 percent more expensive, broke easily, and were difficult to procure.

[225] Some reasons included lower chances of disruptions in supply in case one or more farmers faced crop failure, a flexible production portfolio which allowed farmers to respond quickly to consumers' changing preferences and the ability (or rather, need) of smallholders to maintain prescribed quality standards because of low bargaining power, aided by family labour.

[226] Funded by the Watershed Department.

handful of farmers from the Parvati and neighbouring regions on an exposure trip. Not everyone came back equally enthused, but two farmers from Bangaon appeared to have been impressed enough to give commercial horticulture a try. Bahuguna was tasked with providing advice about cropping cycles and patterns, leading to the formation of FIGs as well as assisting with knowledge and produce dissemination. In the first stage of this activity, farming households were identified as beneficiaries for the distribution of vermicompost pits and/or polytunnel[227]. Vermicompost pits were more widely distributed than polytunnels. The hope was that farmers with access to polytunnels would grow seedlings both for use on their own plots, but also for sale to other farmers who could in turn grow vegetables. Seedlings were to be priced nominally, with a part of the cost borne by the ULP[228]. Since the polytunnels were largely to be distributed to poorer farmers, recipients of polytunnels stood to make some modest gains from this setup - assuming they were willing to participate in this entrepreneurial activity. Simultaneously, FIGs were to act as knowledge sharing platforms and as entities that could come together to sell their produce. FIGs were to be eventually linked to larger Farmer Federations.

FIGs or Farmer Producer Organisations (FPOs), as many of these groups are known, have largely operated in multiple ways, with some profiting, and some failing to meet their objectives as contradictory logics and understandings impede their path (McDonald 1999). They are expected to be especially useful for small-holders who face a number of

---

[227] A sudden and unanticipated cut in funding from the funder meant that the original list of vermipit beneficiaries was cut down accordingly. This had implications for who qualified as a legitimate beneficiary, a point of contestation and negotiation discussed below.
[228] In the initial articulation of the division of expenses, single tomato seedlings would be sold at 70 paise, capsicum at 80 paise, and aubergine at 70 paise. Half of the cost was to be borne by the ULP.

constraints[229] by displacing risk. With an "individual as enterprise" (Gordon 1991) notion of farmer behaviour, farmer groups spread out this risk amongst themselves. FPOs also allow for aggregation of output and consequently economies of scale in marketing, in addition to better bargaining power (Bernard and Spielman 2009). FPOs therefore ostensibly act as enablers of better productivity, efficiency and viability. The question remains of their perceived utility to farmers. For them to be useful, farmers must subscribe to the same production imperatives. Extension work must also be attuned to the needs of farmers who can then assess the value of these initiatives. Since commercial horticultural production has not been part of the landscape in the area prior to the introduction of the project, efficiency and productivity were not the criteria with which the value of an initiative could be judged either by external evaluators or farmers given lack of precedence. Viability and interest were far more pressing concerns, and were the cornerstones of framing exercises.

Moral Geographies of Cultivation

Previously an arbiter of agricultural development, the Indian state's current strategy in agriculture is concomitant with its larger strategy in development: individualisation of

---

[229] These include poor access to information, an inability to meet quality and standardisation norms and a large difference in margins between farm-gate and retail prices exacerbated by a lack of influence over the terms of sale (Gulati, et al. 2005). Farmer organisations are useful because collective action allows farmers some control over transaction costs, access to new technologies and high value markets (Stockbridge, et al. 2003), in addition to increasing bargaining power (Markelova, et al. 2009). Facilitators (like development organisations) can address some of these issues in the early stages of commercial production, especially in terms of initiating the formation of farmer organisations (Hellin, Lundy and Meijer 2009) and later in helping them negotiate power relationships between farmer groups and other members of the supply chain (Bebbington 1996).

the onus of choosing to engage in development, as well as practicing it. These prescriptions of subjectivity feed into nationalistic imperatives that elude and naturalise hierarchies of age, gender (Alonso 1994), and caste. Failure to "progress" is attributed to personal weakness as well as a failure to submit to tropes of the good farmer, the hardworking citizen and national welfare. This is best exemplified in the Government of Karnataka's mandate provided to the Expert Committee on Farmer Suicides: apart from identifying the causes of suicides, the Committee was tasked with finding ways to instil self-respect and self-reliance amongst farmers. The Maharashtra government went one step further, seeking the help of Mata Amritanandamayi (the "hugging guru") to address farmer suicides in the Vidarbha region of the state (Vasavi 2009). These "lean in" variety strategies (Sandberg 2013) do little to address systemic gaps or account for the specificities of different kinds of agricultural contexts.

Within agriculture, different kinds of crops attract different moral and/or economic frameworks. This was best exemplified in the contradictory and differentiated moralities attributed to pahadi farming in the project. Arguments for SWI hinged on people's need to think about future generations, to be good farmers who used less seeds and water to grow more food, to be able to feed families. The call to vegetable farming, on the other hand, invoked the shining figure of Lakshmi Devi, that is, the Goddess of Wealth.

Having already discussed the articulation of SWI as a method of cultivation to be pursued in the previous chapter, in this chapter I limit my description of imaginaries to those invoked for horticultural production. I begin by providing an abbreviated account of the manner in which Bahuguna made a case for horticultural production.

Towards the end of the wheat season in 2015, the UDP began its vegetable promotion exercise. Bahuguna visited a few villages to motivate residents to pursue the activity, conducting village level meetings and inviting (exhorting) residents to join village-level farmer groups. At the same time, the Gramya project continued with its own outreach efforts, conducting a second trip for farmers to visit areas where vegetable farming was booming - largely, the Uttarkashi region. The tours (two had taken place by the time the 2015 kharif season began) were conducted by Gramya, though Rekha also participated in one of them, only partially as a representative of the UDP. The groups were met by Bahuguna at their destination. The tours were usually exciting - though also a little bit terrifying when conducted during the monsoons since the area is notorious for landslides. Farmers who participated in the tours came back impressed with what they had seen. They reported that the scale of horticulture operations was far more than they had witnessed in the Parvati region. These avenues were not however, without their share of problems. Uttarakashi at one point had six federations covering 80 villages and their farmers. Produce (largely tomatoes) was sold both through contracts entered into with retailers such as Safal and Mother Dairy, as well as private traders (Singh and Singla 2011). Strict quality criteria implemented by retailers led to high rejection rates. At times, a whole truck would be rejected during the course of produce quality checks and grading because an errant farmer had attempted to smuggle poor produce in, leading to strife amongst farmer groups. The distance between Uttarkashi and Delhi where some of the produce was sold also compounded the situation. Nevertheless, Uttarakashi was a success story recognised by most.

At the first horticulture production meeting in Bhadkot, Bahuguna, along with Rajesh the young professional attached to this valley, and Ram, the manager of the project, jointly put forward an argument for taking up vegetable production[230]. Bahuguna began the meeting by comparing the ostensible gains to be had from growing wheat versus growing vegetables. Comparison required that costs and yield be estimated. The audience and Bahuguna jointly established - with Bahuguna taking the lead - that per nalli[231], the audience could hope to gain an income of Rs. 375 from a wheat crop[232]. Bahuguna followed this calculation with an estimation of the economic gains to be made by sowing and marketing vegetable crops[233]. By the estimate jointly arrived at - with Bahuguna providing many of the figures - the gain for the different crops discussed were as follows: Rs. 7000 for capsicum[234], Rs. 6000 for tomato[235] and Rs. 3500 to Rs. 5000 for cabbage[236].

These startling figures were followed by some murmuring. The numbers were astonishing - and almost definitely impossible. The crowd, somewhat incredulous, pointed out that they did not have access to irrigation, or else they would be willing to

---

[230] The meeting itself was hastily called and poorly attended: women whose houses were located in the vicinity of the courtyard of the house where the meeting took place comprised the bulk of those present. Residents of the adjacent hamlet were largely unaware of the meeting, as were residents located away from this household. Women also outnumbered the men, some of whom were youth and visiting members of family with little role to play in crop related decision-making. The meeting continued however; there was little time to be lost.

[231] Nalli is a unit of measure used for land in Uttarakhand, and equals 240 square yards or 0.5 acres.

[232] Assuming the crop was sold in the open market at the rate of Rs.15 per kilogram for 25 kilograms (which actually equals Rs.355 to be precise).

[233] These estimates are of course crude, and do not take into account other considerations like post-harvest losses.

[234] Assuming you sow half a kilogram of seeds, and harvest 350 kilograms. The crop is then estimated to be sold at a rate of Rs.20 per kilogram.

[235] Assuming you sow 675 seedlings, of which 75 perish. The remaining 600 fully grown plants are estimated to weigh one kilogram each, and are sold at Rs.10 per kilogram.

[236] Assuming you sow 2000 plants, of which 500 die. The remaining 1500 seedlings provide a yield of 750 kilograms, which are sold at Rs.5 in the market. In this instance, assuming variability in market prices, Bahuguna accounted for a variation in total price.

sow vegetables in this manner as well. Bahuguna responded by drawing from his successful experiences with horticulture in Uttarkashi:

> Those people (in Uttarkashi) also said the same thing. There is no water here. There are monkeys. They told me to chase away the monkeys. I told them that that was not my job. 'You are the one who needs to eat, you are the one who needs to earn'. They then told us to leave... But later three people approached us and said that the three of them wanted to grow vegetables. Now all 55 households in the village are growing vegetables. They have stopped growing rice, wheat and finger millets... They have the same problems. Such as lack of access to water. But they made arrangements, and harvest rain water... They now earn Rs.50 lakh[237] every year from vegetable production. The monkeys no longer come there because they know they will be chased away[238].

In other words - or rather, in the words of Bahuguna himself - as profits increased, the farmers of Uttarkashi stopped looking for excuses not to farm, and stopped looking to farm cereals. Bahuguna dangled the proverbial carrot in front of the residents of Bangaon. The message was focussed - literally and metaphorically - on *lakshmi* or wealth.

Lakshmi Devi is (the presumably fictional name of) a woman in one of the project villages of the NGO HARC in Uttarakashi who was the cornerstone of Bahuguna's address. Belonging to a similarly situated farming context in her unenlightened days Lakshmi Devi was also equally incredulous when urged to try growing vegetables for sale. A lack of water, space, an overabundance of simian neighbours - all these plagued the fields of the village she lived in[239]. Slowly she was persuaded by Bahuguna and his team to

---

[237] $78,315 (at August 2017 exchange rates).

[238] The figures he presents with respect to the comparative yields of cereal and horticulture vegetable crops do not tally with the official state-level statistics. In the period 2010-11, the average yield for total cereals was 22.52, while the average yield for vegetables was 9.88 (Tuteja 2013). It is not unusual for outreach workers to be forced to succumb to hyperbole for the purpose of advocacy work.

[239] He also invoked very specific challenges and objections to vegetable farming in his message: simian attacks and a lack of access to water. He did not make reference to climate variability-induced losses, post-harvest losses, disease control that as we shall see later in the chapter, played a role in how the crops sown were received by residents. Which is not

try growing vegetables. In Bahuguna's telling of the story - one that is repeated at every first vegetable farming meeting - over the course of time Lakshmi Devi came to see that the beautiful vegetables hanging from trees were not vegetables, but money.

In a later part of his presentation, having just mentioned profits (loosely defined) of Rs.100 crore[240] Bahuguna reverted to the moral argument for horticulture: for the residents of the village he spoke of, the imperative was to bring money to their villages, rather than migrate and take it outside. The goal was for vegetable farming to allow people to buy vehicles that could transport vegetables to markets, rather than travel elsewhere in other people's vehicles. Concurrently, farmers with large plots of land could hire labourers, providing employment to the poor and landless.

According to Bahuguna, some households in Uttarkashi enjoyed so much success that men quit their jobs, their Rs.20,000 to Rs.25,000 salaries being poor substitutes for the enormous gains vegetable farming was ostensibly offering them. The increase in prosperity also resulted in a boarding school being established in the area, with teachers from "outside" being brought in to ensure high quality education.

Bahuguna invoked three sentiments: one of monetary gain; the second was a parochial/moral one - that of keeping the money within; and finally, third, what this gain could mean for children's futures. By all accounts these are attractive arguments and address very real and emergent concerns in the area. For those who are unable or unwilling to leave the valley in search of greener pastures, income that is located within

---

to suggest that he was not aware of them; Bahuguna had many years of experience and many success stories to prove otherwise.

[240] An especially difficult number to accept, even if the profits are said to accrue from a large consolidated patch of land spread over three villages.

is sought after. Cereal production for commercial sale is non-viable, with only high value crops offering hope. That this is possible is engraved in the minds of all, with Hirsa, a village in the adjoining river valley, having gained immense fame in the area for its horticultural production rates. A former teacher, Bhanu Singh is well-known in the area for his large-scale production and sale of kiwi. But Bhanu Singh, as everyone points out, is a very hardworking man[241]. Apart from a mistrust of Bahuguna's narrative, the absence of a defined marketing channel for produce, and the perceived high cost of individually transporting small quantities of vegetables to the nearest market, most were sceptical that there was value in expanding production from their homestead plots.

The Production of Space: Modes of Production and Modes of Perception

Farming in the changing agrarian context of India is being called upon to take new meanings, in terms of both human-land as well as human-human relationships (Vasavi 1994). Agriculture has historically been ascribed a particular symbolic value, and it is this symbolism that is being both challenged and made to take a new form. Farmers are asked to envision new and prosperous futures, though the form - and indeed the newness - of the vision varies across different agricultural regimes. Clearly, the performativity of particular material configurations of the future requires particular material configurations of the present. As different actors endeavour to remake agricultural spaces, it is important

---

[241] Hirsa is also known for horticulture production in general. At one point, it sold truckloads of potatoes. These numbers have since come down, though the legends remain. The two weeks I spent in Sama made clear to me, though, that farmers struggle with much the same concerns as do the farmers in this river valley.

to note that landscapes change in both symbolic and material terms. Their logics and imaginaries may have very material bases (Setten 2004). Of the fourteen percent of land available for cultivation in Uttarakhand, close to 50 percent of the land holdings are what is termed "sub-marginal". 21 percent are between 0.5 and one hectares. These areas combined account for 27 percent of the area under cultivation. Larger landholdings varying between one and four hectares account for 51 percent of the total cultivated area (Govindrajan 2014). Much of the land is fragmented as residents often unhappily point out, and *chakbandi* or land consolidation is yet to find its way to this area.

Land distribution and ownership patterns have implications for how new production patterns play out. The Uttarkashi story would seem to indicate that the specificities of mountain land distribution in Uttarakhand do not preclude it from being amenable to surplus extraction. In the absence of sufficient information about how the agrarian relations of Uttarkashi converge or diverge from that in the Parvati area, it is difficult to hypothesise how similar their trajectories may be. Uttarkashi's trajectory is admittedly atypical since it diverges from other similarly constituted mountainous regions such as in Arunachal Pradesh, where a seemingly pre-capitalist economy also constrained by its ecological and topographical characteristics and underlined by its agrarian relations has largely resisted expansion of a capitalistic framework (Harriss-White, Mishra and Upadhyay 2009)[242].

---

[242] Arunachal Pradesh's agrarian trajectory is very similar to that of Uttarakhand, given the overt commonalities in physical landscape, mountain specificities, a pre-capitalist agrarian system and geographical remoteness complicated by mountainous terrain that makes transportation of produce cumbersome. Where Arunachal Pradesh diverges from most parts of Uttarakhand is its relatively higher level of militarisation.

As is the case with Arunachal Pradesh, however, Uttarakhand's capitalist transformation is not uniformly typified by conventional notions of primitive accumulation. The seizure of land is undoubtedly a reality in many parts of the state, especially where hydroelectric power projects have been initiated. In the Parvati valley region however, no private land has been expropriated for these projects, though their side-effects[243] have made cultivation difficult in some areas. Apart from hydroelectric power projects, an undeveloped land market (that is unlikely to be developed any time soon given the region's remoteness) makes the area and its residents less susceptible to dispossession from their land[244]. But the abandonment of agriculture is a decision at the centre of a confluence of factors of which land distribution and ownership patterns are only a few.

The pull of the urban imaginary is no small contributor. The imbrication of consumption patterns in national and global supply chains that have gained new currency with the spread of social media has decentred the pahad from the affective pull of space. For an appeal for a changed production pattern to work, there has to be a sufficiently invocative imagination of the future to produce changed activity. The materiality of the present and the imagined future may or may not be sufficient to precipitate alterations in agrarian patterns. The selection of horticulture as a project activity itself hinged on a

---

[243] The project has caused erosion of land on the river bank in some parts, and has also been claimed to be responsible for the drying up of natural water sources.

[244] In the previous chapter, I spoke of the diminished and rapidly diminishing interest residents have in farming. Since the land question is crucial to the agrarian question, let me briefly attempt to address it here. The land question is not limited to the physical properties of land, or even its ownership, but about its affective pull - and push - for residents. Land in the Parvati region is neither sold nor bought: at the most it is exchanged or share-cropped through a number of formulations. Its identity remains that of agricultural land.

particular understanding of rural subjects[245] juxtaposed against the realities of mountain farming. Consequently, analytics must focus on "describing the consequences, the possibilities invented as much as the limits imposed, of particular ways of subjectifying humans" (Barry, Osborne and Rose 1996, 13).

Advocates of commercial horticulture in Uttarkashi appear to have been successful on this front. Farmers themselves also came to begin to embrace new modes of perception as the mode of production changed (Taussig 1985 cited in Vasavi 1994)[246]. With a (small) change in the form of agriculture was a concomitant change in its valuation as a source of benefits external to production itself - whether access to better education, a car or a cement-based house. Significantly, in Uttarkashi a fetishism of the modern and urbane reinforced rather than challenged the allure of place. It is too early to tell what will happen in the Parvati valley. While the older generation may be willing to shift to horticulture, it is yet to be seen if increased incomes will keep the younger generation farming their family fields.

Self-making in rural Uttarakhand - as over the world - displays a significant relationship with consumption. In the Parvati valley youth across the socio-economic spectrum embody and perform particular imagined urban identities. Even Bittoo, Rekha's brother, whose family was one of the poorest in the village, could be seen sporting very urbane clothing reminiscent of popular figures in addition to new and trendy haircuts[247]. Bittoo finally chose to leave the village after his 12th standard exam, heading to wash

---

[245] See Chapter One.

[246] Even if, the new modes continue to be made sense of through the lens of old paradigms (Vasavi 1994).

[247] Bittoo did not have access to enough money to invest in multiple sets of fashionable clothing. Urban and modern imaginaries are frustrated by the materialities of everyday clothing.

dishes in a small eatery in Rajasthan. When I met him in March of 2017 on one of his visits back home, he had lost much of his bravado (though his clothing stayed the same). He had grown unhappy with the "group" he was with, and was unwilling to return to them. Instead he headed to Delhi, in the hope of finding something new. Staying behind in the village was not an option. Work for youth (like him) was not just a source of income, but was a "material and symbolic activity... (and was the way he created himself) in relation to others through the meanings invested in forms of work" (Upadhya 2016). Work was also a means with which to differentiate oneself from those who stayed behind. Horticultural production will have to exert an extraordinary pull to hold the youth back - as it presumably did in Uttarkashi.

This is what Bahuguna tried to do by ascribing secondary value to place and sentiment. By privileging commercial horticultural over subsistence cereal production, the ULP - or rather, Bahuguna - was attempting to discursively revalue an agrarian space that had until then been depreciating in real and imagined value. Bahuguna attempted to present a relationally produced space: the futility of a cereal-cropped space versus the financial benefit of horticultural production in a physical or agrarian landscape that remains materially unchanged in both articulations. Acceptance of this reformulation of space would not seriously contradict the existing socio-affective pull of farming and sentiment, what Lisa Douglass suggests is a "historically derived and culturally meaningful embodied experience" (Douglass 1992: 18). According to Douglass, sentiment may reinforce or disrupt the effects of ideas and practices. Bahuguna's appeal to farm did not challenge sentiment, it just gave it a different outlet, thereby channelling it

In pushing for commercial horticulture, Bahuguna was also making very tangible demands. He invoked socio-material collaborations in terms of monetary and labour investment, both at an individual level as well as at a community level[248]. His vision for the valley involved changed agricultural practices and imagined future collaborations (an informally implemented chakbandi system to grow vegetables). But do the rhythms of pahadi lives allow for this to be pursued?

The labour question persists, and given inequalities in intra-household family labour practices, the labour question is very pertinent. Since farming is family based, and landholdings small, the practice and question of hiring in labour is very limited. Exchange labour contributes towards rice farming, but other crops are maintained by family members. In comparison with rice farming, horticulture is meant to be easier on time, vertebrae, and women.

There is a potential transformation of dominant labour typologies that the shift to commercial horticulture could spark. Agricultural labour in the Parvati region is not solely about subsistence: it is also about the preservation of a symbolic relationship with the land, and is a social performance. Commercial production, by fostering the linkage with networks of capital, transforms labour's form. Agricultural labour has also begun to assume a form of legitimacy, borne of its income-earning capacity. This is seen in Uttarkashi, where it is claimed that men have left their private jobs to return to villages to farm for profit.

---

[248] Joint patrolling of monkeys for example.

These processes related to the uptake of commercial horticulture have historically been demonstrated to be uneven, and biased towards certain groups, usually better off farmers (Hall, Scoones and Tsikata 2017; Ulrich 2014). Commercial horticulture may even create further divisions in social relations (Berry 1993). In the Parvati valley case, wealth is not closely linked to current land ownership. The ULP itself thinks of wealth largely in income terms (for the purpose of allocating benefits that is) and not other conventionally used criteria. The validity of wealth as a criterion - or rather, the sole criterion - to delimit beneficiaries is challenged when we think about who makes the most of these newly opened up and imagined spaces. While relations of production are uneven given the similarities in landholdings and a largely family-based labour system even amongst richer farmers, curiously, interest in vegetable farming was lopsided, with largely residents of Bangaon taking an increasing interest in horticulture. One of the reasons for this derives from a trip organised to visit farms and universities in Himachal Pradesh, in which three farmers from Bangaon (all three of whom were Brahmin, and one of whom was a former Pradhan and spouse of the current Pradhan) and one farmer from Bangaon came away from the trip immensely affected. Two - from Bangaon - were the first enthusiastic cultivators to pursue vegetable cultivation in a meaningful way, enthused after a visit to Solan in Himachal Pradesh. They chose to use the opportunity and knowledge provided by this trip alongside the newly gifted polytunnels and vermipits to begin farming with the intention of upscaling, though on a small scale.

One farmer's efforts in particular offered an element of the spectacular, as he and his family members took to standing guard in their fields throughout the day, armed with

long sticks to chase away monkeys[249] - a break from an established pattern of disinterest in agriculture compounded by poor institutional functioning and discipline. Though his capsicum crop largely failed[250] (for reasons that were not clear) the aubergine and tomato crops thrived for the most part (parts of the tomato crop did face some damage), and he sold Rs.4000 worth vegetables at different locations, including the nearby district headquarter Bageshwar. While by no means a princely sum, the profit he made was unprecedented for agriculture in the area. Though reluctant to term it a "business", Shekhar and his family remained hopeful. Barring the odd bag of walnuts from trees in homestead or forest plots that may be sold to neighbours, sale of produce in the area is unheard off. As the season progressed, more and more farmers in Bangaon came to indicate interest in horticulture for sale. Crop success is concurrent with its irreducible materiality and visuality. Crop success makes evident the sociality of farming, which contributes towards its (farming's) existence, its practice, and also its demise as we will see.

---

[249] On one occasion, staff members and I also volunteered to stand guard as he made his way home to eat lunch.
[250] Some farmers in Bhadkot attested to having known that the seeds were sown at the wrong time, and needed to have been sown earlier.

The Invisibilising[251] of Caste

In the year following the introduction of horticulture by the ULP, 2016, when asked about how many people they believed would take up vegetable cultivation, Shekhar's wife Neema Devi responded:

> Rajesh Dutt will definitely (grow and) sell vegetables. Only those who pay attention to the monkeys will sell. Also Govind Dutt. Tushar Chand, Haren Chand have grown some vegetables. Nine to ten people have got polytunnels. The others got seeds from elsewhere. In the village people looked at us and said, we will also grow vegetables. Now in the village four to five people have decided that next year, we will grow vegetables on one side, in a *chak*[252]. Let's see what happens. We will grow vegetables, and stop growing rice and wheat.

Though polytunnels and vermipits were distributed in all the project villages, apart from a few exceptions in Sikri, vegetable cultivation did not evince extraordinary interest in residents apart from the Brahmin dominated Bangaon. During a conversation about why the farmers of Bangaon had demonstrated more interest in horticulture than farmers in other villages, Neema Devi responded:

> Whoever comes to our village, our village of pandits, they say they like this village a lot. It is a rich village. Whenever Rawat comes, he says (she laughs) President[253], we've finished your tea! Whoever comes from Sneha they know only me. They only come here. It's like how they show on television. A guest is like god[254].

---

[251] I use the term invisibilising following the tradition of work that has foregrounded women's hidden labour (such as Delaney (2017)), the suppression of sexualities (such as McAllum (2018)) amongst other themes to denote an active process, much like the way the term impoverished is used rather than poor.

[252] A chak is a consolidated piece of land. While usually referring to a plot of land consolidated and owned by one family, Neema Devi suggested that the farmers she spoke of had decided to grow their vegetables in plots adjoining each other so as to ensure that they could be well cared for (from monkeys).

[253] Referring to a representative, or someone in charge.

[254] She referred here to the common saying, "*Atithi deva ho*".

While this might appear a tangential response, it points towards a very clear sense of caste identity that gets reproduced in different spaces. Elite capture of similar initiatives has been documented elsewhere; richer farmers are better positioned to be able to invest capital and absorb losses. While not the only rural elites, most Brahmin households in Bangaon do fall in this bracket.

Many residents attempted to ingratiate themselves with NGO staff to attract benefits. Some were more successful than others. Many built on pre-existing identities (as "progressive" farmers for example) within the area and with important figures - including the local women staff - to position themselves as worthy candidates for consideration. These identities did not operate in isolation, but worked through networks of privilege. At an agriculture department extension meeting conducted in Parkatiya - the main village to which Bangaon is attached - I witnessed a crowd of attendees almost exclusively from Bangaon and Parkatiya. While the meeting was meant to be conducted for the residents of Bhadkot as well, Govind Singh, the most widely proclaimed "progressive farmer" of Bhadkot pointed out that he had not heard of it. At a smaller meeting conducted by the Gramya team with a visiting scientist from Himachal Pradesh, only residents from Parkatiya - mostly from its hamlet Bangaon - were present. The meeting was held in the small shop that the pradhan's husband owned, where many functionaries gather on their way to and from meetings in surrounding villages. Though an important meeting in which the scientist spoke at length about horticultural production in the area and offered advice about problems farmers were facing at the time, most farmers in the project area were unaware of it.

Information networks are built on pre-existing channels of privilege that get replicated and compounded in ways that need explicit attention. By continuing to privilege income over other stratifiers in its project implementation, the ULP obscured these dynamics, contributing to a reproduction of caste hierarchy. For their part, staff members themselves, deeply enmeshed in these caste relationships, viewed participation in project meetings in general in terms of "interest" rather than caste identity. Class identity on the other hand did figure in their explanations for who participated in project activities more generally: Above Poverty Line (APL) households allegedly were far more "interested" than Below Poverty Line (BPL) households, despite being ineligible for many benefits.

Staff workers often complained about BPL families not participating in the project. When asked about Scheduled Caste (SC) families specifically, they held the same opinion. Even Neeta, a temporary staff member who herself belonged to a Scheduled Caste household, expressed the opinion that people belonging to the Scheduled Castes are lazy. An alternative reading would suggest that agrarian relations have always been biased against the Scheduled Castes. The poorer households either did not have access to land or had very poor land. More pertinently, the disprivileged are unlikely to want to continue with a social system that has historically reproduced their marginality. Marginality intrudes into collective processes. In Uttarakhand where people belonging to lower castes are not allowed to enter the kitchens of the higher castes and still face censure for being able to access the benefits of affirmative action, caste-based discrimination works in both insidious and overt ways (Scott 2009). When the ULP came up against overt discrimination in the context of the project, staff took a clear stand. On one occasion,

residents of the main village of Baicholia objected to a standpipe being set up that would be shared with the hamlet populated by Scheduled Caste households. Rawat very firmly stated that the ULP would not shift the pipe to leave it out of the reach of the hamlet. The categorisation of beneficiaries by class, and not caste or gender however, meant that project activities did not account for its unanticipated effects or their specific needs. The lens of development can be exacting in its performance.

Materialities, Practices and Disruptions of Ideology

The practice of horticulture in the project had contested ideological and material roots. The team charged with procuring vegetable seeds for distribution acquired hybrid seeds, without the knowledge of senior management in the first year, and caused a stir within the project. Senior management were strongly opposed to the promotion of hybrid seeds. The use of unfamiliar seeds with familiar (organic) production practices was later held responsible for the failure of some crops. Unused to the properties of the new seeds, farmers were unable to decipher the signs of failure, their practical knowledge not meshing with the unknowns of the seeds. Farmers were unable to control the production process and the outcomes, and many faced losses. Despite this, as late as 2017, hybrid seeds were being distributed, despite widespread reports of crop failure in the preceding season. The promotion of hybrid seeds alongside a stated commitment to organic farming was anomalous with the chemical-based fertilisers required to sustain hybrid crops. It

marked a clear reluctance to part with the rationalism that underpinned this form of social engineering through (ostensibly) high value crops, but also a simpler lack of coordination between teams.

Rawat admitted to this dissonance between the explicit and implicit requirements of ULP-sponsored vegetable cultivation:

> The tomatoes grew (here), but we thought that we shouldn't use chemicals, so they got spoilt. Hybrid seeds don't work without chemicals and pesticides. Now in this area where people never used chemicals, for vegetable farming we are introducing chemicals. Thinking about the environment, and our own status as a social work organisation, we are not keen to introduce other (bad) things just to increase incomes. But the people can do it on their own, tomorrow they can bring chemicals. If they can bring chemicals it is not a good thing for us. But if you introduce vegetables, and talk about increasing incomes, this may happen slowly anyway. People will start bringing them. In this area for example, some eight to ten quintals of tomato got spoilt. It didn't acquire the right colour. If they had added some chemicals, it would have ripened and could have been sold in the market. And aubergine was comparatively better. Also, here it rains in May-June. Could we maybe sow the seeds fifteen to twenty days earlier next year? Maybe the saplings will take root properly then. That's also there, did we perhaps sow the seeds late? Could we use early maturing varieties? These are the things we will have to do if we want to move in the direction of horticulture... perhaps we should have not given hybrid seeds, or suggested using local seeds with hybrid seeds to see how it works out[255]. So our plan is that next year we will not give seeds, people can use their own seeds... over here people sold ten to twelve thousand worth of vegetables this year. For an area that made no income off of vegetable cultivation, Rs.10,000 to Rs.12,000 is a decent amount, even if only six or eight farmers earned this money. They earned between Rs.2,000 toRs. 4000 each. This is there that next year the numbers will increase. But people believe now that they can grow vegetables here. Then people can compare it with rice, with their effort. Then maybe in two or three years they

---

[255] On the other hand, productivity concerns apart, commodity fetishism of a sort precludes many local varieties from being sold in regular markets, since many local varieties do not conform to the imagined aesthetics of the urbanising population. Vegetable markets in Uttarakhand are largely dominated by produce from the plains (including Uttarakhand's flat areas in Nainital and around Dehradun, where standardisation of product appearance is de rigueur owing to the hybrid varieties used). A long history of agricultural research practices and ideologies undergirds the kinds of tomatoes that are available in the market. Local tomato varieties grown in areas like the Parvati valley have limited takers even within the area, owing to their taste and size. Consumers tend to prefer large, shiny, spotless and reddish tomatoes, meaning that organically produced vegetables might not be easy to sell.

will have the option of growing rice and/or vegetables. But our contention is that if we don't test the soil, monitor rainfall, no scientist comes here, there will be a lack. So that will be our effort, to bring a scientist here... including organic cultivation... Then there is the marketing issue, but that is not that much of a problem. Making arrangements is difficult, it has to be done collectively. But if people organise together, will not be difficult to sell in the market, the market is well established. (Interview by author. Transcript. Bhadkot, October 1, 2015)

Though reluctant to promote chemical-based farming because of the perceived damage to the soil, Rawat was under no illusions about being able to stop its advance once horticultural production began. Though organic manures are also available and alluded to at meetings, in private, agricultural officers were sceptical about their usefulness. The visiting scientist from Himachal Pradesh was unequivocal in his recommendation that farmers use chemical fertilisers and pesticides in horticultural production, soil conditions and climate change[256] making their use inevitable[257].

Disease-caused loss is a challenge, even in the now thriving horticultural scene in Uttarkashi. The tomato stem borer for example, is a particularly insidious pest. It very often makes its presence known only once produce reaches the point where it is being graded, causing unanticipated losses. In 2015, many farmers reported heavy losses in their capsicum crops. Much of the tomato crop was reported to have inexplicably rotted. Some farmers reported the tomatoes remaining green instead of turning red, much to the chagrin of farmers and staff. Other farmers noted cabbages not forming or "closing" properly. Only the aubergine crop displayed a modicum of success.

---

[256] Changing rainfall patterns and rising temperatures.
[257] In this articulation of the problem, capital is inserted into nature: in this formulating of nature, it cannot exist without capital because plants cannot be grown organically to be financially viable.

Despite this, in the summer of 2016, farmers persisted with vegetable cultivation, hopeful and enthusiastic about the potential returns. When I returned in March 2017, I was told about the dismal performance of the different vegetable crops (with the exception of cucumber, a crop widely grown prior to the introduction of the different projects), attributed by most to uncooperative weather and bad seeds. Even the most enthusiastic farmers of the past like Manohar Joshi were pessimistic about the future of vegetable farming in the area, and reverted to growing vegetables for self-consumption, though now in the polytunnels. Though Manohar's family had previously been very enthusiastic about expanding cultivation and growing vegetables in a chak, the new seeds presented many unknowns, and staff or government employees were unable to shed light on the problem. Manohar's wife Neema Devi also pointed out that horticulture took up a lot of time offering little monetary gain in comparison with the daily wages she received for participating in the laying of a concrete path in the village, funded by the ULP. Instead, they chose to sow and sell ginger, a labour-intensive crop ignored by monkeys, selling their crop for Rs.4000 - similar to what they gained from tomato and aubergine farming the previous year. Ginger was an easier crop to grow, required less patrolling, was less susceptible to disease, and easier to sell. It did not however, contribute as much as tomato and aubergine did to the household diet.

The impact of the poor seeds was magnified through the ignorance of farmers, staff and Gramya employees, and was sufficient to tip the scales away from the expansion of horticulture. Yet people continued to approach staff for seeds[258] to sow in 2017, because of

---

[258] Seeds for green chilli, capsicum, tomatoes and aubergine.

their easy availability in the village, and the low cost at which they were being sold. The seeds being sold were - incomprehensibly, given their failures in the past - hybrid. By distributing seeds that had come to be known as risky, the project privileged things over knowledge-based inputs.

The active presence of two different agencies - the ULP and Gramya - providing similar things also muddied the field (deriving from a common, dominant understanding of poverty). Gramya distributed seeds to farmers in its project villages - 43 out of the 73 revenue villages in the block. Over the course of the year, in addition to aubergine, capsicum and tomato, they also distributed seeds for French bean, radish and peas. Though some of their representatives claimed to advocate organic manure, the scientist they brought to the village did not and was a jarring source of confusion. The absence of a village-level presence (apart from the village worker whose responsibilities largely consisted of calling for meetings) meant that the responsibility for overseeing these crops fell to ULP staff.

In June 2016, Gramya distributed chemical-based inputs to some of the farmers. Soon after, farmers found that some of their horticulture crops were withering up and dying. Later at a meeting with officials at the Department of Agriculture, an Agricultural Development Officer (ADO) privately attested to there being problems with the chemicals distributed[259]. In the villages, a general confusion about the difference between the ULP and the Gramya projects meant that ULP staff were sought out for solutions[260].

---

[259] The ADO was however reluctant to point this out to his superiors who he claimed, did not want to hear about it.
[260] They were also sought out because they were far more accessible than the Gramya team.

Similarities in the projects had cross-effects. While the similarity in project formulation indicates the inter-twining of civil society and the state (Gupta and Ferguson 2002), the burden of both projects fell on ULP staff, even if unintentionally.

On one occasion, a farmer from Bangaon approached staff workers Govind and Radha as we were milling around outside the office to ask for advice about how to treat the bugs and/or diseases affecting his capsicum, cucumber and pomegranate crops. Govind and Radha entreated him to use panchgabya, and suggested that it be mixed with water in the ratio 1:10 so that the crops were not destroyed. This was echoed by Dhan Guru, the former pradhan and husband to the current pradhan, who, perched on his chair, then turned to Govind and Radha to concur with the farmer that his crops were inexplicably being attacked by pests and diseases. The farmer, visibly unimpressed, turned to the side, and called up his son, asking him to buy Rs. 30 to Rs. 40 worth of chemical pesticides (in only so many words, without reference to the name or type of pesticide) when he returned. Dhan Guru turned to us and laughed, saying, "he doesn't believe in home remedies".

This incident was particularly revelatory: the knowledge, lack of knowledge and proclivities of everyone involved was sharply evident. The use of the new seeds and fertilisers in the area was underwritten by an absence of knowledge about how to cultivate these seeds whose properties were largely unknown. The prescriptions of the local NGO staff who espoused a stated commitment to organic farming clashed with changing perceptions of what would work. Prescriptions were clearly not always well

received (including for SCI), especially for a small but slowly growing circle of farmers who believed the march of progress to be linked inextricably to modern techniques.

At the same time, the incomplete knowledge offered by the state and the ULP magnified pre-existing concerns about the viability of farming. Further, the role staff came to play in the village is notable, as de facto sources of agricultural knowledge in an area where external knowledge was usually only available at the biannual Farmer's Festival and rare copies of farming manuals issued by agricultural universities. Resident-ULP-state inter-weavings were marked by a lack of coherence. "Everyday discussions" between different actors in a space where development was carried out (re)drew the line between the state and NGOs, reconstituting what the state is and what it does (Sharma 2006).

Chicken Coops and Kitchen Sheds

In addition to SWI and horticulture, another project activity included poultry farming: building poultry sheds, and providing beneficiaries with 25 chicks along with feed and the requisite training to kickstart poultry farming. Reactions to the poultry initiative were enthusiastic, if mostly stratified by caste. The Brahmins of Bangaon refused to farm poultry, a religious no-no. Households belonging to Scheduled Caste communities in the villages of Chohar and Choharsthal were less inhibited, and used the opportunity to continue or build on whatever poultry farming that was already taking place. The

Thakurs were a bit more ambivalent. In the initial days, households with temples on their properties refused poultry sheds. Prior to the commencement of the project, Manohri Devi of Bangaon in whose house a temple was located expressed disdain about the recent increase in the number of households raising chickens. A part of this antipathy was related to religious associations made with certain animals as well as of eating meat with caste. Chickens, unlike goats, according to Manohri Devi, were unclean because they eat whatever they find on the ground, insects included. Goats on the other hand were vegetarian, consuming only plant matter. Manohri Devi also expressed contempt for neighbours who were eating meat and becoming "harijans"[261]. When I returned to the project site in March 2017, I found that Manohri Devi had overcome her concerns and built a poultry shed in her courtyard.

Unlike with other activities, field staff were very encouraged by responses to the poultry work despite the fact that the actual building of poultry sheds and physical transportation of chicks from Haldwani were troubling and caused them some physical hardship[262]. But, staff did not have to expend much energy to convince residents to engage in the activity, meeting their targets with relative ease. Even the allegedly errant BPL households began attending project meetings after they received sheds. But as with the polytunnels, staff were attuned to the apparent interest that many beneficiaries had in

[261] A term to refer to members of the Scheduled Castes. It is considered derogatory in many parts of India, though it is used commonly in the Parvati valley across all castes.
[262] Govind actually travelled eight hours down mountain roads to Haldwani where the chicks were loaded onto a truck, and then turned around and travelled in the truck all the way up that same night.

using the sheds as kitchens over time. Priya laughed and pointed out, "they're even thinking about where to build the shed so that it can be used as a kitchen".

The chicken shed posed innumerable and enviable opportunities. As part of the package, households were provided with 25 chickens to raise and sell. In addition, they were provided with feed and much of the material for the shed. As with vegetables, many were uncertain about the marketing avenues open to them. While Chohar residents were believed to be better acquainted with the business side of things, other residents pleaded ignorance. Poor accessibility to roads and the absence of a supply chain posed understandable concerns. While the price for an average-sized, fully grown chicken in the area hovered around Rs. 1000, buyers were few and far between. Many joked that residents would most likely consume the chickens themselves - which turned out to be the case.

The fractured acceptance of poultry farming indicates chinks in the practice of Hinduism and caste identity by contrasting gain with religious injunctions. Development projects reveal caste solidarities and fractures while also, as in the case of horticulture in Bangaon, solidifying them.

This activity also had a salutary effect on people's perceptions of the project. The poultry farming initiative followed and also coincided with the vegetable farming work Together they initiated shifts in people's perceptions of the project as well as acceptance (and practice) of SRI as this exchange between Priya and Radha indicated:

Priya: We have started new works, which is why people are showing more interest (in SRI). For example if in Chohar we say do this, grow napier. They think, "yes,

they've given us a poultry coop, we need to accept to what they say. Next time we will get something." That's how their thinking has changed!" (laughs)

Radha: They want ginger (to sow), someone wants a polytunnel. Someone wants a goat. So they agree to do everything.

Priya: That's how we can apply pressure. You have to do this, and that as well.

Radha: People are greedy. There is a change now. It doesn't feel as difficult to do work now. We feel like yes, it will happen.

Priya: People also feel like our work is clear and transparent. Each rupee is accounted for at the meeting. So people feel like this is not like the previous NGOs. Because we are from the village ourselves. They see us all the time. They themselves ask us, "you don't even take a day off. What kind of job is this?". We say this is our own village, we don't have any problem in doing it. We get to see what is happening here and there. They themselves think, "yes, these people don't stop for even a day". Until today there hasn't been a single NGO that goes to the village so often and tells them do this do that. This is also new for people. They wonder why are they working like this.

Radha and Priya took advantage of and spoke from the interstitial spaces between the project and Gramya, and Bahuguna's confusing presence in both. These spaces also gave rise to a continuous reformulation of the idea of the state versus the idea of NGOs. Whether the wave of enthusiasm and "cooperation" will last, and what direction it takes remains to be seen. Will it go the Uttarkashi way? Or will it go the way that a previous project - Ajeevika, which most residents believed to be NGO-run rather than an offshoot of the state - which also distributed polytunnels and vermipits did? Written off as a pointless, money-grabbing exercise? More interesting is what the co-presence of similarly situated NGO and state projects tell us about how we might understand the space of development work as it is inhabited in Uttarakhand today.

Blurred Lines: Deciphering the State

Space, according to Massey, is characterized by "inherently dynamic simultaneity", and is consequently "an ever-shifting social geometry of power and signification" (Massey 1994, 3). We have already seen in Chapter Three how state space was shaped by the particularities of the terrain that it encapsulated. The mountain landscape made transportation difficult, a problem attenuated by the lack of grain to be transported from the Lesser Himalayas due to the low levels of productivity that characterised the area vis-à-vis the terai. Geography and topography limited Uttarakhand's potential development trajectories, largely delimited by the state.

Gupta points our attention to what states mean for the poor, and how they themselves are interpellated by the state (Gupta 2012), a reading that may be applied to developmental organisations as well. Social structure is often politically illegible to state-makers (Scott 2009), though techniques of legibilisation may render subjects misrecognised. The ULP was no different, the technique of legibilisation - Participatory Rural Appraisal (PRA) - according particular identities to residents in the project area.

PRA exercises conducted both by the ULP and the Gramya project to identify beneficiaries and development activities extracted "legibility" (Scott 1998) from the complexity of the social and economic lives of residents. The UDP collected detailed information about the different assets and activities that could be attributed to each household, making it theoretically possible for it to identify lack and look to fill those gaps.

The dimensions of what constituted lack were partially pre-determined and written into the survey form. While PRA was the preferred tool for analysis by both the ULP and Gramya (though Gramya spent much less time on the process), many outcomes and choices were predetermined and circumscribed; what was left to determine was who was eligible for what. The identification of a livelihood and a potential livelihood was limited to naming and listing it. Surveyors would ask residents if they farmed/raised cattle/grew vegetables at the time of the survey. To identify project activities they wished to be enrolled in, they similarly stated options: SWI, vegetable farming. Other considerations, some objective such as soil type and fertility, and some subjective such as informed willingness to grow wheat the SWI way, did not make their way to beneficiary selection decisions. This lack of coherence in planning led in some alleged cases to selected beneficiaries accepting products (such as polytunnels) to rent out to non-beneficiaries on a commission basis[263]. However, other elements were captured in village-level meetings, and suggestions about different livelihood activities that could be pursued were solicited by the ULP to ensure that residents had a role to play in shaping the project's contours.

For the most part, rural development came to mean sustainable agriculture and forestry, and as is required by any donor-funded project, of the kind that may be easily quantified. Numbers allow the rural experience to be translated into terms understandable to planners. Rashmi Pant's analysis of colonial practices of categorization in the North-West Provinces and Oudh provides us a lens to see (colonial) bureaucratic

---

[263] I was told about this phenomenon in the case of poultry farming. A field staff member I spoke with confirmed that swapping does take place.

practice "as a contingent and historically shaped locus of agency in its own right, (that) helped to create a special and powerful relationship between essentialization, discipline, surveillance, objectification, and group-consciousness" (Pant 1987 cited in Appadurai 1993, 328). By simplifying the reality of and making rural livelihoods and imaginaries legible, quantifiable and easily monitored (Mosse 1995), the PRA precluded alternative and radical understandings and practices, such as challenging caste structures that affect outcomes but are less easily measured and dealt with[264].

For their part, the UDP cannot be faulted for being circumspect about the scope of the project. The precarity of the project itself was evidenced when the donor for this area cut its funds by half, leaving the UDP in a lurch. When the budget was cut, management had to identify beneficiaries to be cut from certain activity lists. Doing this meant taking another look at assets and determining what assets *now* precluded inclusion in the beneficiary list. Fortunately, the lack of clarity residents possessed about their inclusion in different lists when the initial survey was being conducted eased the transition into a pared down list of inclusion. The seeming legibility of the beneficiaries and the plans designed for them were further confounded in practice. As we have seen in previous chapters - especially in the case of SWI - frontline workers reworked guidelines into particular forms of practice[265], rendering new interpretations of old data and knowledge.

If the selection of individuals to give them access to certain benefits may seem to fit into an individualistic framework of development, the inclusion of the fairly common

---

[264] Caste was enumerated in the PRA process but was not the lens through which the activities were conceptualised. Economic poverty was a much stronger identifier of need.
[265] For more on this see Long (1999).

Self Help Groups (SHGs) as well as the less common Gram Swaraj Samiti (GSS)[266] bears

consideration. The GSS comprised volunteers from the project villages, and was instituted

to ensure that beneficiaries could oversee project activities, ensuring their

implementation and looking to the future. Their purpose was to check the functioning of

project workers (and the UDP and Sneha more generally), institute longevity into

development planning in the area, and to remain even after the withdrawal of the ULP.

The GSS was not just a means: it was an end too. The GSS was meant to promote a

collective sense of purpose, encouraging residents to work together rather than

separately.

Nikolas Rose comments on the idea of government through community: "(I)n the

institution of community a sector is brought into existence whose vectors and forces can

be mobilized, enrolled, deployed in novel programmes and techniques which encourage

and harness active practices of self-engagement and identity-construction, of personal

ethics and collective allegiances" (Rose 1999, 176 cited in Li 2011). Tania Murray Li

extends this discussion of government through community with a discussion of

neoliberalism: "neoliberalism does not mean less intervention: it means intervention

thought about and constructed along different, more subtle lines" (Li 2011, 76). NGO-run

development projects are often linked to a receding state and the need to fill the gaps it

leaves behind. But it matters not so much what the state (or NGO) is (government) as

much as what it does (governance) (Jessop 1999 cited in Sharma and Gupta 2006). The

imperative of research of states (or NGOs) must be of their micro-politics and cultural

---

[266] Village Self-Rule Committee.

constructions (Sharma and Gupta 2006) (while firmly upholding an analysis of what they offer in terms of development activities).

Governance through community was preferred to different degrees by the two projects (ULP and Gramya), rendering community practice intelligible and community management technical. The ULP laid out frameworks for functioning in terms of meetings and reporting formats, which helped keep track of what was happening while also ensuring that the governance groups were structured to meet specific ends. Community practice and management took the form of "participatory" structures that placed the onus of public service provisioning on citizens (Sharma and Gupta 2006). Experiences of microcredit groups and self-help groups more generally have turned women into responsible citizen-subjects, potentially de-radicalising them (Sharma 2006; Cruikshank 1999). Fernandez (2016) points out that popular state development mechanisms of 'swarozgari' (self-rule) and SHGs seem to create an "empowered subjectivity" (72), though they also tie into the neoliberal state's agenda of displaced responsibility, fostering in subject-citizens a need to bear the responsibility of development. To return to the village-level groups that were formed, the Gram Swaraj concept introduced into the area by the ULP was a departure from the usual SHG/'samuh' formulation of development: it introduced governance into the sphere of development practice by the NGO. It did, however, in some ways replicate pre-existing village level governance structures of panchayati raj. The multiplicity of groups and meetings they were required to attend quickly posed a source of concern, especially for women who complained that there were too many meetings to participate in given how much work

they had to do in the domestic sphere. The simultaneous introduction of individualized benefits and a collective-based governance system engendered both individual and collective rationalities that bounced off pre-existing rationalities. A fractured beneficiary group of APL and BPL households alongside pre-existing notions of sanctioned corruption in development projects led to office-bearers in some of the committees asking for a "cut" of the funds to sign cheques. There is a tension here, however, between the imperatives of a constrictive governmentality and a more radical impetus towards self-determination. Which characterizes the functioning of the ULP and the Gramya? While Gramya did incorporate village-level groups (that ULP staff reported having formed themselves), monitoring was under the purview of state-appointed functionaries.

As staff workers found themselves filling in the spaces left by Gramya, the lines between the ULP, the Gramya project and other state activities became very blurred. The UDP did not envision itself replacing the state, but rather complementing it[267]. Many components of the village plans included activities/projects that were to be completed through state channels: whether by including them in the MGNREGS plan for the village or by lobbying the state. Such an approach resonates with attempts by NGOs in other parts of the country and the world to hold the state accountable for the social contract it has with residents (Bebbington 1997).

The blurring of lines between Gramya and the ULP mentioned above suggests a "de´placement (in perceptions of) state functions" (Trouillot 2003, 132) vis-à-vis NGO

---

[267] Senior members of the UDP believed that without the long arm of the state, practices such as SWI would never be scaled up. The state machinery - Gramya in particular - on the other hand believed that it was not capable of reaching as many people as NGOs, and looked to partner with non-governmental entities.

functions. As NGO's also see like the state (Scott 1998) they themselves are seen like the state and produce "state effects" (Trouillot 2003, 130). Michel-Rolph Trouillot (2003) suggests that we conceptualise "state effects" in terms of the subjectivities they engender. The experience of state/development power in this place is subject to periodisation, and the "situated knowledges" of differently placed people (Haraway 1988). Residents themselves interpellate the state - and NGOs - in different ways, drawing in part from their own histories and experiences with similar structures (Sharma and Gupta 2006).

Initially, residents made general claims about NGO functioning that are echoed in many contexts: lack of transparency (Bebbington 1997), unfair access to and control over public funds, poor knowledge of needs on the ground, absence of staff in the field. Previous agricultural interventions by quasi-government projects like Ajeevika in the area had been sporadic and dispersed - at least, in people's memories of them. To speak of "previous organisations" was to invoke two primary themes: *samuhs*[268] and corruption. "Corrupt" was certainly a common term deployed. Interestingly, the ULP team - and I, by extension - were often referred to as "samuh-walas" and later, less commonly, "kheti walas" since we were often seen in SWI fields. Residents understandings of NGOs were of organisations that made samuhs and "ate" their money. Gramya occupied a nebulous space between samuh-walas and sarkar.

This was the initial framework within which the ULP was located. Knowledge and memory about past interventions was scattered and fleeting, but created a general disposition to newer ones. New development projects like the ULP have to contend with

---

[268] Women's self-help groups.

opposition to their own work as seen through the lens of opposition to previous attempts. It was only later that perceptions of the ULP began to change.

By June 2015, the ULP had begun work on other project activities with more visible benefits than SWI. Rather than the less tangible "knowledge" product that SWI offered, the ULP had begun or completed activities including the sale of subsidised plum and walnut trees, ginger roots for sowing, and the distribution of materials for and construction of polytunnels and vermicompost pits. While the vermicompost pits did not match the polytunnels in popularity, both were sought after products. The (slow) rollout of these activities marked a shift in people's perceptions of the ULP and the NGOs involved. The shift was heightened by the concurrent fall in steam of the government's parallel Gramya project that was in many ways astonishingly similar to the ULP with the added advantage of having a budget that was significantly larger[269].

My changing relationship with Parvati Devi illustrates this shift. Parvati Devi agreed to have wheat sown the SWI way in her field, believing that the field staff would shoulder most of the responsibility of caring for the crop. When she came to realise that the responsibility for the field still lay with her, she grew very unhappy. The fallout for my research was that despite my best efforts to separate myself from the project, she (and many others) believed that I was a part of the team. My constant presence around team members during the wheat sowing process as well as most people's incredulity at my claim to being a student and choosing to live in the mountains far away from home meant

---

[269] Gramya also promoted horticulture, offering polyhouses and seeds. It recommended line sowing. It also engaged in watershed development work.

that she, like many others, did not believe that I had nothing to do with the implementation of the project. For the first few months of the wheat crop season, Parvati Devi looked at me unsmilingly or even angrily whenever I ventured to ask her about the crop, and for an interview. A few months after the crop had been sown, I passed by her house, somewhat warily, prepared to offer a tentative smile. To my great surprise, I found her smiling widely at me. We began chatting, and a little later I glimpsed the tell-tale plastic sheets that comprised a polytunnel. Despite her continued unhappiness with the method, Parvati Devi was cordial with me, and later even helped me thresh some of the wheat I collected as a sample for a crop cutting exercise.

The ULP now had something to offer, and it was offering something people wanted. Not everyone thought of the polytunnels or vermipits in terms of how they are necessarily meant to be used. Staff themselves drily remarked that in time both would be cannibalized for their plastic sheets and the iron bands[270]. But for many, the polytunnel offered the ability to grow vegetables for self-consumption, with some degree of protection from monkeys. In contrast, the Gramya project still did not have much to show for its presence, barring the distribution of ginger root for cultivation.

It also became increasingly clear to residents that they could benefit in as yet unspecified or rather insufficiently understood ways from the project. Prior to the distribution of goods, a few resident farmers such as Puran Singh, Manohar Joshi and Lata Devi had begun to involve themselves closely with the project, some in the hope that they would be in line to receive benefits. When Puran realized he was not on the list of

---

[270] Iron bands were used in the construction of the polytunnel.

beneficiaries for the polytunnel, he came up to the office and expressed deep disappointment that he had "supported" the organization and they had turned their back on him. Others like Harish Singh and Shekhar Singh came to be involved with the project when they were selected as members of the village committee appointed to oversee village development activities instituted by the project. Some of these members took up SCI in the second season with rice, even though in Bangaon only one plot had yielded demonstrably favourable results. What is most telling of people's reasons for involvement is the limited overlap between SWI and SRI farmers. The crop had had limited and spatially concentrated success rates. Because of mitigating factors like poor weather patterns, crop damage had afflicted most harvests, leaving little basis for crops to be compared. Inadequate distinction between the traditional method and SWI as it was practiced meant that the yields could not have been as high as those claimed in the beginning. And yet, as we saw in the previous chapter, the number of households practicing SRI/SWI after the first season was far more than would be expected given the yields of the previous crop[271].

The increase in interest in the ULP must be seen in tandem with the seeming fall in interest in Gramya. One of the first Gramya meetings at Bhadkot followed an important ULP meeting where the village plan was presented. At the ULP meeting, field staff workers spent close to two hours moving up and down the village, trying to convince residents to attend the meeting. The meeting began late (not unusual with village meetings), and tempers ran short. Even after the meeting had begun, many stepped

---

[271] See the previous chapter for a more detailed description of reasons for this.

outside the *panchayat ghar* (council hall) in which it was being conducted for a smoke or to chat. The response to the Gramya meeting on the other hand was astonishing, and not just in comparison. Village meetings usually take some time to convene, and some degree of coaxing is involved. When the first Gramya meeting was held, the village pradhan was responsible for organising it, as a Gramya representative had not been appointed at the time. Despite this, at the appointed time a very large proportion of the village had drifted onto the council hall terrace and seated themselves by the table and chairs lining one side. Participants listened attentively to the speakers, with most staying on until the end. Gramya's budget for the village was exponentially larger than the URLPs.

As the year progressed, it became increasingly clear that the Gramya project was not going to evidence any material results for a while. Meanwhile the ULP had started distributing vermipits and polytunnels, shifting public perception in its favour. While the team had created a list of beneficiaries to be provided the vermipit based on their evaluations of need and interest demonstrated during the survey, the process of installing these structures took some time, creating a mounting interest in the project. Residents who had not received vermipits or polytunnels but wanted them would accost staff workers, asking if they could get one, or why they hadn't been added to the list.

Later on, when the Gramya project also began distributing goods or began to publicly announce lists of future beneficiaries of their different activities, residents who were unclear about the distinction between the two projects would come up to staff workers and ask for their names to be included in lists. As late as June 2016, a woman who overheard talk of beneficiary lists for different activities at a Gramya meeting where not a

single ULP staff member was present, walked up to Rawat, the deputy director of the partner NGO, as he sat in his car and prepared to drive away, whispering into his ears that she too wanted a cowshed. Other farmers were allegedly - according to field staff - unhappy with Gramya, as officials had allegedly visited the field site to take pictures of the polytunnels to include in their own activity reports[272].

The ULP replaced the state in practice, even if its mandate was clearly not that[273]. Part of this may be attributed to the constant presence of field staff in the area, who were always accessible, their accessibility challenging and replacing notions of NGO and state functioning. Past encounters with the state had engendered a particular cultural inscription of people's ideas of the state (Alonso 1994), and particular rationalities and subjectivities vis-à-vis the state. People began by operating with certain assumptions about the role, knowledgeability and reach of the different actors (state and NGO) vis-à-vis each other. NGOs had little money compared to the state, and therefore much less value. But when the Gramya and ULP activities began to approximate each other, the lines became blurrier. Residents' perceptions of one actor impinged on their perceptions of the other. Perceptions moved in tandem, and it turned out, inversely. Authority - of the ULP and Gramya/the state was produced dynamically and relationally, amplified by the simultaneity of the actions and presence of both actors, driven by structures of feeling and not just materialities (Hosein 2009).

---

[272] I was not present when this took place, but staff were certain that officials had visited their villages for this purpose.
[273] People's expectations of the state varied, and there was a clear distinction between the types and scope of activities residents expect the state to perform. The ULP provided smaller benefits than the state, which alone could be responsible for building roads and other large infrastructural goods.

The current formulation of development in the Parvati challenged the hegemonic construction of the state as a source of development despite the considerably larger budgets apportioned for development by the state. To recap and reiterate the discussion above, two things contributed to this: the visibility of development representatives, and the visibility (of the commonality) of outputs. While the state was seen as more useful than a development organisation initially - even if both were discursively accorded the same level of corruption - the change in perception points towards a fluidity in perception. The state was constantly (re)constructed and underwent a process of (re)signification based on its everyday practices (Gupta 2012) - or the seeming lack of them. It was also constituted by relational sets of practices (Mathur 2016) and took different forms at different levels. The Gramya wing acquired legibility at the block level office where employees provided coherent narratives of its role and function to beneficiaries who stopped by for the odd bag of seed; at the village level without sufficient representation, and largely invisible, it was subsumed by other institutions and remained unremarkable and de rigeur. The 30 percent cut of development funds diverted to the pradhan of a village was not out of the ordinary[274]. On the other hand, the ULP provided accounts of expenditure from received funds at the village level at meetings down to every last rupee: while only a select few attended these meetings, they were aware of the difference.

---

[274] The state has such a long history of corruption with its subjects that corruption has been normalised (Gupta 2012).

Conclusion

In this chapter I have discussed the framing and practices of horticultural production as a project activity in the field area. I have examined how horticulture is posited as a transformative form of agriculture, while undergirded by the contradictory and opposing ideologies of the different actors involved. I have also contrasted the differential responses of beneficiaries to different project activities: SCI, horticulture production and poultry farming, and the different needs and preferences of residents/beneficiary-subjects covered under the scope of a development project. I have also made a very small and modest attempt at situating these activities in the current livelihood trajectory of the area, considering the implications for how society is arranged. Modern agriculture has the potential to reconstitute social relations. What remains to be seen is whether it will challenge or reinforce them. Commercial farming is likely to create further rifts between already differentiated farmers (Appadurai 1990), as some benefit from the gains of horticulture and others get left "behind". The unequal rise in wealth has already paved the way for inter-family *jalan* or jealousy, a point that Rekha courageously raised at a meeting called to form a Farmer Interest Group in Bangaon. Envy is important to consider, because it challenges the bases of the community-minded inclinations that are required to underpin farmers groups.

Finally, my comparison of the evolving citizen/beneficiary-subject and NGO/state relationship points towards the co-production of both, even if through unequal relations of power. Though the citizenry and the state are asymmetrical figures (Gupta 2012), both produce the other to differing degrees. The state creates the rural citizenry by prescribing

what they need to function as a *rural* citizenry, while the citizenry itself makes demands of the state.

A theology of development (Borstein 2003) is implicated in the using of state funds to build a temple as a development project, as well as a visiting agriculture department representative's expostulation of the twin benefits of cow urine for crop and human health[275]. The state and residents co-produced this narrative of development, subjectivities of residents and representatives of the state inextricably enmeshed in personal faith. In addition, though I have focused on representatives of the ULP in this chapter, equally significant is the signification of the state as seen through its hiring practices: Gramya hires village level representatives (also paid low wages but with significantly less work burdens than ULP staff) who are often envied for capturing employment opportunities and/or the odd polyhouse.

The larger question this chapter has indirectly raised is the age-old question of what is "development" and how do we interrogate its effects? How do we value ideology and value frameworks alongside the exigencies of practice? Is an analysis a of rural livelihood project just about the politics of good management or a managerialist culture? What are the wider, more desirable politics? And even if the project is limited in its scope, is this sufficient reason to decry it if residents can now access more vegetables and meat-based protein?

---

[275] The official made reference to the drinking of cow urine, and the allegedly world-wide scientific appreciation of its benefits.

Finally, what the chapter has also indicated is the significant role that frontline workers or local staff played in the implementation of the project, and how it came to be understood, interpreted and accepted. This chapter specifically has also pointed attention towards the state's indirect appropriation of the staff workers' time, subjecting them to a kind of double exploitation. In the next chapter I will draw from the different experiences of the project to focus on what they have meant for frontline workers.

Chapter Seven
Practices of the Body

Introduction

When I formulated my research proposal I had included the practice of SRI in my analytical frame, but had limited the role of development workers to verbal engagements with farmers. The physicality of farming, and what it takes to show people how to grow a crop a particular way, had not been a part of my initial imagination. It was first in the training session conducted for staff workers who were to double as trainers that I first witnessed the until then gendered division of *agricultural* labour as practiced in a *development* space[276].

The full force of this became astoundingly clear when I found myself feebly toiling alongside Rekha, Priya and Radha in the hamlet of Sikri, having just trekked up a steep four kilometre "path" on an uninspiring breakfast of white bread and jam. The girls were far unluckier, since they had also completed a range of activities from collecting fodder to feeding cattle before they came to "work". The shade of the many trees surrounding the field provided a brief respite from the merciless sun before we got to work breaking up clods of earth and later holding ropes and digging furrows. The two sisters-in-law whose

---

[276] I have already spoken about this in detail in Chapter Four.

fields we were sowing alternated between helping us and laughing at us from a distance, amused at our performance.

We sowed wheat in two fields that day, and 147 fields were (theoretically) left to be sown. Dismayed, I quickly began to regret my commitment to ethnography and imagined writing STATA code back in the cool confines of the graduate students' bay at Syracuse University. It was only later, after participating in the sowing of many other fields, slowly coming to grips with the intensity of the sun's glare in the middle Himalayas, did I begin to see how frontline workers work, and the gendered dimensions of the very embodied experience of doing development work. The two weeks we spent sowing wheat, (watching the women) struggling to convince farmers to sow it the SWI way, trekking up and down the mountainsides as different farmers from different villages offered us different time slots to sow wheat on the same day, skipping meals, nursing aching backs, being told off for bringing useless techniques to the area, negotiating the different demands of farmers and of the tools we held in our hands, and always creatively trying to make our work easier slowly made clear what seemed to me an epiphany at the time but is really common sense: a project is as good as its frontline workers. A project *hinges* on its frontline workers. We should be paying more attention to frontline workers.

This realisation had the dual effect of attuning me to the different kinds of labour practices the women perform as part of their job, and also forcing me to acknowledge how my own positionality mediated my interpretation and analysis of the method and people's – including frontline workers – experience of the method. A question that

bothered me about my own initial impressions of the method was the influence of my own subjectivity and identity as an upper caste, middle-class urban resident enrolled in a doctoral programme with no prior experience of farming and a marked inability to engage in heavy manual work under the sun. After grappling with the validity of my initial analysis, I finally realised that mediation does not doom experience to "epistemic vacuity" (Alcoff 2010, 152). More importantly, farmers and staff workers also voiced the same impressions that I had: of it all being very hard.

Women have increasingly been hired to fill staff positions alongside men, as ideals of women's participation – both in the organisation as well as in the project activities – have taken root in development discourse (O'Reilly 2004; Goetz 2001). But the gendered roles and experiences of workers remain under-examined. While organisations and projects themselves have been the subjects of a number of excellent research studies (see Escobar 1995; Ferguson 1990; Carney and Watts 1991), staff workers themselves have often not featured prominently in these accounts (for exceptions see Mosse 2001; Nagar 2000). Anne-Meike Fechter and Heather Hindman (2011) argue that we are often do not study development workers because they appear all too familiar. In doing so, they argue, we de-historicise them and obscure the particularities of their experiences. This is especially unfortunate since critiques of development projects have tended to vilify staff workers by extension.

Even less examined are their family lives and their externalities, life patterns and their habits, all of which are relevant to how development and aid workers choose to

participate in a project, carry out their work (Fechter and Hindman 2011) and how they navigate these new terrains. Chandra Mohanty (1997) points out that the place of the Third World woman worker is grounded in ideologies of gender, caste and class that permeate across occupational boundaries. Following that, the "analysis of the location of Third World women in the new international division of labor must draw upon the histories of colonialism and race, class and capitalism, gender and patriarchy, and sexual and familial figurations... This is in opposition to ahistorical notions of the common experience, exploitation, or strength of Third-World women or between third- and first-world women, which serve to naturalize normative Western feminist categories of self and others" (Mohanty 1997, 28).

Using this framework, in this chapter I focus on the specificities of women frontline workers' embodied experiences, making space for how their embodied lives mediate development project practices and outcomes (Fechter and Hindman 2011). How do women come to occupy certain roles in a project or organisation? What challenges do they face owing to their embodied identities and specific life-contexts? What does women's participation as staff members in a development organisation make possible for them? How does participation reinforce or reshape the structuring conditions in which they find themselves? Prentice urges us to focus not just on "what work *means* to people, but also what it *does* to them" (Prentice 2008). In the sections that follow, I examine how the identities and specific habitus that women in the *pahad* are endowed with circumscribe the/ir practice of development.

Body Practices

Meenakshi Thapan (2009) points out that the sociology of the body is a field of research with a rich history, including the works of Pierre Bourdieu (1977; 1984), Chris Shilling (1993), Bryan Turner (1984), etc. The study of embodiment has been somewhat less popular in comparison. Instead, the study of the body has somewhat eclipsed the study of embodiment itself (Fielding 2000 cited in Thapan 2009), a phenomenon Thapan attributes to a feminist fear of essentialising women's experiences, and relegating them to purely biological bases as opposed to treating embodiment as a conceptual category (Thapan 2009). Phenomenologists like Shildrick and Price (1998), De Certeau (1984) and Elizabeth Grosz (1994) have focussed on embodiment in terms of the body's being-in-the-world, operationalised differently in various temporal and spatial contexts. Grosz for example draws our attention to the mutuality between experience and the embodied self, by stating that lived experience is also embodied, "corporeally constituted, located in and as the subject's incarnation" (Grosz 1994, 95). The subject's embodied experience is also structured by social relations and institutions (Bryant and Garnham 2014), "moulded by a great many distinct regimes" (Foucault 1977, 153), and is "imprinted by history… (examples of which include) sentiments or feelings, ways of seeing… love and instinct" (Foucault 1977, 148). Merleau-Ponty complicates this notion of the body-subject with his notion of embodied action. Embodied action further defines the social world and produces meaning in it. The production of meaning is the prerogative of the engaged body-subject and its habit(uated) actions (Merleau-Ponty cited in Crossley 1996). In other

271

words, "active bodies are acted upon" (Crossley 1996, 105). In a related vein, bodies act upon spaces, and in doing so constitute and animate them (de Certeau 1984).

Bourdieu's work on habitus offers a useful framework with which to analyse how bodies animate different spaces in dis/similar ways. Bourdieu defines habitus as a "generative principle of regulated improvisations" (Bourdieu 1977, 78), and an "embodied history, internalised as a second nature" (Bourdieu 1990, 56). Habitus is "structured structures, generative principles of distinct and distinctive practices" and also "structuring structures, different classifying schemes classification principles, different principles of vision and division, different tastes" (reference), internalised through a process of socialisation to define the "rules of the game" (Bourdieu 1990, 66-68). It is not fixed, but is an "*open system of dispositions*", shaped by experiences (Bourdieu and Wacquant 1992) "which, deposited in each organism in the form of schemes of perception, thought and vision, tend to guarantee the "correctness" of practices and their constancy over time, more reliably than all formal rules and explicit norms" (Bourdieu 1990, 54).

Habitus functions alongside practice, and Bourdieu's theory of habitus lays the framework for a fully articulated theory of practice (Crossley 2001). Practice is a function of habitus and what he terms "capital" (resources such as economic and social capital) and "field" (structured social conditions such as family, politics, media, etc.). Habitus and field are co-produced, shaping each other. But what does habitus, or even the embodied nature of our, to borrow from Merleau-Ponty, being-in-the-world mean for our understanding of identity? Speaking of the embodied self, Thapan suggests that it is constituted by the "lived and communicative body", "lived experience" (Thapan 2009, 3) and also

272

continuously reshaped expressions of "inner feelings, selfhood and identity" (Thapan 2009, 4). We live our identities, and our identities are also simultaneously inscribed on our bodies. Identities are also characterised by multiplicity[277].

Rose points out that the gendered identity is not "merely culturally relative or acquired through gender socialization, but (is a) regime of the body which seek(s) to subjectify in terms of a certain truth of gender, inscribing a particular relation to oneself in a corporeal regime: prescribed, rationalized, and taught in manuals of advice, etiquette and manners and enjoined by sanctions as well as seductions" (Rose 2011, 137). Caste and other identity markers such as race also often segment work (practices), hierarchising their practice and access. Certain kinds of work carry with them embedded assumptions that make themselves evident freely. Care work for example, is often performed by women across many contexts, whether professional or personal. A few decades of feminist research have made this observation decidedly uncontroversial. "Sex-role spillover" (Gutek 1985, 40) or the seepage of private roles into public roles is also a well-established phenomenon. With this in mind, I turn to the embodied NGO worker to examine how both she and he are constituted simultaneously as a village woman/outsider man and a fieldworker, both shaped by and shaping her and his context or field. I focus on the manner in which hierarchies of gender and rank function in development practice. Though much of my analysis is predicated on the experiences and contexts of

---

[277] For more on subjectification and identity see Chapter One.

the women, it must be read against the specific experiences and positioning of the men as well.

The Embodied NGO Worker

We have to look at how the *pahadi*-woman is constituted to understand how the NGO-woman is constituted. Staff workers do not magically transform into staff workers the moment they walk through an office door; their identities are pre-existing, mediated and certainly, embodied. People act as "bodily-engaged beings within occupational milieu's" (Kupers 2015, 163), whose practices are "gendered and racialised" (Chatterjee 2001, 4). In this section I will focus on the gendered practices of physical and emotional labour that the staff workers perform in the ULP, locating them within the specific context of the Himalayan/Kumaoni subsistence-oriented agro-pastoral system they come from. I dwell on the specific structuring context of the rural space in which the fieldworkers find themselves. I will focus on the materialities of their existence in a difficult geophysical context, as well as their linked identities as pahadi women or girls. Finally, I will link these to highlight the implications of these attendant concepts for their corporeal being as staff members.

The Lives of Pahadi Women

> Natasha: Why is farming important here?
> Reena Devi: To eat. We have to pay for food in the shop.
> Natasha: If someone has a lot of money is there a need for him to farm or can she buy food from the shop?
> Reena Devi: Save the money. If you have fields then do farming... It is necessary to do farming. We cannot leave the fields barren. Because it does not look good. Keep the money in the bank. What else will you do? Everyone is farming. That's why we have to farm.
>
> (Interview by author. Transcript. Bangaon, August 25, 2015)

Even though Uttarakhand's agricultural productivity is unenviably low, and its contribution to income and livelihoods is rapidly decreasing, agriculture is culturally valued amongst (mostly middle-aged and older) residents of the region, and is also discursively valued by development projects and the state. But there are distinctions between the valuations of the practice of agriculture, the produce of agriculture, and the participants in agriculture. In previous chapters I have made mention of the increasing abandonment of agricultural plots. At the same time, there is a minimum farming threshold beyond which most families will not fall. This threshold is determined in part by levels of economic status.

The better off might choose to sow just a couple of plots in areas of high visibility, where leaving a plot barren would invite censure. The poor on the other hand often sow multiple plots, while still leaving some plots barren. The produce of agriculture is accordingly of varying levels of importance to family diets. The practice of it, or the fact of it being practiced, even if in minimal terms, by a family is almost a non-negotiable. This forces many women to stay behind in their villages rather than accompany their

husbands with jobs elsewhere because someone in the household has to be available to farm ancestral lands. On the few occasions when mothers-in-law are young or able enough to take care of the farming, daughters-in-law may live elsewhere, returning during peak work periods to take up activities like weeding, harvesting, etc. As migration out of villages and rural areas in general increases, it is women who must shoulder the burden of reduced male participation in agriculture, accompanied by an increase in the overall burden of maintaining a household. As pointed out previously, historically, men did participate in agriculture and allied livelihood activities such as livestock rearing, but in the current context women have become the keepers of agriculture.

There is a vast and increasing body of literature on the feminization of agriculture (Garikipati 2009; Jiggins 1998). While the number of men and women engaged in agriculture is falling, the decrease is disproportionately higher for men rather than women. In some contexts, there has been an increase in the number of women engaged in agricultural labour. This is true of Uttarakhand as well. In much of the global South, women perform much of the work in farming. Men's agricultural tasks are specific and limited. Most commonly, women and marginalised groups more generally, perform tasks that are the most onerous, such as weeding and transplanting (Mencher 1988) rather than requiring strength. This is truer of subsistence farming than commercialised farming, but the pattern prevails. When men do take over tasks that tend to be thought of as "women's work", they are often commercialised activities that command payment. The mountains of Uttarakhand offer a variation in this trend which challenges what popularly constitutes "women's work" in agriculture.

Materialities and discursive practices bring into being certain kinds of subjects. Denise Riley (1988) and Chandra Mohanty's (1984) call us to recognise the indeterminacy of the term "woman" and to attend to the role of place in shaping the particularities of the identities and subjectivities of historically marginalised women. Women's experience of labour in agriculture and allied activities in Uttarakhand, and in mountain societies more generally, is qualitatively different from the experiences of women in the plains. There is a certain physicality attached to agrarian labour that women living in the plains are not subjected to. The terrain is an obvious intrusion in this sense. The unevenness and steepness of terrain extends the burden of related activities. Women climb steep cliff faces clad in slippers to collect fodder, often in the monsoon when the wet grass makes the "path" treacherously slippery. Stories of women falling to their deaths on these slopes are not uncommon.

Women climb surrounding mountains almost every day, collecting large bundles of leaf litter that surround them like blown up brown parachutes as they make their way down slopes. Even more difficult to navigate are 40-50 kilogram bundles of firewood bundled up and balanced on their backs. A thick rope to which a smoother band of plastic has been attached balances on their foreheads and anchors the bundles to their bodies. Women carrying bundles walk slowly as they trudge back home. Hoisting it onto their backs is also a group effort, punctuated by scrunched up faces and groans of effort. The effort is doubled when women must scale trees, sometimes over 20 feet high, to chop down branches. On "easier" days, women may walk to their farm plots and cut grass and/or weeds to serve as green fodder for livestock. Men do not usually participate in

such activities, though there are some exceptions. The few men who do participate in such work may come from the poorest families, where the overall energy is expended on eking out a living from the natural environment is too much for a single woman to bear.

It is not just that the men do not participate in such activities. They also cannot, having not being habituated to such activities from a young age unlike girls and women. On one occasion I watched a mother and her teenage son carry firewood home after chopping down a few branches from a tree overhanging the main road. The mother lifted and carried her bundle with ease, but the son struggled to straighten himself off the ground, his burden weighing heavily on him. On another occasion I walked past Gita Devi from Bhadkot who was being accompanied by her husband. They had just trekked one kilometre from the grocery shop to the outer boundary of their village. The woman carried a 30 or 40 kilogram bag of flour on her back, but stopped to chat with me. Behind her, her husband laboured under the weight of what appeared to be a five kilogram bag of food.

I include this story not to minimize the difficulty the man faced in transporting rations from the shop to his house. Many residents pointed out that the government had failed in its responsibility to set up Public Distribution Scheme (PDS) shops within their villages. I also do not include this story solely to indicate the inequality in the burdens of men and women. I include this story and the examples before to draw attention to the sheer physicality of women's everyday existence[278] in pahadi society. Women labour, and

---

[278] Following the example of Whatmore's (1991) work *Farming Women*, that is premised on the need to privilege women's experiences as sources of knowledge.

not just in ways that are tedious, like sowing or transplanting rice, as much of the literature on women in agriculture has rightly pointed out. Women labour in ways that are traditionally thought of as being "masculine" when seen through the lens of lowland agriculture. I don't mean to suggest that women's bodies always shoulder the burden of inscriptions of fragility and helplessness. These inscriptions are historical, and a product of a constellation of factors. No one disciplinary regime of gender rules them. Economic and social relations of production, colonial conscription patterns, family structures all impinge on the lived body.

Wage rate differentials in other parts of the country ascribed to the "hard" work performed by men cannot assume a similar logic here. One of the reasons used to justify higher wages for men in agriculture and allied activities is that the activities they engage in are more physically demanding than the activities women engage in. In the absence of timed activity studies measuring energy expenditure, such claims are undoubtedly contestable. It remains, even so, that men usually engage in tasks that require the lifting of heavy objects because of an assumed difference between men and women's bodies. Not so in the *pahad*. When men are seen engaging in such activities, they usually belong to the poorer or poorest families, picking up odd jobs supplement the family income. On one instance, I spotted two men from two of the poorest households in the village each carrying a 20 foot long wooden log uphill a distance of one kilometre for a sum of Rs. 50[279]. Many other men choose to leave, opting to wash dishes in roadside eateries or in

---

[279] 0.75 cents.

factories in other parts of the country. Bodies that work hard tend to be women's bodies. In Uttarakhand women are subjected to hetero-patriarchal norms of gender that while disrupting in some ways the gender norms within which women in the plains are located, remain unequal.

Differences between men and women are often articulated in terms of binary oppositions (Saugeres 2002). Male/female is often laid onto oppositions of mind/body, culture/nature, strong/weak etc. Things associated with the female are devalued. In agriculture for example, women's work is often undervalued because it is seen as mindless body work. Technical knowledge and physical strength - considered the domain of men - is valued instead. Uttarakhand presents a peculiar picture then. Almost all the activities that require physical strength are performed by women, which is why ideas of masculinity in farming so prevalent in the northern plains of India don't find purchase here. Rather than speak of a feminisation of agriculture as understood in the lowlands, we must rethink what constitutes women's work and consequently what women's bodies are expected to do because of the materialities or geophysical characteristics of mountain landscapes, coupled with historical processes of economic and occupational change. These differences in body practices in the mountains do not contest or challenge unequal patriarchal gender relations; only their form is different.

Acknowledging the significant challenges posed by local livelihood patterns for women, both men and women for the most part were very aware and vocal about the *kasht* or difficulties that women face. Both also emphatically acknowledged that women

"do a lot of work". But such statements were usually in response to questions eliciting descriptive answers about people's daily lives. When discussions about alternative life paths or even my career came up, women and men discursively negated the value of women's contribution in farming activities, while also concurrently valuing the produce of farming. Most women when questioned about what kinds of work they did, would respond stating, "*Ghaas katna, lakdi lana. Kya hain usme?*" translated "*Cut grass, bring firewood. What's there in that?*" The preferred pattern on the other hand, according to Rani Devi, is to

> Go outside to do a course. Like people are going to Delhi. Someone goes somewhere, someone goes somewhere else. (What will happen to farming? Who will do farming if they do a course?) The women of the village will do. Their mothers will do. They will not go. Their children will study nearby in schools. At least the land won't remain fallow and house won't be abandoned. No cows and calves are left. The house is becoming empty. Who will do all this. After that they go to the plains. Then they won't want to come up to the mountains. They get used to the comfort. Then they come home and don't do work. Like me[280]. (What will happen if after all this studying they don't want to farm?) Even if the children don't want to work the older women will do it anyway. Though if the daughter-in-law does not come to the village and farm then the mother-in-law won't either. The older people will farm though. They will definitely do farming. No woman living in the village can leave farming. (Interview by author. Transcript. Siyali. 2015.)

When I asked Reena Devi (whose views on the need to farm irrespective of income I presented earlier in the chapter) what she wanted for her children, she responded:

> That they won't have to clear out the dung, cut grass. But if that's their fate what can be done? There is so much difficulty in this kind of work. I have to go climb the cliffs. After getting married a daughter's fate may be bad and she'll have to do this kind of work. If she falls and dies what is the use? If she has a good future she won't have to do this kind of work. She won't have to worry. She'll be happy.

---

[280] Rani Devi is one of the very few women I came across who does not farm. She has endured serious injuries and illness in the past, making the manual work of farming difficult to practice.

Reena Devi wanted a daughter-in-law to take over her farming work, but also wished a life for her daughters very removed from this same context. This stemmed from two imperatives: physical safety and a life less burdened by manual work than hers, as well as a wish for them to "get ahead" and enjoy happier, successful and meaningful lives. Agriculture is a referent of under-development. The discourse of developmentalism has permeated to engender a sense of "temporal and spatial marginalities" which in turn precipitate particular identity and subject formations (Kumar 2016, 106).

With the increased privileging of education and its seemingly inherent ability to allow a person to "get ahead", women's identities as uneducated *pahadi* women are being sharply accentuated in comparison with those men and women who do make it out. A distinction is drawn between the mind-work of the educated and the body-work of the uneducated. The mind-work involved in, for example, weeding a plot of rice in which the weeds are indistinguishable from rice to the untrained eye, was subsumed to and invisibilised by the body-work. Embodied work falls prey to the mind-body dualism, and is pushed to its boundaries.

At the same time, there has been a pushback by women over time, who are choosing to undertake lower work burdens. As joint families become smaller, livestock holdings also reduce in size. Women may choose not to have more than one to three cows/bulls/buffaloes. Increasingly, families who can afford to pay for others to plough their fields have been getting rid of bulls since bulls require more effort in terms of fodder

collection. This is true of buffaloes as well. Cows are the most preferred of livestock since like buffaloes they provide milk, but also require less fodder. When discussing this slow decline of livestock holdings, women would retort: "*kaun karega itna kaam*?" or "*who will do so much work*"? Many women appreciated that workloads had lessened over time, though this did not diminish the reality of the current workloads. While many men and women reminisced nostalgically about past times when food was plentifully available from farm lands and milk, curd and *ghee* and other products available from livestock was free flowing, everyone recoiled from being subjected to similar lifestyles. Concurrently, women were held responsible for this decline. Both men and women ascribed this decline to the refusal of women to do *mahanath* or work hard. Men berated women. Women berated themselves and each other.

Women's refusal to engage in "hard work" as prescribed by their inherited identities is a political act, its politics tempered by an articulation of it themselves as an unwillingness to "work hard" as they should and fit into a "good" identity (Mohanty 2000). The goodness of this identity is not just perpetuated by those farming, but also by development planners, state agencies, academics and the like whose consistent interpellation of (women) farmers as being lazy and unwilling to become Lakshmi Devi[281] reproduces unequal narratives.

---

[281] See Chapter Six.

Incomplete Women

Women's places and roles in the development project is shaped by their identities. Their identities as staff workers can be traced back to their identities as pahadi women. Or rather, pahadi girls. A married person of the female gender is referred to as an "*aurath*" or "woman" in Uttarakhand. An unmarried person of the female gender is referred to as a "*ladki*" or "girl". I myself was frequently chastised for being unmarried, and upon enquiring about my age (I was 29-30 years old at the time), was told that I was a "*buddi*" or "old woman". And yet, while referring to me, however respectfully, I was still referred to as a *ladki*. A ladki has responsibilities, but not quite those of the aurath, who must tend to her husband, her children and her in-laws. An aurath (with children) is a complete person. Much of this narrative will be familiar and perhaps obvious. My intention is not to convince the reader of its originality, but to emphasise the change in identity that marriage confers on a woman and her role in a family, society and development organisations, a theme I take up here.

Urbasitis channels Ebrahim (2003) to reiterate that NGOs have their own habitus, based on "the organizations historical circumstances, its present institutional environment, and the dispositions of its members" (Urbasaitis 2009, 37). An organization's past as well as its current institutional environment will have a structuring effect on its practices. Change on the other hand, Ebrahim suggests, cannot take place without the catalytic effect of the habitus of individuals in the organization (2003). In the following section I describe the effects of NGO structure on work and being, moving onto

how pahadi dispositions merge with the practices of the ULP/UDP/Sneha to produce complex social ways of being.

Let me begin with an analysis of the structuring effects of what Joan Acker terms "inequality regimes" (Acker 1990)[282]. One of the structuring effects of an organization can be traced back to the spatialities of development work. Development work is spatial, because development workers are spatially organised. In her discussion of the spatialities of labour in car factories, Doreen Massey (1984) talks about head offices versus branch offices of organisations being located to reflect the social composition of the places where they are based. The hierarchy amongst development workers also reflects the social and geographical contexts from which they derive, rather than their individual competencies. The space and place from which they hail also purports to signify their competence or at the very least their ability; a village girl usually does not occupy the space reserved for a city girl. At the mid-project level, all of the staff hired belonged to urban and middle or upper-class backgrounds. Only one of the young "professionals" from the immediate team was a woman. At the field staff level, almost all the staff hired were from either the project villages or nearby villages and towns. Positions within the project mapped onto education levels, mapped onto place and also onto pay.

Kanter (1977) attributes unequal practices like gender discrimination within organisations to the inherent structural features of organisations. Gender (and place) does not only organise, but is also organised by embedded and embodied work and labour

---

[282] Inequality regimes are the "interrelated practices, processes, actions, and meanings that result in and maintain class, gender and racial inequalities within particular organizations".

practices (Bryant and Garnham 2014; Acker 1999). The invisibility of gender inequality, write Bryant and Garnham (2014), produces the illusion of gender neutrality. For example, the normalisation of assumptions about men and women's roles and place perpetuates and extends the inequality into the workplace. Here I want to return to the previous point I made about women's identities with respect to their marital status and its implications for their participation in development projects by contrasting their identities with that of the (ideal) male employee.

The ideal male employee can work full-time, home-based care requirements exerting less of a pull on him than on a woman, married or otherwise. Marriage for a woman on the other hand, is a double-edged sword. Acker points out that "to function at the top of male hierarchies requires that women render irrelevant everything that makes them women" (Acker 1990, 154). That is, married, or soon-to-be married, children and domestic responsibilities. To survive or "succeed" as a disembodied, neutral worker, women would have to give these all up, and effectively become "men"-like. Doing this would however also render them illegitimate amongst beneficiaries, who also consider womanhood in the same fashion. Their ability to be good workers is predicated on them being good women. As I found out while doing fieldwork, a body unmarked by gold and *sindoor*[283] is a body that is incomplete. My mobility was frowned upon because it did not take place within defined constraints: I travelled unaccompanied (across a great distance), did not have a husband whose existence would have made my mobility legitimate (such

---

[283] A cosmetic powder of some shade of red or orange, worn along the parting of a woman's hair to indicate that she is married.

as married school teachers posted away from their conjugal homes), and to make matters worse, was not employed. Women are caught in a bind, a small transient age window (right before they attain marriageable age) allowing them to be men-like workers.

Married women may "enjoy" some leeway, given the socially sanctioned expectation that their familial priorities will take precedence, though this does not work for the most impoverished women, who are expected to manage both sets of activities. Unmarried women or young adults have the accumulated disadvantages of not having conjugal families to prioritise as well as lower status, making them most vulnerable to being co-opted into unfavourable labour practices. While unmarried women are not as "unencumbered" (Bryant and Garnham 2014, 414) as male workers, they are often the easiest to make accede to project demands.

Being unmarried, the women staff also did not have a "valid" reason to skip work or command lighter workloads. This is not to suggest that LDTs were unaware of or unsympathetic towards the women staff's familial responsibilities (many time and season-based). The male staff were solicitous about the needs of the women, and during periods of relatively low activity would allow them time off to pursue other activities. These usually included helping their own families with household/farm work or travelling to the nearest town to sort out paperwork associated with the degrees they were pursuing during periods of slack. On other occasions the exigencies of targets and deadlines overshadowed these emotional ways of relating. Much of the work, like growing vegetables and planting trees is seasonal, and must be undertaken in different beneficiary

plots at the same time leading to overburdening at different points in the project cycle. What complicates the situation is that all three women must perform similar tasks in their own homes as well, with their employment cutting into their time.

Familial responsibilities did not take precedence over work responsibilities, even during off-duty hours on occasion, or on days that the women were not supposed to be working given the ostensibly part time nature of their jobs[284]. The need to ask permission to take time off is paradoxical, since in fact they usually worked overtime and for longer periods of time than required by their original understanding with the leaders of Sneha. For their part, a lack of funding for more staff members to shoulder some of the workload forced them to impose these work schedules on the field staff, but not without a great deal of regret.

Though the LDTs were aware that the women had competing household tasks to attend to, the women were answerable to their parents who were more ostensibly more easily persuaded to let them off compared to members of marital homes. While tensions persisted throughout my time there, it never resulted in the women being forced to choose between their jobs and their homes as it did in the case of Shanti Devi, a married woman working as a village representative for Gramya[285]. Practical considerations were part of this decision to stick on: though low salaries were a point of contention, the dire

---

[284] The women were hired to work 20 days a month, though in practice they ended up working most days, including weekends. This was true of the men as well. Since beneficiaries did not subscribe to the concept of working days and holidays (barring religious festivals and special events), work was conducted whenever it was possible, and needed to meet deadlines.

[285] Shanti Devi's husband would not let her travel away from the village on overnight trips for trainings.

financial situation of their families made staying on a necessity, though one articulated more forcefully by the women than their families. Radha for example, was deeply unhappy about the salary she was being paid, but the job brought her more than monetary benefits. Her parents would argue that the job did not offer her sufficient remuneration to offset the loss of time she could devote to household activities because of her work demands. Radha would respond by arguing that the family needed the money. Excessive though the work was, employment also opened up new avenues for Radha, Rekha and Priya, a theme I will explore later in this chapter.

Hierarchical Practices of the Body

Emotional Labour

In his study of apprentices, Herzfeld (2004) draws our attention to the ways in which apprentices learn "social ways of being", their dispositions naturalising social (and in this case, also organisational) hierarchy. Inequality and gender discrimination in the workplace are common frames used to analyse men and women's work. All too often, these frames resonate clearly with the contexts they are applied to. Perhaps what reinforces these structures are conflicted, yes, but nevertheless emotional ways of relating driven in part by their inculcation into socialised hierarchy.

Marital status apart, women's general "female incompleteness" by virtue of being encumbered women without experience and training also reinforced their own pre-existing identities as performers of domestic work in extra-project or project-oriented domestic activities. The cleaning of living spaces (where the male staff slept, or cooked) was taken up usually in the morning before the women arrived at work. Any tasks that remained unfinished by the time they arrived however were mostly then taken up by the women. Sometimes this was without suggestion. Upon noticing a dirty bedsheet or office space one of the women would undertake to clean it. The female staff often engaged in kitchen chores, but even when asked to stop, retorted that the LDTs wouldn't do it anyway. The LDTs did in fact maintain the kitchen during off-duty hours, and for their part did not shy away from domestic work when the women were not around. Mid-day requests for tea required some cajoling, and the women would often negotiate amongst themselves who would actually make it. This was not limited to the office space. On one occasion when I accompanied the team to a village for the screening of a documentary before I moved to the valley, the male staff members limited their activity to speaking with the people gathering at the event while Rekha, Radha and Priya cleaned the courtyard, and later spent the night and much of the morning cooking for the team. For my part, I looked on guiltily - feeling anxious about not helping them, while also plagued by a mistaken sense of vulnerability of not being taken seriously were I to join them.

The 'naturalness" of their roles as caretakers was emphasised by their relationships with Aadarsh and Govind. During the day, during office hours, identities switched or were performed differently, made possible by hierarchies that gender and age

290

cumulatively inscribed on their relationships. The male staff referred to the women by their names, being older than them. The women on the other hand referred to the male staff as "*bhaiyya*" or "*brother*". The titles Sir and Madam were limited to middle and senior management. This is not an uncommon practice, especially when staff workers are of similar ages or are not significantly older (the men were between seven to nine years older than the women). The invocation of the term brother hints at the emotionalities that were operationalised in day to day lives[286].

The relationship was not always that of a junior and senior employee, but slid into a less formal one that hinged on familiarity and emotion. In the absence of visiting staff, the men and women would even playfully (and platonically) tease each other, whether verbally or physically. In turn, being embedded in these fictive kin relationships, the women effectively undertook privatised social reproduction for the organisation, subsidising its functioning. That performing these tasks involved some emotional labour was evidenced by protests on some occasions, and constant negotiation in others about who might perform a task. On one occasion Aadarsh and Ramesh, and Rekha, Radha and Priya, argued for an hour about who might make savoury snacks and tea to better enjoy the monsoon rain that had deluged the area that evening. It is not clear whether a more professional relationship between staff members might have precluded this kind of work. It is also not clear whether this work was born of an affective register that permeates staff relationships or was a burden taken on nonetheless. What is clear is that these tasks

---

[286] Men and women staff also observed the festival of raksha bandhan, where sisters or sister-like girls/women tie rakhis on the wrists of their brothers or brother-like men. The rakhi symbolises love, and also the protection that the brother provides his sister.

constituted unwaged work, in a situation where even waged work did not command its due. Hilary Rose (2004) suggests that while being a labour of love, caring work such as this tends to be emotionally demanding. While such caring work is often thought to be found in the domain of the home or the private sphere, it is clear that the private-work divide is not quite as accentuated.

This serves to make a larger point as well, that when we consider organisational or project practices, we cannot limit ourselves to the specifics of activities that are strictly project based and outlined in project documents. *Extra*-project work also requires some scrutiny, especially since it is this work that is excluded from an analysis of project functioning (or most kinds of visibility), but is crucial to its continuance.

It was not just the women who experienced hierarchy. The LDTs also found themselves in the unenviable position of what has come to be believed to be women's work by virtue of their rank, as this vignette from my time in the Parvati Valley will illustrate:

Rawat, the project director of Sneha is visiting the field site. Govind has been here for a month, and his wife who used to be a local staff member here has been in her new home elsewhere, with her in-laws/his family. Govind finds it difficult living here. The days can be long and tiring, and healthy, nutritious food is often difficult to source. When Aadarsh, the other LDT goes on leave, Govind is alone. He misses

his family and his new wife. Before they got married, Rekha's presence in the project team made working in this field site a sufficiently palatable proposition. With Rekha elsewhere, Govind is eager to quit and find a job closer to home. Loyalty to the senior management team holds him back. When Govind visits, he brings Rekha with her, who has come to spend time with her family. They arrive at the office at five pm. The young couple is bashful, as is "befitting" a newly married couple. Rekha's slightly swollen belly adds to her bashfulness, and the other women staff make sure to tease her. Later Rekha entreats Govind to come to her village with her. For her to go to her parents' house alone when her husband is in the vicinity less than a mile away would be an embarrassment and improper. Govind points out that someone needs to stay back to cook for Rawat. I offer to cook for Rawat (Govind and I cook together on a daily basis anyway), but my inability to make chapattis (bread) makes me a poor substitute. Frustrated, the couple parts. Rekha paints a lonely figure walking up the sloping path to her village in the gathering dusk, struggling with her bags.

I later point out to Govind that he could have cooked the meal and headed to his in-laws later in the evening. Govind retorts, "But Rawatji should have suggested it first.". We both lapse into silence.

Rawat expected Govind to cook for him. The LDTs in certain contexts expected the fieldworkers to cook for them. The fieldworkers expected that they would be asked to

cook for everyone. Organisational hierarchy, imbued with gender, age, seniority and caste operated alongside traditional gender hierarchies. Rank functioned in an almost gendered fashion. There was a "feminisation" of junior ranks, and a "masculinisation" of senior ranks, all of which fed into how personal and professional relationships were enacted, and project activities performed.

"Smooth" functioning of an organisation is predicated on the acceptance of hierarchy. And yet lower staff challenged (though not officially) the hierarchy that dictated who did what, especially when it came to staff from the headquarter visiting the field site for an extended period of time. Tensions erupted often, especially when (better paid) young staff visited from the head office. Hierarchy was performed, a signifier being the ability to stay behind in the office while junior/women staff went out into the field to collect data, dig pits, build polytunnels, weed wheat or work in the kitchen. Hierarchy was also resisted, even if not always in effective ways. On one occasion Govind outlined the various local team member's planned activities for the day, ending contemptuously with the plan for the visiting staff member's activity, "*Aur Nikhil bistar ka khyal rakhega*" translated "*And Nikhil will keep the bed safe*" (by sleeping in it).

Labouring in the Field(s): The Gendering of Body Practices

Not only did the organisation structurally not make specific allowances for women staff, in day to day practice, unequal relations were reproduced as gendered private roles

shaped public roles. Male staff, while sometimes cautioning female staff against providing physical labour to beneficiaries, did not always offer their own to lighten the burden. While in a position to definitively tell the female staff to stop engaging in a particular activity, this was never unambiguously conveyed. Or rather, there was a dissonance between the verbal and bodily practices of staff, which maintained the status quo in terms of male female relationships *and* project practices. Though Aadarsh and Govind told the women not to sow wheat or perform weeding for farmers because that was not their job and would create an unhealthy dependence on and expectations of field staff, they never actually stopped them. Both the male and female staff knew that some activities would not take place unless the staff completed them, though this was explicitly acknowledged verbally only by the female staff. The men did not usually sow wheat, except when it was sown by dropping seeds into furrows created by livestock pulling a plough. While Govind had not yet arrived at the field site when the sowing took place, Aadarsh was fairly involved in the process when he was present at the field site, being the most willing LDT of all the LDTs across the three valley sites to do manual labour. On one occasion early on in the season when the sowing work had already begun to take a toll on the women, the men deputed them to begin sowing in Parkatiya. When I left the office, the men were watching a movie on a laptop. On arriving at Parkatiya, the women asked me where the men were. Unwilling to be a source of friction, I simply stated that they were in the office. The women asked me if the men knew they had come to the village to sow wheat, and I replied yes. They turned away, unhappiness clear on their faces. Though the men

joined us later in the morning to supervise the work, it was clear that the burden of the process was heavily tilted towards the young women[287].

 In a way, the men performed their gender, and in opposition to women's. Male staff maintained that the female staff were letting themselves be taken advantage of. The needs of the project outweighed other considerations in practice, though not speech. Some excerpts from my field notes, spread over the course of my time in Uttarakhand illustrate some of these points.

On a hot day in February, Rekha set out to run the mechanical weeder through an especially large field. While the job of the owner of the field, an especially caste-abiding Brahmin, Rekha pointed out that he was unlikely to weed the plot himself, leaving the responsibility to her. In doing so, Rekha accepted his status and role as a Brahmin shop owner, and also hers as a young woman who was a service provider. What set the encounter with this farmer apart from encounters with other farmers was that with the others, the staff made attempts to convince them to do the weeding themselves. Basuguru on the other hand enjoyed an elevated status by virtue of this economic, social and political background.

While extremely reluctant (a reluctance strengthened by bad weather) Rekha ploughed on. The day was hot, and the sun extraordinarily bright, made worse by

[287] See Chapter Four for more details.

the altitude we were located at. Having spent the morning procrastinating about the weeding, Rekha knew she had to get to it before the day was over. Govind (also her fiancé) sat perched on a rock overlooking the field, partially to oversee the work, and partially to accompany her. Mid-way through, Rekha appealed to him to take over. He refused, stating that it wasn't his job. Pursuing a line of conversation he and I had been engaged in moments earlier, he pointed out that this wasn't her job, and by doing it she was making people dependent on her (and the ULP). Govind himself was not convinced that the farmers found the method particularly useful, pointing out that if they did they might have done the weeding themselves. Instead, he said, the real practitioners of the method became the (female) staff members instead. And they could have been earning more working on the MGNREGA scheme doing the same kind of manual labour.

If Rekha had not weeded the field herself, it would have amounted to one less check mark on the monitoring and evaluation document, and perhaps lower yields. If Rekha hadn't weeded the field, no one would have weeded the field.

Field staff also fell into the role of sowing wheat in the fields of people asked to participate in the System of Wheat Intensification activity that the ULP was advocating. While the original intention was for farmers to attend SWI training sessions, the training sessions were mostly done away with, and staff were asked to demonstrate the method to farmers in their fields. There existed some ambiguity about how this demonstration was to take place. The more senior staff later suggested that demonstrations involve the staff

engaging in helping sow wheat in two lines/furrows of wheat. Social relations did not allow for this to happen. Personal relationships, belonging to the village/area and gendered constructions of the role of young women allowed farmers to make these claims on the staff members bodies. While sowing rice in the SRI way, as Aadarsh, Govind, Rekha, Radha, Nikhil and I prepared to undertake the sowing, Anita Devi whose field it was came up to us and said, "Sow the entire field like you did in Rekha's plot." Aadarsh protested, "There are 450 farmers, how will we cover all of them?". To which Anita Devi responded, "You will have to". In this instance Anita Devi was not just making gendered claims over the staff (the men were largely holding the ropes while the women dug furrows), but also claims over what she and many beneficiaries believed to be their right over the ULP and NGOs in general. Many beneficiaries articulated the belief that since NGOs received money, beneficiaries were entitled to ask them to provide labour. The NGO's identity and the staff worker's identity collapsed into one.

These claims allowed for beneficiaries to ask for more than was due even by the necessities of the project. On a few occasions some staff even levelled the plots for farmers when it appeared that there was a delay in land preparation for sowing. (Levelling a field required that a hoe be used to break up clumps of mud and then spread it evenly across the plot). None of these activities were new to the staff, and formed a part of their daily existence since they belonged to farming families as well. The hard, physical life that they belonged to implicitly legitimised a hard, physical life in the project. This did not in any way reduce the physical burden that the activity placed on their bodies. Their identities

as farmers only augmented their identities as staff workers[288]. And the women were very aware of what their contribution meant to the project, and how they felt undervalued. After being severely reprimanded on one occasion, Priya cried and said to me:

> Whatever result you see is because of us, not because of the villagers. They (the project leaders) don't even give us one day holiday. *Daily* field, *daily* field. And in the end we have to listen to this. How will a worker feel? They never ask us about our own work.

Making polytunnels and vermipits was on the other hand was a different story. This "construction" work was less gendered. Both the men and the women would make solo trips to demonstrate how the polytunnel was to be made. When both were present at a site at the same time, the men would usually take charge over the supervision of the construction work. By the end of the season however, both were equally adept at all the tasks, and did not rely on others. Making polytunnels and vermipits were less inscribed in gendered scripts, having much less precedence in the area.

Despite the persistence of a heavy workload, there was a clear acknowledgment within Sneha that all the staff but especially the young women were underpaid. In fact, they were paid much less than they were when they came on as volunteers to conduct the household survey. At the time, they were paid Rs. 120 per day, with incentives for

---

[288] Staff identities were also mobilised in unexpected ways to create pressure on others to participate. In one instance the girls of an SC family who often worked as wage labour for the high caste Thakurs during the agricultural season were compelled to leave the sidelines from where they watched the wheat being sown and participate in the sowing themselves. Mohan Singh, a high caste Thakur, retired Subedaar and local representative of the ruling political party called out to the girls, pointing to the Brahmin fieldworker Radha who was digging furrows. "See the Brahmin is working, why aren't you?"

each form they filled. Impressed with their performance, Rawat wanted to hold onto them, but money had been allocated for just one staff worker. So instead, they split the Rs.8000 meant for one staff workers amongst the three of them, with Priya receiving Rs.4000 and holding the post of LDT. Rekha and Radha received Rs.2000 each for 20 days of work a month. When Rawat explained the salary structure to me, he was deeply embarrassed, and very cognisant of the fact that they needed to be paid much more. He felt caught between the demands of the project and the funding available. The director of Sneha, Bimla Rawat also pointed out that being field staff who are brand new with no experience, they should be earning at least Rs.6000 - Rs.7000. The situation was exacerbated, she pointed out, by the fact that the girls worked for almost 30 days a month, with no Sundays off. For her part, Priya was willing to earn even a little less than that, saying that that would be enough to meet her modest needs of paying phone bills and an occasional new set of clothing[289]. The context from which she derived, with its limited opportunities for women, and an inability to envision asking for more suggests a fashioning of subjectivity through "technologies of the self" (Foucault 1988) that coincide with dominant practice.

When I left the site in October 2015, Radha's salary had gone up to Rs.2500 a month and Priya's remained unchanged. And yet when something went wrong or targets weren't met, the young women bore the most responsibility. The salary structure as well as the social and geographic locations of the different staff members vis-a-vis each other

---

[289] Similarly Rekha used her salary to supplement the family income as well as indulge in a collection of (inexpensive) footwear.

naturalised social hierarchies. These hierarchies also mapped onto who was providing the most feedback about the functioning of SCI to higher level staff, and consequently project management, academic writings, and science. The women did not attend many of the meetings conducted at the UDP headquarters. When their opinions were solicited, their awareness of hierarchy resulted in them remaining quiet. Many valuable insights remained hidden.

Dirty Work

The Trainer Bisht stands over an empty plastic bucket in the verandah of a farmer's house. It is October, and the sun shines oppressively overhead. A snow-clad Himalayan peak peeps out coquettishly from behind brown mountains. It looks wondrously and tantalisingly close, but is actually probably a week's hike away. It is past two in the afternoon, and we all know that there will be no lunch and no cool fans to retire under until the organic manure panchgabya is made as part of the System of Wheat Intensification training for staff and select, "progressive" farmers. We gather around the bucket in an uneven semi-circle, some of the men perched on a cot behind him. Even the three young women who have been quietly dismissed by other members of the group for not being "real farmers" and for being too posh, arrange themselves in this circle, curiosity piquing everyone.

An array of products is spread around the bucket in which the manure is to be assembled, including milk, ghee, vinegar, a lump of jaggery, a bottle of cow urine and a ball of fresh cow dung wrapped in a transparent plastic bag. Finally, we are about to begin. Bisht begins, "Alright, there are eight to nine women here. Who is going to put her hand in the cow dung?". All the women immediately volunteer themselves.

<p style="text-align:center">* * *</p>

It is another warm morning in April, and we are in Bhadkot, in the process of constructing a vermipit. Trainer Bisht is here to guide the team. Rekha, Radha, Priya, Aadarsh and Govind are also here. The farmer whose plot we are building the polytunnel in walks in and out of the plot, bringing a shovel, a rock, a piece of rope, etc. Other family members peer down from the topmost floor of the house, unconvinced about the merit of this contraption. A volley of exchanges about whose onions will be better (sowed within and without the polytunnel being built alongside) erupts between staff and some family members. The vermipit has finally been set up, and all that remains is for it to be filled with cow dung and dried up old leaves. Later, earthworms will be placed in the pit, to aid the process of decomposition of the dung and leaves into rich manure. It is time for the pit to be filled, and Rekha, Radha and Priya are directed to gather the cow dung and empty it into the pit. Radha picks up some dung and dumps it into the vermipit. As she walks away from it, her hands are caked with the sticky dung. Govind looks at her and

says "sheee", disgusted, avoiding the reach of her hands. Radha is unimpressed, and

then playfully pretends to chase him to wipe the dung on him.

<div align="center">* * *</div>

I walk up to Rekha Devi's house to chat with her as I make my way around the

village. I meet her teenage daughter Munni for the first time. Munni stands out from

other girls in the village, with her track pants and her shoulder length hair. We

introduce ourselves to each other, curious. Munni hopes to get a Bachelor's of

Education, from Haldwani. After a while Munni walks away and heads off to do

some chores. Later in the evening I walk towards the path leading out of the village,

and see Munni standing on the path, her back to me. On her back, suspended by a

rope that is wrapped around her forehead, is animal dung that Munni is taking to

dump into one of the wheat fields. Munni turns around and sees me, and quickly

turns away, embarrassed. As I approach her, she turns back to me and says: in the

village we even have to collect dung.

<div align="center">* * *</div>

It is June, and trainer Dutt, Govind, Aadarsh and Harish Singh are in Harish Singh's

field. The girls are elsewhere today, tasked with other responsibilities. We are

preparing a raised bed nursery for the rice crop. To prepare the nursery, a rectangle

is marked out. A moat is created around it, and the soil from the moat sprinkled on

top of the rectangle to raise its height. The soil is mixed with composted animal

<div align="center">303</div>

manure and sprinkled on top of the nursery bed. Govind and Aadarsh mix the fresh

earth with the compost, and distribute it evenly on the nursery bed.

(Author's field notes, Parvati Valley, 2014-2015.)

* * *

Collecting manure to use as fertiliser in agriculture is a practice that has been used for centuries, and is not a point of contention in itself. In the mountains of Uttarakhand especially, where the Green Revolution has not made deep inroads, animal manure is the primary source of fertiliser. Collecting manure from cattle sheds and depositing them in heaps in the fields is the task of women, and still very much an integral element of local farming systems. And yet, as the case of Munni shows, there are signs of a pushback against it, even if this comes later than in other parts of the country (see Wadley 2000).

This marks a shift in younger generations acceptance of tasks that constitute farming, a trend Wadley (2000) has described as being influenced by urbanisation and globalisation. Without ascribing a normative value to it, what is important to note here though, is that boys and men are catching up with globalization and urbanization faster than girls and women because of their unequal status and bodily privilege.

Older women were also conscious of dung being "dirty" even as it is simultaneously considered ritually pure; this was a theme that manifested itself frequently during my time there when women made (sometimes playful) references to it. In the context of Govind's changed attitude towards handling the compost I can only hypothesize about

304

what might have caused the change. Compost is not fresh dung, and perhaps the change in its form made it less repulsive. Ranked hierarchy also plays a part here. For one, no women were around to engage in the tasks themselves. Govind also had to perform the role of a junior staff member in front of Dutt, and the good, and also from-a-farming-background role in front of the farmer-beneficiary rather than risk alienating him. What is important to note here is the role women assume in terms of bodily actions for the project.

Ethnographic Vitalism and Women in the Pahad

In his discussion of his research on migrant workers in Delhi, Leo Coleman presents to us his idea of "ethnographic vitalism" (Coleman 2016, 4), developed in part from João Biehl's (2005) book *Vita,* Joel Robbin's (2013) work and also that of Gilles Deleuze (1997). Coleman challenges us to "craft ethnographies of lives that are marked by mobility, characterized by marginality in relation to settled categories of membership and belonging, and shaped by struggles with intimate, domestic, and large-scale structures of power and inequality" (Coleman 2016, 4). A tension exists between strands of ethnographic thought that prioritise the vitalism and life-affirming possibilities of ethnography (Biehl 2005), what Coleman (2016) calls a "subject-centred construction of (subject) lives" and the ones that privilege constraints imposed by economic, political and social structures and contexts.

It is not my intention to leave a reader of this work under a cloud of despair, and with the belief that fieldworkers were stuck in a rut that offered them little more than drudgery born of their habitus and identity with no agency. The project in many ways offered the women opportunities unthinkable to those not employed.

Social norms in the pahad usually dictate that unmarried girl-women must not travel unaccompanied outside their village localities. Even if the purpose is education, a highly valued activity even for women whose families have the means to provide it, residing elsewhere without the protection of the husband's or maternal family is a source of dismay and censure. Policing is limited mostly to travel to urbanised/ing areas.

Mobility is a privilege, made possible and legitimate for the fieldworkers by the demands of the job. "Exposure visits" organised by the Agriculture Department, Gramya or different NGOs opened up opportunities to staff. For some the visits provided farmers with opportunities to expand their farming repertoire; for many it was an opportunity to *ghoomna*, or travel, with legitimate cause. For men who have travelled outside the region this was less significant than for women for whom such opportunities to travel to a location other than the nearby district headquarters was unthinkable. Radha told me of other women who asked her to take them with her when she went on official trips just so that they could leave the confines of their villages. These collective activities - attending a workshop on self-development or participating in meetings in Dehradun or visiting Uttarkashi to study horticulture - created spaces for and make possible altered personal subjectivities. After one workshop conducted an external NGO, both Aadarsh, Rekha and

Radha returned in high spirits, excited about the new perspectives and opportunities that the workshop had provided them. Aadarsh who had expressed a desire to join the army, full of patriotism, pointed out on Republic Day that there was nothing to celebrate and the country was still in chains. Rekha and Radha (both very fair-skinned women) also described learning about the ill-effects of the popular whitening cream, Fair and Lovely, and their decisions to stop using it.

Even the act of joining Sneha was an act in defiance of non-mobility. Rekha was refused permission to join Sneha by her father, the act of joining a deviation from acceptable norms about women's place in society (Simmons, Rezina and Koenig 1992). Rekha joined anyway. Mobility is not just physical mobility, though physical mobility itself provides the greatest challenge to barriers. NGO practices destabilized identity practices. Women frequently broke the boundaries of the man-woman divide in NGO work, made possible by either project imperatives or a "gender-blindness" of sorts about prescriptions about women's mobility after dark.

Concerns about getting back late even within the "safe space" of the field site were not significant concerns as far as the LDTs were concerned. Staff members often returned late to the office from their field sites for the day, heading home late or staying over in the office. Was this lack of discrimination an emancipatory practice or one driven by the exigencies or work, or just by blindness and 'neutrality'? Is this particular construction of the women staff in this organisation, within this cultural space which places less proscriptions on women's mobilities within circumscribed spaces, doubly

disadvantageous? The "blindness" was certainly rooted in labour exploitation rather than a political imperative. While management and staff were attentive to the gendered dimensions of being a female staff worker (Sneha itself works on gendered dimensions of women's lives) in practice the seemingly overwhelming demands of the project led to many of these sensitivities being pushed under the rug; articulated but not enacted. Women frequently finished work late, but were not perceived as needing protection. In extending these temporal and spatial boundaries, the women could challenge the paths laid out for them, and their identities as "good" pahadi girls or women.

Over the course of time, the women came to see themselves as more than women from the village, as beneficiary perceptions began to change and were reflected back on them. When I returned to the area in June of 2016, the women recounted to me how they had had an easier time getting people to sow wheat the SWI way[290]. The Gramya story apart, they also attributed the increased willingness of people to sow wheat the SWI way to people's own changing perceptions of them, as being legitimate staff members of an organisation rather than girls from the village. Rani Devi while speaking of her own employment by Gramya offered clues to the value of employment, even if small, poorly paid jobs. "The people here say that if you work outside the house, even if you're washing vessels, you'll be respected". Rani Devi articulated her desire to be a part of the Gramya team as wanting to "learn how to sit, how to stand". Describing meetings she had to attend, she said, "the other person says something, you say something. Only then will

---

[290] See Chapter Four.

there be new ideas in your head". Rural or village space or traditional livelihoods were characterised by stagnation, marking women who rarely travel outside it with a sense of inadequacy and naiveté.

That the women found value in employment by Sneha is indicated by their unwillingness to leave Sneha, despite poor salaries, long work hour, physical strain and occasional harangues from dissatisfied middle and senior management. When questioned about her mother's insistence that Radha quit her job because it did not pay enough and distracted her from her responsibilities at home, Radha articulated Sneha's work as also being necessary, prioritising it over chores to be completed at home. Financial necessity was a strong driver to cause Radha to remain in her job, but was not the sole or primary one.

Identities and mobility apart, Sneha practices as well as the physical space it occupied offered possibilities; something not quite tangible but still real. To borrow from Coleman (2016), ethnographic vitalism allows equal space to possibility as well as constraint and necessity. Rekha and Govind met on the job, fell in love and got married almost two years after the project began. Both were Thakurs, caste presenting no obstacle. For Rekha, whose family was one of the poorest in her villages and whose family members all bore signs of severe nutritional deficiency, the marriage offered a way out. I do not mean to suggest that the decision to get married was for instrumental purposes, but that the project opened up different opportunities not available to those not attached to it.

On a few occasions either during the work day or in the evenings the girls stayed back in the office because it was too dark for them to head to their homes, and also because they wanted a break from the routines that village life offered them. After dinner they would all congregate in the office, a space unencumbered by furniture for the most part. Mobiles were then whipped out, or the "office laptop" which housed almost only music and movies was set up, and attached to speaker salvaged from somewhere. And then they would dance, to new and old popular music, just as a Bollywood heroine of old might.

Conclusion

In this chapter I have tried to make a case for expanding the analysis of a development project from a focus on organisational structures and project plans and implementation, to the micro-structures, the daily practices, fair and unfair, that are enacted on worker's bodies. I have also argued that we have to pay attention to what is going on at multiple scales to understand how power functions (Nagar 2006). Understanding how power functions offers insights into understanding how certain ascribed identities come to retain a degree of immutability in practice in certain spaces, as well as how the subjectification of embodied selves is challenged by the holders of them. Staff practices "produc(e) social relations that are based on meanings constructed through their practices", and therefore, "staff power and positionality within these contexts are critical for the outcomes of struggles" (O'Reilly 2004, 178).

The description of the practices of emotional and physical labour that Rekha, Radha and Priya performed as a result of their inter-subjective relationships with higher up staff has hopefully demonstrated how development projects may hinge on the labouring bodies of staff members like Rekha, and by default, on the labouring woman's body. We have already seen from the description of the practice of SWI that the project of self-betterment and entrepreneurship hinges on the good behaviour of women - and female staff. Women bear the burden of project success, whether as staff members or beneficiaries, holding up its weight with practices of emotional and physical labour. The labouring woman's body becomes the bridge between "underdevelopment" and "development". To address this would require paying attention to the cost of social reproduction in development projects rather than subsuming them under the banner of paid work. Such spaces also offer radical possibilities: frontline workers occupy positions of epistemic privilege, being themselves a part of knowledge-making processes. The challenge remains for those who occupy relatively marginal places in science-making processes to contribute to discourse – and science, however defined - in a meaningful manner.

Chapter Eight

Conclusion

In this dissertation, my aim has been to extend the analysis of how agricultural technologies come to be created, both discursively and in practice, through an ethnographic study of a post-disaster livelihood project in the mountains of Uttarakhand. While paying attention to the usual constraints that inhibit expansion of cultivation and cultivation practices, I have simultaneously made an argument for paying attention to *everything else*.

I have demonstrated how state and colonial power over time has sedimented a particular development pattern of extraction, creating spatial disparities of "development" between the mountains and the plains. I have also shown how the current development paradigm challenges local imaginaries that are increasingly outward oriented. Modernity co-exists with multiple and contradictory environmentalisms. While there is unsurprisingly a clear and obvious cognisance of the role of the environment and livelihoods that is mobilised through state and NGO interventions, there is also an acceptance of the untethering of everyday life from the environmental landscape. This, along with the constraints born of climate change and increased human-wildlife conflict, has precipitated a shift away from agriculture. These patterns circumscribe the introduction of the System of Rice/Crop/Wheat Intensification, an agroecological method

of crop cultivation that is enacted differently in different spaces. Displaying enactment has required that I demonstrate the oscillation between how SRI was conceptualised and the form it took in agricultural fields. That is, interrogating the gaps and overlaps between representation and enactment. Through a detailed description of the manner in which it was practiced and evaluated, I have shown how messiness, complexity and inter-subjectivity underlie the processes involved. By contrasting the reactions of project beneficiaries to SRI and other activities such as horticulture and poultry farming, I have also shown the co-production and co-practice of different project activities, and the contradictions inherent in their propagation - which is how a polytunnel to grow vegetables came to play a role in a farmer's decision to grow rice SRI-style.

Similarities in the outlining of development work between the ULP and Gramya collapsed both into a single entity in some people's minds, catapulting ULP staff workers into the role of providers for both. At the same time, those who could distinguish between the two increasingly began to favour the ULP, reversing their perception of the state and its role in their lives. While this made it easier for staff members to meet targets, the invisibilising of caste and gender hierarchies had unanticipated effects in the rolling out of project activities, as well as the work practices of field staff.

Based on this analysis, I have made four main arguments in my dissertation that I recapitulate here.

Enactment of a Technology (or Method) and its Evaluation

In my analysis of the practice of SRI, I depart from the common characterisation of it as being "interpretatively flexible" and instead argue that the metaphor of enactment is a more useful analytical frame in an analysis of its adoption practices. Translation assumes the innate stability of SRI, when in fact we have seen that both in discourse and practice, it is not. Enactment, on the other hand, allows me to take practice more seriously, its framework affording more agency to non-human and material actors.

There are innumerable forms that SWI could have taken but did not. In contrast to what we saw in Chapter Four, if plant spacing were a little sparser in Mohan Singh's plot, if it had been better attended to and the wheat rust addressed, if during sowing the square planting had been conducted in a different plot of the field where troughs didn't force water to collect during irrigation, if a scientist had looked over the fields in his village to know what was wrong not just with his but with Jodh Singh's field, SRI and SWI in the seasons to come may not only have been practiced, but may have taken unexpected forms, departing from and/or improving upon the methods that were finally used. There were many possibilities that were not actualised. Through Bisht's evocation of multiple practices of SWI, we see the different contingencies suggested to underlie it, as well as the sometimes sheer incalculability of its practice[291]. We also see how in that field, at that point, a clump of manure that had been enriching the soil for a long time provoked different understandings of crop outcomes, and was itself an outcome of inter-subjective

---

[291] See pages 165-166.

relationships as well as the choreography between trainers, staff workers and farmers. Practice and discourse are embroiled in a dialectical relationship, as are all the actors who inhabit all these spaces – whether in academic journals or wheat fields. As Latour has argued, to study practice is to "multiply the mediators that collectively produce the sciences" (Latour 1999, 309). What is most telling however, is what practices get left out of discourse, and why.

I also argue that the indeterminacy of SWI practice requires that we relook what we privilege in evaluations of a method. Making sense of technology requires an analytic that is in addition to that offered by crop statistics. Statistics ossify plants, and while they may provide valuable information about the nitrogen uptake of root systems, they may obscure what it takes to sow a seedling so that its roots lay parallel rather than perpendicular to the soil. They also do not sufficiently explain future action.

Turner (2008) reminds us that knowledgeability is not a sufficient explanation for social action: emotions and perceptions are equally relevant. For many others, though, the productivity benefits of SCI did not coincide sufficiently with their additional and competing non-productivity oriented concerns. That increasing productivity is the rational aim of a farmer seems a truism, but rather than rationalistic, farmers/actors are, in the words of Sherry Ortner, "subjectively complex" (Ortner 2006, 103). Many including the implementers of the project are well aware of this. "Unresolved discursive inconsistencies" (Feuer 2008, 17) remain a challenge for institutions that struggle to coalesce complex goals.

Embodied Practices of Development Work

I have presented the contradictions that exist between the (perceived) legitimacy of frontline workers as well the claims that are made of their bodies and time. In privileging their experiences that have so far been narratively eclipsed by the contradictions of the production method (SRI/SWI/SCI), I have brought to the fore how their identities, subjectivities and the subjectification of their selves shaped the adoption of a wheat cultivation method. I have consequently argued that the evaluation of a development project must focus not just on outcomes or beneficiaries, but also the structuring effects of projects themselves. These structuring effects precipitate hierarchical body practices that necessitate different kinds of emotional and physical labour work on the part of staff members. Radha, Rekha, Priya, Govind and Aadarsh not only had to negotiate the expectations of the UDP, but also of the beneficiaries of the UDP. Brokering outcomes between both parties required a continuous reformulation of project activities that would be acceptable to both sides. Staff workers were driven by the need to appease residents, and also sought to construct and reconstruct the space of the ULP, while simultaneously reformulating their relationships with beneficiaries

I also made a renewed call to pay attention to bodies in agricultural and development practice. Though the body is the site of research in many strands of scholarship such as medical anthropology (Kaufman 1988; Arnold 1995) and sexuality studies (Prosser 1998), agrarian studies has limited understandings of labour to number of work hours put in by

farmers and, in some noteworthy examples, of the drudgery involved in growing crops (Tiki 2014; Mencher and Saradamoni 1982).

I have demonstrated how the body and physical or bodily states insert themselves into the growing of wheat and rice using SRI - whether that of field staff sowing, or farmers inter-cultivating their crops with manual weeders. The tired body that finds it difficult to push a weeder with a blunt blade (thereby allowing the weeder to skim over the surface of the soil rather than dig deep into it) plays as much of a role in the practice of SWI as does a training meeting or a diktat issued in a journal article. These bodily states contributed to the knowledge-making processes of SWI by inserting themselves amongst cognitive and verbal procedures adopted by staff workers and farmers to determine how to grow wheat.

Bodily states intersect with gendered bodily practices that are reproduced across different topographic spaces and are legitimised over time. Rekha, Radha and Priya along with other women staff at the SWI training meeting were left to toil under the hot sun dropping wheat seeds in furrows in October 2014, and performed similar tasks when they helped sow wheat in November 2014 and rice in May 2015. Black-boxing and naturalising the staff worker's body (and what it is made to do) indemnifies everyone who tasks a staff worker with performing a task - whether a manager or a neighbour from the village. It does not sufficiently account for what it makes to make a project function. However, a project is as good as its frontline workers. One of my theoretical contributions in this dissertation has been to identify and pay attention to this gap in the

analysis of why technologies are non/dis/adopted by privileging the experiences of frontline workers.

I also finally draw out what working in this project meant for the women who were a part of it. While the women were able to fulfil the expectations set for them, they also learnt to slowly push back so as to make the space one that was meaningful to their lives.

Co-Production of Different Development Paradigms

Residents misrecognised both the state and the project, switching out the state for the ULP that began in the margins but went on to occupy a place of prominence, for however long or brief a period. There are two points to be made here.

First the high degree of similarity of both projects (the ULP and Gramya) points to a broad consensus in terms of what a development framework in the mountains of Uttarakhand must look like. But with the outcomes of both projects being reported as underwhelming by multiple actors in the implementing teams, there is perhaps a need for a more imaginative conceptualisation of what a better livelihood framework could look like, rather than the reproduction of similar narratives across state and non-state spaces. That, of course, is easier said than done.

The second point relates to how public perceptions of different kinds of development projects and consequently relationships with the non-profit sector and the state are done and undone temporally. The subjectification of residents of rural spaces apart, they

themselves also frame NGO roles based on their *memory* of previous NGO interventions. In the project area, people had encountered a development project in the past. The previous intervention not only provided an interpretative frame, it also fostered a particular subject position amongst the beneficiaries of former projects. Many came to expect benefits with monetary value or education services that would allow them a way out of farming. This took place even as residents came to believe that NGOs in general are self-serving, money-grabbing entities of limited means. While not more enamoured of the state, its vastly larger resources made it worthier of attention. Over time, residents reversed this position, enabled by their own relationships with both projects. More generally, apart from the temporal element of project implementation and assessment, development projects may be viewed against each other, as people make sense of them in tandem, each feeding off the other. These relationships are dialectical. Project managers must then not only account for the functioning of their own projects, but of others.

Moral Economies of Farming

A popular song that I often heard playing the in the taxis that shuttled me between Haldwani and the Parvati Valley goes "Don't call me pahadi. I am a Dehradunwala"[292].

Drawing from Massumi (2002) and Thrift (2007), Duff points out that "the art of place-making, and the diverse practices that support and extend this art, serve to enmesh

---

[292] Someone from the capital city of Dehradun.

bodies in relational networks of meaning and belonging, of time and space. *These relational networks are primarily felt and affective in their lived immediacy*" (Duff 2010, 890) (emphasis in original).

The identification with the category of farmer does not preclude constantly reformulated discourses and strategies of place and people-making that diverge from those of observers outside this network of bodies who are placed within very different frameworks of meaning. The incompatibility, or rather the limitations of scholarly and activist frameworks of legibilisation of rural spaces, must be challenged by new and emerging imaginaries imaginary grounded in research and practice that does away with these binaries of rural and urban but recognises their interconnected production. Many smaller towns and fringes of cities in Uttarakhand and India more generally are attracting migrants, who find them to be more hospitable than large, metropolitan cities. This is not to argue that the project planners are unaware of the declining importance and preference for farming, but that this awareness has not precluded agriculture from holding a place of prominence in the development script.

The ascribed category of farmer continues to hold value in terms of emancipatory politics - and certainly state politics. It is its ontological and epistemic value that needs re-thinking. We need to use different frameworks when we use the analytic of identity vis-à-vis the politics of identity. In addition, questions of caste and gender need to be placed far more prominently in the agrarian and development agenda. Does our acknowledgement of drudgery and exploitation in this particular performance of SRI,

rooted as it is in a progressive discourse of sustainable farming, permit exit? For example, despite the plethora of research on how women's bodies fit into geopolitical and economic regimes, we have yet to ask how they fit into regimes of emancipatory politics. Finally, what would an exit mean for the future of farming?

Future Directions

While I have been critical of the ULP, I realise that my dissertation has not offered an alternative framework with which to envision a future that is respectful both of people's needs for a desirable future and one that does not contradict principles of social justice and equity. I want to be clear that I am not making a case for large-scale land deals to fill in the space left behind by migrating rural residents. To do so would be to completely cut smallholders off from their lands when they do not wish to be, while concentrating power in the hands of a few, throttling local development (de Schutter 2011). Nor do I want to suggest moving away from farming practices that are environmentally sound, socially acceptable, place equal burdens on all involved, and pay special attention to the twin concerns of water scarcity and climate change. Uttarakhand's unfettered "development" trajectory of dams and unplanned urbanisation is both ecologically and socially dangerous. There is little to stand in the way of a recurrence of the 2013 floods.

Imagining a desirable future would require deconstructing the binaries between "urban" and "rural", and imagining a continuum of rural, peri-urban and urban that are not as vastly different as they are now. While there is some research being conducted on

the urban-rural continuum and what a new urbanity does and could look like (see Harriss-White, 2015), there is also a need to proactively envisage what a new "rural" could look like. In my work in this dissertation, I have also fallen into a rural trap of sorts, with my ethnography being very local-based. This is not to argue that such work is not useful, but that future work should attend to cross-scale dynamic changes (Scoones 2009). This of course, remains a methodological challenge.

Equally important is a strong need to find a way to making these re-imagined spaces attractive to youth by attending seriously to their own desires and imaginaries, rather than perpetuating their need to engage in "timepass" (Jeffrey 2010), caught between worlds they cannot and do not want to belong to. This would require addressing questions such as that of deskilling (Katz 2004), better access to and independence over farmland (White 2012), as well as understanding why urban spaces foster a place attachment that some rural spaces may not. In November 2017 I learned that the UDP was considering setting up a "creativity centre" for children, which would include a library amongst other things, and be self-sustaining. It was also considering offering some kinds of training (computer and beauty salon practice amongst others) to village youth. But having begun to work independently in March of that year, with a project end-date of March 2017, the Director himself was not sure how to attain these goals in the time frame.

Paradoxically, in cities like Bangalore, and Delhi urban consumers are increasingly flocking to farm plots of land on their outskirts on weekends, while farmers from those

same areas are being displaced by the imperatives of industrial development and land acquisition. While urban farming is becoming chic in metropolitan cities, its class-based nature is being obscured by a recognition of and a fetishisation of organic food[293]. It is by addressing contradictions such as these, that simultaneously make explicit the privileges, positions and interests as scholars rooted ourselves in urban spaces and consuming urbanity, that we can move forward.

---

[293] This has perpetuated the same kinds of trends we see in some countries of the Global North, where organic and/or healthy food is only available to a select few.

Bibliography

Abraham, Binju, O.O. AdeOluwa, Hailu Araya, Tareke Berhe, Yogesh Bhatt, Sue Edwards, Biksham Gujja, et al. 2014. *The System of Crop Intensification: Agroecological Innovations for Improving Agricultural Production, Food Security and Resilience to Climate Change.* SRI International Network and Resources Center. Accessed December 6, 2016. sri.ciifad.cornell.edu/aboutsri/othercrops/SCImonograph_SRIRice2014.pdf,.

Acker, Joan. 1990. "Hierarchy, Jobs, Bodies: A Theory of Gendered Organizations." *Gender and Society* 4 (2): 139-158.

Aggarwal, Safia. 2010. "The Role of Religion in Conservation and Degradation of Forests: Examples from the Kumaun Himalaya." In *Culture and Environment in the Himalaya*, by Arjun Guneratne, 133-150. London and New York: Routledge.

Agrawal, Arun. 2005. *Environmentality: Technologies of Government and the Making of Subjects.* Durham, NC: Duke University Press.

Alcoff, Linda M. 2000. "Who's Afraid of Identity Politics." In *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism*, by Paula M.L. Moya and Michael R. Hames-Garcia, 312-344. Berkeley, Los Angeles, London: University of California Press.

—. 2010. "New Epistemologies: Post-Positivist Accounts of Identity." In *The SAGE Handbook of Identities*, by Margaret Wetherell and Chandra Talpade Mohanty, 144-162. London, Thousand Oaks, New Delhi and Singapore: Sage.

Alonso, Ana Maria. 1994. "The Politics of Space, Time and Substance: State Formation, Nationalism, and Ethnicity." *Annual Review of Anthropology* 23: 379-405.

Altieri, Michael. 2005. *Agroecology: The Science of Sustainable Agriculture.* Boulder, CO: Westview Press.

Appadurai, Arjun. 1990. "Technology and the Reproduction of Values in Rural Western India." In *Dominating Knowledge: Development, Culture and Resistance*, by Apfel F Marglin and S.A. Marglin, 185-216. Oxford, UK: Clarendon Press.

Baden-Powell, B.H. 1908. *The Origin and Growth of Village Communities in India.* London.

Barry, Andrew. 2012. "Political Situations: Knowledge Controversies in Transitional Governance." *Critical Policy Studies* 6 (3): 324-336.

Barry, Andrew, Thomas Osborne, and Nikolas Rose. 1996. "Introduction." In *Foucault and Political Reason: Liberalism, Neo-Liberalism and Rationalities of Government*, by Andrew Barry, Thomas Osborne and Nikolas Rose, 1-18. Chicago: University of Chicago Press.

Bebbington, Anthony. 1996. "Organizations and Intensifications: Campesino Federations, Rural Livelihoods and Agricultural Technology in the Andes and Amazonia." *World Development* 24 (7).

—. 1997. "New states, New NGOs? Crises and Transitions Among Rural Development NGOs in the Andean Region." *World Development* 25 (11): 1155-1765.

Beej Bachao Andolan. 2011. *Documentation of Climate Change Perceptions and Adaptation Practices in Uttarakhand, North India.* Penang: Pesticide Action Network.

Behera, Debaraj, Arvind Kumar Chaudhury, Vinay Kumar Vutukuru, Abhishek Gupta, Sitaramachandra Machiraju, and Parmesh Shah. 2013. *Enhancing Agricultural Livelihoods through Community Institutions in Bihar, India.* South Asia Livelihoods Note Learning Series 3 Note 1, Bihar Rural Livelihoods Promotion Society and World Bank .

Beinart, William. 2015. "Reflecting on Unruliness." In *Unruly Environments*, by Siddhartha Krishnan, Christopher L Pastore and Samuel (eds) Temple, 69-74. Munich: Rachel Carson Centre Perspectives.

Beniston, Martin. 2006. "Mountain Weather and Climate: A General Overview and a Focus on Climactic Change in the Alps." *Hydrologia* 562: 3–16.

Benzecry, Claudio E., and Monika Krause. 2010. "How Do they Know? Practicing Knowledge in Comparative Perspective." *Qualitative Sociology* 33: 415-422.

Bernard, Tanguy, and David J. Spielman. 2009. "Reaching the Rural Poor through Rural Producer Organizations? A Study of Agricultural Marketing Cooperatives in Ethiopia." *Food Policy* 34: 60–69.

Berry, Sara. 1993. *No Condition is Permanent: The Social Dynamics of Agrarian Change in Sub-saharan Africa.* Madison: University of Wisconsin Press.

Biehl, João. 2005. *Vita: Life in a Zone of Social Abandonment.* Berkeley: University of California Press.

Body, Expert. 2014. "Assessment of Environmental Degradation and Impact of Hydroelectric projects during the June 2013 Disaster in Uttarakhand." *India Environment Portal.* April. Accessed November 6, 2016. http://www.indiaenvironmentportal.org.in/files/file/environmental%20degradation%20&%20hydroelectric%20projects.pdf.

Bondi, Liz. 2005. "Working the Spaces of Neoliberal Subjectivity: Psychotherapeutic Technologies, Professionalization and Counselling." *Antipode* 37: 497–514.

Borstein, Erica. 2003. *The Spirit of Development: Protestant NGOs, Morality, and Economics in Zimbabwe.* New York and London: Routledge.

Bouman, Bas and Tuong, T.P. 2001. "Field Water Management to Save Water and Increase in Productivity in Irrigated Lowland Rice." *Agricultural Water Management* 49(1): 11-30.

Bourdieu, Pierre. 1984. *Distinction: A Social Critique of the Judgement of Taste* . Cambridge, MA: Harvard University Press.

—. 1988. *Homo Academicus.* Stanford: Stanfor University Press.

—. 1990. *The Logic of Practice.* Cambridge: Polity Press.

Bourdieu, Pierre, and Loic J.D. Wacquant. 1992. *An Invitation to Reflexive Sociology.* Chicago: The University of Chicago Press.

Breman, Jan. 1988. *The Shattered Image: Construction and Deconstruction of the Village in Colonial Asia.* Vol. Comparative Asian Studies 2. Dordrecht and Providence: Foris Publications.

—. 1997. "The Village in Focus." In *The Village in Asia Revisited*, by Jan Breman and Ashwani Saith, 15-75. New Delhi: Oxford University Press.

Brison, Susan. 1997. "Outliving Oneself: Trauma, Memory, and Personal Identity." In *Feminists Rethink the Self*, by Diana Tietjens Meyers. Boulder, CO: Westview Press.

Bryant, Lia, and Garnham, Bridget. 2014. "The Embodiment of Women in Wine: Gender Inequality and Gendered Inscriptions of the Working Body in a Corporate Wine Institution." *Gender, Work and Oragnisation* 21 (5): 411-426.

Butler, Judith. 1997. *The Psychic Life of Power: Theories in Subjection.* Stanford: Stanford University Press.

Callon, Michael, and J.P. Vignolle. 1977. "Breaking Down the Organization: Local Conflicts and Societal Systems of Action." *Social Science of Information* 16: 147-167.

Casper, Monica, and Adele Clarke. 1998. "Making the Pap Smear into the "Right Tool" for the Job: Cervical Cancer Screening in the USA, circa 1940-95',." *Social Studies of Science* 8 (2): 255-290.

Chadha, Gita, and Asha Achuthan. 2017. "Feminist Science Studies: Intersectional Narratives of Persons in Gender-marginal Locations in Science." *Economic and Political Weekly* 52 (17): 33-36.

Chapagain, T, and Yamaji, E. 2010. "The Effects of Irrigation Method, Age of Seedling, and Spacing on Crop Performance, Productivity and Water-Wise Rice Production in Japan." *Paddy & Water Environment* 8: 81-90.

Chatterjee, Piya. 2001. *A Time for Tea.* Durham and London: Duke University Press.

Chauhan, Anita, and R.S. Pirta. 2010. "Public Opinion Regarding Human-Monkey Conflict in Shimla, Himachal Pradesh." *Journal of Human Ecology* 30 (2): 105-109.

Chinn, Sarah E. 2010. "Performative Identities: From Identity Politics to Queer Theory." In *The Sage Handbook of Identities*, by Wetherell Margaret and Chandra Talpade Mohanty, 104-124. London, Thousand Oaks, New Delhi and Singapore: Sage.

Coffey, Amanda. 1999. *The Ethnographic Self: Fieldwork and the Representation of Identity.* London, Thousand Oaks and New Delhi: Sage.

Cohn, Bernard. 1996. *Colonialism and Its Forms of Knowledge: The British in India.* Princeton, NJ: Princeton University Press.

Coleman, Leo. 2016. "Inside and Outside the House." *Journal of Contemporary Ethnography* 1-24.

Crossley, Nick. 1996. "Body-Subject/Body-Power: Agency, Inscription and Control in Foucault and Merleau-Ponty." *Body and Society* 2 (2): 99-116.

—. 2001. *The Social Body: Habit, Identity and Desire.* London, Thousan Oaks, New Delhi: Sage.

CSDS. 2015. *State of Indian Farmers: A Report.* Working Papers ID 6283, Centre for the Study of Developing Societies. Accessed July 7, 2017. http://www.lokniti.org/pdf/Farmers_Report_Final.pdf.

Cussins, Charis. 1996. "Ontological Choreography: Agency through Objectification in Infertility Clinics." *Social Studies of Science* 26 (3): 575-610.

David, I.P. 1978. *Non-sampling Errors in Agricultural Surveys. Review, Current Findings, and Suggestions for Future Research.* Philippine Statistical Association Conference .

de Certeau, Michel. 1984. *The Practice of Everyday Life.* Berkeley: University of California Press.

de Schutter, Olivier. 2011. "How Not to Think ofLand-grabbing: Three Critiques of Large-scale Investments in Farmland." *Journal of Peasant Studies* 38 (2): 249-279.

Delaney, Annie. 2017. "A Comparison of Australian and Indian Garment and Footwear Homeworkers." In *Women, Labor Segmentation and Regulation: Varieties of*

Gender Gaps, by David Peetz and Georgina Murray, 193-210. New York: Palgrave Macmillan.

Deleuze, Gilles. 1997. *Essays Critical and Clinical.* Minneapolis: University of Minnesota Press.

Desai, Bina. 2006. "Inside Out: Rationalizing Practices and Representations in Agricultural Development Projects." In *Development Brokers and Translators: The Ethnography of Aid and Agencies*, by David Lewis and David Mosse, 173-194. Bloomfield, CT: Kumarian Press Inc.

Dhar, Shiva, B.C. Barah, A.K. Vyas, and Norman Uphoff. 2016. "Comparing System of Wheat Intensification (SWI) with standard recommended practices in the northwestern plain zone of India." *Archives of Agronomy and Soil Science* 62: 994-1006.

Dobermann, Achim. n.d. "Another New Rice Yield Record? Let's Move Beyond It." *IRRI.* Accessed 2017 йил 12-August. http://irri.org/blogs/achim-dobermann-s-blog/another-new-rice-yield-record-let-s-move-beyond-it.

Dube, Saurabh. 2017. *Subjects of Modernity: Time-Space, Disciples, Margins.* Manchester: Manchester University Press.

Duff, Cameron. 2010. "On the role of affect and practice in the production of place." *Environment and Planning D: Society and Space* 28: 881-895.

Dumont, L, and B Pocock. 1957. "Village Studies." In *Contributions to Indian Sociology I*, by L Dumont and B Pocock, 23-41. The Hague: Eindresume.

Ebrahim, A. 2003. *NGOs and Organisational Change.* New York: Cambridge University Press.

ENVIS Centre on Himalayan Ecology. 2015. "State at a Glance: Uttarakhand Vol (1)5." Accessed July 23, 2017. http://gbpihedenvis.nic.in/State_at_glance/UK%20Glance/Horticulture_profile.pdf.

Escobar, Arturo. 2008. *Territories of Movements: Place, Movements, Life, Redes.* Durham and London: Duke University Press.

Farooq, S, Indu Sharma, and Nazish M Khan. 2015. "Geomorphic Evidence of Active Tectonics in Eastern Kumaon Himalaya as Deciphered from the Morphometry of Ramganga Basin." *International Journal of Advancement in Earth and Environmental Sciences* 3 (1).

Fechter, Anne Meike, and Heather Hindman. 2011. "Introduction." In *Inside the Everyday Lives of Development Workers: The Challenges and Futures of Aidland*, by Anne Meike Fechter and Heather Hindman. Kumarian Press.

Feldman, Shelley, Stephen Biggs, and Rajeswari Raina. 2010. "A Messy Confrontation of a Crisis in Agricultural Science." *Economic and Political Weekly* XLV (3): 66-71.

Ferichani, Minar, and Dani A. Prasetya. 2017. "System of Rice Intensification Increases Rice Productivity on Saline." *Paddy Water Environment* 15: 649–657.

Fermont, Anneke, and Todd Benson. 2011. *Estimating Yields of Food Crops Grown by Smallholder Farmers: A Review in the Ugandan Context.* International Food Policy Research Institute.

Fernandez, Bina. 2016. *Transformative Policy for Poor Women: A New Feminist Framework.* Abingdon and New York: Routledge.

Feuer, Hart Nadav. 2008. *Sustainable Agricultural Techniques and Performance Oriented Empowerment: An Actor-Network Theory Approach to CEDAC Agricultural and Empowerment Programmes in Cambodia.* MPhil Thesis Submitted to University of Oxford, Oxford: University of Oxford.

Foucault, Michel. 1982. "The Subject and Power." *Critical Inquiry* 8 (4): 777-795.

- 1988. "Technologies of the Self." In *Technologies of the Self: A Seminar with Michel Foucault*, by Luther H. Martin, Huck Gutman and Patrick H. (eds.) Hutton, 16-49. University of Massachusetts Press.

Galison, Peter. 1997. *Image and Logic: Material Culture of Microphysics (C.* Chicago: University of Chicago Press.

Garfinkel, Harold. 1967. *Studies in Ethnomedthology:.* Prentice Hall.

Garforth, Lisa. 2012. "In/Visibilities of Research: Seeing and Knowing in STS." *Science, Technology and Human Values* 37 (2): 264-285.

Gathorne-Hardy, Alfred, D. Narasimha Reddy, and Harriss-White, Babara Venkatanarayana. 2016. "System of Rice Intensification Provides Environmental and

Economic Gains but at the Expense of Social Sustainability — A Multidisciplinary Analysis in India." *Agricultural Systems* 143 (C): 159-168.

Gathorne-Hardy, Alfred, Narasimha D. Reddy, Motkuri Venkatanarayana, and Barbara Harriss-White. 2013. "A Life Cycle Assessment of Greenhouse Gas Emissions from SRI and Flooded Rice Production in SE India." *Taiwan Water Conservancy* 61 (4): 110-125.

Gieryn, Thomas F. 1983. "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists." *American Sociological Review* 48 (6): 781-795.

—. 1999. *Cultural Boundaries of Science: Credibility on the Line.* Chicago and London: University of Chicago Press.

Gliessman, S.R. 2007. *Agroecology: The Ecology of Sustainable Food Systems.* Boca Raton, FL: CRC Press.

Glover, Dominic. 2011. "A System Designed for Rice? Materiality and the Invention/Discovery of the System of Rice Intensification." *East Asian Science, Technology and Society: An International Journal* 5: 217-237.

Goffman, E. 1959. *The Presentation of Self in Everyday Life.* New York: Doubleday.

GOI. 2005. *Land Use Statistics.* Government of India.

Gold, Ann Grodzins. 2017. *Shiptown: Between Rural and Urban North India.* Philadelphia: University of Pennsylvania Press.

Gooding, David. 1990. *Experiment and the Making of Meaning: Human Agency in Scientific Observation and Experiment.* Vol. 5. Dordrecht: Kluwer Academic Publishers.

Gopalakrishnan, Subramaniam, R. Mahender Kumar, Pagidi Humayun, V. Srinivas, and B. Ratna. 2013. "Assessment of Different Methods of Rice (Oryza Sativa. L) Cultivation Affecting Growth Parameters, Soil Chemical, Biological, and Microbiological Properties, Water Saving, and Grain Yield In Rice–Rice System." *Paddy and Water Environment.*

Gordon, Colin. 1991. "Governmental Rationality: An Introduction." In *The Foucault Effect: Studies in Governmentality*, by Graham Burchell, Colin Gordon and Peter Miller, 1-51. Chicago: University of Chicago Press.

Govindrajan, Radhika. 2014. "How to Be Hindu in the Himalayas: Conflicts Over Animal Scarific in Uttarakahdn." In *Shifting Ground: People, Animals,and Mobility in India's Environmental History*, by Mahesh Rangarajahn and K Sivaramakrishnan, 204-227. New Delhi: Oxford University Press.

Gramsci, Antonio. 1971. "Hegemony, Intellectuals and the State." In *Selection from Prison Notebooks*, by Antonio Gramsci, 210-216. London: Lawrence and Wishart.

Greene, M, and D. Hulme. 2005. "From Correlates and Characteristics to Causes: Thinking About." *World Development* 33 (6): 867-879.

Grosz, Elizabeth. 1994. *Volatile Bodies: Toward a Corporeal Feminism .* Bloomington, IN: Allen and Unwin.

Gujja, Biksham, and T.M. Thiyagarajan. 2009. *New Hope for Indian Food Security? The System of Rice Intensification.* London: IIED.

Gulati, Ashok, Nicholas Minot, Chris Delgado, and Saswati Bora. 2005. "Growth in High-value Agriculture in Asia." Linking Small-Scale Producers to Markets: Old and New Challenges, New Delhi.

Gunwant, Vinay Kumar. 2012. "A Comparative Study of Production and Marketing Problems of Vegetables in Nainital and Udham Singh Nagar Districts of Uttarakhand." Kumaon University.

Gupta, Akhil. 2012. *Red Tape: Bureaucracy, Structural Violence, and Poverty in India.* Durham and London: Duke University Press.

Gupta, Akhil, and James Ferguson. 2002. "Spatializing States: Toward an Ethnography of Neoliberal Governmentality." *American Ethnologist* 29 (4): 981–1002.

Gupta, Dipankar. 2000. *Mistaken Modernity: India Between Worlds.* New Delhi: Harper Collins.

Gupta, Dipankar. 2005. "Whither the Indian Village: Culture and Agriculture in 'Rural' India." *Economic and Political Weekly* 40 (8): 751-758.

Gupta, K. 2013. "Unprecedented Growth of Dehradun Urban Area: A Spatio-temporal Analysis." *International Journal of Advancement in Remote Sensing, GIS and Geography* 1 (2): 47-56.

Gutek, Barbara A. 1985. *Sex and the Workplace: Impact of Sexual Behaviour and Harassment on Women, Men and Organisations.*

Hames-Garcia, Michael R. 2000. ""Who Are Our Own People?": Challenges for a Theory of Social Identity." In *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism*, by Paula M.L. Moya and Michael R. Hames-Garcia, 102-132. Berkeley, Los Angeles and London: California University Press.

Haraway, Donna. 1988. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14 (3): 575-599.

Harriss-White, Barbara, D.K. Mishra, and Vandana Upadhyay. 2009. "Institutional Diversity and Capitalist Transition: The Political Economy of Agrarian Change in Arunachal Pradesh, Indian." *Journal of Agrarian Change* 9: 512-547.

Hasson, S, J Böhner, and V Lucarini. 2017. "Prevailing Climatic Trends and Runoff Response from Hindukush-Karakoram-Himalaya, Upper Indus Basin." *Earth System Dynamics* 8: 337-355. Accessed October 11, 2016. https://arxiv.org/ftp/arxiv/papers/1503/1503.06708.pdf.

Heitzman, James. 2008. *The City in South Asia.* London: Routledge.

Hellin, Jon, Mark Lundy, and Madelon Meijer. 2009. "Farmer Organization, Collective Action and Market Access in Meso-America." *Food Policy* 34 (1): 16-22.

Hempel, Carl. 1970. "Fundamentals of Concept Formation in Empirical Science." In *Foundations of the Unity of Science, Volume 2*, by Rudolf Carnap and C Morris Otto Neurath, 651-746. Chicaho, IL: University of Chicago Press.

Herzfeld, Michael. 2004. *The Body Impolitic: Artisans and Artifice in the Global Hierarchy of Value.* Chicago: University of Chicago Press.

Hine, Christine. 2006. "Databases as Scientific Instruments and Their Role in the Ordering of Scientific Work." *Social Studies of Science* 36 (2): 269-298.

Hosein, Gabrielle. 2009. "Food, Family, Art and God: Aesthetic Authority in Public Life in Trinidad." In *Anthropology and the Individual: A Material Culture Perspective*, by Daniel Miller, 159-177. New York: Berg.

Husain, A.M. Muazzam, Barua Proloy, and Shantana Rani Halder. 2003. *Verification and Refinement of the System fo Rice Intensification (SRI) Project in Selected Areas of Bangladesh.* Trial Monitoring Survey Report: On Chatkhil and Begumgonj in Noakhali District, BRAC.

India, Forest Survey of. 2015. *India State of Forest Report.* Forest Survey of India.

IPCC. 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change .* Cambridge and New York: Cambridge University Press.

Ives, Jack D., and Bruno Messerli. 1989. *The Himalayan Dilemma: Reconciling Development and Conservation.* London and New York: Routledge.

Jacka, Tamara. 1994. "Countering Voices: An Approach to Asian and Feminist Studies in the 1990s." *Women's Studies International Forum* 17 (6): 663-672.

Jacobson, Doranne, and Susan S. Wadley. 1977. *Women in India: Two Perspectives.* New Delhi: Manohar Books.

Jamison, Rachel J., and John H. Perkins. 2010. "The History of Organic Agriculture." In *The Conversion to Sustainable Agriculture: Principles, Processes, and Practices*, by Stephen R. Gliessman and Martha (eds.) Rosemeyer, 48-63. Boca Raton, London and New York: CRC Press.

Jeffrey, Craig. 2010. *Timepass: Youth, Class and the Politics of Waiting in India.* Stanford, CA: Stanford University Press.

Jodhka, Surinder. 2015. "Revisiting the Rural in 21st Century India." *Economic and Political Weekly* 51 (26-27).

Joshi, Sanjay. 2002. *Fractured Modernity: Making of a Middle Class in Colonial North India.* New Delhi: Oxford University Press.

Kannan, K.P. 1990. "Secularism and People's Science Movement in India." *Economic and Political Weekly* 25 (6): 311-313.

Kanter, Elizabeth Moss. 1977. *Men and Women of the Corporation.* New York: Basic Books.

Kapoor, Abeer. 2016. "Agrarian Riots And Rural Distress: Is India's Countryside Burning?" *The Wire.* October 19. Accessed November 6, 2016. http://thewire.in/74046/is-the-countryside-burning/.

Katz, Cindy. 2004. *Growing Up Global: Economic Restructuring and Children's Everyday Lives.* Minneapolis: University of Minneapolis Press.

Keiler, Margaret, Jasper Knight, and Stephan Harrison. 2010. "Climate Change and Geomorphological Hazards in the Eastern Europea Alps." *Philosophical Transactions of the Royal Society A* 2461-2479.

Kelly, Ann. 2008. "Pragmatic Evidence and the Politics of Everyday Practice." In *How do we know? Evidence, Ethnography, and the Making of Anthropological Knowledge*, by Liana Chua, Casey High and Timm Lau. Newcastle: Cambridge Scholars Publishing.

Knorr-Cetina, Karin. 1981. *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science.* Oxford, New York, Potts Point, Paris and Hammerweg: Pergamon Press.

—. 1999. *Epistemic Cultures: How the Sciences Make Knowledge.* Cambridge and London: Harvard University Press.

—. 2001. "Objectual Practice." In *The Practice Turn in Contemporary Theory*, by Theodore Schatzki, Karin Knorr Cetina and Eike Von Savigny, 175-188. London and New York: Routledge.

Kumar, Nilotpal. 2016. *Unraveling Farmer Suicides in India: Egoism and Masculinity in Peasant Life.* New Delhi: Oxford University Press.

Kumar, Satendra. 2015. "Agrarian Transformation and the New Rurality in Western Uttar Pradesh." *Economic and Political Weekly* 51 (26-27): 61-71.

Kumara, Honnavalli N, Shanthala Kumar, and Mewa Singh. 2010. "Of How Much Concern are the 'Least Concern' Species? Distribution and Conservation Status of Bonnet Macaques, Rhesus Macaques and Hanuman Langurs in Karnataka, India." *Primate* 51 (1).

Kupers, Wendelin M. 2015. *Phenomenology of the Embodied Organization: The Contribution of Merleau-Ponty for Organizational Studies and Practice.* Hampshire and New York: Palgrave Macmillan.

Latif, M.A., M.Y. Ali, M.R. Islam, M.A. Badshah, and M.S. Hasan. 2009. "Evaluation of management principles and performance of the System of Rice." *Field Crops Research* 114: 255–262.

Latour, Bruno. 1987. *Science in Action.* Cambridge: Harvard University Press.

—. 1990. "Drawing Things Together." In *Representation in Scientific Practice*, by M Lynch and Steve Woolgar, 19-69. Cambridge: MIT Press.

—. 1996. "On Actor-Network Theory. A Few Clarifications Plus More Than a Few Complications." *Soziale Welt* 47: 369-381.

—. 1999. *Pandora's Hope.* Harvard University Press.

Latour, Bruno, and Steve Woolgar. 1986. *Laboratory Life: The Construction of Scientific Facts.* Princeton, NJ: Princeton University Press.

Laulanie, Henri de. 1992. "Technical Presentation of the System of Rice Intensification, Based on Katayama's Tillering Model."

Law, John, and Marianne Elisabeth Lien. 2012. "Slippery: Field Notes in Empirical Ontology." *Social Studies of Science* 43 (3): 363–378.

Lewis, Oscar. 1966. "The Culture of Poverty." *American* 215 (4): 19-25.

Li, Tana. 1996. *Peasants on the Move: Rural-Urban Migration in the Hanoi Region.* Singapore: Institute of South East Asian Studies.

Li, Tania Murray. 2009. "Exit from Agriculture: A Step Forward or a Step Backward for the Rural Poor?" *Journal of Peasant Studies* 36 (3): 629-636.

—. 2011. "Rendering Society Technical: Government and Community and the Ethnographic Turn at the World Bank in Indonesia." In *Adventures in Aidland: The Anthropology of Professionals in International Development*, by David Mosse, 57-80. Berghahn.

Lies, Alastair, Garrett Graddy-Lovelace, Maywa Montenegro, and Ryan Galt. 2016. "Agricultural Systems: Co-producing Knowledge and Food." In *The Handbook of Science and Technology Studies*, by Ulrike Felt, Ravyon Fouché and Clark A. Miller, 943-972. Cambridge, MA: MIT Press.

Lofland, J, and L.H. Lofland. 1995. *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis.* 3rd. Belmont, CA: Wadsworth.

Lokanadhan, Subbulakshmi, S. Manonmani, K. Mohana Sundaram, and p. mUTHU Krishnan. 2010. "A Method to Refine Seed Selection for Boosting Rice Yields Under SRI Method of Rice Cultivation." *Paper Presented at Rice for Future Generations, the Third International Rice Congress (IRC).* Hain, Vietnam.

Long, Norman. 1999. "The Multiple Optic of Interface Analysis." *UNESCO Background Paper on Interface Analysis.* October. Accessed November 7, 2017. http://lanic.utexas.edu/project/etext/llilas/claspo/workingpapers/multipleoptic.pdf.

Mani, Kunnikuyi S, and P.S. Anirudhanin. 2013. *Mahatma Ayyankali: Ayyankaliyude Ariyapedathu Charitram.* D.C. Books.

Markelova, H., R. Meinzen-Dick, J. Hellin, and S. Dohrn. 2009. "Collective Action for Smallholder Market Access." *Food Policy* 34: 1-7.

Martin, Brian. 2016. "STS Interventions: Preparing, Defending, Learning." *Engaging Science, Technology and Society* 2: 83-87.

Massey, Doreen. 1984. *Spatial Divisions of Labour: Social Structures and the Geography of Production.* Hampshire and London: Palgrave Macmillan.

—. 1994. *Space, Place and Gender.* Minneapolis, MN: University of Minnesota Press.

Massumi, B. 2002. *A User's Guide to Capitalism and Schizophrenia: Deviations from Deleuze and Guattari.* Cambridge: MIT Press.

Mathur, Nayanika. 2016. *Paper Tiger: Law, Bureaucracy and the Developmental State in Himalayan India.* Cambridge: Cambridge University Press.

Mawdsley, Emma. 2010. "The Abuse of Religion and Ecology: The Vishva Hindu Parishad and Tehri Dam." In *Culture and Environment in the Himalaya*, by Arjun (ed) Guneratne, 151-165. New York and London: Routledge.

McAllum, Mary Anne. 2018. *Young Bisexual Women's Experiences in Secondary Schools.* New York and Oxon: Routledge.

McDonald, A.J., P.R. Hobbs, and S.J. Riha. 2008. "Stubborn Facts: Still No Evidence That the System of Rice Intensification." *Field Crops Research* 108: 188-191.

McDonald, James. 1999. "The Neoliberal Project and Governmentality in Rural Mexico: Emergent Farmer Organization in Rural Michoacan Highlands." *Human Organization* 58 (3): 274-284.

Meadows, Michael E, and Jiun Chan Lin. 2016. *Geomorpohology and Society: Advances in Geographical and Environmental Sciences.* Springer.

Mencher, Joan P. 1988. "Women's Work and Poverty: Women's Contribution to Household Maintenance in South India." In *A Home Divided: Women and Income in the Third World*, by Daisy Dwyer and Judith (eds.) Bruce, 99-119. Stanford: Standford University Press.

Menete, M. Z. L., H. M. van Es, R. M. L. Brito, and S. D. DeGloria. 2008. "Evaluation of System of Rice Intensification (SRI) Component Practices and their Synergies on Salt-affected Soils." *Field Crops Research* 109: 34-44.

Mines, Diane P., and Nicholas Yazgi. 2010. In *Village Matters: Relocating Villages in the Contemporary Anthropology of India*, by Diane P. Mines and Nicholas Yazgi. Delhi: Oxford University Press.

Mishra, Niti, and Gargi Chaudhuri. 2015. "Spatio-temporal Analysis of Trends in Seasonal Vegetation Productivity across Uttarakhand, Indian Himalayas, 2000-2014." *Applied Geography* 56: 29-41.

Mohanty, Chandra Talpade. 1984. "Under Western Eyes: Feminist Scholarship and Colonial Discourses." *boundary 2* 12 (3): 333-358.

—. 1997. "Women Workers and Capitalist Scripts: Ideologies of Domination, Common Interests and the Politics of Solidarity." In *Feminist Genealogies, Colonial Legacies, Democratic Futures*, by Chandra Talpade Mohanty and M. Jacqui Alexander, 3-30. New York: Routledge.

Mohanty, Satya P. 2000. "The Epistemic Status of Cultural Identity: On Beloved and the Postcolonial Condition." In *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism*, by Paula M.L. Moya and Michael R (eds.) Hames-Garcia, 29-66. Berkeley, Los Angeles and London: University of California Press.

Mol, Annemarie. 2012. "Mind Your Plate!: The Ontonorms of Dutch Eating." *Social Studies of Science* 43 (3): 379–396.

Moore, Donald S. 1998. "Subaltern Struggles and the Politics of Place: Remapping Resistance in Zimbabwe's Eastern." *Cultural Anthropology* 13 (3): 344-381.

Mosse, David. 1995. "Authority, Gender and Knowledge-Theoretical Reflections on Participatory Rural Appraisal." *Economic and Political Weekly* 30 (11): 569-578.

—. 2007. "Notes on the ethnography of expertise and professionals in international development." *Ethnografeast III: 'Ethnography and the Public Sphere'*. Lisbon. http://ceas.iscte.pt/ethnografeast/papers/david_mosse.pdf.

Moya, Paula M.L. 2000. "Reclaiming Identity." In *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism*, by Paula M.L. Moya and Michael R. (eds.) Hames-Garcia, 1-28. Berkeley, Los Angeles and London: University of California Press.

Nagar, Richa. 2006. *Playing with Fire: Feminist Thought and Activism through Seven Lives in India.* Minneapolis, MN: University of Minnesota Press.

Nanda, M. 2002. *Breaking the Spell of Dharma and Other Essays.* New Delhi: Three Essays Press.

Nelson, L.E. 1998. "The Dualism of Nondualism: Advaita Vedanta and the Irrelevance of Nature." In *Purifying the Earthly Abode of God*, by L.E. (ed) Nelson. New York: SUNY Press.

NSSO. 2005. *Situation Assessment Survey of Farmers: Some Aspects of Farming, 59th Round (January-December 2003).* New Delhi: National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India.

O'Reilly, Kathleen. 2004. "Developing Contradictions: Women's Participation as a Site of Struggle Within an Indian NGO." *The Professional Geographer* 56 (2): 174-184.

Ortner, Sherry. 2006. *Anthropology and Social Theory: Culture, Power and the Acting Subject.* Durham and London: Duke University Press.

Osella, Filippo, and Caroline Osella. 2000. *Social Mobility in Kerala: Modernity and Identity in Conflict.* London and Sterling: Pluto Press.

Ozkazanc-Pan, Banu, and Marta B. Calás. 2015. "From Here to There and Back Again: Transnational Perspectives on Diversity in Organizations ." In *The Oxford Handbook of Diversity in Organizations*, by Inge Bleijenbergh, Elina Henttonen, and Albert J. Mills (eds.) Regine Bendl, 575-602. Oxford: Oxford University Press.

Palanisami, K, KR Karunakaran, and U Amarasignhe. 2013. "Doing Different Things or Doing it Differently? Rice Intensification Practices in 13 states of India." *Economic and Political Weekly* 48: 51-58.

People's Science Institute. 2009. "Up-scaling SRI in the Mountain States of Uttarakhand and HP." August 3. Accessed April 19, 2017. https://www.slideshare.net/SRI.CORNELL/0875-upscaling-sri-in-mountain-states-of-uttarakhand-and-hp.

Peritore, N Patrick. 1999. *Third World Environmentalism: Case Studies from the Global South.* University Press of Florida.

Phillip, Kavita. 2001. "Seeds of Neo-colonialism? Reflections on Ecological Politics in the New World Order." *Capitalism, Nature, Socialism* 12 (2): 3-47.

—. 2008. "Producing Transnational Knowledge, Neoliberal Identities and Technoscientific Practice in India." In *Tactical Biopolitics: Art, Activism and Technoscience*, by Beatriz da Costa and Kavita Phillip, 243-268. Cambridge, MA and London: Massachusetts Institute of Technology.

Pickering, Andrew. 1992. *Science as Practice and Culture.* Chicago and London: University of Chicago Press.

Pigg, Stacy Leigh. 1992. "Inventing Social Categories through Place: Social Representations and Development in Nepal." *Comparative Studies in Society and History* 34 (3): 491-513.

Pigg, Stacy Leigh. 1996. "The Credible and the Credulous: The Question of "Villagers' Beliefs" in Nepal." *Cultural Anthropology* 11 (2): 160-201.

Pinch, Trevor R., and Wiebe E. Bijker. 1984. "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other." *Social Studies of Science* 14 (3): 399-441.

Poate, Derek C., and P.F. Daplyn. 1988. *Data for Agrarian Development.* Cambridge: Cambridge University Press.

Potter, Jonathan, and Margaret Wetherell. 1987. *Discourse and Social Psychology: Beyond Attitudes and Behaviour.* Sage: London, Thousand Oaks and New York.

Prasad, Shambu C. 2014. "Uprooting Rice Science to Building a Research Community : Research Policy Challenges and Prospects of SRI in India." New Delhi. Accessed November 8, 2017. http://www.sri-india.net/event2014/documents/presentations/Presentation_20.pdf.

Prasad, Shambu C., and Prajit Basu. 2005. "Understanding Scientific Controversies: The System of Rice Intensification." *4th Annual IWMI Tata Partners Meet.*

Prentice, Rebecca. 2008. "Knowledge, Skill, and the Inculcation of the Anropologist: Reflections on Learning to Sew in the Field." *Anthropology of Work Review* XXIX (3): 54-61.

Prosser, Jay. 1998. *Second Skins: The Body Narratives of Transsexuality.* New York: Columbia University Press.

Rabenandasandra, J. 1999. "Revolution in Rice Intensification in Madagascar." *ILEIA: Newsletter for Low External Input and Sustainable Agriculture* 15 (3/4): 48-49.

Rafaralahy, Sebastien. 2002. "An NGO Perspective on SRI and its Origins in Madagascar." Accessed 2017 йил 11-August. http://sri.ciifad.cornell.edu/proc1/sri_05.pdf.

Raheja, Gloria Goodwin, and Ann Grodzins Gold. 1994. *Listen to the Heron's Words: Reimagining Gender and Kinship in North India.*

Raina, Dhruv. 2012. "The Naturalization of Modern Science in South Asia: A Historical Overview of the Process of Domestication and Globalization." In *The*

Globalization of Knowledge in History, by Renn (ed) Jürgen, 345. Germany: epubli: GmbH.

Randriamiharisoa, Robert, and Norman Uphoff. 2002. "Factorial Trials Evaluating the Separate and Combined Effects of SRI Practices." *Proceedings of the International Conference on Assessments of the System of Rice Intensification (SRI).* Sanya.

Rangan, Haripriya. 1996. "From Chipko to Uttaranchal: The Environment of Protest and Development in the Indian Himalaya." In *Liberation Ecologies: Environment, Development and Social Movements*, by Richard Peet and Michael Watts, 371-393. London and New York: Routledge.

Rangarajan, Mahesh, and K Sivaramakrishnan. 2014. "Introduction." In *Shifting Ground: People, Animals and Mobility in India's Environmental History*, by Mahesh Rangarajan and K Sivaramakrishnan, 1-38. New Delhi: Oxford University Press.

Ravindra, A. 2009. "SRI Promotion in India: Overview of System Architecture." August. Accessed 1 April, 2017. https://www.slideshare.net/SRI.CORNELL/0913-sri-promotion-in-india-overview-of-system-architecture.

Rawat, S. 1999. *Forest Management in the Kumaon: Struggle of the Marginalised People.* New Delhi: Indus Publishing Company.

Rigg, Jonathan. 2006. "Land, Farming, Livelihoods, and Poverty : Rethinking the Links in the Rural South." *World Development* 34 (1): 180-202.

—. 2001. *More Than the Soil: Rural Change in Southeast Asia.* London and New York: Routledge.

Riley, Denise. 1988. *'Am I That Name?' Feminism and the Category of 'Women' in History.* London: Macmillan Press.

Robbins, Joel. 2013. "Beyond the Suffering Subject: Toward an Anthropology of the Good." *Journal of the Royal Anthropological Institute (N.S.)* 19: 447-62.

Roger, P.A., and J.K. Ladha. 1992. "Biological N2 Fixation in Wetland Rice Fields: Estimation and Contribution to Nitrogen Balance." In *Biological Nitrogen Fixation for Sustainable Agriculture: Extended Versions of Papers Presented at Role of Biological Nitrogen Fixation in Sustainable Agriculture at the 13th Congress of Soil Sciences, Kyoto, Japan 1990*, by J.K. Ladha, T George and C. Bohlool, 41-55. Dordrecht: Spimger Science Business Media.

Rose, Hilary. 2004. "Hand, Brain, and Heart: A Feminist Epistemology for the Natural Sciences." In *A Feminist Standpoint Theory Reader*, by Sandra Harding, 67-80. New York: Routledge.

Rose, Nikolas. 2011. "Identity, Genealogy, History." In *Questions of Cultural Identity*, by Stuart Hall and Paul du Gay, 128-150. Los Angeles, London, New Delhi, Singapore, Washington D.C.: Sage.

S.K., Natasha. 2017. "Truth and Truth-Telling in the Agricultural Biotechnology Debate in India." *Discourse and Society.*

SANDRP. 2013. "Uttarakhand: Existing, Under Construction and Proposed

Hydropower Projects:."

http://sandrp.in/copy_of_Uttarakhand_Existing_under_construction_and_proposed_Hydr

opower_Projects_August2013.pdf. August. Accessed November 6, 2016.

http://sandrp.in/copy_of_Uttarakhand_Existing_under_construction_and_proposed_Hydr

opower_Projects_August2013.pdf.

Sanghi, and Shambu C Prasad. n.d. "Recommendations Emerging from the Round

Table on SRI for 12th FYP organised by the National Consortium on SRI." *SRI India.*

http://www.sri-india.net/Round_Table_Discussion/Documents/DrSanghi_DrShambu.pdf.

Saraswat, Raghav, Anindya Sinha, and Sindhu Radhakrishna. 2015. "A god becomes a

pest? Human-rhesus Macaque Interactions in Himachal Pradesh, Northern India."

European Journal of Wildlife Research 61: 435–443.

Sarkar, Rinki. 2008. "Decentralised Forest Governance in Central Himalayas: A Re-

Evaluation of Outcomes." *Economic and Political Weekly* 43 (18): 54-61, 63.

Schatzki, Theodore. 2001. "Introduction: Practice Theory." In *The Practice Turn in*

Contemporary Theory, by Theodore Schatzki, Karin Knorr-Cetina and Savigny, 1-14.

New York and London: Routledge.

Scoones, Ian. 2009. "Livelihoods Perspectives and Rural Development." *The Journal of*

Peasant Studies 36(1): 171-196.

Scott, James C. 1985. *Weapons of the Weak: Everyday Forms of Peasant Resistance.* New Haven, CT: Yale University Press.

—. 2009. *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia.* London and New Haven: Yale University Press.

Setten, Gunhild. 2004. "The Habitus, the Rule and the Moral Landscape." *Cultural Geographies* 11 (4): 389-415.

Shah, Esha. 2009. "Debating Knowledge: New Spaces of Conversation." *Seminar.*

Shah, N.C. 1970. "Special Crops in Kumaon and Uttarakhand." *Indian Drugs and Pharmaceutical Industry* 35-40.

—. 1996. "Norman Gill - The Pioneer Horticulturist of the Hills of Uttar Pradesh A Tribute." *Indian Journal of History of Science* 31 (4): 383-390.

Sharma, Aradhana. 2006. "Crossbreeding Institutions, Breeding Struggle: Women's Empowerment, Neoliberal Governmentality and State (Re)Formation in India." *Cultural Anthropology* 21 (1): 60-96.

Sharma, Aradhana, and Akhil Gupta. 2006. "Introduction." In *The Anthropology of the State: A Reader*, by Aradhana Sharma and Akhil (eds) Gupta, 1-42. Malden, Oxford and Carlton: Blackwell Publishing.

Sharma, Neena. 2015. "Chakbandi to Become Reality in State Soon." *The Tribune.* October 7. Accessed July 21, 2017.

http://www.tribuneindia.com/news/uttarakhand/community/chakbandi-to-become-reality-in-state-soon/142559.html.

Sharma, Vijay Paul, Bill Vorley, Jikun Huang, Abid Qaiyum Suleri, Larry Digal, and Thomas A. Reardon. 2013. *Linking Smallholder Producers to Modern Agri-Food Chains: Case Studies from South Asia, Southeast Asia and China.* New Delhi: Allied Publishers.

Sheehy, Sinclair, and Cassman. 2005. "Curiosities, Nonsense, Non-science and SRI." *Field Crops Research* 91: 355-356.

Shildrick, Margaret, and Janet Price. 1998. "Introduction: Vital Signs: Texts, Bodies and Biomedicine." In *Vital Signs: Feminist Reconstructions of the Biol/Logical Body*, by Margaret Shildrick and Janet (eds.) Price, 1-17. Edinburgh: Edinburgh University Press.

Shilling, Chris. 1993. *The Body and Social Theory.* London, New York and Delhi: Sage.

Shrestha, Uttam Babu, Shiva Gautam, and Kamaljit S. Bawa. 2012. "Widespread Climate Change in the Himalayas and Associated Changes in Local Ecosystems." *Local Ecosystems. PLoS ONE* 7 (5).

Simmons, Ruth, Mita Rezina, and Michael A Koenig. 1992. "Employment in Family Planning and Women's Status in Bangladesh." *Studies in Family Planning* 23 (2): 97-109.

Simpson, Bob, and Salla Sariola. 2012. "Blinding authority: Randomised clinical trials and the production of global scientific knowledge in contemporary Sri Lanka." *Science, Technology and Human Values* 37 (5): 555-575.

Singh, Man. n.d. "Demonstration of Crop Cutting Experiment." In *Techniques of Estimation and Forecasting of Crop Production in India*, by U.C. Sud, Hukum Chandra and Aditya Kaustuv, 192-204. New Delhi: IASRI.

Singh, R.B., and Suraj Mal. 2014. "Trends and Variability of Monsoon and Other Rainfall." *Atmospheric Science Letters* 15 (3): 218–226.

Singh, R.B., Udo Shickhoff, and Suraj Mal. 2016. "Introduction." In *Climate Change, Glacier Response, and Vegetation Dynamics in the Himalaya: Contributions Toward Future Earth Initiatives*, by R.B. Singh, Udo Shickhoff and Suraj (eds.) Mal, 2-22. Springer.

Singh, Sukhpal, and Naresh Singla. 2011. *Fresh Food Retail Chains in India: Organisation and Impacts.* Allied, New Delhi: Centre for Management in Agriculture.

Sinha, Subir, Shubra Gururani, and Brian Greenberg. 1997. "The "New Traditionalist" Discourse of Indian Environmentalism." *Journal of Peasant Studies* 24 (3): 65-99.

Stockbridge, A Dorward, J Kydd, J Morrison, and N Poole. 2003. *Farmer Organisations for Market Access: Issues from a Literature Review on Global Experience and Theoretical Analysis.* London: Department of Agricultural Sciences, Imperial College.

Stoop, Willem A., Norman Uphoff, and Amir Kassam. 2002. "A Review of Agricultural Research Issues Raised by The System of Rice Intensification (SRI) from Madagascar: Opportunities for ImprovingFarming Systems for Resource-Poor Farmers." *Agricultural Systems* 71: 249–274.

Stoop, Willem. 2011. "The Scientific Case for System of Rice Intensification and its Relevance for Sustainable Crop Intensification." *International Journal of Agricultural Sustainability* 9 (3): 443-455.

Strahorn, Eric. 2009. *An Environmental History of Postcolonial North India: The Himalayan Tarai in Uttar Pradesh and Uttarakhand.* New York, Washington D.C./Baltimore, Bern, Frankfurt am Main, Berlin, Brussels, Vienna, Oxford: Peter Lang.

Styger, Erica, and Norman Uphoff. 2016. *The System of Rice Intensification (SRI): Revisiting Agronomy for a Changing Climate.* Practice Brief Climate-smart Agriculture, Global Alliance for Climate-smart Agriculture. Accessed December 11, 2016. https://cgspace.cgiar.org/rest/bitstreams/82409/retrieve.

Surabhi, Mittal, Gaurav Tripathi, and Deepti Sethi. 2008. *Development Strategy for the Hill Districts of Uttarakhand.* Working Paper 217, Indian Council for Research on International Economic Relations. Accessed December 12, 2016. http://icrier.org/pdf/Working_Paper_217.pdf.

Suresh, K.G. 2006. *A Comparative Study of Nutrient Management in Paddy Under SRI and Traditional Methods of Cultivation.* Master's thesis submitted to the University of Agricultural Sciences, Dharwad.

Thadani, Rajesh, and Mark S. Ashton. 1995. "Regeneration of Banj Oak (Quercus leuchotrichophora) in Central Himalaya." *Forest Ecology and Management* 78 (1): 217-224.

Thakur, Amod. 2010. "Critiquing SRI Criticism: Beyond Scepticism." *Current Science* 8 (10): 294-1299.

Thakur, Amod, and Norman Uphoff. 2017. "How the System of Rice Intensification Can Contribute to Climate-smart Agriculture." *Agronomy Journal* 109 (4).

Thakur, Amod, Norman Uphoff, and Edna Antony. 2010. "An Assessment of Psychological Effects of System of Rice Intensification (SRI) Practices in India Compared with Recommended Rice Cultivation Practices in India." *Experimental Agriculture* 46 (1): 77-98.

Thakur, Manish. 2014. "Understanding Ruralities: Contemporary Debates." *Research Process* 2 (2): 1-15.

Thapan, Meenakshi. 2009. *Living the Body: Embodiment, Womanhood and Identity in Contemporary India.* Los Angeles, London, New Delhi and Singapore: Sage.

The Indian Express. 2016. "Uttarakhand: 50 Skeletons, Belonging to 2013 flood victims, found, says police." *The Indian Express.* October 16. Accessed July 21, 2017. http://indianexpress.com/article/india/india-news-india/uttarakhand-50-skeletons-found-belonging-to-2013-flood-victims-says-police-3085548/.

The Tribune. 2016. "State Has Big Potential for Citrus Fruit Farming." January 4. Accessed October 12, 2016. http://www.tribuneindia.com/news/uttarakhand/state-has-big-potential-for-citrus-fruit-farming-cm/178962.html.

Thiyagarajan, T.M., V. Velu, S Ramasamy, D Durgadevi, K Govindarajan, and r Priyadarshini. 2002. "Effects of SRI Practices on Hybrid Rice Performance in Tamil Nadu, India." In *Water-wise Rice Production*, by Hengsdijk H, Hardy B, Bindraban PS, Tuong TP, Ladha JK, Bouman BAM, 119-128. Los Banos, Phillippines: IRRI.

Thrift, Nigel. 2007. *Non-representational Theory: Space, Politics, Affect.* London: Routledge.

Tiki, Sabarmatee. 2015. "SRI: A Practice That Transforms the Lives of Women." *Leisa India: Magazine of Low External Input Sustainable Agriculture* 17 (4): 18-20. Accessed November 6, 2017. http://leisaindia.org/articles/sri-a-practice-that-transforms-the-lives-of-women/.

Timmerman, Stefan. 2006. *Postmortem: How Medical Examiners Explain Suspicious Deaths.* Chicago: University of Chicago Press.

Tomalin, E. 2002. "The Limitations of Religious Environmentalism for India." *Worldviews: Environment, Culture, Religion* 6 (1): 12-30.

Tripathi, Prakash. 2008. "History of Apple Cultivation in Uttarakhand." *Asian Agri-History Foundation* 1: 61-66.

Trouillot, Michel-Rolph. 2003. *Global Transformations: Anthropology and the Modern World.* Palgrave Macmillan.

Turner, Bryan. 1984. *The Body and Society: Exploration in Social Theory.* New York, London, Delhi: Sage.

—. 2008. *The Body and Society: Explorations in Social Theory.* Los Angeles, London, New Delhi and Singapore: Sage.

Tuteja, Usha. 2013. "Baseline Data on Horticultural Crops in Uttarakhand." *Agriculture Economics Research Centre.* Accessed November 7, 2017. https://www.google.co.in/search?q=Baseline+Data+on+Horticultural+Crops+in+Uttarakhand&oq=Baseline+Data+on+Horticultural+Crops+in+Uttarakhand&aqs=chrome..69i57j69i61.175j0j7&sourceid=chrome&ie=UTF-8.

UFRMP. 2015. *Uttarakhand Forest Resource Management Project.* Accessed October 24, 2016. http://www.jicauttarakhand.org/Management_society.php.

United Provinces of Agra and Oudh (India) Department of Land Records and Agriculture. 1914. *Report on the Agricultural Stations of the Western Circle, Agra and Oudh.* United Provinces: Government Press.

Upadhya, Carol. 2016. *Reengineering India: Work, Capital, and Class in an Offshore Economy.* New Delhi: Oxford University Press.

Uphoff, Norman. 1997. "System of Rice Intensification in Madagascar: A Study in Synergy." Accessed November 8, 2017. http://agris.fao.org/agris-search/search.do?recordID=ID1999000037.

—. Forthcoming. *Agroecology and Sustainable Food Systems.*

Uphoff, Norman T., and R Randriamiharisoa. 2002. *Reducing Water Use in Irrigated Rice Production with the Madagascar System of Rice Intensification.* Vols. Proceedings of

the International Workshop on Water-wise Rice Production, 8-11 April 2002, Los Baños, Philippines., in *Water-wise Rice Production*, by B.A.M Bouman, H. Hensdijk, B Hardy, P.S. Bindraban, T.P. Tuong and J.K. Ladha, 71-88. Los Baños, Philippines: International Rice Research Institute.

Uphoff, Norman, Amir Kassam, and Willem Stoop. 2007. "A Critical Assessment of a Desk Study Comparing Crop Production Systems: The Example of the 'System of Rice Intensification' Versus 'Best Management Practice'." *Field Crops Research* 108: 109-114.

Urbasaitis, Bryan Mark. 2009. *Wounded Healers & Reconciliation Fatigue: The Search for Social Justice & Sustainable Development in South Africa.* Saarbruecken: VDM Verlag Dr. Mueller.

Varma, P.K. 1998. *The Great Indian Middle Class.* Penguin.

Vasavi, A.R. 1994. "Hybrid Times, Hybrid People: Culture and Agriculture in South India." *Man* 28: 283-300.

—. 2009. "Suicides and the Making of India's Agrarian Distress." *South African Review of Sociology* 40 (1): 94-108.

Vasavi, A.R., and R Vijayabaskar. 2016. "The Problem." *Seminar* 682.

Vidal, John. 2013. "India's Rice Revolution." *The Guardian.* 16-February. Accessed 2017 14-August. https://www.theguardian.com/global-development/2013/feb/16/india-rice-farmers-revolution.

Wadley, Susan Snow. 1995. "No Longer a Wife: Widows in Rural North India." In *From the Margins of Hindu Marriage: Essays on Gender, Religion, and*, by Lindsey and Courtwright, Paul B. Harlan, 92-118. New York and Oxford: Oxford University Press.

—. 2000. "From Sacred Cow Dung to Cow 'shit': Globalization and Local Religious Practices in Rural North India." *Journal of the Japanese Association for South Asian Studies* 12: 1-28.

—. 2008. "In Search of the Hindu "Peasants'" Subjectivity." *India Review* 7 (4): 320-348.

Wajcman, Judy. 2000. "Reflections on Gender and Technology Studies: In What State is the Art?" *Social Studies of Science* 30 (3): 447-464.

Walford, Antonia. 2013. *Transforming Data: An Ethnography of Scientific Data from the Brazilian Amazon. PhD Dissertation.* IT-Universitetet i København. .

Walkerdine, Valerie, and Peter Bansel. 2010. "Neoliberalism, Work and Subjectivity: Towards a More Complex Account." In *The Sage Handbook of Identities*, by Margaret Wetherell and Chandra Talpade Mohanty, 492-507. Los Angeles, London, New Delhi, Singapore, Washington D.C.: Sage.

Wetherell, Margaret. 1998. "Positioning and Interpretative Repertoires: Conversation Analysis and Post-structuralism in Dialogue." *Discourse and Society* 9 (3): 387-412.

Whatmore, Sarah. 1991. *Farming Women: Gender, Work and Family Enterprise.* Houndmills: Macmillan.

White, Ben. 2012. "Agriculture and the Generation Problem: Rural Youth, Employment and the Future of Farming." *IDS Bulletin* 43 (6): 9-19.

Williams, Catharina Purwani. 2005. "'Knowing One's Place': Gender, Mobility and Shifting Subjectivity in Eastern Indonesia." *Global Networks* 5 (4): 401-417.

Winner, Langdon. 1980. "Do Artifacts Have Politics?" *Daedalus* 9 (1, Modern Technology: Problem or Opportunity?): 121-136.

Woolgar, Steve, and Javier Lezaun. 2013. "The Wrong Bin Bag: A Turn to Ontology and Science and Technology Studies." *Social Studies of Science* 43 (3): 321-340.

Zea, Leopoldo. 1992. *The Role of the Americas in History.* Savage: Rowman and Littlefield Publishers, Inc.

Zuiderant-Jerak, Teun. 2016. "If Intervention is Method, What Are We Learning." *Engaging Science, Technology and Society* 2: 73-81.

Biographical Data

NATASHA S.K.

C-1203, Elita · N. Dutta Marg · D.N. Nagar · Andheri (W) · Mumbai 400053

+91 98605 77631

koshy.natasha@gmail.com · nskoshy@syr.edu

EDUCATION

PhD Social Science, Syracuse University, Syracuse, USA. 2017

Dissertation Title: Enacting "Technology" and Everything Else: Gendered Practices and the System of Crop Intensification

Abstract: This dissertation is a qualitative examination of the functioning of a rural development project in a Himalayan region of India, with a special focus on a particular project activity centred around an agro-ecological method of crop production, the System of Crop Intensification (SCI). Environmental changes and disasters along with rapid transformations in the rural economy in Uttarakhand has engendered a renewed interest in non-mainstream farming practices. However, the success and/or failure rates of adoption of new agricultural methods and technologies remains a poorly understood phenomenon. Studies of adoption rates tend to focus on the aspects of the technology itself, rather than its social life.

Drawing from science, technology and society studies, agrarian studies, scholarship on rural livelihoods, political ecology, gender studies and practice theory, this research study examines how the discourse of SCI is articulated differently in different spaces, and the implications of these variations for extension and adoption practices. Beginning with the construction of knowledge at the institutional level, the research study first traces who articulates what, and how and why this process takes place, in both the national and regional contexts. Second, it examines how contestations in discourse translate into mediated practices and outcomes. Finally, the study focuses on the embodied identities of field development workers and the inhibitory as well as emancipatory effects of the structuring elements of the organisation. The study finds that SCI, and rural development projects more broadly, are co-produced both discursively and in practice, by project planners, development workers, and beneficiaries.

Committee: Susan Wadley (Advisor) (Anthropology); John Burdick (Anthropology); John McPeak (Public Administration); Tom Perreault (Geography); Chandra Talpade Mohanty (Women's and Gender Studies)

MA Development Studies, Tata Institute of Social Sciences, Mumbai, India. 2009

Dissertation: A Study of Interventions in the Rehabilitation of Child Labour with a Special Focus on Education.

BA Economics, Fergusson College, Pune, India. 2007

RESEARCH INTERESTS

Agriculture	Development Projects	Migration
Rural Livelihoods	Science, Technology and Society Studies	Urban Studies
Environment	Gender Studies	Climate Change
Political Ecology	Labour	

FELLOWSHIPS AND GRANTS

2016   Roscoe Martin Grant, Syracuse University

2016   Work, Labor, and Citizenship Research Grant, Maxwell Tenth Decade Project, Syracuse University

2016   Travel Grant, Graduate Student Organisation, Syracuse University

2014   University Fellowship, Syracuse University

2014   Travel Grant, Graduate Student Organisation, Syracuse University

2013   Bharati Memorial Grant, Syracuse University

2013   Research Travel Grant, Graduate Student Organisation, Syracuse University

2012   University Fellowship, Syracuse University

CONFERENCE PRESENTATIONS

Upcoming

2018   "Subjectification, Subjectivity and Resistance: Gendering Farm Work in Contemporary Uttarakhand." Development, Agrarian Change and Gender in India: Exploring Interdisciplinary Approaches, Ahmedabad, India, February 6-7.

Past

2017   "Creating Categories: Climate Change and Migrant Labour in Maharashtra." Work, Labour and Citizenship Conference, Syracuse, USA, April 14.

2016   "Good Data/Bad Data: Claims-making in a Rural Development Organisation." American Association of Anthropologists Annual Meeting, Minneapolis, USA, November 16-20

2016   "The Social Life of Data: Whose Data Counts?" 45th Annual Conference on South Asia. Wisconsin, USA, October 20-23

2016   "Labouring Bodies." New York Conference on Asian Studies, Utica, USA, September 23-24

2016   "Keepers of the Future? Women and Agricultural Technologies in Uttarakhand." STGlobal Conference, Washington D.C., USA, April 8-9

2016   "Good Farmer/Bad Farmer: The Imaginations of Development Work in Uttarakhand, India". Annual Meeting of the American Association of Geographer, San Francisco, USA, March 29-April 2

2016 "When More is Not Enough: Science Making and Science Taking in Agrarian India." Dimensions of Political Ecology, Lexington, USA, February 26-27

2015 "Keepers of the Future? Women and Agricultural Technologies in Uttarakhand." New York Conference on Asian Studies, Poughkeepsie, USA, October 16-17

2014 "The Limits to Public Participation." Situating Solidarities, EASST Conference, Torun, Poland, September 17-19

2014 "Truth and Truth Telling in the Bio-Technology Debate in India." Brave New South Asia Conference, University of Hawai'i, Hawai'i, USA, April 15-17

2013 "Gender (In)Justice Across Spheres." Investigating Inequalities: Linking Theory and Method, Syracuse University, Syracuse USA, March 28

PUBLICATIONS

JOURNAL ARTICLES

"Gender (In)Justice Across Spheres." 2017. With S. Parasuraman. *Economic and Political Weekly*. Vol. 52, No. 27.

"Truth and Truth-Telling in the Agricultural Biotechnology Debate in India." 2017. *Language, Discourse and Society*. Vol. 5, No. 1.

BOOK REVIEWS

S.K., Natasha. Review of *Unravelling Farmer Suicides in India: Egoism and Masculinity in Peasant Life,* by Nilotpal Kumar. Forthcoming.

RESEARCH REPORTS

2011 "Decentralized Provisioning of Supplementary Nutrition for the Integrated Child Development Services (ICDS) in Mumbai." Office of the Commissioners to the Supreme Court

2010 "Best Practices for the Implementation of Urban School Nutrition Programmes in India: An Examination of Decentralized and Centralised Mid-Day Meal Models in Delhi and Ahmedabad." With Priya Shankar. Office of the Commissioners to the Supreme Court

2010 "A Comparative Analysis of the Direct Feeding Programme in Tamil Nadu and the Emergency Feeding Programme in Orissa." With M Kumaran, Saswat Panda and Sameet Panda. Office of the Commissioners to the Supreme Court

ON-GOING INDEPENDENT RESEARCH PROJECTS

Qualitative research project on climate change and drought-linked rural to urban distress migration into Mumbai

TEACHING EXPERIENCE

Teaching Assistant – Section Instructor

Anthropology	Global Encounters: Comparing World Views and Values Cross-Culturally, Prof. Susan Wadley (Fall 2016)

Teaching Assistant – Other

Public Administration	Research Design for International Relations Practitioners, Prof. John McPeak (Spring 2016)

PROFESSIONAL RESEARCH EXPERIENCE

2017 onwards — Post-Doctoral Fellow, Indian Institute for Human Settlements

Responsibilities

- Conducting research on indigenous knowledge systems in the Nilgiri Biosphere reserve

- Compiling data and writing on peri-urban transitions in the Bangalore Metropolitan Region
- Contributing towards the Climate Change and Human Settlements Module of the Urban Fellows Programme

2010 - 2012   Research Associate, Directors' Office, Tata Institute of Social Sciences

Responsibilities:

- Designed and implemented pilot research study on gender and time use in the Vidarbha region of India with Prof. S. Parasuraman
- Co-ordinator of the curriculum development group set up by TISS to develop a curriculum for a post-graduate diploma programme on water, sanitation and health

2009 - 2010   Research Associate, Office of the Commissioners to the Supreme Court in the Right to Food Case

Responsibilities:

- Coordinated and conducted various Best Practice Studies on national food and work schemes
- Compiled two research reports based on field data collection on the Integrated Child Development Services Scheme, the Mid-day Meal Scheme, and the National Rural Employment Guarantee Scheme Conducted research on community kitchens and feeding programmes for the destitute with Harsh Mander in the context of the proposal for a National Food Security Act by the National Advisory Council (NAC)
- Formed a part of the team charged with drawing up a manual for the setting up of shelters for the homeless for use by various state governments, as directed by the Supreme Court
- Corresponded with state governments with regard to the implementation and functioning of national food and work schemes

OTHER PROFESSIONAL EXPERIENCE

2016   Reviewed and compiled a research report on the Public Distribution System YUVA, Mumbai

SERVICE

2014, 2016   Labour Studies Group, Syracuse University (Syracuse, USA)

2007-2009   Member, Development Studies Placement Cell, TISS (Mumbai, India)

2008   Volunteer Organiser, 'Curriculum Consultative and Finalisation Meeting TISS/NLSIU Post-Graduate Diploma in Child Rights', TISS (Mumbai, India)

2008   Intern, Centre for Equity Studies (Delhi, India)

2008   Volunteer, Pratham (Mumbai, India)

2008   Founder-Member, TISSTalks (Blog), TISS (Mumbai, India)

2006   Volunteer, Sahara Aalhad Residential Care and Rehabilitation Centre (Pune, India)

2002-2006   Volunteer, Deep Griha Society (Pune, India)

PROFESSIONAL DEVELOPMENT

2016   Future Professoriate Programme, Syracuse University (Syracuse, USA)

2015   Advanced Graduate Summer Workshop, Azim Premji University (Bangalore, India)

2010   Budget Workshop, Centre for Budget Governance and Accountability (Delhi, India)

2008   Workshop on Sexuality and Gender, CREA (Mumbai, India)

PROFESSIONAL MEMBERSHIPS

American Association of Anthropologists

RELATED SKILLS

- Computer-related skills: Functional competence in STATA, SAS, SPSS, ATLAS.ti, MS Office