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**REGULATING GMOs IN INDIA:
PRAGMATISM, POLITICS, REPRESENTATION, AND RISK.**

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**SUBMITTED TOWARDS THE COMPLETION OF DPhil, DEVELOPMENT STUDIES
UNIVERSITY OF SUSSEX**

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I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

UNIVERSITY OF SUSSEX

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REGULATING GMOs IN INDIA: PRAGMATISM, POLITICS, REPRESENTATION, AND RISK

Summary

At the core of any effort by a nation state to regulate new technologies for public release is an implicit navigation of uncertainty. The case of Bt cotton in India presents a very timely and pragmatic example of how nation states grapple with uncertainty in a regulatory context. While much attention has been given to how government actors form regulation, far less is given to how actors outside of the government spheres act as catalysts for regulatory reform. In practice, it is often these parties that drive regulation as a process. The question is how.

This paper outlines the findings of fieldwork conducted in India between March 2007 and July 2009 in addressing this central question: what does regulation really mean in a context where new technologies burdened with uncertain consequences are introduced? How do preferences, decisions, and regulatory norms adapt to this introduction based on the interactions of a multitude of parties acting on multiple framings of understanding what risk means?

The conclusion is that regulation – in the context of Bt cotton in India – is far from a set of government policies derived from scientific measures of risk assessment. Civil society, firms, and farmers themselves all have tremendous influence on how a nation state navigates uncertainty in a regulatory context. It is a process forged on risk interfaces, where constructions of risk both complement and oppose one another. The actors involved enter these spaces, invited or otherwise. What the government may have initially imagined as ‘regulation’ is subject to multiple technical, economic, and political framings of risk from each actor. As a result, regulation is a co-evolutionary, co-constructed process. This process of negotiating these spaces is what regulation really means.

Acknowledgements

This thesis is based on over 100 interviews undertaken in India between April 2007 and July 2009 – just over 30 have been incorporated into this final thesis. I interviewed government officials, civil society actors, reporters, scientists, lawyers, and more than any other actor in this story, farmers. The process began in January 2006 when I was based in Brighton consolidating my research outline, which is where I was based until August 2006. The nature of my professional work involves a significant amount of travel, but from March 2007 onwards I was based in Bombay, India, where I resided on and off until July 2009.

This thesis was written primarily over the course of 2010 in Denmark, England, Canada, Sri Lanka, and India. I used a variety of libraries in each country as a place to write, but any research work was conducted at the Sussex and IDS libraries. I was fortunate to have written this thesis in places of often staggering beauty. The core of this thesis was authored during a period of my living in a remote tea estate in Namunukula, Sri Lanka.

This thesis could not have been possible without Dr. Ian Scoones, whose patience and unconditional support saw me through many challenging times. Thank you Ian.

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CHAPTER 1

INTRODUCTION

The market introduction of crops derived from recombinant DNA, or transgenic, technologies presents a series of concerns to all societies globally, but is of particular relevance to those developing economies that are creating domestic legislation addressing the management of these resources. In economies that are primarily agrarian, transgenic crop technologies may improve yields in the face of biotic and abiotic stressors, provide opportunities to grow new crops that command higher returns, address concerns relating to population growth and limited resources, and provide a more stable nutritional source to combat the adverse economic development that malnutrition presents. These potential benefits are often voiced not only by those firms developing such technologies, but are also often shared by the governments of those countries who have an interest in them.

Yet, within the same government that may believe in the promise of transgenics in agriculture, there may be scepticism. And outside the halls of government and the boardrooms of the firm, other parties may not be convinced. These new technologies often cost more, the long-term environmental, health, and socio-economic impacts are mired in uncertainty, the rise of substitute suppliers taking advantage of these technologies may adversely affect developing economies that historically supply these markets, and the market forces behind commercial research do not necessarily have nutrition, and correspondingly, poverty reduction, as their primary incentive. As a corollary to this broad swathe of potential effects, the implication of the regulation of these technologies are equally as broad, incorporating intellectual property rights (IPR), incentives to trade, the conduct of research and direct investment, and the development of participatory public processes directed toward the creation of this regulation. And at the ground level where these technologies are being adopted – the arena that presents the demand that propels the industry and the efforts of the government to manage them – farmers are facing decisions that are novel, matching the novelty of what these technologies purport to offer.

All of this points to the need for some system of managing these demands, these new markets, these new risks, and these often incalculable uncertainties. These new technologies have to be regulated. Globally, the formulation of regulation in current practice is rooted in a post-Second World War context where neo liberal treatises on trade have become the *lingua franca* among most policy-makers. The notion of multilateralism, most acutely represented by the prescriptive

measures mandated via the over sixty agreements within the World Trade Organization (WTO), has epitomized the primary catalyst for domestic regulatory reform. From a regulatory perspective, these agreements present an attempt at regulatory harmonization among member states to a nearly homogenous set of principles, best practices, and strategies. There are a number of overarching trends that correspond to this process¹.

First, the deliberative process by which, historically, sovereign states have created regulation, has moved into a realm where it requires compliance to an externally prescribed set of minimum criteria. It is determined to be compliant by parties that reside outside the legal jurisdiction of sovereign member states, based on a series of terms and concepts that are often transposed from one geographic and cultural context to another. It is enforced by a body that does not impose legally punitive measures under a domestically enforced legal construct, but rather a system of often opaque dispute settlement. Individual countries operate and develop their own regulatory frameworks in a world where management is directly affected by multilateral frameworks and requirements.

Second, participatory processes where the perspectives and inputs of citizens interface with regulatory deliberation and formation (i.e. referenda and public discussions) are left to individual member states and agents to facilitate. These processes are often compromised by bilateral negotiations occurring outside of a multilateral context, or the requirement of domestic regulation to be created along a predetermined schedule, rendering what historically may have taken generations to develop into a process that necessitates results in a matter of years. Individual countries, as member states of multilateral agreements, must themselves enact domestic regulatory regimes that address their own local realities effectively, navigating previously unknown territories where a multiplicity of interests has to be accounted for.

As this thesis shows, these challenges are particularly relevant to developing economies, where prior regulation may not have existed, where the human capital required to effectively develop effective regulatory frameworks may be low, and where local systems of governance, market epistemologies², and political and legal representation may be either diverse or non-existent. Framing all of these concerns is one theme: technological innovation has introduced goods that present a higher level of risk due to the application of recent advances in scientific research and development that are mired in uncertain consequences. In the context of the regulation of transgenic crop technologies, uncertainty is conventionally characterized by a quantified measure of risk, as determined by a process of scientific inquiry in a closed system, namely the laboratory and controlled field trials, often initiated by private sector agents according to guidelines developed

by the government. The key term here is biosafety. These procedures can only characterize what scientists 'know', and thus any metric of risk concerning transgenic technologies is reflective of an embedded, if not explicit, level of ignorance regarding the full consequences of market introduction. The challenge is to develop and implement regulation that is effective, tenable, and compliant in the global arena within the context of goods and services that are available with an often inaccurate (or at least incomplete) characterization of risk as biosafety.

But - and this is really what frames the challenge as I have depicted it - risk is not, and cannot, be understood in terms of biosafety alone. Risk has multiple meanings, multiple contexts in which these meanings are understood, and correspondingly, multiple arenas where opposing understandings of risk collide. In such a milieu, the process of creating regulation is a complex and highly involved undertaking, one that encompasses and challenges notions of legal representation and culpability, the role and efficacy of science and citizens in rendering uncertainty legible, and the power dynamics and real politik implicit in multilateral and bilateral trade negotiations. Yet regardless of these contexts and challenges, regulatory frameworks are to be developed, due to the commitments that result from membership of multilateral frameworks such as the WTO or the Convention of Biological Diversity (CBD), the market incentives that surround the development and availability of these risky goods and services, and elements of national pride and ambition. If an opportunity beckons, and the parameters are attractive, no country wants to be left behind.

The discussion of how this could be achieved in the context of risk, hazard, biosafety, containment, and public engagement - all central themes in any present day regulatory regime around biotechnology - started at the 1975 Asilomar Conference on Recombinant DNA. The themes that underpinned that seminal gathering of scientists and 'experts' still - for the most part - hold true today. In the words of the organizer, the Nobel laureate Paul Berg, "(...) we gained the public's trust, for it was the very scientists who were most involved in the work and had every incentive to be left free to pursue their dream that called attention to the risks inherent in the experiments they were doing (Berg 2004: 4)." But there is one crucial difference that distinguishes then from now: it is no longer scientists and experts who are engaging with these issues alone. The public's trust can no longer be taken for granted. A far wider section of the public has concerns regarding these risks, and there is a correspondingly far wider variety of how these risks are understood. And most crucially, it is impossible to ignore them.

This all results in a very different dynamic; one that moves away from purely technical understandings of risk towards economic and political understandings. Berg argues that, in the current climate,

there is little prospect for consensus in our society on the ethical issues concerning foetal tissue and embryonic stem cell research, genetic testing, somatic and germ-line gene therapy, and engineered plant and animal species and hence little incentive to seek a compromise. Compromise in those instances may only be achievable by political means, where majority rule prevails (Berg 2004: 5).

The arena of those qualified to discuss risks and hazards have broadened, with corresponding effects on these new realms of knowledge interface with the regulations themselves. This is the arena I wanted to engage with. This is what motivates this research. It is the process of how different parties armed with different market epistemologies interface with one another, given their own unique framings and constructions of risk – technical, economic, and political. These interactions occur in the face of new hazards and opportunities. And these hazards and opportunities present new challenges, new ways of revising knowledge, and ultimately, new pathways of evolution for formal regulatory frameworks. Yet, the frameworks are not what characterize regulation. This research will argue that the interfaces between those who have a stake in the technology, as framed by their own ways of understanding risk, is what truly characterizes regulation. And given that the contested realms of knowledge are premised on often colliding framings of risk, these interfaces are often not merely a negotiation – it is more akin to a battlefield. This is the battlefield of regulation.

1.1 The Starting Point: Biosafety Regulation In India

I wanted to look at the Indian example for a combination of personal and professional reasons. First, I have engaged with the regulations surrounding plant genetic resources in India since my graduate studies in economics. Second, and given that, I have engaged with a number of people and parties involved in this story since 2001. I had a context to work from. And third, given that the experience to date in India is so rich, so engaging, and so dynamic, a critical focus on the underlying principle – what regulation means in practice – presented exactly the kind of canvas I wanted to work on. This thesis is not about policy alone; it is about process.

Since Asilomar, the past thirty-five years has seen an ongoing and increasingly contentious debate regarding the alleged success, failure, safety, and rationale of transgenics in agriculture. In India, the catalyst for the debate was the introduction – initially illegally and outside the purview of formal directives – of Bt cotton³, and the sowing of this crop in the context of various stresses and

controversies since its formal commercial release in 2002. This debate has taken place in a wide variety of spaces. Regulators, academic and scientific ‘experts’, farmers, civil society, and the mainstream media have all deliberated on the technology in both public and private spaces⁴. The discussions have touched on issues such as state sovereignty in the context of corporate influence and incentives, legal culpability and agency in context of unauthorized commercially released technologies, how the public perceives and negotiates the introduction of new technologies in terms of ‘safety’, which parties are included within the deliberation and creation of regulation, and how these new technologies may affect the future of those who derive their livelihood from agriculture. The experience of regulating Bt cotton in India presents a classic study on how one nation has grappled with the exercise of creating regulation in the context of a technology burdened with uncertainty due to scientifically incalculable risk. It allows a remarkable insight on how formal and informal processes interact and influence such a regulatory regime⁵.

While some elements of India’s regulatory regime predate independence, much of the regulatory framework was first established in the mid to late 1980s. This period in India’s history corresponds with three enduring Congress administrations; first, the Indira Gandhi administration – which formed the basis for a “pro-business” environment, followed by her son – Rajiv Gandhi – and the administration he presided over. During his tenure, he began the process of dismantling the license-quota *raj* that prior administrations had built. His reforms aimed to privatize industry and remove the often complex maze of licenses and red tape that enterprise in India was bound to. This marked the first real policy measures that led to the erosion of a Nehruvian, socialist model of development. Following the assassination of Rajiv Gandhi in 1991, the P.V. Narasimha Rao administration then began to further these initial steps towards liberalization (Rodrik and Subramanian 2004).

While Indira Gandhi’s tenure created a warmer environment for collusion between firm and state in a lobby context, the series of reforms in 1991 mandated by the Rajiv Gandhi administration and implemented by the Rao administration created a policy environment conducive to economic liberalization. Interestingly, these measures were overseen by then Finance Minister and current Prime Minister Manmohan Singh, and then advisor to the Prime Minister and current minister of Environment and Forests, Jairam Ramesh. Both – but the latter in particular – play key roles as actors in the more recent aspects of this ongoing story. There were measures taken to increase government support for science and technology and associated industries, reduce import quotas, taxes, and tariffs on technology-based industries, and to move India to a market economy premised on a neo-liberal model of development. In understanding how the regulations began to gel and the overall context in which they did, the story begins in earnest here. The first embryonic stages of the

regulatory environment were in gestation during the mid to late eighties. They are key to discuss here, as they frame the entire formal side of regulation that is still being adapted at the time of this writing.

1.1.1 The System on Paper: Hazard and Ambition

In 1986, the Ministry of Science and Technology (MST) established the Department of Biotechnology (DBT). The aims and objectives of the DBT as stated by the MST are to facilitate a deep involvement of the scientific community via consultations, but also to foster the growth of the India's capacity for R&D (MoEF 2006a). This reflects two objectives: to ensure scientific validation via procedural rigour and review, and to ensure and promote the overall development of India as framed not only by the growth of industry and becoming an Asian leader, but also the promise of raising the incomes of farmers, given that most Indians still engage with farming as a means of livelihood. There were technical, economic, and political incentives at play, and corresponding technical, economic, and political framings of risk that meshed with these underlying incentives, propelling these ambitions forward in formalized decision making.

During the same year, the Environmental Protection Act (EPA), under the aegis of the Ministry of Environment and Forests (MoEF), was established. The management of transgenics in agriculture as referred to in the EPA is mandated in the context of environmental pollution. This was the starting point in practice. The EPA established the role of the government to “make rules” relating to “the procedures and safeguards for the handling of hazardous substances” (MoEF 1986). However, nowhere within the EPA are transgenic technologies mentioned explicitly. In the words of Dr. S.R. Rao, scientific advisor within the DBT and someone who has seen the regulatory process evolve from the very beginning notes,

[c]lauses six and eight [of the EPA] framed the whole thing in the context of 'hazard'. So the DBT wrote a letter to the MoEF saying that 'OK, you are making these rules, but annex the biosafety aspect of genetically modified organisms'. That's basically how the [1989 Rules] came about⁶.

In 1989 the MoEF established the Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms and Genetically Engineered Organisms or Cells (hereafter referred to as the Rules, or the 1989 Rules). These Rules then mandated the creation of six institutions under the aegis of both the MST and MoEF that span the three tiers of governance in India⁷.

Since the formation of the 1989 Rules, these institutions have been the most active components of the regulatory regime surrounding transgenic technologies; not only in agriculture, but in pharmaceuticals as well. While the initial creation of the 1989 regime was borne out of domestic concerns and ambitions – but also a pressing need to address “hazard” as framed within the EPA – these and other frameworks have been amended to ensure compliance to international fora on trade (i.e. the WTO via plant variety protection and patent law) and safety standards and best practices (i.e. the UN via biodiversity and labelling). In total, the Indian regulatory regime currently spans across six ministries, and is in a continual state of development due to these obligations⁸.

Since 2005, new efforts have been put in motion to consolidate this rather “cumbersome” system into a more tractable means of “single window clearance”; the National Biotechnology Regulatory Authority (NBRA). Driving the NBRA is an aim to foster growth by making it easier to conduct business. At the time of this writing, the bill that will serve to formally mandate the roles and responsibilities of the NBRA is being discussed in the Indian parliament. Authored essentially by one person in the DBT, Dr. S.R. Rao, and one legal counsel from the Ministry of Law⁹, the bill has been highly controversial, reflective of the climate and ongoing battles that surround the technologies to date. This system is in a continual state of evolution, triggered by catalysts from both within and outside India. And central to this thesis is the fact that it is not just science that is the basis of this evolution.

1.1.2 *The System in Practice: “We have no expertise, can you help us?”*

India started from scratch. Biotechnology was a new industry in the early eighties, not only in India, but worldwide. The importance of the industry in the years to come was not lost on those who had the foresight, and those working in a regulatory, science infused context. In the words of Shantu Shantharam, a former regulator at the United States Department of Agriculture (USDA) and current director of the Association for Biotechnology Lead Enterprises (ABLE), a newly formed industry lobby group,

[i]n 1982-83, the government of India started the National Biotechnology Board (NBB), which became the DBT. [Dr. M.S.] Swaminathan was the chairman, and [Dr. S.] Ramachandran was the secretary. Ramachandran used to come to the National Institute of Health¹⁰ to seek collaboration, and some [Indian] embassy

people told him about me, as an Indian working as a senior biotechnology regulator [in the USDA in Washington, DC]. So he sought me out, and he told me [that India, as a country grappling with how to regulate these new technologies,] had these problems – ‘we have no expertise, can you help us’. I said ‘sure’. I went back and got permission from the USDA, and that’s how that first contact was made. I mean, you know how the diaspora is, so everyone came to know about me. That’s when I sent a copy of USDA regulations to Ramachandran, who then passed it on to the Ministry of Environment and Forests. They printed a gazetteer in which they published the rules and regulations, [which were] lifted right out of that USDA book! That was rather shocking to me, that they would just lift it. I mean, without thinking of the pros and cons of adopting in wholesale. I think they wanted to announce, ‘we are taking charge, we are in control’. That’s what happened. But of course, they didn’t follow those regulations at all. Later on, they came into contact with other regulations worldwide, and they cut and paste, and made the 1986 Environmental Protection Act and 1989 Rules¹¹.”

These early stages are key to discuss here, as they are at the root of many of the challenges that India faces today in terms of what is on paper outpacing what can be achieved in practice. The 1986 EPA and 1989 Rules presented a means not only to regulate the usage of transgenic technologies within India, but also to promote them. Recall that the regulations were not enacted just to approve technologies, but also to ensure sectoral growth. I would argue that this broad mandate lies at the root of many of the challenges faced in managing transgenics in agriculture, both historically but also in the present. It is this seeking of a balance between safety and ‘not missing the biotech boat’ that lies at the core of the struggle of developing and enacting an effective regulatory regime. As Dr. Sachin Chaturvedi, someone who has been observing the regulatory processes surrounding transgenics in India recalls,

[w]ithin a few years [after the Planning Commission suggested the NBB in 1981], it was clear that it wasn’t working. Coordination was a problem, and [the formation of] a department was suggested. But the thing is, if a bunch of bureaucrats were failing to coordinate, how could a mammoth organization like a department ensure that? On top of that, regulation and promotion can’t be separate. How can a responsible organization have regulation and promotion as two separate exercises? The promotion part was part of the DBT, and the regulatory part was under the EPA, managed by the MoEF¹².

In practice, the DBT has had significant influence and authority concerning the regulatory part, both in terms of approval - though this is technically the mandate of the Review Committee on Genetic Manipulation (RCGM) - and in forming the new regulations, such as the still deliberated NBRA bill. There are clearly gaps between what is on paper and what occurs in practice, and from the very beginning, much of the regulatory ambition itself was framed not only by management practices lifted from other countries, but as I will argue in more detail in chapter three, the fundamental notions of risk as biosafety that underpin the entire system. It was an iterative process - both adoptive and as well as adaptive - that was premised on these notions of risk and hazard.

There were multiple framings of risk, held both by those within the ministries, but more crucially, those outside the ministries. The points of intersection where these different framings meet are what propel this research. The spaces that characterize these points of intersection is where regulatory evolution occurs, and contrary to the technical risk assessment context that the formal regulation emerged within, entry into these spaces does not require knowledge in the form of scientific expertise. Everyone looks at the technologies as embedded with different risks, and there is nothing close to consensus on the implications of these risks. Given this, regulation is a complex, interactive, iterative process, framed by different market epistemologies and different constructions of risk. This is the battlefield of regulation, this is what I have observed, and this is what this research addresses.

1.2 Why This Research?

So this brings us to the obvious question. How does a regime premised on minimizing hazard while balancing industrial ambition fare in practice? What happens when a regime rooted in the classical formulations of 'how to regulate' - often as adopted from other jurisdictions - is implemented? Post implementation, what happens when the regulations are contested by a variety of actors due to alleged failures of the technology by users and those who claim to represent these users? And given that these parties do not all frame risk as biosafety, what happens when these different understandings collide? While some observers have characterized the emergence of biosafety regulation in India¹³, there is a dearth of analysis of how this regulation actually operates and evolves in practice. How do the multiplicity of parties involved in the ongoing story of regulation as set in motion by the Bt cotton experience affect this regulation, given the fact that risk is not understood as merely biosafety by all concerned?

To begin with, consider a bit of context. The numbers surrounding Bt cotton adoption are impressive. Indian cotton production has increased from 13.6 to 29 million bales between official release in 2002 and 2009, and per hectare yields have increased from 308 kg in 2002 to 591 kg in 2008 (James 2008: 52). As of 2009, 5.6 million farmers have adopted Bt Cotton on 8.4 million hectares of land (James 2009: 7)¹⁴. All of this lead one observer to comment that Bt cotton adoption “(...) represents perhaps the most rapid rate of diffusion for any technology [in India] after the mobile phone¹⁵.” The approximately 830 varieties of Bt cotton currently available on the market comprise 87% of all cotton grown in India (James 2009; Karihaloo¹⁶ and Kumar 2009). In the face of such numbers, there has been no shortage of analyses of the Bt cotton experience in India.

There have been a number of peer reviewed articles on how the technology has fared on the ground in terms of yield and performance¹⁷. There are a wealth of narratives arguing how Bt cotton is either directly linked to the agrarian crisis in India, or conversely, how it has lifted farmers out of poverty. Careers have been made on the ongoing and still unfolding story. ‘Anti-GM’ campaigners have risen in the ranks of their organizations on the basis of their successful work in delaying release, ministers have gained higher profiles given their stance on the technology and what they have done about it, and columnists have won awards and gained international recognition in depicting the story to a wider audience. Even Bollywood movies have been released to varying levels of acclaim on elements of this story¹⁸. But somehow, to me, there is really something that is missing in the ongoing discussion of Bt cotton in India. And in many ways, it is the most obvious thing. Maybe it was just too obvious to have been considered in any detail to date.

In speaking of biotechnology, what really frames the entire debate – though I personally refuse to succumb to the bipolar ‘for’ or ‘against’ debate as I find it misses the point entirely – is risk¹⁹. The more interesting question is how policy in practice, and science as a series of guiding principles, relate to one another when the knowledge that informs both is contested by different actors who interface with one another. Ultimately science can only present one dimension of risk - biosafety. But as this does not resonate with a general public who - from the perspective of an often frustrated and sometimes condescending science establishment - is not trained in the state of the art. There are different languages and no interpreter, and as a result, there is little scope for agreement or trust, let alone dialogue. Directly outside the boundaries that science presents are a wealth of other considerations, which are no less relevant given the political dimension of policymaking, and the economic nature of incentive construction. This is the core of the risk framing argument I present throughout this work. There are also notions of ethics – a vastly different arena to frame risk within when compared to scientific principles, but one that, unlike science, does resonate with those who reside outside these boundaries. This is what characterizes the battlefield, and this is where

regulation really occurs. Regulation is not simply the policies that guide management, it is the process of how these policies are formed. Simply put, it is impossible for one party to manage such a diverse array of risk framings, and consensus is virtually impossible to achieve given that all the parties involved look at risk in different ways. This is the debate, and this is why regulation is far removed from mere scientific evaluation for the public good.

There is not one party who is capable of knowing what is really in the interests of the public given the uncertainty of new technologies like Bt cotton. Moreover, there is no one that can conclusively say what will happen when transgenic crops are released into the environment. No scientist, no policy maker, no activist, no one. We just do not know. We cannot know. The time frames involved to really determine what might happen when transgenic technologies are released into the environment – anything ranging from ‘nothing’ to “superweeds²⁰” to Parkinson’s disease²¹ if one reviews the narratives – are simply beyond what industry, regulators, , civil society, the public, and farmers can wait for. Mechanisms providing a means to govern the technology have to in place in the meantime. So they have been – the Indian system is a testament to this.

No one has the patience to wait and observe how generations of living things are affected, and as I have depicted, history shows that no one is going to start entirely from scratch. As the old adage goes, ‘time is money’. From my perspective, any attempt at debating the merits of the technology itself really misses the point. The products resulting from transgenics in agriculture are in the market. There is a demand for them. Suppliers are keen to meet this demand. And among those nations that are open to the idea, the market is ready. It does not matter whether or not one opposes or supports it – boiling it down to such bipolar parameters ignores the underlying narratives that these technologies have been developed within.

Regulation in the typical sense of managing the technical risks of transgenics means very little. Such a limited focus is just not reflected in fact. If we move away from points of entry and R&D and look at the situation on the ground, most farmers tend to gravitate towards technologies that have the potential to make their enterprise more cost and labour effective, though framed by a very complex decision making calculus. I do not wish to render farmers as mechanistic welfare optimizing agents, but at the same time, they are entrepreneurs in exactly the same way as those supplying the technologies are, and they will cross borders if they have to in order to get their hands on the technology. Regulation in the formal sense means little to them; the government cannot monitor every plot of land. So yes, there are risks. And no, we do not know what the risks are. No one does. So what.

1.3 So what?

If we start with the premise that transgenics is either 'good' or 'bad', the story could end there. But that would be tragic. It should not end there, because actually, the whole basis of the 'debate' – all the formal regulation, all the opposing viewpoints, all the mobilizations, all the massive incentives to enter new markets like India, all the packets of Bt cotton legal and illegal seed purchased by farmers – all of these elements of the story are framed by one notion: risk. This is a huge word. If one digs a bit deeper – one should – what really frames this debate is a far more sophisticated notion of risk than just saying "well, we don't know what we don't know". Stirling (1999: 15) characterizes risk along five lines. First, it can be premised on how broad the effects of the unknown may affect those in a bounded physical space, and second, over generations. Third is the possibility that these adverse effects can be reversed, while the fourth relates to how much time might occur between the event catalyst and the observed outcome. Finally, fifth is the potential of a broader public to mobilize, given a commonly held sense of potential consequences. We might not know what we do not know, but we certainly deal with that fact in a space contained by certain inescapable boundaries.

While this serves to better specify how one can consider risk, there is still the issue of application. There may be criteria in which to characterize the notion of risk, but how does this relate to regulation? Based on historical observations in the US and Europe, Millstone (2007, 2009) presents a means to consider how risk framings and policy relate. First is a technocratic model, where policy – as a consequence of formal regulation – is borne of science, and science alone. This reflects what initially happened in India, with the regulations that characterized policy drawn from science based guidelines worldwide. Second is a decisionist model. Here, risk in a policy context takes on two dimensions, of assessment and of management. While assessment remains a technical process, management relates to the political and economic spheres of regulatory deliberation. This began to happen in India just before formal release, when the government had to act in the face of widespread adoption of illegal, unauthorized Bt cotton in Gujarat. In that example, the management of political and economic risks trumped technical risk assessment; the state had little other option. Finally, the third model is co-evolutionary, which recognizes the intersections of the technical, economic, and political spheres and their corresponding risk framings.

In this model – which this research adopts – assessment also begins to move out of the realm of science, with management correspondingly addressing these new risk framings. As Millstone (2007: 498) argues, regulation premised on scientific deliberation alone does not fully

characterize the process of regulation; a process “(...) located in particular contexts, which have social, economic, ethical, and policy dimensions.” The scientific framing of risk – biosafety in particular – co-evolves as an approach to risk management given the variety of parties who hold distinct framings of risk. Regulation evolves and changes along a co-evolutionary path, with some framings of risk dominating over others as a consequence of influence and transferability. Biosafety itself – though a highly technical means by which to characterize and frame risk – is itself framed by non-scientific assumptions.

I characterize the evolution that Millstone distinguishes as premised on different ways of understanding the technical, economic, and political risks inherent within the adoption of Bt cotton in India. And as time progressed, a very different picture of policy emerged and evolved. Regulation as a process of this policy evolution incorporates these different ways of understanding risk. This thesis argues that the intersection between science and policy is where the action is. This is where the practice of regulation, and the associated battles over meanings, framings, values, ethics and politics, creates policy. That is actually what regulation is – a co-evolutionary process of negotiating risk, set in motion by a number of parties. It is not an end result or a set of rules. It is not as though science has disappeared, but rather that it is clearly not the only means to assess, but more importantly to construct and frame, the risks of new technologies.

And that is where this research is placed. I am interested not merely in how Bt cotton has fared in India, but who has driven this process, why have they engaged in the way they did, and ultimately, how this process of co-evolution characterizes the battlefield of regulation. On the battlefield, some framings of risk dominate others, with regulation as a process reflecting these conflicts. It is tempting to merely look at adoption and yield statistics, and conclude that in India, Bt cotton is a runaway success. As Shantharam argues, “[w]hy do we have to keep talking this bullshit? Farmers have spoken, they go back and buy Bt cotton. What more do you want²²?” Well, I want a lot more actually. Why have farmers adopted it? Why have civil society organizations lent so much effort to opposing it? Why are firms so keen to enter the Indian market? Why has India enacted the regulatory regime that it did? Who was behind it? And ultimately, how do all the different parties involved understand this word ‘risk’? What does it really mean? Why do some framings of risk dominate others? Now, I am not the first to ask these questions, especially the final one. But no one has really applied that question to the Indian context as of yet.

There has to be a means to govern these technologies in the face of not only domestic and international interests in promoting these technologies, but also a national aim of becoming a

regional leader in biotechnology. Traditionally, that would be the role of the government; to assess risk in terms of biosafety, and to enact guidelines for firms and public sector researchers to follow in developing, testing, assessing, and releasing the technology to make this leadership ambition come true. And on paper, this is what India has done, cutting and pasting passages from existing guidelines throughout the world, and then enacting a regulatory framework that is tailored for India's interests and unique position. Off paper however, something else entirely has taken place. And this is where it gets really interesting.

There are a multiplicity of parties outside the state-firm-science nexus that have an interest in the technology. There has to be. The nature of the technology is such that it affects everybody involved. These are publicly marketed goods. In enacting a means to manage and assess the risks of Bt cotton, the government has shown that this nexus alone is simply not capable of enacting rules that society is expected to follow without questioning the science that lies behind it. This is exciting, and for two reasons. First, the capacity of the government itself to actually understand that science in the first place has been questioned. In the words of one regulatory affairs manager of a multinational company,

[t]he assistant to the member secretary of the [Genetic Engineering Approval Committee] GEAC doesn't have any scientific background. So she can't differentiate between a single and stacked event. In fact, we had an application a month before for GM tomatoes, but given we applied again for the stacked event, she got confused between the two - 'why are you applying again'²³?

If there are these kinds of gaps within the corridors of where science based regulation is the mantra, one has to wonder how such a mantra could possibly be upheld in practice.

Second, and as a consequence, I will argue this entire debate actually has far less to do with science. Science becomes less and less relevant as the starting point for any discussion of risk when only a select few have scientific training, and many within the public simply do not trust what scientists say. This is the departure from Asilomar in 1975 - this is India in 2010. As Jairam Ramesh, the recently tenured minister of the MoEF argued, "[s]cientists are not gods"²⁴. Now, if such a statement came from anyone outside the firm-state-science nexus, it would not mean much. But coming from the Minister of the authority that has a massive stake in the entire process of release, it means a lot more. It reflects the climate that surrounds the issue, and summarizes the argument quite well - this is not just about science anymore. Which, given that the entire issue focuses

around a particular technology developed according to rigorous and highly sophisticated scientific procedure, is rather confusing.

But confusion frames the entire story. No one really knows what the long term effects might be, and it seems everyone has an opinion, whether informed by science or not. It is nearly impossible to gauge what the science really means. Studies contradict each other; some are based on data supplied by the firm, others are based on funding from organizations historically opposed to biotechnology, and both are quoted to support the arguments of those who can use the evidence best. If not confusion, it is a series of opposing opinions around the technology itself, rendering a clear picture of how the technology actually fares quite fuzzy indeed. Did India really need Bt cotton? Is it safe? Did it do what it was supposed to do? Was the release rushed as a response to farmers adopting it illegally in Gujarat before the government approved it? Is it appropriate for areas where the majority of farmers do not have access to irrigation? Was the extant agricultural extension network prepared to help farmers use it correctly? Is there even clarity on where the government stands on transgenic versus integrated pest management specifically, and transgenics in agriculture generally? All of these questions were asked, but one wonders if they were asked before the release. I argue that they might have been, but at the end of the day, everybody was just looking to see what would happen in farmers' fields.

In a country like India, opening up the borders to trade in 1991 set a whole series of processes in motion. Of course, these are not related to farming alone. But agriculture is still what drives the country economically and politically. A party cannot successfully be elected at either the central or state level without winning the farmer vote. So when a new technology like Bt cotton is introduced, it resonates. Maybe not initially among the general public, but among those observers and end users who have an interest in it, things are bound to happen. These 'things' are what I am interested in, as they are what generate the confusion that I alluded to earlier, and allow precisely the kinds of insights into how risk is framed that forms the core of my analysis.

In this research, I limit my focus to four groups: the government, civil society, the private sector, and farmers themselves. These are the four parties that have best characterized who affects regulation, invited or otherwise. Regulation is not a top down process developed by the government and adhered to by those it addresses. The formulation of rules and their being enacted is a reflexive process that is steered and reframed by a multiplicity of parties. Given this multiplicity, it cannot be based on a uniform notion of risk. In the context of Bt cotton, biosafety may have been the guiding principle that the government envisioned framing the process at the initial stages of regulatory formation. But such a framing of risk does not equally resonate with the

other parties involved; biosafety itself means different things to different people. And as a result, the nature of formal regulation adapts – risks are not just technical, they are also economic and political. This is why I wish to present a different view of what regulation really means, and this is what my thesis is about.

1.4 The Battlefield Of Regulation: Contested Knowledge And Clashing Risk Framings

So, this is the more interesting story. Yes, there are risks involved in adopting transgenics in agriculture. But these risks are not homogenous. They differ depending who you consider in this ongoing story. The government frames risk in one particular way, just as civil society, firms, and farmers do. So how do they frame it? When and how are these framings generated? That is what I wanted to know. At the root of the battle or the debate are not hard facts, empirical proofs, or scientific evidence. As I said, empirics have less and less to do with how the technology is managed from a regulatory perspective – it is not just science that frames this debate as not everyone can, wants, or needs to understand the science. The basis of disagreement is on different ways of understanding risk outside of the realm of biosafety.

What is universal, however, are the information subsets in the public domain that inform preferences. For instance, an awareness of new technologies, an understanding of what they are meant to do, cues as observed from the experiences of others, and so on. They may differ in their modality, but the premise of basing an awareness of some observed reality is the same, and these information subsets often overlap among the actors. The distinction begins with the incentives that underpin and motivate action. These incentive structures mesh with how the decision maker perceives the risks involved in using the technology, which further differentiates parties. These two factors – risk framings and incentive structures – lead to some measure of uncertainty. And based on this metric, a decision is made. But this decision is bound by a combination of what is known – *information subsets*. These are referred to in order to get what one wants, and are subject to the implicit unknown of what the future holds along technical, economic, and political dynamics – *risk framings*. And based on how the decision maker (and others) observe the outcomes of that decision, attempts to seek accountability will occur, depending on how satisfied the parties involved might or might not be. Seeking accountability can either use established formal tools (i.e. legal instruments, regulatory clauses), or informal tools (i.e. bribes, kidnapping, arson). These observations then facilitate a *reflexive feedback loop*, further enriching the information subsets that generated the initial incentive structures and risk framings of the decision maker and those observing the decision making process and its outcomes, *and the process repeats itself*.

1.4.1 *An Illustrative Example*

Consider a simplified sketch of the decision making processes of the early days of civil society engagement with transgenics in Indian agriculture and how this led to regulatory reform. The story begins in earnest in the late nineties, with iconic leaders like Vandana Shiva generating the debate in terms of gene use restrictive technologies (GURTs, or “Terminator” technologies), the perils of globalization, the threat of patents on life in the face of TRIPS and article 27.3b, the threat of multinational domination in India, and the need to protect and preserve a means of farming in India. The information subsets are observed along the lines of post 1991 economic reforms, with firms entering the Indian market, and the government referring to, for the first time, the then untested regulatory structure. The firm to watch is essentially singular – it is Monsanto, the only firm with the stamina and resources to push the process along. Their tenacity is both impressive and threatening, but impossible to ignore. Their past practices of introducing toxic chemicals is referred to – this is the firm that developed Agent Orange, who bought out Delta Pine Land and acquired the patents on GURTs, and who have gone on record saying that control of the food system is their ultimate goal.

The narrative is forged on three premises. First is to “cremate” Monsanto given their apparent single minded focus on dominating Indian agriculture. There are underlying themes of Gandhian non-violence in the face of oppression, of the identity of a country which only fifty years ago was under foreign rule, of India’s first prime minister Nehru’s statement soon after Indian independence in 1947 that “[e]verything else can wait, but not agriculture.” Or put another way, in the words of the second prime minister Shastri, “Jai Jawan, Jai Kisan”; hail the soldier, hail the farmer. Defend India, and protect India’s agricultural heritage. This frames the second incentive: to ‘protect’ the interests of Indian farmers, though both Shiva and Sahai’s alleged representation of these farmers is suspect given their urban, upper middle class reference points. Third is to portray to a wider audience how ‘dangerous’ this firm and how ‘unprepared’ Indian regulators are for their onslaught. Or as prime minister Vajpayee further modified Shastri’s slogan after the first successful nuclear tests of 1998, “Jai Jawan, Jai Kisan, Jai Vigyan” – hail the soldier, hail the farmer, hail science. As interpreted by Shiva and Sahai, well, science may be worth celebrating, but one should not be carried away.

The risk framings are along three lines; the technical risks involved with the nature of the technology (GURTs disallow farmers to save seed, though in practice hybrids have been around for

years and no farmer in his right mind or capacity to do otherwise would save an F2 seed), the economic risks (the costs of a farmer to purchase transgenic seed is staggering and beyond their means, regardless of the fact that farmers are not clueless when it comes to an investment and are willing to spend money now to get higher returns later), and the political risks (if we do not sensitize a wider public to these issues, regulators in collusion with firms will get away with murder). Uncertainty is then measured considering these factors; the situation is dire indeed, and given these parameters, the outcome that will occur is one where India will be subject to multinational domination in the name of science, commerce, and the ambition of a government playing with some very fundamental notions of Indian identity. This is what the future holds. They cannot let this happen.

So, they had to do something. They had to find out to what extent the government is acting on these concerns, so they filed public interest litigations on the basis that the government is not following the rules they themselves have put on paper. Or, they would organize rallies to bring farmers together to create a visual complement that the media would pick up. Or, they would work within the government to ensure that farmers' rights are a central component of Plant Variety Protection (PVP) laws that were being drawn up as a TRIPS compliancy measure. These are but three examples for the sake of illustration, though all based on actual fact. And once these decisions were made and acted upon, they observed the outcome. Did the strategy work? Did they get the outcome we expected? Did using legal means force the government to respond? Did the rally attract enough media attention to warrant broader public debate? Did they manage to get farmers' rights into the PVP laws that were being developed in like of multilateral obligations? If so, or if not, why? Depending on the outcome, why did or did it not happen? What went wrong? Who was responsible for disallowing it to happen? Who do we address for the outcome?

Once that was established, new strategies were drawn up for future actions. Just as government regulation to date in India is an evolutionary process, so is the regulation that surrounds these strategies. Battles are forged on how these risk framings and incentive structures lead to decisions that pit parties against each other. The battle is fought because, in this example, technical risks dictated that the government might have had their own view of the potential benefits or unwanted consequences of GURTs. In this example, the Indian laws that were enacted disallowed GURTs, arguably because that particular framing of risk resonated with regulators. Economic risks may have dictated that seeds should have been priced at a premium according to the firms stated technology transfer fee. Here, the government did intervene in pricing and forced seed suppliers to cap the price, though this was changed not due to the arguments of civil society alone, but rather political incentives at the state level. But there are interfaces between these risk framings, in this

case those of civil society and those of a Chief Minister meshing in harmony. Finally, political risks may foster a space where the public does react positively to how civil society has framed transgenics as being 'unsafe'. This is exactly what happened in the more recent Bt *brinjal*²⁵ moratorium given the assertion of the current minister of the MoEF, Jairam Ramesh, that the system that evolved and was observed in practice over the Bt cotton experience is not adequate to manage a food crop effectively. But on the other hand, he was also responding to a political climate, one where much of the general public had become sceptical of the safety – the risk – of Bt *brinjal* as framed successfully by civil society. Again, this represents successful meshing of risk framings; technical risks as understood by civil society meshing with the political risks as understood by the government.

Ultimately, this process of regulation is far, far different from anything resembling the science based, biosafety centric view of regulation borne out of Ramachandran's initial stab at appropriating USDA guidelines, the DBT requesting a separate set of rules for biosafety given that lacking inclusion in the EPA, or arguably even the central tenets of a 'one stop shop' as envisioned in the still gestating NBRA bill. This simple sketch shows that, depending on whether risk framings mesh or collide, the actions of one of these actors can force an interaction with other actor or actors, thereby pushing the debate into directions it may have never been intended to go. But these directions cannot be guided by any single party. This is regulation; something far removed from the standard views of regulation presented in the literature, and discussed in chapter two.

Observers in the field of Science and Technology Studies (STS) have termed this way of looking at policy as an "argumentative turn" (Fischer and Forrester 1993; Fischer 1999; Hoppe 1999). Regulation has to incorporate multiple arguments based on how persuasive they may be, as opposed to arguments based on technical considerations alone. It has to acknowledge the existence of multiple framings of risk, and belief systems that generate power dynamics. And in the context of a democracy, there has to be a dialogue between planners and the public in the context of the frameworks they enact. But I will go one step further, and argue that this dialogue in the context of Bt cotton occurred not merely out of an obligation of the state, but because they had no choice in the matter. It was a reflection of an urgency, characterized the risk framings of those outside the sphere of government.

This is where this research is placed. While the following chapter will discuss the canonical literature on regulation and my methodology, the core of this thesis are the middle four chapters. These chapters deconstruct the risk framings of the four parties that I observed as having both the most pressing stake in the dynamics surrounding Bt cotton in India, detailing the technical,

economic, and political realms. It is as much about risk assessment as it is risk management, but the real thrust of my empirical work is not to merely characterize what I have seen along these two lines, but more how regulation then plays out as a co-evolutionary, co-constructed process that sees these risk framings clashing, meshing, and always evolving. Because, this is really what regulation is all about. This research is premised on a series of observations, conversations, and experiments. The results of all of this will reveal and better identify these constructions and framings. In doing so, a clearer picture of what regulation means will emerge.

Distinct risk framings pit parties against each other, but also forge alliances in ways that were never imagined. However, to fully appreciate why, we need to see how risks are constructed and understood. Because of the fact that they differ amongst all the parties I consider, there are conflicting views of the technologies involved. Ultimately, political, economic, and technical risk framings come full circle, and the interfaces forge reactions. This is the battlefield, and this is the basis for how the regulation surrounding transgenics in Indian agriculture actually evolved (and evolves) in practice.

1.5 Next...

The following chapter will review the literature on regulation to better place how my approach is both a product and a departure from the work of others. After that, I will provide a more localized explanation of how I conducted my research; where I did it, who I spoke to, how I shared those perspectives across the actors, how I struggled and attempted to overcome the challenge of positionality in any kind of anthropological research, and why I chose the methodology I did. Chapters three to six then present the core, empirical side of my work. Over the course of two years, I interviewed actors of all four parties – the government, civil society, the firm, and farmers themselves. I should note here that among these four actors, the vast majority of my time – almost half of it – was spent with farmers.

The reason for this is simple, and borne again of both personal and professional motivations. Personally, it was something I had wanted to do for many years. I wanted to know what it was like to be a farmer growing Bt cotton. I wanted to live in a farming community. I wanted to grow Bt cotton myself. I wanted to learn Hindi enough to actually release myself from relying on my translator so I could work on my own schedule. I achieved all these things. That is personal. Professionally, I strongly believe that to really understand this technology, one has to spend time with those who really drive the entire debate – farmers. Not doing so would render all of this

research just like many of the other large number of narratives on Bt cotton in India. And that is not why I chose to do a PhD.

Finally, chapter seven will conclude. After establishing why I wanted to do this research and the underlying theoretical framework of my entry into the questions, after establishing what the literature has already said about these questions, and after applying the analytical framework I have established to ask and process the questions and their answers, what does it all mean? The aim, in sum, is to rethink regulation.

Endnotes: Chapter 1

¹ Since 2007, the STEPS centre at the University of Sussex has begun to systematically deal with these themes; the rethinking of regulation in particular (Leach, Scoones, and Stirling, 2007; Leach, Scoones and Wynne 2005; van Zwanenberg et al 2008, 2010). Refer to <http://www.steps-centre.org/publications/index.html> for a series of publications. It is a limited field, and one that is only now receiving more attention.

² I characterize market epistemologies those overarching theories of knowledge that dictate how agents rationalize the incentives they are faced with in deciding how to act within a market, dictated by the normative frameworks - as determined by cultural factors - that these agents operate in. This diversity is a product of the variety of cultures that economic agents work within, and the variety of perspectives that color and imbue how these agents make decisions; for instance, the accumulation of debt among families due to the cost of paying for the marriage of daughters and/or dowries. In practice, this can be applied to farmers in India who appear willing to accept significant amounts of debt secured from private money lenders in order to afford a new technology such as Bt Cotton, regardless of the uncertain performance of the technology. Such behaviour counters the "risk averse" and "informed" agent of neoclassical economics, borne of a unique framing of of risk: a distinct market epistemology.

³ Briefly, *Bacillus thuringiensis*, or Bt, is a soil-dwelling bacterium. The bacteria forms protein toxins from Cry1Ac genes. When Bt is genetically incorporated into crop species, these toxins have lethal effects on species of caterpillars and beetles, and more specifically, the bollworm. As a result, the application of pesticides used to combat these pests is allegedly not required, as the pesticide is incorporated into the plant itself.

⁴ There are a wealth of academic and mainstream studies focusing on the regulation of Bt cotton in India and its performance. Refer, for instance, to Ahuja 2007; Bambawale 2010; Bambawale et al 2004; Barwale et al 2004; Bennet et al 2004, 2005, 2006; Crost et al 2007; David and Sai 2002; Glover 2010; Gujar et al 2007, 2008, 2010; Gupta and Chandak 2005; Glover 2002, 2010; Herring 2005, 2006, 2007a, 2007b, 2007c, 2008, 2009a, 2009b; 2010; Karilahoo 2009; Kranthi and Kranthi 2004; Kulkarni 2002; Kuruganti 2006, 2008, 2009a, 2010; Kuruganti and Ramanjaneyulu 2006; Morse, Bennett, and Ismael 2005a, 2005b; Morse 2006, 2007a, 2007b; Narayanamoorthy and Kalamkar 2006; Newell 2003a, 2003b, 2008; Pemsli et al 2004; Qaim and Zilberman 2003; Qaim 2003; Qaim et al 2006; Qayum and Sakhari 2005; Ramamurthy 2009; Ramanjaneyulu and Kuruganti 2006; Ramasundaram et al 2007; Kameswara Rao 2010; Sahai 2002, 2003; Sainath 2005, 2006a, 2006b; Scoones 2002, 2003, 2005, 2008; Subramaniam and Qaim 2009, 2010; Sahai and Rahman 2003, 2004; Smale et al 2008.

⁵ The general notion of informal vs. formal in the social sciences poses an institutional framework against something outside, or the other, often characterized as non-governmental. The primary point of departure for this delineation is well defined in economics, namely the notion of the informal economy. More recently, and outside of economics, Peters (2005) discusses informal governance; namely, governing through mechanisms that depend to some extent upon the cooperation with non-state (non-governmental, private sector) actors. The economic literature characterizes the informal sphere as where certain types of income and the means of their generation are unregulated by the institutions of society (i.e. government) in a legal and social environment in which similar activities are regulated (Portes et al. 1989, de Soto 1989). While the classical notion of formal regulation is based on processes that are standards-based, government driven, and contingent on legal recourse in cases of non-compliance (command and control), informal regulation (Pargal et al. 1997, Kathuria 2003, Peters 2005) exists as a response to absent or ineffective formal regulatory mechanisms, created by communities using tools outside the realm of legal instruments, and compliant to shared community determined standards of acceptable performance.

⁶ Interview, S.R. Rao, Scientific Advisor, DBT, New Delhi, 18 August 2010.

⁷ The Recombinant DNA Advisory Committee (RDAC) recommends and/or create further guidelines, the Institutional Biosafety Committees (IBSC) ensures adherence to standards of safety in R&D, the Review Committee on Genetic Manipulation (RCGM) restricts field trials and ensures safety upon release, the Genetic Engineering Approval Committee (GEAC) permits commercial application, and State Biosafety Coordination Committees (SBCC) and District Level Committees (DLC) monitors and reports on field level performance. Refer to MoEF (1986).

⁸ Refer to Appendix 1 for an outline of these institutions and their relation to one another.

⁹ Interview, S.R. Rao, Scientific Advisor, DBT, New Delhi, 18 August 2010.

¹⁰ The NIH operates under the US Department of Health and Human Services, with a mandate focused on "(...) the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce the burdens of illness and disability." Refer to <http://www.nih.gov>.

¹¹ Interview, S. Shantharam, Director, ABLE, New Delhi, 20 August 2010.

¹² Interview, S. Chaturvedi, Senior Fellow, Research and Information System for the Developing Countries (RIS), New Delhi, 23 August 2010.

¹³ For instance, refer to Bharathan 2000; Bhargava 2002; Chaturvedi 2002, 2004; Damodaran 1999; Dhar 2001; Ghosh 1997, 2008; Gupta 2002, 2005; Jayaraman 2001; Karilahoo and Kumar 2009; Kuruganti 2008; Newell 2003a, 2003b, 2008; Pray and Bengali 2005; Pray et al. 2006; Ramanna 2005; Rao 2002; Sahai 2002, 2003, 2005; Scoones 2003; Sharma 2001; Shiva et al. 1999.

¹⁴ Also refer to "Statistics", <http://cotcorp.gov.in/statistics.asp>.

¹⁵ "Cotton farmers opt for double gene Bt technology", *Hindu*, 25 July 2010.

¹⁶ Note that Karilahoo is a member of both the RCGM and the MEC; any statistic relating to Bt cotton adoption has to be taken with a grain of salt, but the trend is accurate - Bt cotton in terms of adoption has been significant.

¹⁷ For a sample of both qualitative and quantitative studies on the performance of Bt cotton, refer to Ahuja 2007; Bambawale 2010; Bambawale et al. 2004; Barwale et al. 2004; Bennet et al. 2004, 2005, 2006; Crost et al 2007; David and Sai 2002; Glover 2010; Gujar et al 2007, 2008, 2010; Gupta and Chandak 2005; Herring 2008; Kranthi and Kranthi 2004; Kulkarni 2002; Kuruganti 2006; Morse, Bennett and Ismael 2005a, 2005b; Morse 2006, 2007a, 2007b, 2009; Narayanamoorthy and Kalamkar 2006; Pemsli et al. 2004; Qaim and Zilberman 2003; Qaim 2003; Qaim et al. 2006; Qayum and Sakhari 2005; Ramamurthy 2009;

Ramanjaneyulu and Kuruganti 2006; Ramasundaram et al. 2007; Subramaniam and Qaim 2009, 2010; Sahai and Rehman 2003, 2004; Smale et al 2008.

¹⁸ Three movies in particular are of note, all with a focus on the area of my research, the Indian state of Maharashtra. Refer to “Summer 2007” (2008, <http://www.imdb.com/title/tt1260689>); “Jhing Chik Jhing” (2009, <http://www.imdb.com/title/tt1587683>); and “Peepli Live” (2010, <http://www.imdb.com/title/tt1447508>).

¹⁹ Starting from Beck (1992), a number of observers have considered in detail how risk and regulation interface from a policy perspective removed of a focus on the “for or against” argument. Refer for instance to Herring 2007a, 2007b, 2009a, 2009b; Jasanoff 1987, 1999, 2000; Jasanoff and Wynne 1998; Levidow 1994; Levidow and Carr 1997, 1999, 2000a, 2000b; Millstone 2007; Wynne 2001, 2005.

²⁰ “Genetically-modified superweeds ‘not uncommon’”, *New Scientist*, 5 February 2002.

²¹ “Bt Brinjal and other GM crop Field Trials ‘Contempt of Court’ Application by Petitioners”, Press Release, A. Rodrigues et al., 10 April 2007.

²² Interview, S. Shantaram, Director, ABLE, New Delhi, 20 August 2010.

²³ Interview, Anonymous Regulatory Affairs Manager, New Delhi. 24 August 2010.

²⁴ “Jairam Ramesh hits back at scientists for Bt brinjal criticism”, *Business Standard*, 12 February 2010.

²⁵ *Brinjal* is Hindi for eggplant, or aubergine.

CHAPTER 2

WHAT IS REGULATION: THE LITERATURE AND HOW TO RETHINK IT

The process of regulation is addressed at length in a wide variety of disciplines, cutting across a wide variety of contexts. It presents a fascinating tableau to consider how a state entity can manage the incentives, desires, ambitions, and expectations of a public. There are symmetries across the disciplines – notions of governance, the role of the state, the firm, and civil society – and the introduction of new technologies presents a common link between them all. The literature I have reviewed certainly applies to what I have seen over the course of my research. In terms of where the Indian government initially was heading at the outset of regulatory creation, many of the tenets of what I present here are relevant. Classical formulations of technical risk, managing competition in the face of monopoly pricing, and adhering to international best practices were all hallmarks of the first stages of regulatory formation around transgenics in India. However, there is an analytical gap in the literature.

My analysis starts from a way of looking at risk proposed by Beck (1992), and a regulatory model argued by Millstone (2007, 2009). From there, I fuse it with arguments put forth by a number of scholars associated with the STEPS centre regarding citizenship, uncertainty, science, and regulation (Jasanoff and Wynne 1998; Leach et al 2007; Leach, Scoones and Stirling 2007; Levi-Faur 2005; Millstone and van Zwanenberg 2003; Newell 2002; Scoones 2002, 2003; Scoones et al. 2007; van Zwanenberg, Ely, and Smith 2008). In doing so, I offer a way of looking at risk interfaces in the context of regulation that I have not come across in the literature. My argument focuses on a co-evolutionary, co-constructed model of regulation, where risk interfaces generate a process of regulation as opposed to policy formulations as regulation. There has to be a way to consider how the parties involved in regulatory deliberation and evolution interface with one another – and how this process is actually regulation – as opposed to a mechanistic focus on risk and policy instruments alone. But to see why such a focus is both key and novel, a review of what the literary canon has observed is necessary. This chapter will address both the state of the art, as well as how what has been written to date both complements and falls short of explaining what I have found over the course of this research.

I first present the literature, with a focus on three classic subsets: economics, political science, and international relations. The literature on regulation is of course vast, and what follows is necessarily only a limited subset. However, in my reading for this thesis, I have tried to gain a sense of

dominant perspectives, and resulting gaps and limitations. The aim is not to provide a complete synthesis, but to carve out a focus for this work, one that takes a broad view of regulation, but is also aware of the limitations of any particular framing.

Economics frames how agents interact with one another in the context of incentives, risk, and decisions. Beyond that, it addresses how this arena is managed; the role of the state, how much of a role it should have, and what happens in spaces where the state cannot reach. The political science literature focuses more on these spaces – it moves the analysis away from government and more into governance. It presents a focus on the broader inclusion of a public who have a stake in regulation, particularly in the context of new technologies released to a broader public who have their own notions of hazard. There is recognition of nonjudicial forms of regulation; of the informal realm along with the formal. Finally, through a wider lens, the international law and relations literature takes a global view, and addresses what happens when both the economic and political science literature are applied not just to individual nation states, but the interface between nation states in the context of both trade and governance. Just as the individual actors frame risk in distinct ways, so do disciplines.

Second, and as a consequence of what the literature does and does not address, I present a series of questions that builds on this literature and more concretely place this research within this canon of work. While I have attempted to establish why this research is important in the preceding chapter, references to the existing bodies of work surrounding regulation will render my ambition clearer, and provide additional evidence as to why this research is novel, relevant, and timely. Finally, with both the literature presented and a more explicit rationale for my research justified, I move to how exactly I conducted my research – the methodology.

2.1 Economics

Posner (1974) defines regulation in an economic context as “ (...) taxes and subsidies of all sorts [and] explicit legislative and administrative controls over rates, entry, and other facets of economic activity”. More broadly, Chang (1997: 704) defines it as “(...) government activity that is intended to affect directly the behaviours of private sector agents in order to align them with the ‘public interest’”. Both definitions (one implicitly, the other explicitly) cast a role of an agent that enforces control, which is broadly as some sort of regulatory authority. A definition such as this places regulation firmly within the context of a market consisting of parties who, due to the incentives present within a capitalist system, engage in activities characterized along the lines of various

modes of production, with the result being a good or service available for consumption in the market. However, such a characterization is somewhat in opposition to the classical view of optimal market behaviour.

2.1.1 The Neoclassical Tradition

In the context of regulation, there are three core tenets of the neoclassical school. First, efficiency results from competitive markets. Second, a wide variety of agents in a competitive market will result in the determination of a price that is best suited for what the market can support. Where there are many competitors, and assuming perfect information, prices will adjust to Pareto optimal levels. Third, and this is where the government could – but should not – intervene, any efforts by the state to fix prices or otherwise intervene in this negotiation of value between firms will create distorting incentives, thereby resulting in the misallocation of resources and perverting the process of attaining efficiency.

With particular reference to the final assumption, some individuals – initially Keynes – have presented arguments for government intervention within this system to address the “excesses and contradictions” of capitalism. His work was not limited to theoretical exercises, and his ideas and presence were highly influential in the Bretton Woods conference of 1944, which acted as the catalyst for the ITO, and ultimately, GATT and the WTO. Yet while the Keynesian approach called for state intervention – particularly with regards to fiscal as opposed to monetary policy – current trends within the context of globalization and neoliberalism have seen the implementation of privatization schemes, the decreasing role of individual states in creating policy, and attempts at the harmonization of trade policy to facilitate the exchange of goods and services across borders (Chang 1997: 714). Indeed, it is as though these are attempts to regulate deregulation.

2.1.2 Regulation and “Development”

Regulation in a post second world war context can be further characterized by two geographic distinctions; developed and developing economies. Chang (1997: 704) refers to the post-colonial period beginning in the 1960s as the “age of regulation”, where the former group emphasized the correction of market failures (in the neoclassical sense) via government intervention. The focus shifted towards “developmental” objectives, namely Import-Substitution-Industrialization, or ISI. This focus began to change in the 1970s, with the developed economies moving away from interventionist regulation, and developing economies becoming dissatisfied with ISI.

Two of the primary arguments against intervention during this time were regulatory capture (Stigler 1971: 13), or where interventionist policies reflect the interests of particular groups - lobbyists - as opposed to the public, and rent seeking (Tullock 1967: 224), where monopolies allocate resources to ensure the excludable nature of their activities, thus ensuring profits, or rents. Similarly, in the developing country context, concerns arose regarding the notion of efficiency, and the fact that the imposed nature of policies aimed at speeding up industrialization via the promotion of efficient markets raised inefficiencies themselves (Toye 1987). Finally, in the 1980s, policies appeared to come full circle, with a focus on deregulation and privatization.

Parker (2001: 6) characterizes six elements that apply to both developed and developing economies. First are the economics of market failure. This applies to where the notion of competitive markets efficiently allocating resources fails due to externalities (Scitovsky 1954: 144), information asymmetries (Akerlof 1970: 490), public goods (Samuelson 1954: 387), merit goods, incomplete markets, monopolies, or income inequalities. Second are the economics of state failure. A state fails in such a context if it does not act in the best interests of the citizenry. Third are the economics of regulating prices and profits. This applies primarily in the context of monopolies, natural or otherwise, and the role of the state in limiting the potential of monopoly pricing abuses. Fourth is the notion of regulatory efficiency, seen not just through the lens of competition, but also legitimacy, and central to this thesis, risk. Fifth is how regulation affects business practice. Does it facilitate an environment that is conducive to economic growth, or is it overly cumbersome? Or put another way, it is the management of “red tape”. Sixth is the nature of policy transfer, or what happens when one nation state adopts the regulatory structures of another in the face of time or resource constraints; the prescriptive measures of the WTO and other international guidelines being the obvious example.

2.1.3 The Big Picture: Information, Competition, and the State

In applied practice, some have argued that different industries need different mixes of institutional arrangements free of ideology (Kahn 1988), while others have argued that a diversity of regulatory objectives disturb regulatory balance and any attempt at harmonization (Holmes and Young 2001: 32). There is clearly a difference of opinion here, one that is particularly hard to navigate within current trends of globalization, particularly as represented by the WTO. Others have stated that any regulatory action must be subject to a cost-benefit test as a means of determining the uncertainty implicit in enacting a regime within a market, and using the United States as an

example, argue that over half of the frameworks developed by the American government would fail such a test (Hahn 1998: 201). Still others have noted that excessive regulation can be a barrier to innovation, but on the other hand can be a “spur” to it (White 1997: 1). The debates continue.

In summary, there are three common themes that run across much of the economic literature, all of which present a framework for an economic understanding of risk. First is the notion of information asymmetries. This applies both in the context of “not having enough information”, but also when one party has information, while the other does not. Second is competition, relating primarily to the risk of monopoly abuse. Third relates to the role of the state; how excessive government “intrusion” may be harmful to growth. Regulation has to strike a balance between allowing for growth while still maintaining the primacy of the public interest. The overarching theme is the reduction of barriers to trade and increased privatization/liberalization, coming full circle to the neoclassical tradition. However, while information, competition, and liberalization are all key elements in the story of Bt cotton, what the literature does not really address is how these themes play out amongst the wider series of participants in regulatory deliberation and evolution, and the conflicts that arise out of these interfaces. While the battlefield of regulation is premised on these catalysts and dynamics, the real underlying factor is the diversity of market epistemologies as framed by a diversity of risk framings, as opposed to the neoclassical school of market dynamics alone.

2.1.4 *Farm Level Dynamics and Risk*

Moving away from the nation state and focusing more on individual communities and agents, another literature - rooted in microeconomics, statistical probability, and game theory - analyzes risk through a lens of rational decision making (Hicks 1931; Tintner 1941; Von Neumann and Morgenstern 1947; Friedman and Savage 1948; Turvey et al. 1949; Arrow 1951; Boan 1955). This canonical body of work formed the basis for a more specific consideration of farm planning under uncertainty (Dillon and Anderson 1971; Just 1974; Wolgin 1975; Brink and McCarl 1978; Dillon and Scandizzo 1978; Young 1979; Binswanger 1980; Feder 1980; Binswanger 1981; Hamal and Anderson 1982; Chavas and Holt 1990; Foster and Rausser 1991; Feder and Umali 1993). Using these quantitative efforts as their basis for entry, recent criticisms to such an approach have argued that such a framework focuses too narrowly on neo-classical economics as a basis for explaining behaviour; that is, risk is not merely a probabilistic parameter. As Adams (1982: 668) argues: “if farmers are taken as risk-averse or risk-takers for subjective reasons (...) we are once again plunged back into the projection of mentalistic constructs and taken away from the behavioural realm.”

Cultural references have been discussed, either under the aegis of how religion and faith offers a form of “insurance” against unforeseen consequences - “a long term strategy to avoid future loss” (Iannaccone 1995: 288; Miller 2000: 8) - or the relationship between farming practice and the longer term effects of new technologies on what is perceived as “nature”, or more broadly, the environment (Tomalin 2004: 266).

However, rationality does not hinge entirely on a notion of benefit, or expected utility maximization as represented by stylized variables that aim to characterize elements of decision making. Adams (1982: 664) argues that “one can at best talk about a qualified *in situ* economic rationality, which for want of a better term I will call ‘demi rationality’ (...) economic rationality must be considered in context; there is an economic interest but it flickers like a candle, sometimes burning intensely, sometimes waning.” There are other factors outside the neoclassical formulation of the rational agent, and the underlying factor is risk (Douglas and Wildavsky 1983). However, beyond risk and probabilities is one additional, crucial factor. It is how risk is framed or understood uniquely by different individuals or groupings of individuals. Following from that, within different groupings of decision makers interfacing with one another emerge “class and risk positions” that further differentiate these risk framings (Beck 1992: 53). As Tversky and Kahneman (1981: 453) and Druckman (2003: 1) note, “[a] framing effect occurs when different, but logically equivalent, words or phrases cause individuals to alter their preferences.” While there are mechanisms to mitigate risk based on price indications, expected yields, and information subsets, there are other factors that generate what actions are “right” now in order to achieve the “right” outcome later. And these factors are distinct from observed cues; they are threads woven into a cultural fabric that cloak the unknown, providing a structure for facilitating a characterization of what the “right” action is to achieve the “right” outcome.

Economics has established the role of expectations, information, and quantifiable risk explicitly, with others then elaborating on these basic principles – their relevance, limitations, and application. Yet, regulation is not merely a function of the degree of state intervention, individual choice as a function of expected utility, and the maximization of this measure of welfare. While at the core of any effort to regulate among these lines are state agents and those they are mandated to manage in terms of market oriented decisions, there is – in a democratic context - the additional and crucial role of political processes and governance that oversees the implementation of such efforts. If risk cannot be rationalized, then how can one consider it? No doubt it has been addressed in the literature, but I am more interested in the framings. Beck’s assertion is key here; and more than any of the classic analyses of risk in the economic literature, this is where the battlefield is found. Beyond class, the battlefield plays out between actors who have their own constructions of risk that

underpin these divisions.

2.2 Political Science

Clearly, one cannot separate markets from the political underpinnings of the agents that comprise the markets and make decisions given their particular framing of risk - both those who supply and demand economic goods, but also those who manage the conduct of such incentives. But these incentives are borne of interests, and this is where a political analysis becomes crucial. The conflicts that characterize the battlefield are also based on conflicting interests, which play out not only in economic, but also political spaces. There are ownership issues - of knowledge, of primacy, of urgency. While economics has primarily addressed the role of the government in managing these incentives and risks, the political science literature addresses the broader notion of governance. The focus is on the wider net of stakeholders who do affect regulation, though the literature does not address this question in the context of risk framings. However, it does sketch a context where the question begs addressing.

2.2.1 *Principles and Theories of the State and Governance*

The World Bank (1991: 23) defines governance as “(...) the form of political regime (parliamentary/presidential, military/civilian, authoritarian/democratic), the processes by which authority is exercised in the management of a country’s economic and social resources, and the capacity of governments to design, formulate, and implement policies, and, in general, to discharge government functions”, while Pierre and Peters (2000) characterize it simply as the capacity of government - as an institution of the state - to steer society towards achieving collective goals. Pierson (1996) characterizes the modern, Westphalian state (by way of Weber) along five criteria: monopoly control of the means of (legitimate) violence, territoriality, sovereignty, bureaucracy, and taxation.

The starting point is how the state enacts regulation given these aspects of governance, taking into consideration the fact that governance encompasses parties apart from the government. Regulatory reform in the current political context can be traced back to state initiated economic reform efforts in the U.S.; first the Progressive Era of the late 19th century, followed by the New Deal - relief, recovery, and reform - during the Great Depression. These initiatives were characterized by state directed intervention, and most of these attempts were focused on economic regulation; to ensure, define and establish the preconditions for “good” market performance¹ (Nichols 2000). In the US at

this time, intervention and regulation were almost interchangeable terms.

After 1930, two issues arose: first, the acknowledgment of the contributions of the economic literature - regulatory capture, rent seeking behaviour and concerns of regulatory independence (Moran 2002: 393) - and second, the movement of state sponsored regulation into unprecedented social spheres such as health and safety and the environment during the 1960s and 70s. This era represents the beginning of the modern regulatory era (Wiener 2004: 483).

2.2.1 *The Regulatory State*

Movement into social spheres produced litigation and a growing legalization of regulation for maintaining authority, characterized in the literature as command and control (Rhodes 1997). As Millstone (2007) has observed, there is not only risk assessment behind regulation, but risk management as well - the decisionist model of regulation - which is the distinction that this movement into social spheres represents. This was distinct from the prior negotiation of outcomes between state agencies and industry (Stewart 1988). Because of these changes, the notion of the Regulatory State arose, in contrast with the (Keynesian) Welfare State. The Regulatory State contains more emphasis on the use of authority, rules and standard-setting, and shifted the emphasis of control from traditional bureaucratic mechanisms towards instruments of regulation. This is in contrast to the Welfare State emphasis on public ownership, public subsidies, and directly provided services, often offered via a partnership of local and central government (Hood et al. 1999, Scott 2003: 6; Jones 1998: 959).

Scott presents three core assumptions of the Regulatory State. First, that regulation is instrumental and standardized in character. Second, that the state is necessarily central to regulatory governance. Third, that state law is the central instrument of regulatory governance. However, given the movement of the state into social spheres, and the broadening scope and Schumpeterian evolution of different approaches, the Regulation Approach diverged from these assumptions in the 1970s as an attempt to characterize this new process².

2.2.2 *The Post Regulatory State*

More recently, the 1990s have seen further movement away from these assumptions, as some critics have viewed them as overly theoretical (MacLeod 1997: 531; Moran 2002: 411). The Post Regulatory State shifts the focus of analysis from state law to the wider range of norms and mechanisms to

assert or achieve control due to tensions resulting from the interface of the social and economic goals of regulatory politics. Starting from Foucault (1979)³, Parker (2001: 29) and Morgen (2003: 489) present the notion of metaregulation, characterized as an instance of nonjudicial legality, situated at the intersection of two trends – an increasing legalization of politics and a growing reliance on nonjudicial mechanisms of accountability.

An additional factor in the Post Regulatory State is the nature of those technologies regulated, particularly in the context of risk, uncertainty, and public health (Wiener 2004: 487). Smith (1991: 235) presents the example of food policy in the 1980s via an outbreak of salmonella, where the consensual policy community was obliged to evolve into more socially pluralistic issue networks. Vignon (2003) argues that knowledge is no longer “given” and made accessible by specialist expertise, but is rather constructed and renewed in a process of collective learning that draws support from social pluralism. Purcell (2002: 303) characterizes this as a re-scaling of the state – from government to governance – with the state transferring some of its traditional duties to civil society (in a Gramscian sense) at the local level, and at the international (globalized) level, re-territorialization to inter/supra-state entities (i.e. WTO, EU, NAFTA, etc).

Mann (1997: 473) and Scott (2003: 15) characterize this “weakening” of the state as follows. First, that global capitalism is undermining the nation state, as there is a variety of norms to account for. Second, social and environmental problems of a global risk society (Beck 1992) grow beyond the reach of singular states, and necessitate a variety of control mechanisms. Third, new identity-based movements compete with national and class identities and highlight demands of civil society. There are a variety of controllers and controllees. In sum, Jordana and Levi-Faur (2004: 2) presents the current role of the state concerning regulation along four lines. First, there is an evolution and transformation of the notion of regulation. Who regulates? What does regulation mean? Is it merely adopted by other states or uniquely created? Second, even though economists have debated this for over a century, regulating competition in the context of efficiency is still an overarching theme. Third, the state determines the political character of the regulatory state, neoliberal or otherwise. Fourth is the issue of trust and the regulatory state, and those actors outside the halls of government whose perspectives are impossible to ignore – from individual politicians, to civil society, to experts, and everyone they claim to represent.

This re-scaling – or weakening – of the state is reflective of the uncertainties embedded in transgenics. The government as the “controller” is no longer capable of managing all the risks implicit in Bt cotton adoption alone, because they are not alone in having the capacity to frame risk. There is much more going here than biosafety alone, and the technical risk framings embedded in

the biosafety narrative just do not capture all the elements of what might happen once Bt cotton is released and adopted. These are the concerns of other controlees, and these concerns enter policy, not just due to technical risk framings, but political risk framings as well. Science is just one component of how regulation unfolds; there are many other realms of contested knowledge that force their way in to the space of regulatory deliberation.

2.3 International Law And International Relations

Overarching the capacity of individual states and notions of governance versus government is the arena of interaction between individual states and the market incentives that exist between them at a global scale. The battlefield of regulation unfolds within individual nation states, but there are linkages to complementary battles that happen internationally. Framing the incentives are rules; rules that are not bound by borders, but are to be applied equally across them. The definition and applicability of international law as a regulatory instrument is debatable. The rationale for these debates is rooted in the (lacking) mechanisms for enforcement, retortion and reprisal excepted. Some have argued that the efficacy of an international legal system is directly a function of the capacity of domestic legal systems, rendering the notion of “international” law somewhat misleading, as it is domestic law that ultimately implements international directives. Malanczuk (1997: 65) identifies three main functions of any domestic legal system; law making (legislature), determination (courts/tribunals), and enforcement (police/army).

2.3.1 Vertical vs. Horizontal Systems

However, in contrast to domestic law, international law is a horizontal legal system. It lacks any one supreme authority, a centralized source of force, or a manifestation of the three functions embodied in the domestic context. The UN General Assembly, Security Council, or International Criminal Court do not and cannot embody the functions of their analogues in a domestic context (Malanczuk 1997: 3). Moreover, international law (i.e. the International Court of Justice) differs from (common) law as it does not recognize past legal precedence, or *stare decisis* (Shahabudeen 1996). de Senarclens (1998: 91) identifies two main factors behind recent changes and the resultant distancing from Eurocentrism within the arena of international relations (IR) and regulation: the end of the Cold War, and the process of globalization, both of which coincided with the moves towards regional integration, and the resultant reconsideration of what sovereignty really means (Lake 2003). Gilpin (1987: 3) identifies three additional factors that have also facilitated change: the Bretton Woods agreements, stable currencies, and as discussed within the review of economics, the

deterioration of liberalism in the 1970s and the promotion of free markets⁴.

2.3.2 *Ideological Interfaces and the WTO*

When considering regulation within the context of international relations and law, the WTO presents an applied architecture for analysis that the literature of both disciplines refer to considerably, particularly from the mid 1990s onwards. The legal implications of the WTO and the intrastate dynamics that result from the incentives to engage in trade, while still international in scope, are distinct from other international legal instruments due to the process and architecture of dispute settlement and the treaties that govern interaction. The legal status of the WTO is tractable via a series of treaties. The WTO constitutes hard law, characterized by Abbott and Sindal (2000: 421-422) as legally binding obligations that delegate authority for implementation (i.e. covenants, contracts). On the other hand, soft law is characterized as legal arrangements that are less precise in terms of obligation, precision, and delegation (i.e. international best practices, many UN agreements).

Yet, the real question is how effective all these rules really are in practice. How does it link to what actually happens in the battlefield of regulation? While international markets do present a metric on which the minimum support prices are calculated, and farmers then pick up these cues during the cotton harvest, does central government regulation really link to these multilateral frameworks? Much of what has happened in India around regulation is less focused on trade guidelines – save for IPR regulation – and more around domestic negotiations that took place in the courts, as chapter four will detail. There was a noticeable transfer of scientific language and content from a variety of international best practices and guidelines like the OECD Blue Book, TRIPS, and the CBD, but again, these were all mostly premised on technical risk framings. In reality, the co-evolutionary process of regulation, co-constructed by parties not versed in science, renders multilateral agreements as something on paper, but only relevant when contested in a legal setting. And in terms of what happened around Bt cotton, those cues were less based on multilateral rules, and more on the rules that emerged out of the risk interfaces between the state and the other actors in this story.

2.4 **Looking Backwards And Forwards: The Literature, Regulation, And Bt Cotton**

The literature reviewed here addresses many of the issues that framed the queries that propelled my desire to conduct this research. If the process of regulation was merely an exercise in top down

governance, undertaken primarily by the government, then this research would be rather dull indeed. But, it is not, and it was not, and for one reason – everyone constructs risk in different ways, and the decisions that arise out of these constructions present a sort of window into how these risk framings relate to outcomes. These are windows that anyone can look through. These decisions resonate with others in a public sphere, and given the stakes that individuals may have in characterizing the outcomes of these decisions in particular ways, there emerges a space where these risk framings collide. This is what the literature does not address in enough detail. Rather than a focus on the institutions of regulation and the more mechanistic, economic framings of risk, what is missing are an analysis of risk interfaces.

There are points of intersection where the firms producing such technologies, the state as manager of conduct (at least on paper), civil society as a representative body, and end users of the technologies – in this case cotton farmers – all meet, clash, agree, or disagree, and sometimes all four at once. This is the battlefield (Long and Long 1992)⁵. While the economics literature does consider risk as a function of decision making, critics have wondered how such probabilistic constructs can be truly representative of a notion as abstract as risk (Adams 1982). There are so many cultural cues, contexts, and constructions that no quantitative model can incorporate – faith, trust, and expectations are parameters that a statistically derived metric of risk can approximate and represent, but never completely. Utility maximization in the context of expectations and welfare measures is based on microeconomic axiomatic assumptions, which are often violated. The state does manage release, and all of the concerns outlined in the classic economic literature – government intervention, ‘red tape’, rent seeking, regulatory capture, information asymmetries – do resonate. Yet, most of the interfaces considered are between firms and the state. What of the management of this relationship as it relates to the additional parties that are affected by the structures that these two parties have historically negotiated?

The political science literature does present the notion of metaregulation as a vehicle to explain what happens when a new technology emerges within the “public sphere” is questioned by society perceiving hazards borne of a non-science based perspective. This is the risk framing that economics has addressed, but without the political implications that it carries. Clearly, governance is not simply a function of the government, and the emergence of transgenic in agriculture certainly reflects this assertion. The classic formulation of biosafety does frame this construction of risk, as it lies at the root of the often assumed and yet unknown hazards. And while metaregulation and the post regulatory state in the context of unknown unknowns does characterize the multitude of parties that enter the milieu of regulatory formulation – invited or not – there has been little discussion about parties outside of civil society who enter this arena. Moreover, though risk is

discussed – Beck arguably single handedly presented a new way of looking at the notion – there is little discussion in the political science literature about risk interfaces. This is really the core of the matter. These interfaces - borne of “socially pluralistic issue networks”, a “nonjudicial” means of addressing accountability, and the distinct ways in which these networks characterize risk - are what really form the basis of the entire debate. Political science has identified the nature of the movement from government to governance, but has not considered, in detail, the nature of the interface from the perspective of risk construction. This is key to flag here, as my observations have led me to conclude that political processes as framed by political risks are at the core of what propels regulatory evolution.

Yet, there are economic and technical risks as well, framed by a combination of the motivations to enter multilateral trade negotiations, to adopt (often wholesale) regulatory frameworks from other jurisdictions, and to do so under pressures. These pressures find their root not only in political opportunity, but also a paucity of technical capacity – the ability to really ascertain technical biosafety metrics – as well as the economic risks of missing the biotech boat. The international relations literature characterizes multilateralism – the WTO as hard law and UN covenants like the CBD as soft, but beyond that is something more pressing. Given these frameworks, how do they play out on the ground? Do international norms really affect domestic regulation, and do these elements of culpability as enshrined in dispute settlement really make any difference on the ground? Given economic, political, and technical risks, I would argue that something else occurs, something that, again, is the result of how different parties who frame risk in their own way, armed with their own interests in the technology itself, interact in the battlefield of regulation.

The release of Bt cotton may have initially been governed by regulatory frameworks adopted from outside India in the face of time, resource, and capacity constraints. Yet, as time passed, distinct political, economic, and technical risk framings as held by the multitude of parties that were and are involved are what truly characterize the dynamics that triggered regulatory evolution. This is the battlefield of regulation, and these processes are what really characterize regulation as I see it.

2.4.1 *Where Does This Research Fit?*

Drawing from Long and Long (1992), the battlefields of knowledge they refer to are, in my mind, more akin to a battlefield of regulation. I look at regulation as a far more holistically inclusive process, one that has decision making processes at the core, but one that is premised not merely on decisions, but the underlying framings and constructions of risk that propel decisions under

uncertainty. These decisions are observed when the multitude of parties involved as stakeholders interact with one another. However, these interactions are not merely based on commonly shared interests, as that alone is not what propels the interactions. These parties uniquely frame risk, and that is the basis for the interactions. Knowledge may differentiate parties, but regulatory evolution characterizes the battlefield. This research considers these interactions as the interfaces that reveal what regulation really means, with these unique risk constructions forming the basis for the interface.

As such, this research attempts a rethinking of regulation. My aim is to consider why regulation evolves, changes, is challenged, and is accepted. There are formal frameworks that do overarch the entire process, and these formal frameworks mirror the classic notions of regulation as discussed in the literature. However, of additional interest here are the informal frameworks that affect the management of these technologies. The premise of the distinction is based on assertions of accountability (Goetz 2005: 10) that arise after decisions are made and observed. One can either assert their desire for accountability formally via legal redress and an electoral vote, or informally – nonjudicially – via direct actions, vandalism, or bribes. And most crucially, both are intrinsic to the practice of regulation.

This research is a response to Bt cotton adoption in India, but the overarching theme is regulation in the context of risk, and the way in which regulation plays out in practice (Braithwaite, Coglianese, and Levi-Faur 2007; Jasanoff and Wynne 1998; Leach et al. 2007; Leach, Scoones and Stirling 2007; Levi-Faur 2005; Millstone and van Zwanenberg 2003; Newell 2002; Scoones 2002, 2003; Scoones et al 2007; van Zwanenberg, Ely, and Smith 2008). In order to conduct this research, I had to understand first, how the stakeholders involved framed risk, and second, what the consequences of these framings were in an applied context, using the story of Bt cotton in India as my vehicle of analysis. There were many I needed to interact with – farmers, firm representatives, government officials, and civil society campaigners. Given the focus on risk, there had to be a way to address the queries that came out of my initial research outline via some form of systematic and sustained interaction.

2.5 Techniques, Trials, And Timing: The Methodology


The starting point of the fieldwork component of this research was based on a desire to understand how these risk framings are constructed, understood, and find their character in practice. It was based on a series of approximately fifty interviews across urban India, but at the level of the farm – where this research offers its unique addition to the literature – a longer series of sustained

interactions occurred, less structured around interviews and more on daily interactions. **For the purposes of this thesis, I have not referred to the over 200 informants I interviewed. My focus here will be on those who spoke at length on their experience as observers of the regulatory process from 1982 onwards, those who have engaged in both the formal and informal realm as agents co-evolutionary regulatory reform, and of course those farmers who have – or have not – adopted Bt cotton. Over the four core empirical chapters of this thesis, I address the role of four parties: the government, civil society, firms, and farmers. The rationale for this approach as opposed to a chronological treatment of the actors as the story unfolded is to keep the focus on risk framings; to delineate how each party constructs risk along technical, political, and economic lines, thus rendering the co-evolutionary dynamics of regulatory reform clear.**

I spent approximately one year conducting my fieldwork in India, cumulatively occurring between April 2007 and July 2009. The primary reasons for choosing India were a combination of the professional and personal. I chose to look at Bt cotton as I had been looking at the regulatory issues surrounding transgenics in Indian agriculture since my time as a graduate student of economics. I was familiar with both the formal and informal regulatory landscape, and I also had a working relationship with many of the key players involved. It was where I had a background; not just in terms of being familiar with the research landscape, but also as a Canadian of Indian descent. Spending time in the village where I conducted the bulk of my fieldwork was a combination of many things for me. The experience forced me to challenge many issues related to my identity, which was not always pretty. Granted, similar things happened during my time in Bombay – worlds apart in so many ways – but in the rural setting, I never felt judged by anyone. I dealt with these conflicts openly and freely, and never felt embarrassed about my efforts to learn Hindi, the person I was, or the person I was becoming. And all of this is mirrored in a practice, a means of achieving a goal. Just as I was there to conduct this research and had a set (at least initially) plan for doing so, all the farmers I encountered had a similar plan for their own farming practice. And just as I had to adapt given realities I was facing, internalizing, and reassessing, the same happens for farmers facing new choices – that of Bt cotton adoption and all the corresponding inputs and practices it entails.

Beyond these personal and professional motivations, I also wanted to explore in more detail how research and participatory video (PV) could intersect. Over the course of the five years that I conducted the entire process surrounding this phase of my life, I spent around a year and a half freelancing as a video producer and photographer. I had to in order to pay for this process, but beyond finances, working with the visual medium – both the still and moving image – was (and is) a function of compulsion. As I had trained many people throughout Asia in the two years prior to

my beginning this DPhil on how to shoot and edit video in a project documentation context, it became clear that there was no reason why I could not merge that experience with academic research. This realization found its catalyst in my reading the anthropological literature on positionality, fieldwork, and bias over the course of my first year, a body of work that I had not engaged with previously, but was amazed at the symmetries between what I was reading and what I had experienced as a video trainer, producer, and photographer.

Beyond a research tool however – the precise deployment of which I will provide more of an explanation on later in this section – I also documented most of my interviews (especially those at the farm level) on video. Throughout the remaining chapters, many quotations are hyperlinked to streaming video content on my website; any quotation followed by the  symbol is linked to a video, a full list of which can be found on my website at ranaghose.com/thesisvideo. It offers a unique window to actually see, hear, and maybe even know a bit about these people beyond verbal cues; their cadence of speech, their body language, the kind of people they might be. It is not a common approach in academic research, but I hope it will be something that becomes more so. Those who informed this research should never be rendered as mere names in an endnote alone. Like any story, the characters are often the most compelling feature of the narrative.

Finally – and this is something that perhaps overarches everything – there is my (conflicted) relationship to the discipline of economics. To put it succinctly, I love economics as much as I hate it. I always have. I adore pulling apart the decisions we make as people burdened with egos, how we value outcomes, and how expectations are generated. I always was drawn to how economics presents a framework for analyzing this. To be sure, it may reflect a capacity on my part to overthink everything, but it is a reflection of the kind of person I am. This is what relates to the, shall I say, unloving aspect of my relationship with the discipline.

Something happened after completing my Masters in economics that threw me off balance. I could no longer take the state of the art seriously. There were too many assumptions based on clever econometric modelling that pointed to the direction in which the discipline was heading, and I no longer wanted to be a part of that world. The core tenets of the discipline are still very close to my heart, and I do find mathematics to be a beautiful language, but essentially, there is essentially more than math in understanding and characterizing the choices we make as humans. I wanted immersion. I wanted to spend time with the people who would inform this research. I wanted to know how they made the whole series of choices that surround Bt cotton in India. And I wanted to grow Bt cotton myself, and make these choices myself. I did all these things.

2.5.1 *Locations and Strategies*

The research occurred within four spaces: the central level of government in New Delhi, the state level in Maharashtra, at the district level within Wardha District in eastern Maharashtra, and of course at the village level. At a state level, I chose Maharashtra as it historically has been the main cotton growing area in India, and within Maharashtra, the eastern region of Vidharba has been the area where most of the cotton has been grown⁶. Vidharba presents a rich context to place this research given the amount of attention the area has received since 2006 in the media as being an epicentre of what is commonly termed the agrarian crisis (Bunsha 2006; Deshpande and Arora 2010; Mishra 2008; Mishra et al. 2006; Reddy and Mishra 2009)⁷. The scale of civil society mobilization in the area, state responses to the “crisis” by way of allocating billions of rupees of relief packages, and the continuous (though somewhat subdued) call among some for the region to achieve sovereignty as a independent state were all appealing factors to consider. There are political, technical, and economic risk factors and framings all interweaved within the cultivation of cotton in this area. The introduction of Bt cotton has simply added another level of complexity to what is already a fascinating area to observe how decision making and technology adoption by farmers, how other parties manifest their preferences via representing the interests of these farmers, and, central to this thesis, how technical, economic, and political risks are framed in such a context.

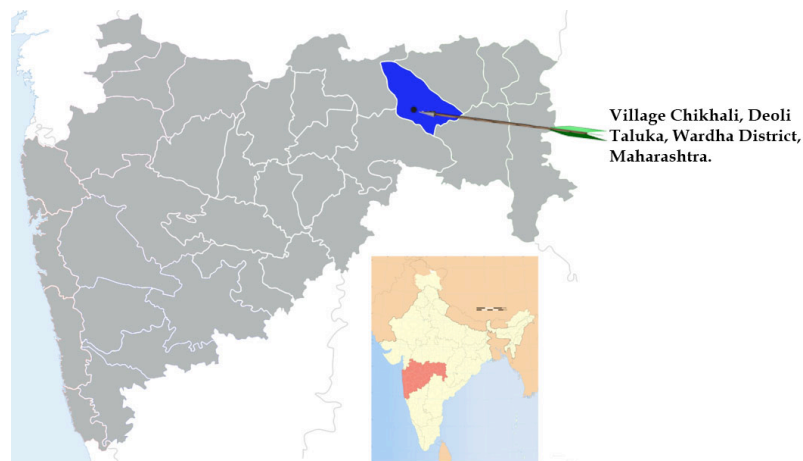
Second, while the area piqued my interest for these reasons, I had to also ensure that logistically, it would work. After some initial queries I sent to colleagues in India regarding assistance with contacts on the ground, I chose that Vidharba, and that region alone. At the level of how individual states operate within central directives surrounding transgenics, Vidarbha presents a unique case study. Seventy percent of the 30,000 agrarian suicides that have occurred in the state of Maharashtra have occurred in Vidarbha⁸. The press, both Indian as well as international, have been particularly vocal in depicting the area as the epicentre of the agrarian crisis – the “Bt Cotton Nightmare” (Ho 2010: 1). Vidarbha consists of “killing fields⁹” where the government has failed, farming has become “deadly¹⁰”, and “killer Bt Cotton¹¹” is responsible for the suicides of thousands of farmers. Each growing season, there are fresh mentions of farmer suicides, of fields sown with “seeds of despair” in the Vidarbha “suicide belt”, where a “GM genocide” is unfolding¹². As the headlines indicate, there are aspects of sensationalism that overtake fact in many cases (Guere et al. 2008). However, linking agrarian suicide to widows becoming prostitutes¹³ sells copy. Of course, I cannot argue that Bt cotton alone is responsible for the crisis, as the reality is far more complicated.

What I can state is that the region has seen a significant adoption rate of the technology, though

with mixed results in terms of the purported benefit that the technology presents – increased yields due to pest resistance and lower farm input factor costs. Yet, the adoption statistics are hard to ignore. Among other factors behind such trends, the marketing effort is quite sophisticated and aggressive¹⁴, and farmers do observe real evidence of the benefit of the technology, something I address in far more detail in chapter six. Yet this has occurred in the face of real challenges. Bt cotton is not meant for rain fed cultivation, though 70% of all farmers in Vidarbha do not have access to perennial irrigation¹⁵. Second, there is limited knowledge among farmers of how best to harness the technology, thereby limiting the extent of benefit that can be derived from it. The application of a refugia to counter inter plot pest and gene transfer, monocropping, the onset of new viral and fungal infections, the incorrect application of pesticides for secondary pests, and a disconnect between farmers and state extension services are all factors among those farmers who have not found Bt cotton as beneficial as hoped.

My initial desire to look at three states now seemed less likely to provide me with the depth I required to really get my head around the complex series of risk framings that only a focused and more long term immersion on one community would allow. My initial plan was a comparison of three states – Maharashtra, Punjab, and Andhra Pradesh. But in practice, such a wide net of localities would have diluted the strength of my analysis. Because of these factors, the bulk of the research occurred in one small farming community in Wardha District: Chikhali.

Farm Level Fieldwork Location



The rationale for Chikhali was both pragmatic and logistical. Pragmatic as historically, communities in the Vidharba region of Maharashtra have grown cotton since time immemorial. Logistical as Chikhali is relatively small – 170 households – and a strong connection was quickly

forged with one group of people; the Chikhalkar family and a close friend of theirs, Kiran Raut. This community represents the bulk of the farm-level observations that occurred over those two years, though observation and interviews alone were not the only means by which information was gathered.

The primary means by which information was gathered was via in depth interviews with a wide variety of stakeholders: policy makers in central and state capitals, civil society members in both rural and urban settings, scientists, representatives of private sector firms, and most significantly, farmers in Chikhali. Though I interviewed well over 100 farmers in Chikhali and the surrounding area over the course of this research, this thesis focuses primarily on the quoted contributions of only those who I felt provided the most revealing and pertinent insights. Their voices are the ones that inform the written aspect of this research via often longer direct quotations, but the voices of all are embedded within the observations I made and my corresponding analysis. Questions were formalized prior to engagement, but most often interaction was fostered via conversations of, on average, one hour in duration. Initially, I employed a translator, but over time (particularly in 2009) my growing proficiency in Hindi allowed for interactions to occur without the need of the translator, at least on a broad day to day level. Apart from conversations, I spent much of his time interacting with people daily – farmers primarily, but not only.

While meeting regulators, scientists, and civil society members were fairly straightforward exercises, the farm level research presented a very different landscape. I was fortunate to have forged a friendship with the Chikhalkar family, one that allowed for my living in their home, and to share a wide variety of experiences with them over the course of those two years. Via such activities as cultivating two acres of cotton for my own cultivation of Bt cotton, visiting extended family members of the Chikhalkar family, accompanying them on day to day exercises (i.e. visiting the doctor, conducting banking, microfinance meetings, a variety of weddings and other social engagements), and simply having conversations with people in the village during periods when they were not engaged with their work, a broad subset of varied experiences enriched my understanding of the researcher of the context in which farmers make decisions within. While a wide variety of farmers within Chikhali were interviewed here, the bulk of the responses were gleaned from a core group of ten farmers, chosen via a combination of landholding size (from large to small), crop selection (Bt cotton, non Bt cotton, or soybean), perceived success levels (yield amounts as well as how the community viewed their level of success), and whether or not they were employed as farmers or landless labourers (the majority were farmers).

2.5.2 *The Purity of Perspective: Participatory Video as a Research Tool*

As a means of capitalizing on the visceral nature of the medium and its ability to be shared widely, digital video was used as a participatory research tool¹⁶ to reallocate who forms questions in a research context, primarily by allowing farmers themselves to forge narratives based on scripts they themselves authored and shot on issues relating to Bt cotton adoption. This process fostered a more holistic perception of local realities, with all content screened back to the community for further consideration and feedback. Using video as a tool in this manner is not entirely novel (Friere 1970; Chambers 1983; Snowden 1984; Crawford 1997; Johansson 1999; White 2003), but using it in an academic research context is. The primary rationale for using this tool was based in an awareness of the positionality of the researcher (Clifford and Marcus 1986; Geertz 1990; Scheper-Hughes 1995), and to address this pragmatically by reallocating whose perspective could generate research questions depending on their own framings and reference points.

Many of the interviews conducted were videotaped and played back to both people in Chikhali along with others – policy makers, scientists, civil society members – in an attempt to create a space where the central themes of this research could be made more explicit relative to who was framing the discourse. Ultimately the multitude of perspectives that were represented among those interviewed were shared amongst all in real time, corresponding to the multiple framings that the difference stakeholders involved possessed. This unique feedback loop then acted as the catalyst for conversations based on an awareness of these multiple framings in an applied, current context that otherwise may never have occurred. And while there may have been an element of those I spoke to telling me what they thought I wanted to hear given the nature of the camera, I would argue that for the purposes of the novel means I used to visually share research findings, the effects were minimal. My using a camera was to record the moment, to be able to refer to it later, and to ultimately edit a series of video footnotes, which I have done here. Moreover – with the exception of four civil society members – I made it a point to develop a relationship with those I spoke with before I recorded them. This was especially the case in Chikhali, where it was months before I actually recorded them on camera. I was and am certainly aware of the capacity of the camera to alter dynamics; but in what follows, I argue that rather than that dynamic being a hindrance, it can be capitalized upon by changing who is on the other side of the camera.

However, the real application of the tool was deployed in Chikhali itself. In 2006, I began to consider in more detail what would happen during my initial entry point into Chikhali as a researcher. I had questions, but I also knew that after I left, I would then internalize the responses I

have transcribed and carried around with me for two years now, ultimately to better isolate some semblance of a theme, notion, or narrative. I did not want those who formed the basis of my understanding to merely be embedded in this work; translated, transcribed, arguably transparent, or perhaps translucent. On the one hand, my role as a DPhil candidate is to learn how to do research, via a combination of my appreciating the experiences of others and through my own experiences. On the other hand, my role is to represent a certain reality to an audience who has never been to this community. It is this process of contextual accuracy in my representing my dynamic with this community - and how I rationalized my perception of what I found - that was the driving premise of deploying this tool.

To address this, I wanted to reallocate the responsibility of asking the question to those individuals who possessed the experiences that I wished to better understand. An exercise in asking farmers to answer predetermined questions I authored would, I felt, present a combination of what they expect I want to hear and their own honest interpretation of these terms. My challenge was to distill the latter down by removing the former as much as possible. In another representation of this dichotomy, it was to remove myself from this process as a directive element, and to allow those I was working with the opportunity to navigate these questions on their own terms. It was, in essence, to retain the integrity of the purity of perspective (Ghose 2007: 18).

2.5.3 *The Bt Cotton Show: A Case Study*

The precise objective of my using digital video has been to address my positionality as a researcher, and to minimize my directive role as an 'asker of questions'. In practice, a series of productions were undertaken by farmers on a number of themes, not limited to my own research interests, but to whatever they felt was relevant to my research from their perspective. The example I present here was based primarily on my prior experience in training individuals on how to use a digital video camera, but also on some additional PV methodology training I received from Insight Share¹⁷ in 2006 and the invaluable inputs of some Bombay based colleagues professionally involved in performance art¹⁸ and film production¹⁹ who joined me in Chikhali on several occasions. To illustrate how I used the tool and the kinds of insights it allowed for, the following outlines one production undertaking by farmers in Chikhali on their chosen theme of agrarian suicide.

Who are you?

I first introduced the tool to farmers in Chikhali by doing a series of house-to-house visits to ask the elementary questions that would allow me to focus logistically and thematically (i.e. your name, how much land you have, what you are growing). I first asked these questions to one household, and after their response, showed them how to engage the camera to record. They would then ask the same questions to the next household, with that person showing the next how to engage the camera to record, and so on. This was done over 170 households over three days, which was then screened back to the community each evening for their comments and reactions, which were well attended and the source of much entertainment. This occurred during my second week there, and it served to introduce the camera - and me - to the residents of Chikhali.

What is Your Story?

In the days after this initial exercise, I began to introduce farmers to the concept of storyboarding. On the steps of the *anganwadi*, or primary school, I brought a piece of paper, which would be divided into six sections for six scenes. After giving an example of a story, I would then ask the groups of farmers who began to gather in curiosity to tell me a story in these six (or more) boxes by drawing it out, referring to themes of their own choice. In the first instance of doing this, one of the participants scripted a dialogue to complement the storyboard with input from others, which was beyond what I had expected. The chosen narrative was agrarian suicide, and the vehicle was Bt cotton adoption.

The Shoot

The participants would then find actors and a 'set' to shoot the story, based on the proceeding exercise. After deciding on who the cameraperson, sound technician (I had a microphone attached to a simple boom pole - actually a broken tripod leg), actors, and extras would be, they would then shoot it on camera. All editing was done in camera - scenes were shot sequentially onto tape - which allowed for immediate playback and minimal technical challenges.

The Screening

After the shooting was complete and credits were added (i.e. a still shot of a piece of paper with the names of the 'crew' written on it), my camera was hooked into my laptop, which was then fed into an LCD projector and enlarged onto a white bed sheet approximately ten feet high in the front of one farmers house, Dilip Taywade. It was broadcast in a common space where people could easily gather, and began after dinner around eight in the evening. An amplifier and speaker were

borrowed from the *panchayat*²⁰ hall and a microphone was placed near the speaker of my laptop to amplify the sound.


“Late Night with Kiran Raut”

After the piece was screened, Kiran acted as talk show host, and people came up to the microphone and in front of the camera, which projected their interaction to the rest of the audience, about one hundred people. Kiran would ask questions (in this case, about farming and cotton in particular) and conversations (often quite entertaining) would occur.

Processing and Analysis

This process would occur over an eight hour period over the course of a day. After it was complete, usually around midnight and just after often impromptu concerts (microphones, cameras, and projectors have multiple usages) I would begin to the footage translated of the piece and the talk show, and attempt to make the necessary links to my research in terms of themes and their representation. Of course, it is the last element, processing and analysis, which presented the most pressing challenge of all.

2.5.4 *“Farmer Suicides”*

The final cut ²¹ provided some unique insights on Bt cotton adoption and choices. There are distinct themes that arose: what constitutes a “good” farmer (i.e. following instructions as presented by scientific institutions, avoiding debt, capitalizing on new technologies such as seed and pesticides, accumulating material wealth) and a “bad” farmer (i.e. what could be termed laziness, alcoholism, the acceptance of debt, and the resultant resort to suicide as a final solution the problems incurred from his decisions). Of interest to me here was this notion of formal regulation in terms of farming practice, as well as the role of credit in farmers’ decision-making processes (as voiced by the main scriptwriter at the end of the piece). The narrative seems to allege that in order to be successful as a farmer, one must capitalize on formal knowledge, and avoid informal debt.

In terms my own work, the link here is the relationship between traditional farming practice and new, “scientific” techniques, such as using Bt cotton and other inputs. “Progress” is determined by successful application of these new technologies, and that information on how to do so should be gleaned from third parties; in this case, an agricultural university. This will lead to success: having

two gas cylinders, a “Hero Honda Super Splendour”, cotton plants “up to my waist with 100 bolls and 200 flowers”. The exercise provided additional insight on how farmers consider the introduction of new technologies, and the resultant onset of new ways of “regulating” their farming practice. If you want to succeed and be prosperous, you must adapt to new technologies in an informed manner, as the consequences of not doing so are dire indeed.

Prior to this exercise, I had not asked about what constitutes a ‘good’ or ‘bad’ farmer; I did not really consider it on those terms, as I was more focused on an understanding of regulation, risk, and uncertainty. In allowing those I was working with an opportunity to form their own narrative, I was able to gain access to a process of asking a question that I would not have asked otherwise, with the corresponding production and themes arising (i.e. a judgment of progress as fuelled by behavioural change via technological adoption as a means to avoid severe consequences) furthering my own capacity to understand what I was seeing. And while a video camera always carries with it the capacity to generate stunted responses when one hits “record” – people saying what they believe they are supposed to say, or what the person behind the camera wants to hear – the fact that farmers had authorial power directly addressed this dynamic in this research. Ethnographic fieldwork always presents the spectre of bias in presenting the findings to a wider audience, as the basis of the analysis is often embedded in the voice of the author. But my ambition was to maintain that purity of perspective. The camera may have influenced what they said, but only based on their desire of how they wanted to portray themselves, a mutual acceptance of those terms based on inclusive and participatory scripting, and the skills they acquired to do so. Using the tool as I did formed the basis, along with the more traditional aspects of fieldwork, that chapter six on risk framings among farmers will elaborate on, in far more detail.

2.6 From Literature, To Practice, And On To The Field

The next four chapters will indicate how I used all of these elements – the established viewpoints from the literature, the gaps that I identified in my fieldwork and in practice, the tools and locations that I chose to utilize and focus on – to address, inform, and relate my findings more explicitly. The focus is on risk constructions; similar to what the literature has presented in terms of decision making, the role of the state, and international guidelines as a means to navigate these new worlds, but with a focus on how this notion of risk translates into practice via the interfaces that characterize the battlefield of regulation.

In my view, what really characterizes the entire debate that surrounds transgenics in India has little to do with the science, or even the formal regulations that the MoEF or MST have devised. At the core of the debate is the points where risk framings either mesh or conflict one another – this is the battlefield, and this is regulation. As a process as opposed to a series of guidelines, as a negotiation as opposed to an accepted framework, and as embodied in technical, economic, and political contexts, as opposed to mere policy alone. The science may be what brought Bt cotton to farmers' fields as a technology, but the technology is not merely about the science.

The adoption of the technology is not merely about rational decision making by individuals – Bt cotton farmers. It is about those who claim to represent farmers politically, firms who look at market potential and strive to capture demand, civil society groups that, though removed from farmers fields, claim to know what is best for Indian farming, of a state who wants to lead the Asian biotech race, and of course of farmers who make decisions in their own way. And unlike the other three parties I consider here, farmers' framings of risk cannot be lumped in to the technical, economic, or political realms so easily. There is a whole other world removed from those spheres that motivates their own regulatory practice. This is the setting, and this is what the core of the thesis – the next four chapters – will address.

In the first three chapters – on the government, civil society, and the private sector respectively – I look at risk framings along three lines: technical, economic, and political. These groupings were not something I had initially planned to do, but rather emerged out of the writing process as presenting a more tractable means to consider the nature of the risk framings I observed. Much of this thesis emerged in this way; pragmatism in the face of analysis and new ways of looking at the volumes of material I had collected necessitated it. At the end, however, one element of my initial outlook remained constant. Regulation is fascinating. It aims to control, but it is controlled. It sets out to prescribe a means to achieve a set goal, but its formation is itself a goal that is regulated. It changes, is subject to shocks, and is governed by a multitude of different perspectives, all of which foster continual evolution and change. And no one really knows what form it will eventually take. Regulating uncertainty is an uncertain process in itself. But, when the nature of the risks – that which lies at the core of uncertainty – is revealed, the process becomes tractable. That desire for tractability is the purpose of what follows.

Endnotes: Chapter 2

¹ Competition (TVA), labour unions (Wagner Act), bank insurance (FDIC), and regulating the stock market (SEC) are examples.

² See Jessop (1997). The main authors and works of this are Aglietta (1976) and Boyer (1979) - the Parisian School.

³ Foucault (1979) argued that the "state" is just one site of managing the "conduct of conduct".

⁴ Though these notions have come back into favour since the mid 1990s via neoliberalism and the process of globalization.

⁵ The notion of a "battlefield" is adapted from the work of Long and Long, who characterized "battlefields of knowledge". They argued for the need in research to develop " (...) an analysis of 'interface' situations where the different life-worlds [of actors] interact and interpenetrate" (Long and Long 1992: 6). I extend this interface to risk framings, where the interface of these framings play out in what I term the battlefield of regulation.

⁶ A third of all the cotton grown in India is grown in Maharashtra, and the Vidharba region holds just under half of the entire cotton acreage of the state. Along with cotton, soybean is the other major crop, along with millets, gram, oranges, vegetables, and to a lesser degree than in the west, sugarcane as well. The region generally receiving two thirds the amount of rainfall compared to the state averages, but the rains are erratic. Though the black, loamy soil is well suited for cotton cultivation, conversations I have had with Vijay Jawandhia have painted a picture where this has changed over the last forty years, with the soil quality deteriorating. In his observations, the cropping patterns have changed since the introduction of hybrid cotton in the 1960s, displacing the historical planting of *jowar* (sorghum) one year, which has shallow roots, followed by cotton the next, which has deeper roots. Due to farmers shifting to annual cotton cultivation, he argues that there has not been enough time to allow the topsoil to regenerate. This information is based on a combination of calculations derived from <http://indiastat.com> and my own data collection.

⁷ The journalist P. Sainath has written extensively on the crisis, a body of work that has been seminal in not only the term itself, but of how the state has addressed it, something I address in more detail in chapter 5. Refer to <http://www.indiatogether.org/opinions/psainath/vidharbha.htm> for a selection of his writing on the subject.

⁸ "Maharashtra: 'graveyard of farmers'", *Hindu*, 14 November 2007.

⁹ "Indian Cotton Meadows Turn Into Killing Fields", *Bernama*, July 18, 2007.

¹⁰ "The Suicide Belt", *Columbia City Paper*, 10 November 2009.

¹¹ "Killer Bt Cotton Fails Again in Vidarbha", *Merinews*, 19 October 2008.

¹² See for instance "Life's cheap in the Bt cotton fields of Gujarat", *Times Of India*, 28 August 2009.

¹³ Refer to "Lokmat editor slams NDTV story on Vidarbha widows" at <http://www.andolan.blogspot.com/2007/05/lokmat-editor-slams-ndtv-story-on.html> for a translation of the original Marathi article.

¹⁴ Refer to <http://ranaghose.com/thesisvideo/2-1>.

¹⁵ Refer to "Constraints Analysis of Cotton in India" at http://www.cicr.org.in/research_notes/constraint.htm.

¹⁶ Refer to <http://ranaghose.com/research/prapv.pdf> for a table of PRA tools and their application towards PV over the course of the author's fieldwork.

¹⁷ Refer to <http://insightshare.org>.

¹⁸ Refer to <http://www.nikhilchopra.net>.

¹⁹ Refer to <http://www.imdb.com/name/nm3086939>.

²⁰ The term *panchayat* translates into English as an assembly (*yat*) of five (*panch*) village elders, as chose by the community. In South Asia, it represents the lowest level of governance - *panchayati raj*. The Panchayat hall in Chikhali (and in many other villages) is often a venue for meetings, formal paperwork, and sometimes social functions.

²¹ Refer to <http://ranaghose.com/thesisvideo/2-2>.

CHAPTER 3

THE MIRAGE OF BIOSAFETY: THE STATE AND REGULATORY POLITICS

As the custodian of formal regulatory instruments that govern the introduction of goods and services in a market context, the government has a distinct role to play. Along the three disciplines detailed in the preceding chapter, there are three general trends that describe the context for formal regulatory deliberation. The economics literature presents a narrative where the goal is to ensure efficiency via competition and to limit the power of monopolies, and in the face of information asymmetries, to find a balance between fostering competition and ensuring that efficiency is maintained. With regards to international law, multilateral regulatory frameworks are ultimately a function of the efficacy of individual sovereign states, and are primarily determined by a combination of hard (legally binding obligations) and soft (best practices) laws. Finally, the political science literature argues that the classic firm-state-expert nexus disintegrates when regulation moves into social spheres such as health and the environment.

However, my observations point to something less institutional and mechanistic, particularly concerning the economic and international relations literature. While the state certainly has a role to play in managing these dynamics – that of efficiency, information, and legal culpability – the actual practice of regulation is far less about management alone. As Millstone (2007, 2009) argues, risk assessment and management splinter in the face of new technologies embedded with incalculable uncertainty, and a wider inclusion of stakeholders enter the regulatory battlefield as a result. Co-evolutionary trajectories characterize this battlefield, and risk framings are at the core of what motivates – and differentiates these stakeholders. Again, though the Indian government may have started from framing risk as biosafety, the real story is far more complicated – and interesting.

The state has to manage political and economic risks just as much as the technical risks. This is what has happened in practice, and this paints a far different picture of regulation than what the literature I have reviewed has presented. Co-evolution and co-construction breed conflict. Managing competition via licensing arrangements, and adhering to international best practices of biosafety and plant variety protection, both soft and hard, do characterize the formal regulatory instruments that the Indian government has undertaken since the 1986 introduction of the Environmental Protection Act (EPA). But in line with the central argument of this research, the uncertainty surrounding new technologies like Bt cotton has fostered spaces where the government must respond to the concerns of the public.

I characterize a regulatory space ripe with interactions; interactions that occur outside the firm-state-expert nexus, with direct consequences on formal regulation as managed by the government. Biosafety risk assessment, as gleaned from a variety of international best practices and guidelines, does characterize the fundamental aim of formal regulation of transgenics in India. This is the classic formulation of any regulatory regime surrounding transgenics. But aside from this scientifically derived understanding of risk, there are other, less quantitatively explicit factors that guide this process – there are other understandings of risk that interface and interplay with risk as biosafety.

This chapter will address how the Indian government has developed and enacted the frameworks that surround transgenics in India, but unlike the review that opened this thesis, I characterize the dynamics using risk framings as the central theme. First, I will present a consideration of how exactly risk is framed among government actors along the three lines - technical, economic, and political. Within that exploration of risk, I will explore and detail the current formal regulatory frameworks that govern transgenics, and the context where their continual evolution plays out given these framings of risk. And finally, I will discuss how the regulations themselves, once subject to interactions with other parties outside the firm-state-expert nexus, are consequentially a product of the battlefield of regulation. The following four chapters constitute the empirical content of the core argument of this thesis. Once these empirical realities are presented across these four chapters, a clearer picture of the interactions implicit in any regulatory process will be revealed, and a distinct understanding of what regulation really means will emerge.

3.1 The Practice of Regulation: Risk, Knowledge, And Co-evolutionary Processes

The first framing of risk is based on elements embedded in formal, global frameworks; a means of mitigating risk as gleaned from a combination of widely recognized guidelines and an observation of Indian realities and needs. While this forms the basis for technical risk assessment, and by extension, a practice for biosafety, these guiding principles cannot and do not exist in a scientific vacuum. They may fundamentally characterize the regulatory frameworks that address the technology in terms of establishing fundamental notions such as biosafety, containment, and precaution, but the prescriptions of these frameworks interact with other, more abstract notions.

If the first stream of risk framing is based on scientific laboratory procedure and eventual release, the second stream is premised on a national identity as forged on the pursuit of scientific excellence

and financial reward. Those guidelines that address how risk is to be controlled and understood in a laboratory setting run tandem with more pragmatic concerns of how these regulatory frameworks can either impede or foster growth in what is recognized and championed as a “sunrise industry”. In the view of the Indian government, biotechnology, as characterized as a natural progression in agricultural innovation after the Green Revolution, has tremendous potential. This applies not only to the potential benefits that farmers can derive from pest resistant varieties as developed by local and imported scientific expertise, but also the potential benefits that can be derived by firms developing new technologies for what is perceived as a lucrative market.

This discourse of biotechnology as a component of national identity and aspiration is forged on notions of being a regional leader in biotechnology - to be recognized as world class, and to attract the best of the best in terms of R&D capacity, state of the art facilities, and informed regulators (Visvanathan and Parmar 2002). This desire then frames another aspect of risk - the economic risk of losing the biotech race due to state governance being out of sync with central governance, delays caused by the concerns of civil society, institutional inadequacies, or strategic short-sightedness. While premised on something more abstract - pride, a desire for recognition, or perhaps even insecurity - the abstraction ends when this risk framing is adapted to formal regulatory ambition.

The third stream lies at the confluence of these two preceding streams. The statistics are often repeated, but the relevance of this fact is impossible to ignore. Farmers, by virtue of their numbers, have tremendous influence politically via their constitutional right to vote. When Bt cotton appears to ‘fail’, or when the government can (and does) intervene in the pricing of cotton by paying a premium for Bt cotton, a breeding ground of political opportunism is created. In these spaces, Indian states can manifest their constitutional right to address agriculture as a state domain¹, and can (and have) challenged central directives under the claim that these directives do not suit the interests of their electorate. If an astute politician can capture the imagination of enough farmers, while still relating to the needs of their urban counterparts, their chance of attaining political power is almost guaranteed. This also applies to when a broader public becomes sensitized to the ‘dangers’ of transgenics. Such sentiment can translate into political capital, which ultimately can change the direction that policy follows. However, in practice this was something fostered more by the actions of civil society, and as such, I will address this in more detail in the next chapter.

In the context of this research, two strategies on the part of government to attract and consolidate political power have emerged - a series of central and state relief packages for Vidarbha, and the setting of minimum support prices for cotton. Farmers respond to these signals, and are motivated politically to respond in a way that best characterizes their satisfaction with these offered

incentives. This then characterizes a third framing of risk – the political risk of alienating farmers by not presenting the correct incentives to secure their political support. This has direct influence on who secures state leadership, which then has implications on the interplay between formal central and state level regulation. All of this points to a form of co-evolutionary regulation that is far less about technical risks, and in recent times, even economic risks. It is about political risks, and how all the parties involved interact in the battlefield of regulation.

3.1.1 *Technical Risk: Biosafety, Regulatory Regimes, and Science*

The GEAC provides guidance on how to go about testing [transgenic technologies] before it is released. For most of the transgenics, there are three kinds of biosafety concerns, which have to be advocated. Biosafety concerns for human and animal health, biosafety concerns for environmental safety, and third, the social and ethical concerns. All of them received tests for allergenicity, toxicity, pollen flow, agronomic performance - all these tests which we, in our guidelines, have been prescribed, have been scrupulously followed².

In 1996, Monsanto wanted to expand into India. They saw India as an emerging market. They spent some six to eight million US dollars to get that license here. The Indians thought 'Well can we do it? Can we handle this kind of licensing?' (...) Those 100g of seed [that Monsanto wanted to import into India for testing] started the whole biosafety process. In 1998 the MoEF and the DBT decided that the Guidelines weren't sufficient. But remember, all of that is rooted in those 100g of seed. It's Bt cotton that has really shaped our regulations³.

These two quotes illustrate the starting point of this story: in the eyes of the formal Indian regulatory machinery, technical risk assessment is key and rigorous on paper, but, the real catalyst for assessment – and ultimately management – was the entry of Monsanto in India. That event is what really got the ball rolling in practice. Monsanto first applied to enter the Indian market in 1990. At that time, they were denied because of high technology transfer fees, and concerns relating to the backcrossing of an American variety of cotton with local varieties. Five years later, a new application was approved - the pivotal request to import 100g of Bt cotton seed for backcrossing and testing (Bharathan 2000: 1068). These two events set in motion a previously untested structure and momentum to the ongoing process of forming regulation. The starting point of the regulations

surrounding transgenics was, and is, biosafety, and the upholding of biosafety standards is sacrosanct amongst regulators. On paper at least.

In the words of one senior regulator and one senior scientist, “[b]iosafety is our focus; that’s it⁴. (...) Agronomics is separate; our focus was, is, and will be on biosafety⁵.” This framing is reflected in official documentation authored by the DBT in formulating a strategy for the latest iteration of the regulatory structure surrounding transgenics in India, the 2009 National Biotechnology Regulatory Authority of India (NBRA) Bill:

Scientific risk assessment is a cornerstone of biotechnology regulatory systems and public policy decisions related to the safety and acceptability of GMOs. A strong scientific capacity and knowledge base is widely viewed as key to assessing risk; which entails identifying hazards, assessing their magnitude and duration, and estimating their likelihood of occurrence while recognizing the nature and importance of the attendant uncertainty in each phase. Risk assessment of biotechnology products and processes is an intensive and scientifically demanding activity. (DBT 2009: 9).

The role of “science” clearly lies at the crux of any assessment of risk in terms of the formal regulations on paper – the only way to ascertain potential outcomes is to identify, assess, and estimate the likelihood of potential outcomes. More explicitly, the role of science based practice towards ascertaining a measure of risk can be characterized along four substrates: to provide objective, scientific information on potential environmental risks and benefits for scrutiny by the scientific community and the public; to help identify any potential risks that may be associated with introduction, so these can be avoided and managed as appropriate; to assess the strengths and weaknesses of current regulations and guidelines in India, compile and analyze international approaches to regulating transgenics, and provide recommendations to improve the risk assessment framework for transgenics; and to evaluate if additional scientific capacity may need to be developed within the National Biotechnology Regulatory Authority to support future safety assessments of transgenics by the Risk Assessment Unit (DBT 2009: 12). Ultimately, the outcome of such a process in a formal, regulatory context can only be binary in nature. In the words of one regulator at the DBT, “I can’t call a technology ‘good’ or ‘bad’. I can only say if it is ‘safe’ or ‘unsafe’. And, if that technology is safe, then it should be released to the market⁶.”

Regulation Before 2004: “Do the science...”

We are technocrats, so you can put us anywhere. We may not be experts in everything, so we seek consultations. I mean, I may be an expert in biotechnology, but if it is another subject, the approach is the same: find experts. (...) We have cut and paste from six sources to make our system. We took what we thought was the best⁷.

Though risk assessment can, by construction, only result in bipolar conclusions – yes or no – assessment as a process requires a basis to manifest in practice. Expertise comes from experience. But what if that experience is not present? While the Indian experience with establishing guidelines on laboratory research dates back to 1983⁸, the text that most obviously began to shape current notions of biosafety and risk assessment in a formal regulatory context internationally – as well as within India – can be traced back to 1986. The Recombinant DNA Safety Considerations published by the OECD, or the “Blue Book”, has emerged as the most cited document in terms of international best practice on the management of biotechnology (Balazs 2007). This 74-page document addresses a number of concerns with regards to the management of organisms derived by recombinant DNA techniques, but the primary focus was on safety. It presented “...a range of scientific considerations to be taken into account when assessing [the] potential risks of industrial and environmental applications of micro-organisms, plants and animals and selecting appropriate safety measures (OECD 1986: 24).”

In applied terms, safety is discussed within the more specific context of risk assessment. With reference to a 1981 US Office of Technology Assessment document, the Blue Book refers to risk assessment along five lines: formation, release, proliferation, establishment, and effect. All of these themes are firmly embedded in a quantification of probabilities, epidemiological or toxicological consequences, and how new micro organisms interact with the existing ecosystem. However, surrounding this characterization of risk assessment is a clear caveat: “[p]otential ecosystem interactions between genetically-modified micro-organisms and other existing organisms are extremely difficult to describe or predict accurately (OECD 1986: 25).” Regulators interviewed here indicated the influence of Blue Book on initial stages of the construction of regulatory mechanisms in India, along with the regulatory frameworks of other countries such as Canada, the EU, and the United States⁹.

In the same year as the Blue Book was released, India passed the Environmental Protection Act, which was, I have detailed in the first chapter, firmly embedded in a USDA narrative. The EPA occupies a unique space in the Indian regulatory hierarchy. While not explicitly concerned with biotechnology, it is the cornerstone of the Indian regulatory structure surrounding biotechnology.

This is due to the focus on “...the protection and improvement of [the] environment and the prevention of hazards to human beings, other living creatures, plants and property (MoEF 1986: 1).” The EPA mandates that regulatory structures must be put in place to protect society against the potential damage caused by goods that do have the capacity to cause harm by preventing such hazards. The key term here is “hazard”.

Three years after the EPA was introduced, legislation explicitly addressing biotechnology was introduced based on a perceived lack of biotechnology risk management as desired by the DBT. The 1989 Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Engineered Organisms or Cells were introduced with a mandate based on “...the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act (...) and with a view to protecting the environment, nature and health, in connection with the application of gene technology and micro-organisms (DBT 1989: 1).” In the words of one regulator at the DBT who has been at the centre of much of this regulatory evolution from day one, the Rules were developed and enacted “[b]y *zabardast* (under oppression; in an overbearing way), and by the time they were approved, it was 1989¹⁰.”

The “Rules”, as they are often referred to, aim to protect “(...) the environment, nature, and health, in connection with the application of genetechonology and micro-organisms (DBT 1989: 1)”, and to address activities involving the manufacture, use, import, export, storage and research of transgenics including microorganisms, plants and animals (Damodaran 2005). In terms of a framework, the Rules further mandate and characterize the role of six competent authorities for the management of transgenics. In the face of “...a growing awareness of the commercial potential of [b]iotechnology” and the efforts within the government to “...promote large scale use of indigenously relevant biotechnologies (MST 1990: 1)”, the Rules mandated the 1990 Recombinant Safety Guidelines (RSG), which rendered a more explicit series of guidelines for research, large scale operations, and most relevant here, environmental risk. Drawing from a variety of best practices including the WHO Laboratory Safety Manual and the US Centre for Disease Control & National Institute of Health risk group classifications, the 1990 RSG presents a series of laboratory guidelines, best practices, and perhaps most significantly, an institutional framework for dealing with the research, testing, release, and monitoring of biotechnology in India. While acknowledging that the guidelines can never be considered static, they were introduced in a context where there exists “...a sense of concern among scientists working in biological areas and others to find ways how safely the research in the field should be carried out” due to the nature of “...pathogenic microorganisms and genes of virulence (MST 1990: 1).” Again, the language is firmly embedded in notions of safety in the face of potential hazard, with an implicit indication that while all efforts can

be lent towards minimizing those hazards, the best one can do is to follow well established guidelines to address that risk.

3.1.2 *Economic Risk: Barriers, Pride, and Commercial Interests*

You know, I am today, in this country, perhaps the single most vocal opponent of the release of GMOs without adequate risk testing (...) But as it turns out, not a single product has been released according to such procedures (...) Unfortunately in biotechnology [what occurred was] all on account of the people involved...it got into the hands of willy-nilly people who were purchasable – very simple, I can put it in one word – they were purchased ☐¹¹.

As Dr. Puspha Bhargava¹² would agree, what is on paper and what happens in practice are often two very different things. The technical risks were assessed according to established guidelines – a product of domestically tailored needs and internationally recognized standards. But either something got lost in translation, or perhaps more accurately, economic incentives as framed by economic risks took precedence over the technical realm. In its first iteration, the Indian regulatory system was thorough in its coverage, wide in its breadth across six ministries, and ambitious in its scale. In the face of entrants, biosafety guidelines had to be enacted, and rapidly. Yet in the Indian context, regulatory ambition can often outpace what is institutionally required to meet the regulatory requirements. It would be false to state that India does not have the capacity to adequately run the scientific tests required to arrive at conclusive evidence on biosafety. Similarly, it would be false to state that biosafety alone is what really drove – and drives – the actual formulation of the regulations. There are additional pressures that often demand a more immediate, and often industry friendly, response in a regulatory context. Given this urgency, there is evidence that the regulations themselves have not always been adhered to. Further, one cannot assume that they are created solely with public interest – as characterized by biosafety – as the guiding principle. One case in point was the adoption of the Cry1Ac event in hybrid seeds as opposed to OPVs. In the words of the current director of the Central Institute for Cotton Research (CICR),

[straight line] varieties are pure, but hybrids have a 25% chance of impurity. But the GEAC approved hybrid varieties [of Bt cotton] due to commercial concerns – the fact that you can't save hybrids. That and the typical understanding [among farmers] that hybrids offer higher yields¹³.

More pointedly, the director of the Central Institute for Research on Cotton Technology (CIRCOT) observed that within the Indian scientific community, “[w]e know hybrids bring many problems. But, hybrids are what we are used to¹⁴.” Bhargava on the other hand – whose relevance in this story is something I will discuss in much more detail in the following chapter – is far less more direct about the rationale for hybrids. He notes that while he asked

(...) friends in the agricultural scientific community, ‘why have we not developed to date - given [the] modern techniques of cellular molecular biology - why have we not developed alternatives to hybrids?’ We don’t do this, because if we do there will be no seed business. And therefore those who benefit from the seed business will [no longer] benefit¹⁵.

This is a consequence not only of the rapid private sector development of additional varieties of Bt cotton (let alone Bt maize, rice, aubergine, and so on) but perhaps more important, the ambition that frames so much of India’s rapid economic rise since the 1991 economic liberalization overseen by the Rajiv Gandhi and subsequent P.V. Narasimha Rao administration. Since my being based in India since 2001, I have had the luxury of seeing an entire nation (and in particular an entire generation) consumed by a near obsession to be recognized – to become a player, to be taken seriously in the global imagination, and more than anything else, to succeed on their own terms. This ambition to succeed – utterly inspiring in its conviction, dizzying in its rapidity of deployment, and highly conducive to allowing personal gain to overshadow protocol – is perhaps the only thing that can truly foment change at a national level from the perspective of regulatory construction. In a public setting, protocol must be adhered to in the face of a keenly observant civil society. But protocol alone certainly does not dictate outcomes, though firmly embedded in highly ambitious environment. In the words of one senior regulator in the DBT, “we want to be a regional [Asian] hub; we want to be leaders¹⁶.”

But the question is at what cost? For this ambition to manifest in practice, the formal, ‘on-paper’ regulatory landscape has to strike a balance. One cannot jettison the guiding principles of biosafety in the face of personal and aggregated ambition due to a combination of multilateral commitments, such as being a signatory to the CBD, as well as arguable simple common sense and precaution. Similarly, there are logistical factors, though coupled with concerns of the incentives of the firm overtaking those of farmers. By construction, the public sector does not have the same capacity for R&D that the private sector has. In the words of the Joint Director of Agriculture for the state of Maharashtra,

[w]e ask the private sector to get involved in research. If we closed that option, we never would have got the technology (...) Generally, the government believes that we should encourage the private sector. Firms are free to market their products, though it is true it may not be in favour of the farmers, but then farmers will decide and share their experiences with other farmers¹⁷.

Dr. K.K. Tripathi, a senior scientist within the DBT (and someone who was often in court dealing with civil society PILs when we first tried to meet), offered a more pointed analysis. “You can look at it this way: industry, [Indian agricultural] universities, and regulators are all linked - they interact and depend on one another. But our funding constraints require private sector assistance¹⁸.” The private sector and the public sector are linked given a meshing of economic incentives in the face of lacking capacity within the state. However – and this is where risk management and assessment split - along with these shortcomings and the space it offers for private sector involvement, are the actual approvals of the technologies themselves. In the words of Bhargava, a Supreme Court nominated observer within the GEAC,

[w]e have evidence that the data of trials in forty places was dismissed by the committee in twenty minutes as OK. Now, I am a professional scientist – for me to review one paper takes me a couple of hours. If I were to review data for forty sites, I’ll at least take fifteen hours. They were done in twenty minutes□¹⁹.

It is not just observers who share these opinions. Dr. S.R. Rao, another senior scientist in the DBT and the primary author of the forthcoming NBRA Act noted that,

[l]ook, the DBT is basically three people. Compare that to the 9,000 people in the US Food and Drug Administration! (...) Granted, we aim to hire thirty more people this year, and our budget has increased from 40 *crores* (INR 400 million) in 1989 to 1,100 *crores* (INR 11 billion) in 2009²⁰.

The balance then is best characterized as follows – adhere to biosafety norms, at least on paper, but do not forget that this is a race that India has to win. As I will discuss in the following chapter, this economic framing of risk interfaces with that of civil society, and in many ways these opposing framings – though both based on the same principal of opportunity costs – represents the core of much of the debate. However, the firm trusts the capacity of the government to manage these potential hiccups. In the words of M.K. Sharma, the Mumbai based managing director of Mahyco,

[i]f NGOs have a dialog with government officials, it will be difficult [for the NGOs], as it will become clear to them that the government is simply doing their job. They want to paint this picture that the private sector and government are linked (...) Anyway, the Right to Information Act is available, so what is the problem²¹?

Regulation After 2004: “...but cut the red tape...”

This balance between balancing the public interest and the aspirations of a country is rendered quite explicit in the second iteration of the regulatory system. The system mandated by the RSG 1990 was further revised in 1998, 1999, and 2008 via the Guidelines for Research in Transgenic Crops. This evolution reflects the dynamic nature of research and development within the field, as well as a response to new entrants and new technologies. But these revisions took place in an environment where there were increasing concerns both within and outside the government regarding the state of the regulatory system. It was considered cumbersome, particularly given the large number of regulatory texts and the different ministries that were involved. More specifically, it was seen as a possible barrier to research and the further development of the domestic biotechnology industry. This concern was rooted in the observation of the “...extraordinary growth of the Indian biotechnology sector”, and that this growth “...has significant implications for policy in the area of regulation (MST 2008: 1). As the DBT argues,

[t]he Indian Biotechnology sector is gaining global visibility and is being tracked for emerging investment opportunities. (...) Biotechnology can deliver the next wave of technological change that can be as radical and even more pervasive than that brought about by IT (...) [and] (...) as a business segment for India [it] has the potential of generating revenues to the tune of US\$ 5 billion and creating one million jobs by 2010 through products and services. This can propel India into a significant position in the global biotech sweepstakes (MST 2005: 4).

The usage of the term “sweepstakes” is telling in framing the sense of urgency. In terms of material responses to this sentiment, two external reports were commissioned. First, the 2004 Report of the Task Force on the Application of Agricultural Biotechnology chaired by Dr. M.S. Swaminathan recommended the establishment of an “autonomous, statutory and professionally-led National Biotechnology Regulatory Authority (...) for generating the necessary public, political, professional and commercial confidence in the science based regulatory mechanism in place in the country

(MoA 2004: 4, 8).” In 2005, the Report of the Task Force on Recombinant Pharmaceuticals chaired by Dr. R.A. Mashelkar also recommended the formation of a National Biotechnology Regulatory Authority in order to facilitate “...a professionally managed single window mechanism for giving various clearances including biosafety issues (MoEF 2005: 8).” The aim was to ensure that red tape and bureaucracy do not impede growth. A balance had to be achieved.

Soon after these two reports were disseminated, the DBT published the 2005 National Biotechnology Development Strategy. In line with the recommendations of the Mashelkar and Swaminathan reports, it recommended,

(...) a competent single National Biotechnology Regulatory Authority [to] be established with separate divisions for agriculture products/transgenic crops, pharmaceuticals/drugs and industrial products; and transgenic food/feed and transgenic animal/aqua culture (MST 2005: 18).

The Swaminathan and Mashelkar reports are key to the ongoing evolution of the regulation. The Strategy concluded that the approval process was too long, there was too much duplication in terms of roles and processes across the different ministries, and risk assessment standards were not being fully adhered to due to resource and institutional constraints. On the one hand, the system seemed to present a sound basis for risk assessment in terms of biosafety, though clearly one that responded to Bt cotton as the litmus test. In the words of C.D. Mayee, a former member of GEAC and board member of the biotech industry consortium ISAAA,

[t]he system that was developed in India was fairly rigorous because [Bt cotton] was the first product, and we were very cautious as to test it against everything. Like for example, Bt cotton, although the impact may not be in the fish, but we have data on fish. We have data on birds, predators, parasites, soil macroflora, on goats, large animals, small animals...all that was asked to be generated. I think the government mechanism which has been established for that was fairly good and I would say that sufficient biosafety testing has been done²².

On the other hand, there were observers who, while agreeing that biosafety is a sound basis on which to ascertain risk, were acutely aware of the commercial interests at stake. The issue is the interface between risk as biosafety and risk as “missing the boat”, with the erosion of biosafety standards as a consequence. As Bhargava recalls,

[w]hen we heard of the sheep deaths in Andhra Pradesh, I wrote to my friend [Dr. R.A.] Mashelkar, director of CSIR [and author of the Mashelkar report], and I said I was very concerned. He forwarded it to Rakesh Tuli of the National Botanical Research Institute in Lucknow, who had done all the tests. And Rakesh told me - I know him extremely well - he told me he fed [the animals] the seeds. I asked him, 'who gave you the seeds? If Monsanto gave you the seeds, how do you know they were Bt seeds? Did you test them? Maybe they gave you normal seeds as they were afraid the Bt seeds would have a toxic effect! Did you test the seeds?' No reply. I asked 'did you feed them the leaves as well?' They said 'we didn't feed them the leaves.' It's like they have already approved it - they just need the paperwork²³.

The Future of Regulation: "...and control dissent."

Bhargava's observations were (and still are at the time of this writing) impossible to ignore if one was sceptical of the government's intentions. It is at this stage - post 2004 - that the battlefield of regulation begins to take shape, and where economic risks began to overpower technical risks. In 2007, the Government of India formally adopted the National Biotechnology Development Strategy. The most salient feature of the strategy was the formation of the National Biotechnology Regulatory Act, in order to

(...) provide an opportunity to consolidate and enhance the efficiency and effectiveness of biotechnology regulation, increase collaboration with state governments in this area, promote public confidence in the regulatory system, and facilitate international trade (MST 2008: 3).

To formalize the strategy, a draft of the National Biotechnology Regulatory Authority of India (NBRA) Bill was tabled in 2009 (MST 2008). At the time of this writing, the exact wording of the Bill has yet to be finalized, but it is unprecedented in its content, and for three primary reasons.

First, article 27 provides a space to overrule the existing Right to Information (RTI) Act in cases where "confidential commercial information" may be compromised. Second, articles 61 and 63 allow the state to penalize anyone who either "...provides any information or produces any document that the person knows is false or misleading", or "...without any evidence or scientific record misleads the public about the safety" of biotechnology products. The penalties are severe; "...imprisonment for a term which may extend to three months and also with fine which may

extend to five *lakh*²⁴ rupees“ or “...imprisonment for a term which shall not be less than six months but which may extend to one year and with fine which may extend to two *lakh* rupees or with both” respectively. Third, article 87.2 presents the possibility of state laws to be overruled by the Bill. This provision challenges the constitution on India, as agriculture has always been a state level domain.

These three provisions are reflective of the combative environment that surrounds the formal regulation of biotechnology, with a particular focus on the actions of civil society organizations. As Dr. S.R. Rao at the DBT again recalls,

1999 saw the first arson of field trials in Karnataka, followed by the court cases filed by Vandana Shiva. The business of NGOs started then (...) but why against GM? Why not cigarettes? Chewing tobacco? What about the state of sanitation in India? The only reason is because it's a business, and that's where the money is. If you don't oppose, you are out of a job²⁵.

The NBRA in its current form is a response to civil society organizations that have, first, used the RTI Act to secure information regarding ongoing research, and second, been publicly vocal about their concerns regarding the safety of biotechnology. It is also a response to the preferences of individual state governments, given the current ongoing debate surrounding the release of Bt brinjal, the first transgenic food crop being considered for release. At the time of this writing, nine Indian states have indicated serious doubts about Bt brinjal, with an additional two states banning transgenics in agriculture altogether²⁶. This of course is a thorn in the side of a central government keen on release. All of these factors have significantly delayed the release of further transgenic technologies in India, much to the chagrin of those regulators interviewed here, though not without a certain wit. As Dr. K.K. Tripathi at the DBT puts it, “[w]e are thankful to the petitioners for making our processes and organization more robust²⁷.”

Perceived barriers towards Indian progress in the field of biotech – be it state interventions as a barrier to central directives or the delays caused by civil society actions - present a fascinating insight into the battlefield of regulation: how regulatory evolution interfaces with the public and their preferences. Civil society and firms have had distinct effects on how formal regulatory ambition is both tempered and executed. The top down approach championed in the economic and international relations literature concerning fostering competition and adhering to international best practices holds to a certain degree. The nature of the licensing of the technology from Monsanto to other domestic seed developers is a testament to this, just as the NBRA bill taking time

to be enacted and finalized “ (...) due to our obligations to the Cartagena Protocol [on Biosafety to the Convention on Biological Diversity]²⁸.”

The architect of the NBRA bill, Dr. S.R. Rao, offered a particularly candid insight into how regulation actually gets approved. Just as the bill was being tabled for the parliament debate, Rao was sent to personally visit the MoEF minister, Jairam Ramesh, as an ambassador from the DBT. He recalls that,

(...) the moment I went to him, he asked me, ‘what is your level?’ I said, ‘I am a scientist, I have no level.’ I mean compared to [a minister], I am a Joint Secretary Plus; the ‘plus’ is because I am a scientist. He was initially demoralized. I had five slides to show him. The [NBRA bill] file had to be signed, so it was my job to convince him. (...) I told him that, ‘the biotech market was like this: what is the potential, and what is the myth? And can we catch up? To do this, here is the GEAC, here is the RCGM. These are the limitations.’ I mean, I didn’t say it as an affront - we are all one right - we are in the government. The four slides were: ‘this is the FDA. This is the Australian system. This is the South African system.’ Three slides. ‘This is where we are. This is where we are thinking of going.’ I mean, a copy of everything, an attempt to show what others are doing. ‘The choice is yours.’ I mean, the last slide was literally ‘the choice is yours’. Then he said, ‘aaaaaaaah’ [long exhaling sound], like that. ‘Hmmmmmm. OK. Give me ten minutes. Do you have anything else to say?’ I said, ‘Mr. Minister. There was an editor of Nature, Luther Ford, and he said that he didn’t want to be an editor. So he said - in his appointed role as editor - letters to the editor will be 800 words down from 1200. There were comments from some Nobel prize winners, and in the next editorial, he wrote that if you can’t say what you have to say in a few words, then you haven’t done it or understood it. So I think ten minutes [with you] was enough.’ How arrogant, right? Anyway, he said ‘OK, give me ten minutes.’ He comes back in ten minutes. ‘Dr. Rao, done.’ No questions. ‘What about a coffee?’, I asked. ‘I mean I got here at eight o’clock, and my wife couldn’t give me a coffee. Can we celebrate these good words?’ He said, ‘why not’, and he brought the coffee.

As a scientist, Rao’s role was to convince Ramesh why the NBRA bill was worth it. But as a civil servant, technical risks were not really at the core of his submission. It was more based on an argument of where India should be in comparison to the rest of the world. It was the economic risk

of missing the boat made manifest, both in light of recent civil society actions, but also the bigger picture of India on the global stage. It is the political science literature that best characterizes the more recent evolution of these frameworks and renders the top down regulation untenable and unrecognizable – despite the economic imperatives and technical arguments. Other parties outside the state-firm-expert nexus do affect formal regulation, and this is due to the nature of the technology; its incertitude, its urgency, and its political ramifications. These political ramifications are equally as important to consider as biosafety and urgency. Indeed, if economic risks took precedence over technical risks post 2004, what is happening now points to political risks overtaking both.

3.1.3 Political Risk: Political Pragmatism, Bailouts, and Price Intervention

While technical and economic risks do frame one side of the story, political risks are also calculated. This aspect of regulation will be discussed in more detail in the following chapter, as it is civil society who has truly generated this political risk framing in a way that the government and firms were forced to respond to. But from the perspective of internally generated political risks, there are those that are a direct response by those in power to farm level realities. This frames the third characterization of risk; the risk of alienating the electorate.

Bt cotton has been wildly successful in the region in terms of adoption, either due to perceived benefits on the part of farmers from trusted sources of information, massive marketing campaigns, and first hand information in the form of observation of trial plots indicating apparent success. Perhaps most importantly, in the area where I conducted the farm-based element of my research, it is nearly impossible to find anything but Bt cotton at seed shops. Ultimately, Bt cotton is a significant source of income for farmers. And politicians are acutely aware of this. The agrarian crisis has presented a challenge to both the central and Maharashtra government. Due to how the situation has been narrated to a wider audience via media and civil society representatives, it was forced to respond. Inaction is political suicide. But as a result, it is not a challenge without the potential for political gain.

In terms of pragmatic responses by the central government, there have been two strategies to address this. The first has been the a series of relief packages targeted towards distressed farmers, and the second has been state pricing interventions in the form of minimum support prices and monopoly procurement for cotton, both as a buffer to global market fluctuations, but also as a function of political gain. A party that promises a high Minimum Support Price (MSP) will often

win the farmer vote. MSPs and relief packages generate expectations on the part of farmers for what the government should do in the face of the crisis. Sainath has illustrated this interaction between the expectations of farmers and the capacity of the government to respond in his many articles on the agrarian crisis. In narrating the experience of a recent agrarian suicide in Cotton, he notes:

[h]is message to Mr. Deshmukh: 'Mr. Chief Minister give us the price' And to Home Minister R.R. Patil 'if you do not give us a price of Rs. 3,000 per *quintal*²⁹, suicides will surge.' Kuchankar wrote: 'The cotton price has fallen to Rs. 1,990 a quintal. We cannot manage with that. Which is why I am giving up my life.' The suicide note is a bunch of anguished scribbles across a sheet of paper.

Closer to where I conducted my village-based research, similar sentiments have been echoed in the context of the local *panchayat* election and expectations of formal government. In the words of one farmer in Chikhali, Sharadrao Chikhalkar, "[b]asically, we base our decisions on whether or not [the candidate] can bring schemes here. What will they bring to the village? If they have political contacts, one candidate can capture the imagination of the entire village"³⁰." In this way, the third framing of risk can be simply put as the risk of alienating the farmer vote. In the same way that biosafety frames a scientific formulation of risk, and urgency frames the risk of missing the opportunity to shine, this third risk relates to keeping political parties in power, and what political parties can and will do to ensure their continued leadership. The regulations that surround these are both state and centrally mandated, but both are focused on financial incentives for cotton farmers. The mode is short-term monetary concessions that serve to quell collective feelings of neglect.

The Prime Minister's Package

2006 saw the central government mandating a fairly broad reaching relief package, targeted towards, on paper, alleviating the difficult conditions farmers in the Vidarbha region have been facing. In the face of difficulties securing credit, poor monsoons, and perhaps most politically sensitive, agrarian suicide, the central government allocated over 37.5 billion Indian rupees towards a relief package for farmers. Among other things, the salient features of the package were direct grants to suicide affected families (each district collector was mandated 5 million rupees to use at their discretion), debt forgiveness, restructuring, and interest waiving, irrigation infrastructure, drip irrigation, and rainwater harvesting, a 50% subsidy on public sector seed (mostly soybean in my observation), the fostering of further government extension, and the facilitation of alternative

sources of farm based livelihoods (i.e. dairy, horticulture, and aquaculture)³¹.

The farmers' leader Kishore Tiwari sums up the rationale of the package as being problematic from the start. He argued that,

[i]f you look at the agrarian crisis, Vidarbha has been recognized by the state. The chart [behind me] says in June 2005 the government officially admitted 1,000 farmers committed suicide. (...) They released about 1,000 *crore*³² (10 billion) rupees. In June 2006 they pumped another 3,760 *crores* (37.6 billion). Then after one year, they pumped 70,000 *crore* (700 billion) as a loan waiver, then another 13,000 (130 billion) as a loan waiver. Then in January 2009 the state [of Maharashtra] has pumped 6,208 *crore* (62 billion) as a bailout package. [But] if you look at the result of bailout packages, either the relief packages are not targeted, or the government failed to control the agrarian crisis. One has to admit something³³.

The release of this package had varied affects at the ground level, but what is of interest here is not so much how the package performed or did not perform, as I would argue that was never really the point of the package. The purpose of the package was to foster political support among farmers locally, and as a response to the press generated understanding that Bt cotton was responsible for the crisis nationally.

Beginning in 2006, Sainath began to document the realities of farmers' experiences on the ground in a series of articles for both the Indian and international press. These articles were impossible to ignore politically, as it created an unprecedented awareness among the mostly middle class readers of the papers where the stories were published of what appeared to be an epidemic on home turf, something akin to a source of shame within a country where rapid growth and development is a cherished assumption; an almost narcissistic conviction that India deserves to shine. I found it quite illustrative in my own experiences in Bombay of how people were reacting to these reports: young musicians writing songs about it³⁴, 'aunties' wondering why farmers were killing themselves and why the government was not responding³⁵, and an overall collective sense of guilt, though tempered with the sense of distance that the urban-rural class and geographic divide in India presents - "well, that's the way farming goes anyway...they should probably get out if it³⁶". More specifically in the context of this argument however are the ramifications that this collective sense of shock could - and arguably has - had on those who reacted to the crisis, when one considers this public as a voting electorate.

The popular press, and Sainath in particular, have often linked the agrarian crisis with the adoption of Bt cotton. The popular press narrative can be summarized as follows³⁷:

1. As a technology, Bt cotton was never targeted – or meant for – rain fed farming.
2. There are few sources of formal credit available to farmers, resulting in a massive informal, unregulated informal credit industry where moneylenders are the primary sources of credit charging interest anywhere from 20-100%.
3. In the face of poor monsoons, insect attacks, and fungi or viruses, any expectation of future yields is mired in uncertainty. In the face of crop failure, harvests are never sufficient to outweigh expenses, particularly when massive amounts of factor inputs (pesticides and fertilizers) are applied by farmers based on advice from that most trusted extension officer, the input dealer.
4. Given the farmers' inability to repay the loan in the face of a poor harvest, the debt burden becomes impossible to bear, and due to a number of factors (pride, stigma, fear, or a combination of the three), farmers resort to suicide.
5. While the factors behind suicide are varied³⁸ the debt burden cannot be ignored as a factor. And ultimately, the entire crisis could have been averted, if not for government policy that favoured the interests of the firm as opposed to the welfare of farmers by not authorizing straight line varieties of Bt cotton that could be saved instead of hybrids, by allowing Bt cotton to be targeted to rain fed zones, and by not allowing for easier access to credit for farmers.
6. Most regulators – central and state – are corrupt and easily malleable to the interests of the firm (i.e. allowing Bt cotton in the first place) or for personal gain (i.e. district level bureaucrats pocketing the money or distributing it to their patrons, or regulators taking bribes to authorize Bt cotton). This is why the packages haven't worked well, and this is why farmers are suffering.

The near axiomatic linkage of Bt cotton and agrarian distress in the popular press was clearly not lost on the prime minister, who called Sainath for a one on one consultation on the evening of June 22, prior to his visiting Vidarbha between June 30 and July 1, 2006³⁹. It would not be a stretch to argue that the PM sought advice from Sainath on how exactly to address the crisis, though in effect, the visit and subsequent packages did not achieve their intended benefit – suicides have not decreased. But that is not to say no benefits were accrued. Sainath argues that:

[t]here was a political benefit to the PM's visit; nothing in terms of the economy.

There was also a complete exposure of the Union Agriculture Minister who'd stood in Parliament to say that nothing much was the problem, that the suicides were 'normal'. (...) Neither the CM nor the Union Agriculture Minister had visited any of the distressed families and spoken to them. To find the positives in the government's actions, you would need a microscope⁴⁰.

Soon after the central government announced the package, the Maharashtra state government chimed in with their own relief package. More recently, the Maharashtra state government has requested a second relief package of 72 billion rupees in 2010 – more than double the amount of the first package in 2006. These responses are firmly embedded in a framing of risk that puts losing political support front and centre. The press coverage of the crisis and the alleged ineffectiveness of the relief packages provides context for civil society to further question the government on its motives, as it captures the imagination of enough of a public to question whether or not Bt cotton is responsible for the crisis. But the government cannot undo release. The technology is out there and is in high demand by farmers, regardless of what the press says regarding the technology being responsible for the crisis. The only way to mitigate the political risk implicit with the release of Bt cotton and the way it has been linked to the crisis is to offer concessions to farmers, with the aim of securing their political support. And for the most part it seems to have worked, even in the face of the “GM Genocide⁴¹”.

Minimum Support Prices

This Congress-NCP came to power in October 2004 on the promise that it would restore the MSP to Rs 2,700 per *quintal*, that's what they said when Madam Gandhi canvassed [in Vidarbha] for votes. Then, within a year, the government drops the MSP to Rs 1,700 per *quintal*. Just restoring it to the pre-2005 level would have saved lives this year. Then, they withdrew the advance bonus of Rs 500 per *quintal* which would have cost the government Rs 1,100 *crore* (INR 11 billion) a year. It's a purely ideological decision but the farmers are paying with their lives for it. After all this, the chief minister keeps saying suicides have nothing to do with prices⁴².

While the relief packages present one depiction of the political risk framing of regulators, the pricing of raw cotton as purchased from farmers by the state presents another. The link between the MSP and Bt cotton is based on grading, and the staple length in particular. Based on my visits to the Agricultural Produce Marketing Centre (APMC) in Deoli, the administrative centre of the *taluka*⁴³ where Chikhali is located, higher prices are paid by the APMC for Bt cotton varieties as they

exhibit longer staple lengths⁴⁴. As such, Bt cotton is preferred to farmers given the pricing incentive because of longer staple lengths⁴⁵. It is the dictation of the prices, set from the centre to the state annually, that determines the scale and allure of this incentive. And during election years, these prices often outpace what the markets can truly support. The links between MSPs, Bt cotton, political risks, and the expectations farmers have of the government in the context of the agrarian crisis are clear. Sainath makes the link in the above quote, but the perspective from a farmer is even more telling. Once again, from Sainath's profile on Kuchankar:

'Don't blame my family for my action,' says the suicide note of young Kuchankar. I will never forgive anybody who does.' He perhaps foresaw a standard government explanation of farm suicides: 'family dispute.' And in one poignant sentence, addresses the 19-year-old girl he had wed just six months ago: 'Pratibha, I am sorry. Please get remarried.' He blames the procurement price for cotton as the source of farmers' distress. 'We are fed up with the delay in procurement and crashing prices. This will further aggravate the situation⁴⁶.'

It would appear that monopoly procurement has become less a tool for protecting the interests of farmers, and more a means to ensure political support; a sentiment echoed by one observer who opined that monopoly procurement "(...) is just a political tool - vote bank politics⁴⁷." Maharashtra is unique in India by the means in which the state procures cotton from farmers. In 1971, the state enacted the Maharashtra Raw cotton (Procurement, Processing and Marketing) Act. This mandated state monopoly procurement of cotton to ensure stable prices to farmers. Private trading was banned, and all cotton was to be procured by the Maharashtra State Cooperative cotton Growers Marketing Federation Limited (MSCCGMF). In 1972, the state government undertook an initiative to allow stable prices for farmers as a means to buttress the fluctuations presented by global markets. The Maharashtra Government Monopoly Procurement Scheme (MGMPs) guaranteed a stable price for purchasing cotton, with any difference between the MSP and global prices covered by state sanctioned funds. Although this has been achieved in a far from efficient or effective manner. Even nearly twenty five years ago, one observer argued that the scheme

(...) has, however, been incurring losses on operating the monopoly scheme reflecting the difference between the prices it has been paying to the growers and those realized by it on cotton sold to the textile mills as well as the cost of carrying large unsold stocks. The state government claims to have incurred a loss of Rs 350 crore (3.5 billion)⁴⁸.

More recently, farmers' leader Vijay Jawandhia – long a vocal supporter of state intervention in pricing – noted that:

[t]he accumulated losses due to the procurement scheme, since it started in 1972, are Rs. 5,000 *crores* (50 billion). The Maharashtra government has a debt of Rs. 1.35 *lakh crores* (1.35 trillion). On whom is all this money being spent? In comparison, Rs. 5,000 *crores* is a small price to pay to ensure that 24 per cent of our agriculture remains viable. Are not the U.S. and China heavily subsidizing their farmers⁴⁹?

Moreover, multilateral obligations towards the WTO and the reduction of the tariff to 5% in 2002 allowed the cheap import of US subsidized cotton into India, resulting in a fall in the price of cotton in India and the government incurring massive losses in maintaining the scheme (Mishra 2002). Yet, the scheme continues. And this is mostly because farmers now expect the state to provide an MSP that is higher than market prices. Though the state cannot really afford to this financially, the reigning political party can also not afford to withdraw it, as to do so would be political suicide. As Godbole (1999: 252) observes,

[n]one of the successive governments at the centre, belonging to various political parties, had the courage to reject the requests of the state government at any time during the last 26 years [to continue the scheme]. (...) The only ostensible reason for the continuance of the scheme is to pander to the vote bank of cotton farmers.

At the state level, the necessity to secure the support of the electorate is paramount. Regardless of central directives regarding the release of Bt cotton and the embedded notions of risk that those decisions are made within, the leadership of Maharashtra is based largely in part on the preferences of farmers, as dictated by their own unique incentive structure. That is, to use their democratic right to ensure that whoever is in power will ensure high prices for cotton, debt relief, and other financial incentives. And if not their democratic right, they have other means to dictate their preferences. As Jawandhia argues,

[u]nfortunately or fortunately, I say always this: the suicides of the farmers has compelled some people to think of [what is happening in Vidarbha]. So we farmers must be indebted to those farmers who have committed suicide (...) When mass agitation has failed, I think this new type of agitation, committing suicide, is the one way of agitation. And there cannot be an agitation bigger than this. And after this agitation also, if your system is not going to think about the real problems

in agriculture, I think it will be a very sorry state of affairs⁵⁰.

A co-evolutionary model of regulation with risk framings at its core would indicate that no one party can single-handedly manage these technologies. In the face of uncertainty – and in this case, the linking of highly complex political phenomena such as the agrarian crisis with Bt cotton – non-judicial means of affecting regulation become commonplace. This is the political risk of Bt cotton, and this is how it plays out in terms of affecting regulation. It was never something the government could have imagined around the time of the establishment of the National Biotechnology Board in 1982. Even up to 2004, such dynamics may have been present, but nothing like what has happened could really have been predicted. The contested nature of the technology brought a far wider cache of the public into the battlefield. It was not about experts anymore. As a result regulation as I see it – the practice of negotiating these contested fields of knowledge and risk framings – was the outcome. And it is far from over.

So what does this mean? If regulation started as a process of technical assessment, morphed into a balance of technical risk assessment and management, and finally became a co-evolutionary process that made the technical risks far less relevant, what does regulation really mean? Why has the government reacted in this way? And what effect does all of this really have on Bt cotton, or indeed, the whole slew of transgenically derived agricultural products that are in the Indian R&D pipeline?

3.2 The Politics And Practice Of Regulation

Look, activism is a business. There's hundreds of millions of dollars of money changing hands every year. In a country like India, even one to two percent of that is significant. (...) But our regulations respond to these catalysts; we adapt. Sometimes, [civil society] is required – because of them, our systems respond. But I'm not convinced that they really represent the public. It's not that I am against NGOs, I'm just doing my job⁵¹.

[T]hose NGOs never send people to our consultations. If they do, they just come and leave. I think they need to resolve their own issues – it would make the whole process better (...) You know, [Dr. P.] Bhargava has his 'laundry list' of preferences, but he flip flops. There's a difference between what one 'needs' to know what is 'nice' to know (...) It's not Frankenstein, and we're not idiots⁵².

These telling quotes from two senior regulators in the DBT and MoEF respectively point to one clear admission – like it or not, regulation has to be a co-evolutionary process. The “NGOs” they refer to might not be experts in technical risk assessment, but that is irrelevant. They have – and will – utilize their own distinct framings of risk as a weapon in the battlefield of regulation, and they use it well. This is why regulation from the perspective of a state engineered technical assessment process is simply not tenable or reflected in practice, and this is why I want to offer a way of rethinking it.

The role of the state is not trivial of course, but the real outcome of all this is a new way of looking at what purpose the state really serves in the face of this conflicting risk framings. All of these elements of risk and how the government understands them interface with other parties. And as recent history has shown, economic and political risk framings are as important as managing the technical risks of biosafety alone. As I have argued, the battle ensues when those parties enter the regulatory arena armed with their conflicting understandings of these three types of risk. And overarching the battle is a desire to affect change.

3.2.1 *Technical Regulation*

Just as the overarching technical risk framing of the government is embedded in biosafety, those outside the government who have a stake in the regulation seek also to frame risk as biosafety. And just as the framing of technical risks is embedded in standards adopted from other jurisdictions adapted for an Indian context, the same could be argued for the other parties involved. However, as we shall see in the following chapters, biosafety itself means slightly different things to different people, though the underlying principles of managing hazards remain intact. The technical process is contested by those who are not technically versed due to both judicial and non-judicial means of seeking it – the RTI act, filing PILs, burning trial plots, and so on.

In the lead up to the release of the Swaminathan and Mashelkar reports, the task forces that were commissioned for the initial discussions that led to the reports had significant input from firms. Framing their interests were a desire for science based regulatory approval. As such, the NBRA reflects this ambition rather well. But this only occurred in a context where the government felt accountable to the private sector – and to a lesser degree, the public sector – in providing a framework that could balance the dual prongs of where the firm wanted regulation to go. The balance was to win the race, but to also to protect the public interest.

On the other hand, and whether they liked it or not, the wider public as ostensibly represented by civil society had their own concerns borne of their own unique risk framings. This aspect is something I address in great detail in the following chapter, but in a regulatory context, the motivations were also based on technical risk framings – biosafety – though seen through a slightly wider lens. Civil society wanted to ensure that the other economic risk framing of the government – missing the biotech boat – did not overtake the biosafety element. There were assertions that the government was working too closely with industry. In the words of one of the lawyers who represented Greenpeace,

If you look at the manner in which (...) both the RCGM and the GEAC has been functioning, you begin to wonder why are they functioning in this manner? When you examine this matter more closely, then you realize that many of them have serious conflicts of interest. In fact the co-chairman⁵³ of the GEAC [CD Mayee] is on the board of an organization called the ISAAA, which has been set up, funded, and run, by the biotech companies, which have a commercial interest in this matter (...) The patent holders of Bt Mustard have been made the chair of an expert committee of GEAC to evaluate Bt brinjal⁵⁴.

These facts are not lost on the broader public, who are responding to technical concerns but from a non-expert perspective. But their level of expertise is not an issue. It is their own technical risk framings, borne not of technical skill but a construction of risk surrounding technical unknowns that propels regulatory evolution.

3.2.2 *Economic Regulation*

What is key to note here is that even though both civil society and the government shared similar concerns regarding technical risks, I do not think the government initially imagined themselves having to respond to civil society in the way that they did. This will be addressed in far more detail in the following chapter, but the primary vehicle for this interface occurred in the courts. In the words of Divya Raghunandan, information was sought on

(...) the location of all the field trials that had been approved between 2005-6, so that people would know where these trials were being conducted. Second was the toxicity, allergenicity, and any other health or environment related issues for which

tests had been conducted, specifically brinjal, okra, mustard, and rice. And the third thing we said was that because the RCGM was a public body, we wanted their minutes to be put up on the website, so that people know how these decisions are reached, and how they conduct these field trials⁵⁵.

It was the legal means of addressing these technical concerns that really forced the government to follow the rules they had established on paper. Not only those, such events affected further fine-tuning of the regulations to avoid such “nuisances” in the future.

In the words of S.R. Rao at the DBT on how the NBRA bill has responded to civil society actions,

[t]he main [issue of contention in the draft NBRA bill] was about misleading the public without scientific evidence. That has been deleted. But if someone is going to say ‘it will stop reproduction’ and all this, well, it’s all bullshit. There’s a limit for that. The second issue was the RTI clause. But that was a commercial clause. For patents, for instance, you must have data protection. And that’s even covered in the RTI itself, but we still took it out [of the NBRA bill]. Our intention was to protect such information, just as other countries have. Like, if someone says I have AIDS, perhaps that is private, right? But [another] clause [in the RTI] also says, ‘while it is in the public interest, it overrules confidentiality’. People are reading the NBRA bill as though we are taking over the whole RTI. It’s purely an interpretation. Commercial information - until it is patented - is not [the concern of civil society]. Why do [they] want to know⁵⁶?

I would argue they want to know because how they frame risk is quite different in terms of both the technical risks as embodied in toxicity and allergenicity data, but also in terms of the economic risks of the bill being geared towards the interests of the firm. In the words of Raghunandan,

I had requested to separate the information pertaining to section 8(1)(d) of the RTI Act 2005, which offers exemption to commercial confidence, intellectual property and trade secrets, from the RCGM minutes and provide the rest of the information. This is clear in my appeal (...) Thus ‘spatial inseparability’ as an excuse by the appellate authority to refuse information or to delay the information is entirely unjustifiable⁵⁷.

So while yes, Rao does correctly point out that it is a matter of “interpretation”, a conflicting

interpretation of technical and economic risks is what lies at the core of this conflict. And it is in such a space that accountability is sought, rendering changes in regulation. Growth and prestige may mean a lot to the firm and the state, but less to others. Given this distinction, the ambition of growth – the economic risk of losing the race – finds its mirror image among the wider net of concerned parties who frame economic risk in a different way. From their perspective, the risk is that such a focus detracts from the unknown effects of Bt cotton adoption, something that the state has to consider before their stated desire to win the “sweepstakes”.

3.2.3 *Political Regulation*

Finally, at the level closest to those who use the technology – farmers themselves – representation means everything, and political risks are paramount. Farmers’ leaders interviewed here referred to the spate of agrarian suicides as perhaps the only way in which farmers themselves could draw attention to the situation they face, and have characterized the extreme step of suicide as a signal to the government to react. In the words of Kishore Tiwari, leader of the Vidarbha Jan Andolan Samiti,

[these] are not suicides, it’s a mass genocide – these people are being killed by the wrong policies of the state. (...) [You may wonder] how can Monsanto be blamed for killing cotton farmers in Vidarbha? But if you look in deep penetration, it is true. The chemical farming support by the government of India, official support to the GM revolution, it’s just dragging the farmer in a vicious circle. The investment of the farmer in cultivation has increased a lot. [Granted, the] return on that investment has [also] increased a lot. But when there is no return, the losses are huge. Debt and crop failure have been killing the farmers - that is the truth. (...) The only solution is administrative reform. [It] should be done - a smaller state should be formed - and accountability should be increased⁵⁸.

The means by which a response from the government is sought by farmers is distinct from civil society. This is again due to their distinct incentive structure and framing of risk. Farmers do not represent themselves in these fora, which is where the space for someone like Tiwari or Jawandhia emerges. In Tiwari’s words,

[w]e take out the same demands of the farmers with the government. If the government is not listening to us, then we move to the human rights commission,

or we move to constitutional authorities like [the] high court, supreme court, MRTPC, UNDP, World Bank - everywhere we are going. What we want is that [if there are] people who want to say something, those who are victimized due to wrong policies of the state, [they] should not be victimized like this (...) System failure is a much more difficult task to address than the wrong practices adopted by individuals. Vidarbha will go to that hell. Naxalites are active in four districts. They may be active in next 5 years in all districts. Because they are finding the good soil to promote Naxalism⁵⁹.

So while a democratic system of governance may have inbuilt mechanisms to control for electoral dynamics – if you do not approve of a leader, you will not vote for that candidate again – this is frustrated by the presentation of bailouts, packages, and so on. In the words of one farmer, “[w]e feel Tiwari will help us to receive justice. We remained silent up to this point, and the government has deceived us. But Tiwari managed to provide justice and so we trust him. It’s our last chance⁶⁰.” Indeed, political leadership here is not forged on electoral politics, but rather what a farmer leader can offer given his contacts, strategies, and reach.

While the multiplicity of risk framings bound the arena where the conflict occurs, it is the way by which these realms of knowledge are contested that lies at the root of the conflict. In the context of the negotiations around regulation, the process has been influenced by interfaces with both civil society and private sector actors. These interactions have thrown up new constructions of risk, and challenged the standard technical regulatory approach that the state set out with. In the following chapters, I will look in more detail at the way civil society and private sector actors construct risk, and ultimately, regulatory practice.

Endnotes: Chapter 3

¹ Though for how long remains uncertain at the current time of this writing. The BRAI 2009 Bill proposes to overrule aspects of state primacy over regulatory issues relating to transgenics in agriculture.

² R.P. Sharma, GEAC Member, as recorded in the Mahyco promotional video "The True Story of Bt Cotton in India". Refer to <http://ranaghose.com/thesisvideo/3-1>.

³ Interview, S.R. Rao, DBT, Delhi, 29 April 2009. Rao holds a unique position in the DBT - he considers himself a "regulation academic" as opposed to a bureaucrat. In his words, "I wasn't supposed to work in regulation. But in 1998 I just happened to be there. A professor of genetics asked me for some help, and so I attended a meeting. I saw coverage about it in the press the next day, and I was depicted in a positive way. So from that point on, it just became my domain (...) It wasn't my choice, but my family was here and then there were no jobs. So I was quite happy with the government placement." He has a background in plant protection, and has been posted in a variety of places before settling into the DBT in 1990.

⁴ Interview, R. Warier, Director, MoEF, Delhi, 30 April 2009. Warier is a graduate of IIT Bombay, with a background in Environmental Engineering.

⁵ Interview, K.K. Tripathi, DBT, Delhi, 29 April 2009. One of the more memorable characters encountered over the course of this research, K.K. Tripathi is a microbiologist by training. A full time technocrat, he was shifted within the bureaucracy nine times before settling into the DBT, where he has been since 1990. He holds posts in the DBT, the RCGM, and the MEC.

⁶ *Ibid.*

⁷ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

⁸ The erstwhile National Biotechnology Board, the precursor to the current DBT, issued a set of safety guidelines for India in 1983 to ensure the safety of workers in the laboratory environment.

⁹ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

¹⁰ *Ibid.*

¹¹ Interview, Dr. P.M. Bhargava, Hyderabad, 6 June 2007. Refer to <http://ranaghose.com/thesisvideo/3-2a>.

¹² Dr. P.M. Bhargava was the founder-director of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and former vice-chairman of the National Knowledge Commission, a government entity formed under the Planning Commission. He is currently a member of the National Security Advisory Board, and has chaired several NGOs, professional organizations and pharmaceutical companies, and has authored over 125 major scientific publications, over 400 other articles on a variety of subjects, four books, and has won several awards including the Padma Bhushan. Refer to "Genetically modified crops: The risk factor", *Infochange Agriculture*, 7 July 2009. More recently, he has emerged as a fierce critic of the regulatory process in India, and comes from a unique space - he is a respected scientist but also someone who cooperates regularly with civil society. His perspectives will be addressed in much more detail in the next chapter.

¹³ Interview, Dr. K.R. Kranthi, Director of the Central Institute for cotton Research (CICR) and former member of the GEAC, Nagpur, 13 March 2008. My meeting with Kranthi was unexpected, but he gave me twenty minutes. He was surprisingly candid regarding the influence of corporate interests within regulatory processes, and seemed disillusioned by it all.

¹⁴ Interview, Dr. S. Sreenivasan, Director, CIRCOT, Mumbai, 26 May 2009.

¹⁵ Dr. P. Bhargava, as recorded at a Greenpeace organized press conference on Bt brinjal, 2006. Refer to <http://ranaghose.com/thesisvideo/3-2b>.

¹⁶ Interview, K.K. Tripathi, DBT, Delhi, 29 April 2009.

¹⁷ Interview, J Bhutade, Joint Director of Agriculture (Vidarbha Region), Government of Maharashtra, Nagpur, 13 May 2009.

¹⁸ Interview, K.K. Tripathi, DBT, Delhi, 29 May 2009.

¹⁹ Interview, Dr. P. Bhargava, Hyderabad, 6 June 2007. Refer to <http://ranaghose.com/thesisvideo/3-3a>.

²⁰ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

²¹ Interview, M.K. Sharma, Managing Director, Mahyco, Mumbai, 25 May 2009.

²² CD Mayee, former GEAC member and current board member of the ISAAA, as recorded in the Mahyco promotional video "The Story of Bt cotton in India". Refer to <http://ranaghose.com/thesisvideo/3-4>.

²³ Bhargava, as told to the media at a Bt Brinjal consultation, 2006. Video footage provided by Greenpeace. Refer to <http://ranaghose.com/thesisvideo/3-5>.

²⁴ A *lakh* (often written as 1,00,000) is a unit in the Indian numbering system equal to one hundred thousand.

²⁵ Interview, SR Rao, DBT, New Delhi, 29 May 2009.

²⁶ "Approval for Farming of Bt Brinjal," MoEF Press Release, 23 May 2010.

²⁷ Interview, K.K. Tripathi, DBT, Delhi, 29 April 2009.

²⁸ Interview, R. Warier, Director, MoEF, Delhi, 30 April 2009.

²⁹ In India, the quintal is equivalent to 100 kilogram and is a standard measurement of mass for agricultural products.

³⁰ Interview, S. Chikhalkar, Farmer, Chikhali, 6 June 2009. Refer to <http://ranaghose.com/thesisvideo/3-6>.

³¹ Press release, Prime Ministers Office, 1 July 2006.

³² A *crore* (often written as 1,00,00,000) is a unit in the Indian numbering system equal to ten million.

³³ Interview, K. Tiwari, Pandarkhawada, 15 March 2009. Refer to <http://ranaghose.com/thesisvideo/3-7>.

³⁴ I met this one person (he will remain unnamed here) who constantly wanted to join me to Vidarbha to write a song about "the suffering of farmers"; he showed me lyrics that he had penned based on what he heard in the press that turned me off the idea immediately. He was sincere though.

³⁵ Both within India and the Indian diaspora, "aunty" and "uncle" have become easy fallbacks when addressing people including distant associates, neighbours, acquaintances, and even total strangers who are older than oneself. But "aunty" also has a certain (potentially insulting) stereotype - usually a woman in her 40-50s. This was the sentiment possessed by an ex-girlfriend's mother and her peers while eavesdropping over a lunch.

³⁶ This is a summary of a common conclusion I gathered from a number of informal conversations I had while in Bombay when people would ask me what I was doing in my research.

³⁷ For example, refer to Bhatt (2007); Bari (2007); Chopra (2009); Menon (2007); Hardikar (2007); Sainath (2006a, 2006b); Singh (2006).

³⁸ While not a component of the press narrative, a recent IFPRI study argues that Bt cotton is not the cause alone, there is also alcoholism, marriage related debt, and gambling. Refer to Gruère et al (2008).

³⁹ "Who Killed The Vidarbha Farmers?", *Outlook India*, 8 August 2006.

⁴⁰ P. Sainath, as told to Smruti Koppinkar in "Who Killed The Vidarbha Farmers?", *ibid*.

⁴¹ A. Malone. "The GM Genocide: Thousands of Indian Farmers are Committing Suicide After Using Genetically Modified Crops", *Daily Mail*, November 3, 2008.

⁴² P. Sainath, as told to Smruti Koppinkar in "Who Killed The Vidarbha Farmers?", *Outlook India*, 8 August 2006.

⁴³ A *taluka*, or *tehsil*, is the next administrative level of Indian governance after the *panchayat*. It oversees the fiscal and administrative affairs of villages within its jurisdiction. *Talukas* then feed into districts, followed by divisions, states, and the centre.

⁴⁴ In my observation however, farmers simply mix all their cotton together before going to the APMC market to sell. In practice, graders hold a clump of cotton bolls between their hands and pull them apart slowly to gauge staple length, but given the mixing of cotton by farmers, this process seems dubious if gauging quality is the aim.

⁴⁵ Refer to the CICR document "Minimum Support Prices (sic) for Prominent Cultivars", at <http://www.cicr.org.in/database/dbmsp.htm>. This table lists 28 varieties of cotton – both Bt and non Bt – and their MSPs and staple lengths from 2001 to 2008. Of note here is the fact that RCH-2, Brahma, Bunny (supplied by Rasi, Emergent, and Nuziveedu respectively and all popular varieties that I encountered over the course of my research) offered anywhere from INR 100 to 300 more per 100kg than their non Bt counterparts. Similarly, the staple length averages anywhere from 2 to 8 mm longer of these varieties as compared to the non Bt varieties. While there are non Bt varieties that can compare in terms of staple lengths and MSPs, they were not available in the region.

⁴⁶ P. Sainath. "Striking a Note of Dissent." *The Hindu*, 28.01.07 <http://www.indiatogether.org/2007/jan/psa-dissent.htm>

⁴⁷ Interview, T.P. Rajendra, former Coordinator of AICCP (2002-2005), Delhi, 2 May 2009.

⁴⁸ "Pleasing Cotton Growers". *Economic and Political Weekly*, 22: 8, 299.

⁴⁹ V. Jawandhia, as quoted in "No Integrated Farm Policy", *Frontline*, 16 December 2006.

⁵⁰ Interview, V. Jawandhia, Wardha, 25 March 2009. Refer to <http://ranaghose.com/thesisvideo/3-8>.

⁵¹ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

⁵² Interview, R. Warier, Director, MoEF, Delhi, 30 April 2009.

⁵³ CD Mayee was previously on the board of the GEAC but has since resigned. He still remains on the board of the ISAAA. In the words of Devinder Sharma, as told to Counter Currents: "CD Mayee did not quit GEAC on his own. He was forced to quit GEAC following pressure from NGOs (...) He was also chairperson of the agriculture scientists recruitment board. It is here that his role has to be examined. He has recruited many scientists to the top slots in ICAR who are known to be GM supporters/beneficiaries and there are question marks over their merit and credibility."

⁵⁴ P. Bhushan, lawyer for Greenpeace, as narrated to reporters outside Central Information Committee after a meeting on the RTI Act and Bt Brinjal, Delhi, 15 June 2006. Footage courtesy of Greenpeace.

⁵⁵ D. Raghunandan, as narrated to reporters outside Central Information Committee after a meeting on the RTI Act and Bt Brinjal, Delhi, 15.06.06. Footage courtesy of Greenpeace.

⁵⁶ Interview, S.R. Rao, DBT, Delhi, 18 August 2010.

⁵⁷ D. Raghunandan, as narrated to reporters outside Central Information Committee after a meeting on the RTI Act and Bt Brinjal, Delhi, 15 June 2006. Footage courtesy of Greenpeace.

⁵⁸ Interview, K. Tiwari, Pandarkhawada, 15 March 2009. Refer to <http://ranaghose.com/thesisvideo/3-9>.

⁵⁹ *Ibid*. Refer to <http://ranaghose.com/thesisvideo/3-10>.

⁶⁰ Interview, N. Bongare, Farmer, Chikhali, 19 September 2008.

CHAPTER 4

FOOTSOLDIERS: CIVIL SOCIETY AND THE BATTLEFIELD OF REGULATION

While the government may sanction regulatory frameworks, the actual process of governance includes other parties, all of whom enter the process with their own unique framings of risk and a distinct series of incentives that motivate action. This space where parties enter is not an invitation-only affair, especially when the issue being governed – transgenics in agriculture – is embedded with risks that are defined differently by all parties involved. The process of governance incorporates a far wider range of perspectives than what is found within the halls of government alone, and adapts not only to the classic scientific and economic risks as framed by the government, but a wider cache of political risks. Though parties outside of government may also frame risk in the context of science or economics, they do so on their own unique terms. And within these spaces where these often clashing risk framings meet is where one finds the catalyst for much of the ongoing evolution of regulatory practice around transgenics in India.

From government, therefore, I turn my focus to how civil society has worked within these spaces. The release of Bt cotton has been a harbinger of an unprecedented display of unity amongst civil society actors. The scale of their effect varies, but one cannot ignore the effect their actions have had on the continually unfolding story of the regulation of transgenics in India. It is a reflection of the evolution of social movements and their interface with policy - from 'old' class based struggles to 'new' social movements based on solidarity in the face of a common struggle. Unlike their predecessors, these new movements operate in the realm of contested forms of knowledge (Brass 1994; Castells 1997; Evers 1985; Habermas 1996; Leach and Scoones 2007). Global trade, capital and knowledge flow, and market reforms are what laid the basis for the battle that ensued (and continues to ensue), and this distinguishes the new from the old (Castells 1997). In essence, Bt cotton presented a catalyst for a new social movement in India, premised on the uncertainties that surrounded the release and adoption of the technology.

To be sure, social movements in India around agriculture predated Bt cotton. What is different here however is the focus around one particular technology, and the emergence of new judicial and non-judicial tools that were used by these movements to successfully disperse their risk framings to a general public. As result, the state machinery had to react given the nature of political incentives, and the true face of regulation emerged – an iterative process based on the interface of the diverse risk framings of many. Inside and outside the courts, different members of civil society have

asserted their own framings of risk as being crucial to consider by the state, as well as provoking a far wider swathe of society in general to also consider these framings. In practice, the interface where these distinct framings of risk collide has rendered the entire process of regulation an entirely different affair to what the government may have imagined during the initial formation of the National Biotechnology Board in 1982.

Civil society, perhaps more than any other party considered in this research, epitomizes the battlefield of regulation given their often opposing risk framings on all levels – technical, economic and political. The groups I profile here operate in spaces where notions of identity, representation, and processes of inclusion and exclusion all forge a very complex battlefield landscape. Contested forms of knowledge, power dynamics and trust, ways of performing ‘activism’, and the spaces where all of these factors play out characterize the landscape. It is one rich with characters, different risk constructions, and direct implications on what the Indian government may have initially conceived as a technical space alone (Leach and Scoones 2007). As this chapter will show, it clearly is not. The battlefield of regulation is where ‘local’ and ‘global’ narratives surrounding transgenics collide and morph given local contexts, generating a form of ‘globalization from below’ (Falk 1993; Scoones 2008). What emerges is a co-evolutionary process – and practice - of regulation (Millstone 2007, 2009). But more importantly, driving that process are a multiplicity of ways of understanding the technical, economic, and political risks involved – a series of interfaces that characterize the battlefield of regulation. This is what co-evolution means in practice. This chapter, through a combination of my own interactions and what I have observed from a distance, will reveal these framings, and present a way of understanding how the ongoing battle, through the lens of civil society narratives and actions, forms a new way of looking at regulation.

In what follows, I will first introduce the characters at play: who is ‘civil society’? Given that, I move on to define the multiple framings of risk that this highly heterogeneous group ‘civil society’ adhere to. I then map out the battlefield, which is where these framings are rendered explicit in action. Finally, I ask, how does this all relate to regulation as I see it? If it is a practice forged a series of interlinked, but more often opposing framings of risk, what does it really mean?

4.1 Who is Civil Society?

Civil society can refer to a wide group of actors, and in order to characterize exactly who I am referring to in the story that follows, a clarification is required. Who are these people? Where do they come from? Who do they claim to represent? What motivates their actions? While there may

be a unifying factor in terms of their concerns regarding Bt cotton, there are different ways in acting out these concerns. The debates surrounding agriculture in India go back many, many years, but a consideration of all civil society mobilizations around these issues is far outside the mandate of this thesis. Yet even within the timeframe I consider, there has been enough occurring to indicate evolution. I limit my analysis to 1998 and onwards, and to four distinct groups within the broad term civil society: two types of NGOs, farmer leaders, and the media¹.

4.1.1 NGOs – The Old School

The old school I refer to are two organizations, both very much based in Delhi as a capital city. I state this not merely as a geographic distinction, but one based on strategy - they could not have come into being anywhere else given the advocacy efforts that characterize their work, and their proximity to the halls of central government. While I have been fortunate to have a relatively long-term relationship with one, I cannot say the same about the other. The latter, however, cannot be ignored given their (or rather her) impact on the entire civil society discourse surrounding agriculture in India - particularly as understood outside India - and more recently, transgenics in agriculture. The strategies that they pursue share a common focal point - concerns relating to the introduction of transgenics in India - but the modality differs. One aims to affect change directly in a regulatory context by being directly involved in the process, while the other indirectly via forging narratives that have been disseminated worldwide. Both implicate the government either from the inside or outside via interfacing with risk as biosafety or via a forceful narrative embedded in the economic risks of losing the biotech race.

A geneticist by training, Suman Sahai has worked towards changing and affecting formal regulation, either through her work on including farmers' rights in the Protection of Plant Varieties and Farmers' Rights Act (Sahai 2000, 2001, 2003), being a member of various government committees², or by organizing fairly high profile public events that aim to bring together all the parties I consider in this research - regulators, the firm, civil society, and farmers themselves³. However, in recent times her stance has shifted from being more based on scientific precaution and lending her voice to regulatory reform as an expert to more focused legal actions. And while she initially would distance herself from the bipolar 'for or against' biotechnology debates, she has recently come out as being 'against', but only due to what she perceives as an incompetent and ineffective regulatory system governing transgenics⁴. Her oft-repeated argument is that unlike the publicly funded Green Revolution, the 'Gene Revolution' is privately funded, thereby raising concerns regarding accountability dynamics⁵. Like the government, she also frames risk as

biosafety, but does not think the government is functionally capable of managing biosafety effectively (Sahai 1999: 85). Her motivations have been primarily based on affecting regulatory change by working within the system, often by invitation given her expertise as a geneticist.

On the other hand, Vandana Shiva chooses not to work within the system. But that does not detract from her capacity to affect change. Almost single handedly, and over the course of multiple books, articles, and public engagements both in India and abroad, she has formed a clear and rich narrative on plant genetic resources and the economic incentives that surround them within the context of globalization (Shiva 1989, 1993, 1997, 2002a, 2002b). One cannot easily deny her gifts of oratory and the sheer volume of work she has amassed over the years, a body that has seen her as the face of Indian resistance against a wide variety of parties – Monsanto in particular (Shiva and Crompton 1998; Shiva et al. 1999). Her organization, the Research Foundation for Technology, Science, and the Environment (RFTSE)⁶, has worked on a variety of issues relating to intellectual property on plant genetic resources and access and benefit sharing of traditional knowledge, both via using legal tools as well as fostering public awareness. Just as Sahai is the face of Gene Campaign, Shiva is basically the face of RFTSE; both are icon driven institutions. And like Sahai, she has been active on the regulatory front, filing the first real litigation in the context of transgenics in India in 1999 and publishing numerous articles in the mainstream press. But she is rarely – if ever – an invited party in regulatory construction. Her framing of risk is similar to the economic risk framing of the government, but she flips it on its head. Losing the race is a common thread, but her framing presents the objective as directly against the interests of the nation; the opposite of how the state frames it. For better or for worse, she is, in many ways, the face of the debate internationally, and has extensive linkages with an international network of “resistance”, though her resonance in India may not be as pronounced.

Interestingly, these two individuals do not really get along – there have been well-documented debates in the press (Visavanathan and Parmar 2002: 2723), and they are rarely associated together regardless of their common interests. But they do share a common purpose – their pioneering work around regulatory reform as characterized by their own framings of risk set the bar for the newer school of NGO.

4.1.2 NGOs – *The New School*

The new school responds directly to the scientific and economic risk framings of the government, and aims to offer an alternative perspective. They are represented by a number of organizations;

those with transnational advocacy linkages (i.e. Greenpeace), those who receive funding from foreign donors (i.e. YUVA Rural) and others who are locally based and funded (i.e. Kheti Virasat Mission). Contrary to the old school, they are less driven by iconic figures, are more willing to cooperate with one another, and have been successful in working together to delay the process of further release, using judicial (Right To Information (RTI) Act and Public Interest Litigation submissions) and non-judicial (protests, arson, media events) means. In terms of countering the technical risk assessments of the Indian government, they have compiled masses of scientific studies, based on liaisons with Indian and international experts to support their claims⁷. In terms of economic risk, they argue vociferously on conflicts of interest among regulators, hurried and inadequate biosafety assessment in the face of 'winning the race', and evidence of corruption. And all of this is either contested in the courts, using the 2005 RTI Act as the primary tool, or in city streets, by way of gatherings, press conferences, or information drop in sessions. They work in an urban context, as both that is where the courts are, but also as that is where their target group – the Indian middle class – resides.

The Coalition for a GM Free India⁸ and the Monitoring and Evaluation Committee, or “MEC⁹” are two active collations of new school NGOs that have been unprecedented in their unity in voicing their concerns regarding Bt cotton, and more recently, Bt brinjal. They represent a 'new' social movement (Leach and Scoones 2007), one that finds solidarity in the face of social change (Ellison 1997; Leach and Scoones 2005). In this case, the emergence of Bt cotton and the uncertainty was the catalyst for this solidarity, forged on a perception of the ineffectiveness of the government to manage the technology in a disinterested manner. They are relatively recent entrants into the civil society fray, though they have been adept at making the right connections with the right people – both the old school as well as others in the new school, and both in and outside India. Cutting across state boundaries and employing linkages internationally, these NGOs are typically based in urban or peri-urban areas, and employ workers from similarly corresponding geographic backgrounds, as opposed to a smaller town or rural, farmer-centric base. Divya Raghunandan of Greenpeace India traces her background by referring to her own unique reference points growing up, recalling that:

I come from Kerala so OK, it's mad; people are obsessed with politics and you know, student politics is like the most important thing in everyone's life. So it's just there in your blood – you have to organize, you have to protest, you have to. And there is a space for it. We've always had a good space for it. And we are quite territorial about what we protest about, who else can join, [and] on what terms¹⁰!

The motivations are embedded in a struggle, but not a class struggle. These new movements pick up the need to “protest” from the old, but have done so in the face of the uncertainties surrounding Bt cotton, and more recently, Bt brinjal.

In my research, I focused on two types of new school NGO; first, the more urban based organizations involved in litigation and raising public awareness, and second, those with a more rural presence. The first is represented here by Divya Raghunandan of Greenpeace India in Bangalore, Kavitha Kuruganti, who is difficult to pin down to one organization or locale given her multiple organizational affiliations, and Aruna Rodrigues, who seemed to come from nowhere in 2005 and, as I detail later, ramped up the debate to an entirely whole new level in the span of four years. The second type is represented by YUVA, based in Nagpur. YUVA focuses more on attempts to shift farmers away from Bt cotton and into organics, as determined by a mandate that is often conditional on the funding resources they depend on from foreign and domestic donors. However, in this chapter, most of my analysis will focus on the former, and I consider YUVA in chapter six, where I discuss farm level realities.


4.1.3 Farmer Leaders

Though their overall strategies correlate, farmer leaders work on a different level than the NGOs, reflective of the geographic space in which they operate. Similar to NGOs, the core modality of the strategy of farmers’ leaders is threefold - to agitate, or to protest; to use the media to alert the broader public about the agrarian crisis as linked to Bt cotton adoption; and to hold both the central and state governments accountable to the situation on the ground via the filing legal petitions. Yet they differ from NGOs as their demands are more responsive to the immediate needs of farmers, at least as they perceive them.

There is a long history of farmers’ movements, both outside of Maharashtra (i.e. Nanjundaswamy and the Karnataka Rajya Raitha Sangh (KRRS) in Karnataka and the Bharatiya Kisan Union (BKU) in Uttar Pradesh), but also in Maharashtra (i.e. Sharad Joshi and the Shetkari Sangathana) (Assadi 2002; Brass 1994; Omvedt 1994). Though the focus of both has been similar post 1991 liberalization - the effects of globalization on the livelihood of farmers - the economic and political risk framings are distinct. While Nanjundaswamy framed the economic risks of globalization as a threat to India, targeting multinationals as a focal point - to “Cremate Monsanto” in the name of “Gandhian Violence” (Featherstone 2003: 407) - Joshi argued that economic liberalization as an entry point for the processes of globalization was “(...) not an iniquitous import from the west. Liberalization is in

fact a worldview of *Vedanta*¹¹ (Assadi 2002: 45; Joshi 1994).” However, Joshi would also argue for strong state support for farmers in the form of minimum support prices, something that would seem to contradict a view promoting the benefits of liberalization. But this is the political reality of leading a farmers’ movement; short term financial concessions are what really drive the agenda, as this is what generates the support needed from farmers to sustain a movement.

These examples of the roots of the farmer movement just prior and during the 1991 economic liberalization of India form the basis for the two leaders I profile and consider here. There are two main examples I include here given my focus on Maharashtra – the Vidarbha Jan Andolan Samiti (VJAS, or Vidarbha People’s Revolution Committee), led by Kishore Tiwari and based in Nagpur and Pandharkawada, a small town in Yavatmal district, and Vijay Jawandhia, formerly aligned with Joshi but now based in Wardha, with a field office in Waifad village in Wardha district. Like Shiva, but unlike Joshi, both see globalization, with Monsanto as a prime actor, as being directly linked with the crisis, due to the state succumbing to economic risk framings that place less importance on farmers and more on economic benefit. The race has its victims, and the state is responsible for taking care of those injured on the battlefield. As Tiwari asserts,

[w]e look at the graphs and all these suicides – well, basically they are not suicides, it’s a mass genocide – they are being killed by the wrong policies of the state. Some multinational companies are killing them. (...) [You may ask] how can Monsanto be blamed for killing cotton farmers in Vidarbha. But if you look in deep penetration, it is true. The chemical farming support to the green revolution, [government] support to the GM revolution, its just dragging the farmer in a vicious circle. The investment of the farmer in cultivation has increased a lot. [Granted], the return on investment has [also] increased a lot. But when there is no return, the losses are huge. The debt and crop failure have been killing the farmers - that is the truth ¹².

While on the one hand he does recognize the benefits of the technology, he also argues that the technical risks are not fully understood by farmers, something that the state should be addressing, but is not. And this is where he is placed – a bridge between farmers and the state, though one less focused on mitigating technical risks, and more on the political risks.

While he has been referred to as an “encyclopaedia on information on suicides in Vidarbha¹³”, Tiwari characterizes himself differently. In his words, he works to ensure that “poor people should live with some kind of relief, some kind of respect, and we have been fighting for [the] survival of

our people - that's the only thing¹⁴." Qualified as an engineer and possessing an MBA from IIM Ahmedabad¹⁵, his perspective on his work strongly echoes a Gandhian outlook - a belief in transparency, the 'truth', non-violence, and regular fasting were all elements that came out of our interactions. On his role as a leader, he reflected that "[a]ctivists like us, who are taking grant in aid and doing *tamasha*¹⁶ will have to pay the cost. And people will kill first a fraudulent activist, then a politician. Because they are most dangerous¹⁷." He is acutely aware of his position and the responsibility implicit within.

In speaking to him, he alludes to his work as being something akin to spiritual enlightenment, though mixed with his own personal motives. He refers his working with the "poorest of the poor" as "(...) a process of meditation, a process of going towards soul satisfaction, of achieving awareness¹⁸." However, upon further questioning he reveals a less divine path. In 1999, Tiwari was involved in a protest demanding higher cotton minimum support prices. The protest degenerated into violence, and he was arrested. He recalls that "when we were bailed out from the court - after two or three months of jail - suddenly...we became farmers' leaders¹⁹." He formed the VJAS soon after, to achieve "(...) more transparency in my life, [which] will lead to my further advancement in the field of revolution²⁰."

And he has been busy ever since. He quips that "[m]y phone number is flashed in the local cable channel and every death is reported to me. Even the government goes by my figures²¹." In looking at his blog postings since he began in early 2006²², one will see a series of regular entries detailing the various writ petitions he has filed against the Maharashtra state court, suicide letters from farmers, press clippings both in Marathi and English about the crisis, and most often cited by the media, a series of press releases detailing who have committed suicide²³. His requests boil down to three core demands of the both the central, but mostly state, government: provide higher MSPs for cotton, ensure transparency in any sanction relief package so as to counter "*babu raj* in the government²⁴", and waive all loans. And for the most part, the government has done precisely this.

Vijay Jawandhia comes from a slightly different background. Born into a wealthy family in Nagpur and trained as a chemist, his initial entry point into the movement was in the early 1970s, due to his dissatisfaction with Maharashtra state monopoly procurement of cotton. In 1980, he

(...) read about Sharad Joshi - an IAS officer who was in [the] foreign service [but] who came to India after resigning, and [who] started an agitation of onion farmers in Pune. And he formed Shetkari Sanghatana. I was in the loop with the farmers movement [at that time, and] I thought that - [since] this country is ruled by IAS

officers only, not by the leaders - when an IAS officer is stating that something is wrong in the agricultural policies, I thought that was a good thing; I must go and meet him. So I went to Pune and met him, and in 1980-81 we started Shetkari Sanghatana. And we got such a response within two years we were all over Maharashtra, and all over India also²⁵.


While the two parted ways ideologically in the late 1980s due to opposing beliefs on free market pricing policies²⁶ and the compatibility of liberalization and *Vedantic* tradition, Jawandhia has remained steadfast to his core beliefs – similar to Tiwari’s - that the government must intervene in the market and control prices for farmers. Unlike Tiwari however, he is also on the international circuit as a farmers’ leader in fora where anti-globalization sentiments are shared²⁷, characterized by observers as a “colourful” farmer leader²⁸, speaking for Indian farmers in the face of globalization. His argument links the emergence of the GATT with the agrarian crisis, and he holds post 1991 state policies promoting economic liberalization as directly responsible²⁹.

Tiwari and Jawandhia are acutely aware of how the political game works; they are well versed in the political risk framing that surrounds formal regulation, and they use it to their advantage. In Jawandhia’s words, farmers comprise “(...) 60-65% of the country. If 1% are mobilized, it will be such a big strength that no political party will be able to ignore the demands made by this force³⁰.” They have a stronger field presence, and, in contrast to NGOs, are typically highly regarded within the farmer community, reflective of a strong sense of representation that farmers attribute to their activities. There is both a class and geographic connect. In the words of one farmer I interviewed in Chikhali, “[w]e feel Tiwari will help us to receive justice. We remained silent up to this point, and the government has deceived us. But Tiwari managed to provide justice and so we trust him. It’s our last chance³¹.” This notion of trust characterizes how Jawandhia perceives his role as compared to that of NGOs. While he respects NGO efforts, he laments that Greenpeace is

(...) not going to the farmers. What I say is always this: that is one way of fighting - that that is the *modus operandi* of fighting for the intelligentsia. But unless you go to the farmers and speak in their language, [explain] how it is going to effect them, you cannot have mass support. And that is very essential³².

Tiwari goes a step further, and is fairly critical of NGOs like YUVA, who he sees as

(...) doing all this *tamasha*. (...) [W]hen there is a crisis, these people flood. The parachuting of NGOs is always there, because the grant in aid comes, the donor

comes. Where there is a crisis the parachuting of NGOs is always here. The tribal crisis, then floods, earthquakes, now farming is a crisis, no? So they airlift themselves from Pune, from Mumbai. They have a big stomach. They eat everything. In each they are there – AIDS, they are there. Cancer, they are there. But they are big AIDS and cancer [wry smile and satisfied chuckle]  ³³.

Yet while there is this accountability dynamic between farmers and people like Tiwari and Jawandhia, there is also a disconnect between their efforts at convincing farmers to shun Bt cotton – a challenge also faced by YUVA. Though Tiwari and Jawandhia link Bt cotton adoption with the agrarian crisis, and though farmers look up to them as a means to address the challenges they face, farmers are still adopting Bt cotton in massive numbers. Tiwari laments that,

[n]ow, this year, the farmers are saying they survived due to Bt cotton. I don't know what survival [they refer to]. When I asked them what was their expense, they say 'expenses are 11 *lakh* (1.1 million) rupees'. What is your income, they say '80,000 rupees'. Where is their survival? But: the campaign is so high. 'Bt Is Tremendous'...³⁴.

Farmer leaders operate in a unique space. They know how the state frames political risk inside out, and they play the game well. Though there may be little in the way of direct effects that their work has had on the technical risk assessment based regulatory procedure that surrounds Bt cotton, they are formidable political forces, framing the debate on their terms and generating real financial concessions for farmers. As their narratives are public, those who listen and read their statements may wonder why are farmers killing themselves, questioning the scientific risk framing of the government – is Bt cotton a faulty technology? Politicians are forced to respond as framed by political risk – how can we capitalize on this distress to secure the valuable farmer vote? And farmer leaders demand answers as to why economic risks overtook the welfare of farmers – was Bt cotton released even though it is not particularly suitable for non-irrigated areas like most of Vidarbha just to 'win the race'? The government framings of scientific, economic, and political risk all interface at the ground level, and farmer leaders counter the government framings on all three, but according to their own constructions of risk. They occupy different spaces, but play by similar rules.

4.1.4 *The Media*

Overarching all three of these groups are print and visual media channels. As a “knowledge broker” (Scoones 2005: 37) they have the unique capacity to widely broadcast NGO and farmer leader risk framings to a wider public, thereby affecting public opinion. The relevance of this is key here in the context of fomenting fear in the face of the unknown (Maesele 2009; Scoones 2008: 318). Fear resonates, particularly when the architecture of the medium is predisposed to foment fear. These sentiments then translate into political capital that resonates among government actors.

Unlike the other members of civil society I have discussed, the media can manufacture representation. They have the unique capacity to construct a section of society whose interests they could claim to represent by presenting the danger of the technology, the corrupt nature of the regulatory system, or the harm caused to farmers because of both. I have observed two aspects of the media coverage of the Bt cotton story, and in two directions. First is a more top down strategy: how journalists have presented the narrative to the public to catalyze opinion. Second is bottom up: how NGOs and farmer leaders have created events that attract the media, furthering the dispersal of their risk framings to a wider public.

While there have been a minority of reports indicating the benefits of Bt cotton, the common narrative focuses on a causal link between Bt cotton adoption by farmers and the agrarian crisis, with a particular focus on suicide, or the questionable safety of the technology itself. From one particularly dramatic report:

There were still marks in the dust where he had writhed in agony. Other villagers looked on - they knew from experience that any intervention was pointless - as he lay doubled up on the ground, crying out in pain and vomiting. Moaning, he crawled on to a bench outside his simple home 100 miles from Nagpur in central India. An hour later, he stopped making any noise. Then he stopped breathing. At 5pm on Sunday, the life of Shankara Mandaukar came to an end. As neighbours gathered to pray outside the family home, Nirmala Mandaukar, 50, told how she rushed back from the fields to find her husband dead. ‘He was a loving and caring man,’ she said, weeping quietly. ‘But he couldn’t take any more. The mental anguish was too much. We have lost everything.’ Shankara’s crop had failed - twice. Of course, famine and pestilence are part of India’s ancient story. But the death of this respected farmer has been blamed on something far more modern and sinister: genetically modified crops³⁵.

Perhaps exploitative in terms of capitalizing on suffering, but such evocative narratives serve to frustrate both regulators and the private sector, as they are well aware of the importance of public sentiment. In the opinion of C.K. Rao, who heads industry friendly Foundation for Biotechnology Awareness and Education (FBAE), the challenge the press presents is that,

(...) in many countries – in the West it is also there – the public only gets to know the negative aspects of genetic engineering. That is because the media projects only that. That happens because the media gets their info from the anti-tech activists. So the product developer, the government, the scientists, they are not providing any information to the media to produce a positive picture. (...) All the time, it is ‘it is toxic, it is allergenic, it killed sheep’ - you can’t expect the public to have any favourable view of genetic engineering³⁶.

Regulators and scientists are aware of their lacking public relations strategy. As Dr. S.R. Rao at the DBT laments, scientists “(...) are not bothered with this; according to them, ‘tomorrow it will all be forgotten³⁷.’” They do realize the importance of outreach and communications but are at a loss of how to go about doing it. In the words of Dr. K.K. Sharma, a senior plant breeder at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), “I can’t say ‘just trust me’. I have to explain the technology. But how? Communication skills are key, and we need to have more media workshops³⁸.”

In the other direction, NGOs and farmer leaders are adept at using the media to expand their risk framings with a broader public. On the one hand is the element of spectacle. Be it the sight of NGOs dressing people up as a variety of symbolic caricatures - dead sheep³⁹, giant aubergines, or instant soup⁴⁰ - or in farmer leaders organizing massive rallies with speeches, slogans, and metres of homespun *khadi*⁴¹, unique photo opportunities for the print media and great backdrops for television interviews are constructed and used. On the other hand are the spaces where stories are broken by NGOs and farmer leaders, with the media picking it up. Blogs⁴² and discussion lists⁴³ are two such examples in cyberspace, and formally attended events where the press is invited are another space. The press enters both spaces freely, and capitalizes on that entry to inform their own narratives; for example, civil society breaking a story on links between regulators and firms, or on rushed approvals that dispose of protocol due to internal and external pressures. In both cases, the end result is the same – public perceptions of transgenics and the regulation that surrounds it are forged. It matters little if they are based on technical risk assessment or not, as I would argue that is not the aim of the media or those who present opportunities to the media to cover. The end result

is scepticism and fear, which translates into informing the decisions that the public – as well as regulators – make. In the words of two people interviewed on their perceptions of Bt brinjal,

[i]f these crops can damage vital organs of rats that have fed on them, I am obviously very concerned. What's worse, I would not even know if I was consuming genetically modified food. So if after some time I suffer from an incurable disease, who is to be blamed? (...) I am not against using technology or Bt brinjal, but the media coverage has helped me realize that it is not wise to introduce modified crops till the tests have proved them to be 100% safe for human consumption⁴⁴.

Or even more evident in terms of how such fear translates into political capital, in the words of a minister in Karnataka, "I am not aware about Bt brinjal or anything. I got information through the media that it is not safe. We'll oppose anything that is harmful to health⁴⁵."

The four types of civil society actors I have observed may differ in the modality of their action, but they are all working in a common context – the release of Bt cotton. While the historical underpinnings of the old school of NGOs and farmer leaders are key to illustrate, as they provide a context and an evolutionary path to compare the new school and current trends to, my main focus in what follows is how this all played out post 2002 in the battlefield of regulation. I have defined the actors and characterized the spaces in which they inhabit and work within, and now I want to move on the next crucial context – how they frame risk given these spaces. The catalyst for much of what happened was Bt cotton, but there is a broader narrative that frames these actions. It is about the future of agriculture and how the rules surrounding it are to be managed by the state. But – and this is what is really the point – that process can never be managed by the state alone. Spaces are formed, entry is not exclusive, knowledge is contested, and it all occurs in the face of the uncertainty surrounding the technology itself.

Ideologies and finding others who share these ideologies in a performative sense – solidarity – prevents this process from being managed by the state alone. Those who find common linkages amongst different parties, such as the four groups here working under a common interest in Bt cotton adoption – frame the debate in their own ways (Benford and Snow 2000). But, the effects of these framings in an applied sense – the battlefield of regulation – become far more interesting when a focus is lent to one type of framing: risk.


4.2 Risk Framing: Spaces, Narratives, And Interfaces

So, how do these parties frame risk? Is it purely a response to government risk framings, or is it borne of a unique process? Again, the story begins in the late nineties, when the first field trials began. Prior to the release of Bt cotton in 2002, much of the strategy around opposition to transgenics was premised on a more generic anti-globalization narrative, with old school NGOs targeting multilateral trade agreements as the focus of their dissent. A sketch of the predominant narrative is as follows: the prescriptive guidelines of the WTO jeopardize India's regulatory sovereignty. The agreements mandate new intellectual property rights regimes which will allow for large scale patents on life, which is both unethical and an affront to Indian traditional knowledge. Outside of India, biotechnology firms were planning to release Terminator technology into India, and the lives for farmers – indeed an entire way of life as embedded in a nostalgic view of rural India – was being threatened as a result. There were echoes of neo-colonialism, of gender violence (Shiva 1989), multinational corporate domination (i.e. Monsanto), and nationalism.

Post 2002 however, this began to evolve into something far more interesting. The formal release of Bt cotton and the mobilization of both the old and new school of NGOs around was the catalyst for the mobilization of the old school, but more relevantly, the new school of NGOs, farmer leaders, and the mainstream media. Unlike earlier, these groups now had a real focus and a reason to cooperate – a context for solidarity emerged. This strategic evolution was motivated by two broad assertions. First are concerns regarding the validity of the technology itself – whether or not Bt cotton has presented farmers with the benefits purported by both the firms and the state. The assertion is that Bt cotton has not offered broad pest protection, or that it has resulted in higher costs to farmers due to increasing amounts of factor inputs in the face of pest resistance, fungal, or viral infections. By extension, the argument follows that yields are low in the face of these stressors, and that claims of increased yields were false. And among farmer leaders in particular, it is further argued that in tandem with low MSPs for raw cotton and the effects of globalization, there have been massive losses among farmers and unmanageable debt, with agrarian suicide as the result. The connection is that Bt cotton is responsible for the agrarian crisis, suicides in particular⁴⁶. Such connections are bold to assert, but they were, and much of the public accepted these links, creating a fertile ground for doubt and uncertainty.

Second are concerns relating to the lack of regulatory independence. The assertion is that regulatory agents not only represent the state, but also have their own commercial interests – that they are “purchasable⁴⁷”. Given that some regulators have held, or hold, positions in industry

related contexts such as biotechnology lobby groups⁴⁸; have been, or are, affiliated to institutions conducting research in transgenics for ultimate commercial release⁴⁹; have been overly sympathetic to private sector incentives⁵⁰; or have not used independently verified data in order to arrive at biosafety metrics⁵¹ or other concerns, their capacity to truly be representative of the public interest is suspect. Risk as biosafety has to interface with a broader series of risk framings put forth by civil society agents, and they play out not only with regards to the technical concerns of the hazards of Bt cotton, but the political realities that are borne of representation, and the concerns that the economics of losing the biotech race do not overpower the implicit uncertainty of the technology. In effect, formal regulation has to respond to these concerns, like it or not. As Kuruganti explains,

the way that we are engaging with the regulators is not to take their mandate as [given]. We're not saying that 'Yes, you're right, that's exactly what your mandate is, let us help you with improving it'. That's not where we are beginning. We are saying. 'OK fine, if that's what you take your mandate to be, we'll show you where you need to improve immediately, because otherwise it has implications for livelihoods of farmers' ⁵².

Or as Tiwari argues in a letter to the Prime Minister,

I would like to repeat our arguments that *babus* working in the government and the banks are forcing farmers to commit suicide due to the sanctioned relief not reaching distressed farmers. (...) There is no alternative before the government but to raise MSPs this year in order to slow down the suicides⁵³.

In all cases, it is the state that is responsible for the crisis, and they must be held accountable. This occurs in a context where the official state line lauds the potential benefits of Bt cotton and the massive potential of harnessing India's talent and expertise in the "sunrise industry" (Jayaraman 2005: 481). As the Prime Minister has stated,

[d]evelopments in biotechnology present us the prospect of greatly improving yields in our major crops by increasing resistance to pests and also to moisture stress. Bt cotton has been well accepted in the country and has made a great difference to the production of cotton. (...) Subject to these [biosafety] caveats, we should pursue all possible leads that biotechnology provides that might increase our food security as we go through climate related stress⁵⁴.

On the one hand, new school NGOs and farmer leaders do not trust the science and link it to a dire crisis. On the other, the government sees tremendous potential in what it can offer, both to farmers but also to the overall growth of Indian industry and prestige.

This is where framings of risk of these two parties interface with one another. These framings do not exist in entirely separate dimensions. Indeed, common themes run through the framings of both parties – technical assessment, economic opportunity, and political balancing. As I will show, the framings are often the mirror reflection of the other. It is this duality that lies at the root of the battle between civil society and the state. Like the other four parties I profile in these four empirical chapters, civil society members frame risk in a particular manner, which leads to a particular form of regulatory practice. The implications of this are very real; given these framings and the polarity of their relative placement, the battlefield is set. And regulation as a practice begins to unfold.

4.2.1 Three Framings: Risk Assessment, Precaution, and Representation

The government framing of biosafety as risk is based on an awareness of the potential hazards implicit in these technologies. As depicted in the preceding chapter, the only way to address this risk is via a rigorous, but efficient, process of scientific risk assessment. Interestingly, NGOs and farmer leaders also frame risk as biosafety. But with a difference – the burden of proof is placed squarely on the shoulders of the government. Granted, the government as regulator relies on science for the technical side of risk assessment, but embedded within any proof the government can provide are political and economic risks that, in the view of civil society, cannot be separated from the technical risk. Whereas the government looks to science as being the only real indicator of biosafety, civil society considers the process of ensuring biosafety a far more complex process. It is one that includes science, but it is also inclusive of the distinct incentive structures that underpin the dynamics between the firm and the state. Political and economic framings of risk cannot be ignored.

In the context of NGOs, this burden of proof on characterizing risk entailed is based on the precautionary principle⁵⁵. By placing the burden of proof on the state to ensure safety, a dynamic arises, one where NGOs find their most pragmatic functionality. From the perspective of those NGO members interviewed here, their role is to hold the state accountable for their actions. It is to firmly place – or force – the burden of proof within the mandate of the state. Moreover, it is to provoke the state into action where there appears to be lacking evidence or awareness of empirical field realities. It plays out in demanding transparent biosafety assessment as stipulated in the

regulations, but goes one step further in demanding the consideration of a richer set of assessment criteria not drawn upon by the state, and questioning the scientific capacity of the state to effectively gauge biosafety. This framing is based on the assumption – whether based on scientific fact or otherwise – that transgenics in agriculture are an inherently hazardous proposition presenting real risks and incalculable uncertainties. Kuruganti defines her take the incertitude of transgenics in agriculture as being rooted in not knowing

(...) whether you'll get a good crop or not [and] the fact that you don't know whether this is safe to eat or not...I would say the sheer unpredictability of the technologies is one of the uncertainties. For the simple reason that the genes that you have inserted seem to be settling themselves – even flowing from the technology itself. (...) So, civil society groups don't just have a potential role to play, but I think they have a responsibility in engaging themselves with genetic engineering in farming⁵⁶.

Such a perspective may not be embedded in scientifically established fact, but it does not matter. What does matter is how someone like Kuruganti can assert the value of such a view of technical risk to a wider audience in order to affect regulatory reform.

The second framing relates to how Bt cotton has been released. As indicated by the assertions of conflicting interests, many civil society actions are focused on exposing linkages between regulators and industry. This occurs in the face of government policy that aims to speed up the process of release, potentially at the cost of compromising on both probity and scientific rigour. Risk is framed in the context of the economic incentives of the government – it is the forfeiture of integrity. The concerns of civil society are embedded in what the literature refers to as regulatory capture (Stigler 1971; Posner 1974) and regulatory independence (Moran 2002). It is reflected in assertions of aggressive lobbying, elements of corruption and bribery, conflicts of interest within regulatory bodies, and sacrificing regulatory rigour for fast track release. In essence it is a concern that the state cannot truly be independent in their assessment. Dr. Pushpa Bhargava, a Supreme Court appointed nominee to the GEAC and an eminent scientist in his own right⁵⁷, recalls that,

[m]any years ago, when the Bt cotton approval was being processed, the GEAC was about to approve a strain of Monsanto's bovine somatotropin (rBST) to increase milk [production]. (...) It was approved by the RCGM deputy and then approved by the GEAC. Soon after, an application was filed by LG for genetically engineered rBST. (...) However, LG somatotropin was not even approved by

RCGM. And the reason was very clear. LG very clearly said - the correspondence was sent to me – they are not willing to pay anything to anyone. We have copies of letters [from LG] saying ‘why aren’t they approving it?’ So you can arrive at your own conclusions on what basis approvals are given⁵⁸.

But, if the state cannot be truly independent in assessing and releasing Bt cotton, who can? This is precisely the space where civil society enters. And interestingly, their concerns regarding regulatory capture and independence mirrors the risk framing of the government in terms of losing the biotech race and cutting the red tape. The difference is how the ultimate outcome is valued in terms of what the cost will be.

The third framing of risk is embedded in notions of representation. Politically, it becomes nearly impossible to ignore a public who are sensitized to the potential risks of these new technologies. While the battlefield that I will present in detail initially formed around Bt cotton, there was still a geographic divide between farmers and their urban counterparts that removed some the relevance of the crisis. Simply put, you cannot eat cotton. However, you can eat brinjal. Once the risk framings of civil society – the old school, the new school, farmers’ leaders, and perhaps most effectively, the media – were more widely projected in the context of Bt brinjal, a once dormant urban public began to also question what has happening in the halls of the DBT and MoEF. Bolstered by scientific expertise – technical risk assessment as voiced by Bhargava and others who appeared to have the credentials to discuss such matters with some authority – civil society began to successfully transpose their concerns to a wider public. The government had to respond.

When a minister takes the initiative to travel around the country to hold public debates, it becomes obvious that the issue is no longer in the hands of an expert minority. Technical risks become political capital. This applies on the one hand to a newly sensitized public, but it is also a function of farmers’ leaders also capitalizing on what is happening on the ground as a means to hold the government accountable to those they claim to represent. Just as the media acts as knowledge brokers, farmer leaders take on the role of accountability brokers. They represent the needs of farmers to the government and work towards ensuring that these needs are addressed. And the government responds politically by offering concessions to farmers, or by including an anti-biotech agenda in their political platforms during election time as a response to a sceptical public. Yet again, this all occurs in a context where farmers have adopted Bt cotton in massive numbers.

The risk then is embedded in a political context - that of leverage loss. There is a balancing act at play. Ministers have to appear sensitive to the needs of a growingly concerned public, and farmer leaders have to fulfil farmer expectations by generating concessions. But as Tiwari laments,

[t]housands of vehicles of Monsanto are moving around. Each village has one campaigner – they have put a man on salary there. What can I, Kishor Tiwari, do? No one even listens to me. (...) What can we say; ‘Go to organic farming, go to hell? Do that *jowari* [millet] farming?’ They’ll say, ‘he’s a *chootia* man, he’s a mad man’⁵⁹.

On the one hand, Tiwari risks losing the support of farmers, and on the other he risks losing the attention of the government. Similarly, someone like Jairam Ramesh, the current minister of the MoEF and someone whose relevance in this battlefield will be discussed in much more detail in what follows, has to satisfy his electorate for the sake of the political party he is affiliated with. But, he also has to ensure that he does not alienate the rest of the ministry. There is a large section of the MoEF – the current director Ranjini Warier included – that is in favour of transgenics in agriculture. A balance needs to be struck, and this is the job of a broker.

These framings of risk are based on a series of very traceable events. In what follows I will detail exactly how these framings have both been applied and have gained currency among wider networks, thereby affecting regulatory evolution in the ongoing story of Bt cotton. The next section sketches the battlefield, a fascinating account of how a multitude of parties who often might never engage with one another found themselves addressing new issues and navigating new risks. Over the course of the battlefield description, a series of questions will arise. How have civil society risk framings been made manifest in action to hold the government accountable? How have they projected their risk framings to the broader public as a means to broaden who demands accountability? How does the projection of this framings characterize and catalyze the iterative process of formal regulation as policy? And ultimately, is regulation policy, or something far more complex and inclusive?

4.3 The Battlefield

After three years of working in Greenpeace, it suddenly dawned on me that the best strategy to stop something in this country is to make it more complicated. Because that is exactly what happens anyway. (...) [S]ome third person with a new

angle [enters], and actually confuses the entire debate a little more - stirs it out of proportion. So, actually, if you really want to delay something, stop something, ensure public participation before it moves ahead, what you really need to do is make it murkier, make it dirtier, make it more difficult for people to wade through, bring in more people so its impossible to get consensus, things like that. It's just a statement of the way things happen around you and its part of how we live - I'm not saying it's a bad thing. We've seen it as something that we need to use⁶⁰.

Divya characterizes the strategy that has driven formal regulatory reform to date quite succinctly. The aim is to frustrate the process of release by using judicial means of accountability to force the government to react. There are three phases that best characterize how NGOs and farmer leaders have pursued this aim, delineated by three distinct events. First is the release of Bt cotton itself in 2002, but more importantly the two to three years after release. This post release period allowed NGOs and farmer leaders to collect empirical data on the performance of Bt cotton to strengthen their future arguments. Second is the introduction of the RTI Act in 2005. This piece of legislation radically changed what kind of information NGOs, farmer leaders, and the media had access to, further buttressing their arguments. Third is the 2009 GEAC approval of Bt brinjal and the subsequent - and ongoing - debates that have surrounded its release. As a food crop, it has significantly changed the level at which all four parties I consider operate. But civil society in particular have capitalized on the uncertainty that surrounds its release, among both the general public, but with scientists and a number of regulators as well.

A direct quote from a Court order written by Rodrigues sums up the overarching sentiment from an economic risk perspective well. She argues that caution is required, given that:

(...) India is faced in the present, with an unprecedented, full scale onslaught of GE crops thrust on our nation by a deeply errant, irresponsible Regulator. (...) [I]f the GEAC is allowed to continue in its current course of an implacable determination to approve GM crops no matter the consequences, without a proper assessment of the unique hazards that the GE process presents, India's food chain and the environment will be irreversibly contaminated (...) [T]he concerns with Genetic Engineering and its handling in India have reached such a crisis that it can no longer be entrusted to a Regulator that is betraying the national trust⁶¹.

Strong words indeed. However, impassioned pleas aside, a countering framing of risk from a farmer perspective is impossible to ignore: Bt cotton has been adopted in large numbers. Though

the uncertainty of long term pest resistance and the incorrect deployment of the technology at the farmer level are concerns, high adoption rates would seem to indicate success rather than failure. As C.K. Rao, head of the industry friendly Foundation for Biotechnology Awareness and Education argues, "[NGOs] have already lost the battle over Bt cotton - the only GM crop grown in India - and they know if they lose over Bt brinjal they lose the war⁶²." There is an urgency that surrounds these activities, borne of ideological construction, of risk framings, of a whole narrative that places Bt cotton as a threat to sovereignty, identity, and a whole way of life. In effect, the only way to safeguard these concerns are to stop release.

Yet in my view, the question is not whether or not civil society can stop the release of Bt cotton or any other transgenic crop technology, as I would argue they cannot. The incentives for firms to capitalize on massive demand from farmers are too alluring, and the government – though with its share of detractors and sceptics – is very much in favour of transgenics in agriculture. Rather, the question is twofold. First, how have civil society used formal, judicial instruments as enshrined in their legal rights to ensure that the government is doing their job - the business of releasing transgenics - and addressing the crisis? Second, how has civil society captured the imagination of the broader public via non-judicial means to forge preferences that the state and firms are forced to respond to? It is the interface of risk framings – biosafety as scientific evidence vs. biosafety as the lack of scientific evidence, regulatory efficiency vs. regulatory capture, and the political risks of alienating an electorate - that characterize the conflict that arises when these risk framings collide. Regulation emerges as the overarching process of these interfaces.

4.3.1 1998-2005: Catalysts and Consolidation

The story begins in 1998 with a new partnership: Monsanto purchases a 26% stake in Mahyco, and Bt cotton field trials conducted in forty locations over nine states. This is the standard entry point into any historical discussion on Bt cotton in India. However, running in parallel with this is another series of pivotal events revolving around NGO and farmer leader mobilization against Bt cotton. 1998 is the year that sees these organizations rallying for Monsanto to quit India and to 'cremate' them, and where activists from the Karnataka Rajya Ryota Sangha (KRRS) set a trial plot of Bt cotton in Karnataka ablaze. Another partnership is struck in different, but no less pressing, mutually shared interests – Vandana Shiva finds an ideological connection with Nanjundaswamy of the KRRS (Madsen 2001: 3738). In light of the trial plots and concerns regarding whether or not they have been undertaken according to the rules, the RFSTE publishes a report based on data on Bt cotton trial plots across five states, concluding that the RCGM should not have given permission as

the trial sites were large scale and required GEAC approval, that SLCCs and DLCCs were not functioning, and that Mahyco did not follow the guidelines in terms of formal biosafety guidelines. Already a distinction is formed between NGOs and farmer leaders, and the distinct tools they use to address their concerns – one in the courts and the other in farmers' fields. It is the urban and rural divide made manifest, characterized via a modality to oppose. These differences render the partnership between RFTSE and KRRS a short one⁶³.

In 1999, the RFTSE formalizes the conclusions of the 1998 report on “experimental” trial plot violations by submitting a writ petition to the Supreme Court⁶⁴. This is the first legal petition filed in the context of transgenics in India, and the Court decides that Mahyco has indeed violated the 1989 Rules. Trial plots cease for the time being, but the regulations are amended to allow the RCGM to certain authorize experimental trial plots in the future (MST 1998)⁶⁵. This appears to be a concrete response to the RFTSE petition (Ghosh 2000; Gupta 2002), the first instance of an technical risk interface unfolding in a judicial arena and affecting policy. However, it is short lived; one year after the RFTSE petition, ICAR seeks permission for limited trial plots of domestically produced Bt cotton⁶⁶, which is granted, though in line with the new amendments. Trials recommence for the 2000-01 growing season⁶⁷.

On the non-judicial front, another spate of trial plot arsons occur in 2001⁶⁸. In Maharashtra, Kishore Tiwari finds his future calling and forms the VJAS, and back in Delhi, the DBT announces that Bt cotton should be commercially available by March 2002⁶⁹. Meanwhile, farmers in the state of Gujarat have quietly sowed over 10,000 hectares of illegal Bt cotton⁷⁰. Inquiries are launched with both the DBT and civil society demanding answers as to why, though at its core are economic risk framings; farmers want to capitalize on a new technology, and formal regulations based on technical risk assessment have absolutely no relevance to that calculus.

In March 2002, the GEAC formally releases the first transgenic technology in India - three varieties of Bt cotton (ISAAA 2005). The mobilization against Bt cotton begins in earnest. Six months later, India decides to ratify the Cartagena Biosafety Protocol⁷¹, and soon after RFTSE files a new appeal to the government and Mahyco in the context of the release⁷². The appeal, which built on their 1999 petition, argues that the precautionary principle was violated; that the decision was “not based on any direct information or data collected from the ground level through testing or evaluation by any independent authority”, and that field trials were conducted in an “unscientific and unsafe manner”. The MoEF responds by arguing all tests have been conducted according to the existing regulatory framework. Technical framings of risk assessment do not mesh as the state argues the rules were followed. The courts agree, and the RFTSE appeal is rejected after eight months⁷³.

In farmers' fields however, economic risk framings rule. The technology is in high demand; farmers have been crossing state lines to get their hands on the technology⁷⁴, though reports begin to emerge regarding the varieties not being "up to the mark" and subject to leaf-curl virus⁷⁵. A body of farm level experiences are documented by NGOs, an exercise that will inform much of the debate in the years to come. 2003 continues with claims and counter-claims of the ongoing experiences with Bt cotton by both NGOs and firms, based on the growing empirical evidence of farm application. Articles are published arguing that Bt cotton allows for 43% to 80% yield increases and a 72% to 83% reduction of pesticide use (Qaim and Zilberman 2003; Bennet et al. 2004). The Qaim and Zilberman article is widely contested both by NGOs and other scientists in terms of the methodology and the fact that Mahyco data was used in the analysis⁷⁶. New forms of knowledge begin to enter the realm of debate, enriching the scale of contestation and forging new spaces of battle; NGOs release their own studies, concluding on between 15% to 35% lower yields in Bt cotton compared to non Bt cotton (Sahai and Rehman 2003; Qayum and Sakhari 2002: 32).

In late 2003, Suman Sahai organizes a conference that brings together industry representatives, regulators, and civil society members to discuss the relevance of transgenics in Indian agriculture, a unique and unprecedented event given the breadth and diversity of the participants. Twenty recommendations are submitted to the DBT; however, they are essentially ignored⁷⁷. The state has their own view of the future as framed by their own economic risk constructions, and what Sahai compiles just does not mesh. Gene Campaign changes tack. Changing the interface from economic to technical framings of risk, and using judicial means to force accountability out of the state, the organization files their first writ petition challenging the 1989 Rules on the basis of lacking technical competence among regulators, lacking transparency of the regulatory process; lacking public participation in decision making processes; and lacking accountability and liability stipulations should transgenic technologies cause accidental harm⁷⁸. The petition bases the call for transparency on a 2003 court ruling to an earlier RFTSE submission, which argues that

(...) the Right to Information and Community Participation necessary for Protection of Environment and Human Health is an inalienable part of Article 21 [of the constitution]. (...) The government and the authorities have to motivate the public participation by formulating the necessary programmes⁷⁹.

The Gene Campaign petition remains in the courts to this day, though it has since been clubbed together by the Supreme Court with later petitions that I will discuss in what follows.

Meanwhile, the situation on farmers fields still remains unclear - there are a series of seemingly conflicting reports, and it is very difficult to gauge how Bt cotton is really performing. On one hand, Bt cotton seed sales are up 500% from 2003 to 2004⁸⁰, the government states cotton yields have increased 23% since the release⁸¹, and more zonal areas are approved for Bt cotton cultivation. Mahyco reports that demand for the technology has risen 660% across six states, publishing a peer reviewed study concluding that Bt cotton increases yields by 60% and reduces pesticide applications from three to one spray⁸². On the other hand, a district manager of Mahyco and eight government officials are held hostage in exchange for compensation of INR 15000 an acre due to the poor performance of Bt cotton⁸³, NGOs argue that pesticide costs have increased 690% due to Bt cotton adoption⁸⁴, and in Andhra Pradesh, farmers attack and vandalize seed stalls demanding compensation for low yields⁸⁵. A paper in *Current Science* published by CICR scientists states that the protection offered against the bollworm are “ (...) inadequate to confer full protection” (Kranthi et al 2005: 291), which is capitalized on by Gene Campaign⁸⁶ and prompts a series of questions to the MoEF regarding why Bt cotton was released in light of the CICR study⁸⁷. Yet in the face of these contested realms of knowledge, the rollout continues. Fourteen transgenic vegetable varieties are approved for field trials⁸⁸, and CICR works with an agricultural university, the University of Agricultural Sciences (UAS) Dharwad, towards the commercial release of the first domestically engineered Cry1Ac expression event. The first Indian Bt cotton variety to be developed in India is on its way⁸⁹.

Up to this point, the evolution of the Indian story of transgenics is both impressive and confusing. In a seven year period – between 1998 and 2005 - India had evolved from a country with nascent, untested regulatory frameworks and no commercialized technologies, to a country boasting multiple commercially available varieties of Bt cotton, a wealth of new technologies in the pipeline, and a plan to completely reconsider how these technologies should be regulated based on the Mashelkar and Swaminathan reports⁹⁰. But it is not really clear how the technology is truly faring on the ground. The battlefield is framed by NGOs reporting wide scale failure, while the firm and government trumpet fantastic successes.

Performance aside however, with the exception of the RFTSE petitions and the resultant modification of the Guidelines, one aspect of the story is clear: NGO actions are limited for the most part to producing their own reports, and voicing their concerns of lacking transparency in the regulatory process⁹¹. As the courts are considering petitions, there is little in the way of any action that commands a more explicit response from the state, and for the most part the state and industry considers the opposition as more annoying than anything of any real concern. As K.R. Kranthi, senior scientist at the CICR puts it, “I earnestly hope that the meaningless hullabaloo raised over Bt

cotton by the NGOs comes to an end soon and that a brilliant technology such as Bt cotton, which is state-of-the-art in eco-friendly cotton pest management, will be improved further and stabilized in good varieties and hybrids so as to ensure a pesticide-free, profitable, and sustainable cotton pest management [strategy] in India⁹².” Non-experts are deemed clueless and a nuisance. However, this perception is forced to change when a piece of legislation is introduced that dramatically alters the entire scope of what civil society can be capable of in terms of how relevant scientific expertise really is in matters of policy.

4.3.2 2005-2009: *The RTI and the First Wave of Litigation*

There was Vandana Shiva who put the broad debate out there, (...) then there was KRRS who had burnt down fields and stuff like that – they’d done a lot of it. But a lot of it was anti globalization, anti Monsanto, that kind of thing. (...) In that sense I thought it was a bit difficult for us, because we had to say that ‘no we are not saying its Terminator, we agree its not, but it’s still transgenic, these are the concerns’. So in fact some of the NGO and activist propaganda about what’s wrong with GM - a lot of it we didn’t want to share. We thought a lot of it was black and white; it is a lot more nuanced than that. So in that sense we had a tough time saying ‘no, we want to debate with you on this point, and that point, and that point’⁹³.

Raghuandan’s perspective renders explicit how she sets the new school apart from the old. Moving away from class based politics, the new school is focused on direct engagement, on fighting fire with fire. If the state is focused on technical risk assessment, then the only way to counter that is to speak their language; to contract out scientific expertise and to force it to be recognized, and most relevant here, to use judicial means of accountability to force that recognition. Up to 2005, the story can be summarized as follows: firms claim massive sales, the central government claim yield increases, farmers – depending who and how you ask – are either ecstatic or infuriated with it, and NGOs and farmer leaders uniformly claim the technology ineffective and the government incapable of performing the duties as stipulated in the regulations themselves. But to date, there is little in the way of concrete milestones that civil society could claim. Regulation was evolving along the lines of the Mashelkar and Swaminathan reports, more and more Bt cotton and other transgenic technologies were being released and tested, and firms were entering the market, eager to capitalize on the demand of farmers. However, the next few years present a number of significant milestones, premised on newly enshrined legal rights.

In tandem with the evolution of the regulation surrounding transgenics, a draft bill on freedom of information is introduced in 1996, which evolves towards the Freedom of Information bill in 2000⁹⁴. The rationale is premised on a constitutional right:

Article 19(1) (a) of the Constitution guarantees the fundamental rights to free speech and expression. The prerequisite for enjoying this right is knowledge and information. (...) Therefore, the Right to Information becomes a constitutional right, being an aspect of the right to free speech and expression, which includes the right to receive and collect information. This will also help the citizens perform their fundamental duties as set out in Article 51A of the Constitution. A fully informed citizen will certainly be better equipped for the performance of these duties (MoIB 2000: 2).

In June 2005, the Right to Information Act is introduced, and new government bodies are formed to manage it – the Central Information Commission (CIC) in Delhi and State Information Commissions at the state level⁹⁵. To date, it is the cornerstone of how civil society has addressed their concerns with transgenics. While farmer leaders make a call for a ban on Bt cotton and a moratorium on any further approval of transgenics⁹⁶, echoing pre-2005 strategies, NGOs take the call an entirely new level.

First, Aruna Rodrigues⁹⁷ files a writ petition towards the Supreme Court three months after the Act takes effect. Building on the writ petition submitted by Gene Campaign in 2004, the petition highlights a number of concerns; that regulators used data provided by firms and these firms were conducting the biosafety assessments themselves, creating a clear conflict of interest; that test results were not publicly available; and that without a transparent, independent, credible and publicly accessible system of testing for biosafety and environmental hazard, the precautionary principle was being violated. This last assertion was argued in the context of India's recent ratification of the Cartagena Biosafety Protocol. A number of RTI submissions are sent and responded to, providing a basis for her arguments. Economic risks as framed by the new school of NGO begin to force their way into formal policy spaces.

Second, their framings of technical risks also begin to make their way in. In February 2006, Divya Raghunandan of Greenpeace files a request under the RTI to the DBT with the aim of seeking information on three accounts: a list of 2005 farm field trial locations; toxicity, allergenicity and any other relevant data on transgenic brinjal, rice, mustard and okra; and RCGM meeting minutes⁹⁸.

This RTI submission proves to be a key factor in the years to come in the context of Bt brinjal. One month later, the DBT releases field trial data, but withholds the biosafety data and minutes, citing a section within the Act that allows for confidentiality in cases where information might compromise “the competitive position of the third party⁹⁹.” Raghunandan appeals twice over the next four months interpreting the same section in the Act a having an exception in cases where the “public interest” may be compromised¹⁰⁰. Third, Gene Campaign files four RTI submissions seeking information with regards to, among other things, the status of SBCCs and DLCCs and all copies of all government correspondence leading to the approval of Bt cotton¹⁰¹. Within six weeks, most of the information requested by Gene Campaign is released¹⁰². At this point, the similarities between all three petitions are not lost on the courts, and over time they are often addressed together, with the petitioners sharing strategies and results¹⁰³. All three petitions are premised on technical risk as framed by the precautionary principle and the economic risks of vested interests overtaking regulatory efficiency.

Meanwhile at a more local level, in Maharashtra, Tiwari files a petition against the state government arguing that the farmer suicides are the result of an infringement on Article 21 of the constitution relating to the right to life and liberty. He argues that, while the state government promoted Bt cotton in 2005, the technology had failed to protect against pest attacks; that the Maharashtra government had not regulated the proliferation of "bogus" Bt cotton seed and that Monsanto is liable for compensation under the Monopolies and Restrictive Trade Practices Commission; and that the negligent firms selling spurious seed are being given protection by the state due to mutual financial interests¹⁰⁴. Six months later, the first Prime Minister’s relief package is released¹⁰⁵. Political risk framings also begin to force entry, though not by judicial means – it is a function of political pragmatism and opportunity. Bolstered by this success – though clearly due to a number of combined factors – Tiwari surges ahead. He succeeds in getting a state High Court decision mandating full disclosure of who exactly was to receive package benefits from the government of Maharashtra, based on a petition he filed earlier¹⁰⁶. Soon after, he sends a letter to Prime Minister Manmohan Singh demanding a complete loan waiver and a fixed MSP of INR 2700 per 100kg¹⁰⁷, and another letter to Sonia Gandhi requesting a 30 billion rupee “mobilization fund” to be given to the Maharashtra government; a rise in the cotton MSP to INR 3000 per 100kg; a hike in cotton import levies to 60%; and a subsidy to farmers who grow food crops as a substitute for cotton of INR 1000 per acre. He closes the letter by requesting Gandhi to “change the Prime Minister of India and Chief Minister of Maharashtra, as both are too hostile to continue in office in order to save the farmers of Vidarbha¹⁰⁸.” Tiwari is a busy man.

Back in Delhi, the scene is similar. The Supreme Court presents an interim order in mandating all

ongoing field trials to be approved by the GEAC, and not the RCGM as in the past¹⁰⁹. Not one to rest after an initial achievement, Rodrigues immediately files another interim application - upping the ante considerably - and demands that all field trials should cease. She passionately states that while the court “deliberates on the PIL before it, if the GEAC is allowed to continue in its current course of an implacable determination to approve GM crops no matter the consequences, without a proper assessment of the unique hazards that the GE process presents, India’s food chain and the environment will be irreversibly contaminated and in perpetuity (...) by a whole range of GM foods (as opposed to animal feed like Bt cotton), which are planned and are in the ‘pipeline’, a situation not faced by any other country¹¹⁰.”

The urgent tone of her submission to the courts was not entirely rhetoric; between May and September, the GEAC approves field trials for 24 new transgenic technologies¹¹¹. In September, the Court meets her halfway. While not inclined to stop field trials, the court considered it “(...) appropriate to direct the GEAC to withhold the approvals [of further field trials] till further directions are issued by this Court on hearing all concerned¹¹².” Science still is in charge from the courts perspective, as it is seen as the most objective means to address these contested realms of knowledge. On May 8 2007, the Court allows the GEAC to conduct field trials again, but only for Bt cotton, and with particular stipulations to counter concerns of pollen flow, contamination, and a very low metric for acceptable detection of transgenes in the context of export, contamination, and labelling¹¹³. In response to this limitation, a subcommittee constituted by the MoEF to review the implications of the Court directions considered the stipulations and recommended that “they may be dispensed with¹¹⁴”. This reflects a certain arrogance, one that is based on economic need – research cannot just stop – but also a sense that the courts, in the view of the MoEF, are incapable of grasping the technical limitations of what they propose. A space emerges, and Rodrigues responds quickly – she files a contempt of court order¹¹⁵. She argues that:

[t]he GEAC is well aware that its approvals in the 78th and 79th GEAC Meetings of LSTs of Bt brinjal, field trials of [other] GM food crops and [additional trials of] Bt cotton [all] contravene this Hon’ble Court’s Orders, [and] that its pre-determined stance that GM crops benefit society is inappropriate in a Regulator that must be properly sceptical of a technology that is recognized in science to be hazardous¹¹⁶.

It is a unique situation. The trials are technically illegal, yet they continue. Meanwhile, nearly a year after Raghunandan’s RTI submission, the CIC decides in favour of her arguments and mandates the DBT to release the RCGM minutes and biosafety data (CIC 2007), a landmark judgment. Though it takes time; the DBT, after much reluctance and resistance from Mahyco, takes

two years to release the Mahyco dossier. In August, frustrated by the limits placed on further research and development, the GEAC files a request to the Court to modify the May order on the Rodrigues submission and allow further trials given the challenges in meeting the court mandated requirements¹¹⁷. The Court deliberates.

Meanwhile in Vidarbha, Tiwari remains busy. He is nominated for CNN-IBN's Man Of The Year award on the basis that "(...) he ensured that the Prime Minister stepped in to help Vidarbha's farmers¹¹⁸." The crisis begins to get both domestic and worldwide attention. A political bank of capital accumulates. Former President A.P.J. Kalam visits a number of suicide widows in Yavatmal district in June, accompanied by Tiwari who had sent him correspondence on the crisis. He spends twenty five minutes with them, and when he asks the women if they have benefited from the PM package, they say no. Kalam states he is "(...) disturbed and will raise the matter with the officers concerned at the Centre and the State¹¹⁹." Later that year, Tiwari files a petition toward the Maharashtra high court demanding a higher MSP for cotton¹²⁰. The High Court responds to his petition, stating that "(...) existing schemes, including the special relief package, had actually 'failed to stem the farmers' suicide'¹²¹."

Behind all of this, political parties see an opportunity. While a number of separate studies have been commissioned since 2004 by the government to try to understand the crisis, the leader of the state opposition says "[t]his Congress-NCP government is only buying time with another study panel", with Tiwari concurring "[w]hat's the use of setting up more committees when the state government is not even half serious about implementing any of the earlier recommendations¹²²?" Five months later the central government releases a massive INR 600 billion as a loan waiver package for farmer owning less than five acres and having formal bank loans, seen by some observers as a pre-emptive strategy to the national elections that will occur in a year. It is unprecedented - a "new deal" for farmers as termed by Prime Minister Singh - and one that accounts for 1.7% of India's GDP at the time¹²³. Tiwari criticizes the move, citing that 40 million farmers will not benefit given they source credit from informal moneylenders or own more than five acres. He concludes that "[i]t's a lose-lose proposition. This will not relieve farmers' distress¹²⁴," as "[m]ost of the Vidarbha region is rain fed and the farmers here hold more than two hectares of land, which makes them ineligible to benefit for the loan waiver¹²⁵." He frames the waiver as a political tool reflective of the Union Agriculture Minister Sharad Pawar's home base - western Maharashtra - where more farmers will be eligible for relief under the package terms. The political nature of the risks involved begin to become paramount at the local level, but they resonate along all levels of governance given state and centre linkages. The government reacts with formal policy, but the urgency is borne of political risk, something far removed from the technical

risks that were the catalyst. The interfaces begin to have their effect across these spaces, and the battlefield becomes populated on a variety of sides.

Meanwhile, back in Delhi, the Court passes a verdict that finds a middle ground of sorts. On the one hand, it requests the GEAC to include two prominent scientists, P.M. Bhargava and M.S. Swaminathan as the special invitees to the committee, interesting choices to say the least¹²⁶. On the other hand, it also relaxed the earlier verdict and allowed the GEAC to undertake new field trials, stating “it was very difficult for the Court to entertain PILs in high-stake technical issues as [the Court] had no expertise in the field, more so because the government had put in place an expert body like GEAC¹²⁷”. While Swaminathan chooses not to attend the meetings¹²⁸, Bhargava takes full advantage of the opportunity, much to the chagrin of the GEAC who, after six months, file a request to the court to get Bhargava off the GEAC. They cite his “(...) giving a distorted picture of the regulatory system which has been evolving during the last two decades as a dynamic process keeping in view the developments taking place worldwide in the regulatory process and products in pipeline”; his reporting to the media on “(...) sheep deaths rather than on the scientific evidence and reports submitted by the scientific institutions on the issue¹²⁹,” and his unwillingness to maintain any element of confidentiality¹³⁰. Political and technical risks mesh, and the courts are forced into new spaces where they have little expertise. The delay tactics championed by the new school of NGO are working well indeed.

At the time of this writing, Bhargava is still a court mandated invited expert, though without a vote. “[H]e is welcome to make his observations on the cases that come up in subsequent meetings. The committee will take his views into consideration but the law that is laid down will be followed¹³¹.” The Court ordered inclusion of Bhargava raises the stakes of the game higher, and also raises Bhargava’s profile in the ongoing debate. Over the years that follow his tenure at the GEAC, Bhargava continues to raise significant concerns regarding the efficacy of the regulatory system given his unique perspective as a trained and recognized professional scientist familiar with formal scientific risk assessment procedures. He argues loudly that studies are not being completed or are based on private sector data and not verified independently¹³²; that the institutions mandated for the testing are not equipped for the required tests¹³³; and that the GEAC has selectively summarized conclusions for the public and not the actually test data¹³⁴. But he uses his technical risk assessment capacities politically as well, and he will play a crucial role in the next two years.

In mid June 2008, the DBT drafts the NBRA Bill¹³⁵ and welcomes feedback until the end of the month¹³⁶. Concerns begin to arise within the both schools of NGOs regarding how it will interface with existing laws¹³⁷, in particular state sovereignty over agriculture¹³⁸; and whether or not the

reallocation of certain articles in the existing framework will jeopardize their applicability¹³⁹. Additionally, they argue that no liability system is referred to in case of accidental release and harm, and that elements of public participation as referred to in the Cartagena Biosafety Protocol are missing¹⁴⁰. The NBRA remains in gestation.

In Vidarbha, the situation escalates. Tiwari takes an “I told you so” stance – he notes that with regards to the waiver package, INR 57 billion is disbursed to farmers in western Maharashtra, while farmers Vidharba have only received 5 billion, claiming “(...) it is a mockery of the dying farmers of Vidarbha, as only ten per cent of the total debt of Rs. 5876 *crore* (58 billion) is waived and 80 per cent of the distressed farmers are excluded from the waiver scheme¹⁴¹.” He stages a rally demanding “fresh crop loans” in light of his assertion¹⁴². Echoing Tiwari’s earlier demands, the centre raises the cotton MSP to INR 3000 per quintal for the 2008-9 season, yet this proves difficult to maintain in practice¹⁴³. Continuing on his 2006 petition seeking information on the nature package disbursement, he returns to the High Court arguing that the website set up by the state as a response to his demand for transparency does not contain the relevant information. Adding to the original petition, he further demands among other prayers, that “guilty officials for the offences [be punished under Section 306, 409, 420 & 120 (B) of Indian Penal Code” given their culpability in agrarian suicide; that INR 50,000 be given to each suicide effected family “without any disparity or choose & pick policy”; and that “the State [takes] appropriate action against the Bt cotton Seeds companies” for not providing compensation directly to farmers themselves¹⁴⁴.

His political acumen is hard to ignore. Tiwari travels to Mumbai to hold a rally with a number of suicide widows aimed to coincide with the Prime Ministers visit to the city¹⁴⁵, and leads a massive rally in Pandharkawada attended by 10,000 farmers¹⁴⁶. Prior to the state elections, the government of Maharashtra releases a new bailout package of INR 62 billion and mandates much of the use in line with Jadhav’s report. Tiwari remains unimpressed, and states that “[i]nstead of targeting most distressed farmers of Vidarbha, the new package once again is inclusive for all regions [in the state], even areas which deserve no government largesse¹⁴⁷,” namely western Maharashtra. By the end of 2008, Tiwari notes that “(...) as many as 4,850 farmers have committed suicide during the four year tenure of the Congress-NCP Democratic Front (DF) government in Maharashtra from 2004 to 2008¹⁴⁸,” the highest in the country. Despite over 800 billion rupees being sanctioned to date, the crisis remains¹⁴⁹.

And yet, in the face of all this, the state tops another list. It has highest acreage sown with Bt cotton in the country. By the end of 2008, Bt cotton – now in its second iteration as BGII – remains wildly popular¹⁵⁰. While NGOs, farmer leaders, and the media begin to fight it out in earnest, it appears

that farmers are not terribly concerned with any of this, as long as those concerned with political capital continue to offer them financial concessions, and as the adoption rates indicate, new varieties of Bt cotton.

4.3.3 2009-Present: From Cotton to Brinjal

Unlike Vidarbha, in urban India the debate to date has taken place more in the courts than in the public realm. The stakes are different. The litigation makes the papers, but it is unclear who among the public, outside of civil society and an interested minority, feels any impact of the debate on their daily lives. This soon changes. Almost two years after Raghundnan files her 2006 RTI application, the Supreme Court orders the GEAC to comply with the CIC directive. In April, the Court demands that all biosafety data on Bt brinjal is to be released to the public¹⁵¹, and in four months, the Mahyco dossier is released¹⁵². This flusters Mahyco; they argue release of the data compromises their commercial interests as stated as a qualification for withholding information in the RTI itself, but the CIC disagrees¹⁵³. The decision and the data are both welcomed by Greenpeace India. Over the next two years, the technical data – all 1,100 pages of it¹⁵⁴ – is digested, shared, and deliberated upon by a wide variety of scientists, both within India and outside. It will play a crucial role in the years to come as a context for contested technical realms of knowledge and risk framings to play out and interface with political and economic framings.

Urban, middle class residents begin to get more involved. The Coalition for a GM Free India begins their 'I Am No Lab Rat' campaign on Bt brinjal in New Delhi, which begins with a mass protest in Delhi, a candlelight vigil in Chandigarh, and a petition of 2,000 names addressed to the prime minister indicating peoples concerns with Bt brinjal¹⁵⁵. Similar protests begin to sprout up in other areas¹⁵⁶, and two Mumbai based filmmakers release a documentary called "Poison on the Platter"¹⁵⁷ which has extensive interviews with Bhargava "(...) about loopholes in the approval process and faulty safety data submitted by MNCs¹⁵⁸." The documentary receives mixed reviews and but provokes strong reactions among the many people who view it¹⁵⁹. Public opinion on the issue is further catalyzed. In the face of all this however, firms are unmoved. Mahyco and industry lobby group the National Seed Association of India report they are "(...) hopeful of getting approval for the commercial release of Bt brinjal seeds from the GEAC by end of the next financial year¹⁶⁰". It is business as usual; the firms have faith in the economic risk framings of farmers, citing the figures surrounding the massive adoption of BGII among farmers as evidence.

Back in the Court, two rejoinders are filed by Gene Campaign on a September 2008 petition on field

trials and a moratorium seeking more information from the MoA, MoEF, and DBT¹⁶¹; two months later Gene Campaign files a new RTI submission on the import of LMOs, complementing the earlier RFTSE petition. The issue is a recent iteration of the 1989 Rules allowing the import of “processed food items derived from Living Modified Organisms”¹⁶². The RTI application sought clarity on why the MOEF did not “publish all relevant facts while formulating important policies or announcing the decisions which affect public [health]”¹⁶³ before amending the Rules, along with a request for all relevant information that led up to the special order¹⁶⁴. Later, Greenpeace India discover unauthorized transgenic corn in “Doritos” brand corn chips. The chips are sold at a south Delhi upscale grocery store in an area frequented by wealthier, middle class urban consumers. After filing numerous RTI applications, they argue that official permission was not granted for the import, and that the sale violates the Rules¹⁶⁵.

Outside the courts, the scene evolves further. The broader public begins to get more involved and is subject to more stimuli, further catalyzing opinion. 150 protesters are arrested during a rally in front of Tamil Nadu Agricultural University (TNAU), an agricultural college where field trials for Bt corn and brinjal are occurring¹⁶⁶, a brinjal festival is organized in Bangalore¹⁶⁷, and another rally is organized by Greenpeace under the theme Monsanto Quit India at an agricultural college in Maharashtra where additional Bt corn trials are in progress. The university states, “transgenic trials will no longer be conducted on its land¹⁶⁸.” As catalysed by the new school of NGOs, public sentiment begins to affect the capacity to conduct the technical risk assessment that the formal regulators require, further delaying the process.

At the same time, and after four years of development, India’s first domestically developed Bt cotton OPV is formally released – Bt Bikaneri Nerma¹⁶⁹. Tiwari pans it, stating that the “white elephant research institute” ICAR and “paper tiger baby” CICR should not be trusted in light of “(...) our experience with Monsanto’s Bt cotton [being] too bad to believe in any more *desi* Bt cotton¹⁷⁰.” In May, the court again addresses the Gene Campaign and Rodrigues petitions, now considered together. The court remains sceptical, and states “GM seeds could possibly be a means to eradicate hunger and poverty. Poverty is probably more dangerous than the side-effects of GM seeds”. Still, it asks the government to submit a response to the NGO call for an independent authority – The National Centre for Assessment of GMOs – with regards to testing¹⁷¹. In the courts, deliberation is still premised on technical risk, though the impetus for the assessments are very much premised on the new school of NGO asserting their own technical risk framings in judicial spaces.

As national elections loom, the political realm of risk framing emerges more strongly. The historically right and left parties also enter the debate, sharing a common platform. The BJP and the Communist Party both issue statements indicating an opposition platform towards transgenics, unless “full scientific data on long-term effects on soil, production, and biological impact on consumers” is provided, along with promising incentives for organic cultivation and a strict labelling regime¹⁷², something that the current Congress coalition is wary of in light of concerted lobby efforts to counter labelling. Political opportunities are forming in the context of the polarized debate, and corresponding political risk framings present an obvious means to further political ambition.

At this point, another key event occurs. The MoEF gets a new minister, Jairam Ramesh. Ramesh has a history of being more sceptical of transgenics in agriculture than some of his peers seem to be¹⁷³. In his first press conference, he states that he

(...) is not gung ho on GM foods. Should we promote Bt brinjal? [The] jury is still on and I am not sure. (...) I do not see a great urgency for Bt brinjal [but] I see a very strong case for Bt cotton¹⁷⁴. (...) In fact, I would treat Bt cotton different from Bt foods. For Bt cotton, we should have a statutory comprehensive assessment to recollect our experience with it. Its success and its impacts need to be studied¹⁷⁵.

He straddles the line between the classic technical framing of risk as biosafety on the one hand, but as time passes, he begins to capitalize on public sentiment and fear as fomented by media reports. Ramesh’s scepticism becomes critical in ten months time, though some parties involved are initially sceptical of his capacity to do the job¹⁷⁶. His cautious approach appeals to NGOs¹⁷⁷, but also mirrors a recent admission by the Planning Commission that transgenics in food may hurt India’s capacity to supply export markets preferring non-transgenic products, though Bt cotton still holds promise¹⁷⁸. Ramesh, at this point, is just doing his job; he is a politician, balancing technical, economic, and political risk framings and ensuring to the best of his ability that he satisfies all relevant stakeholders. Though he is often championed as a ‘green’ by the new school of NGOs and others in the ‘movement’, it is worth noting that he also was a key player in India’s move to a liberalized economy in the early 1990s. His a master of balancing political priorities, and it would be naïve to characterize him as necessarily partial to any ‘movement’.

Meanwhile, the CSA organizes a conference entitled "GM Crops/Food and Health Implications" that includes international scientists who have conducted studies revealing potentially negative outcomes of transgenics, including Bt brinjal. Based on their analysis of the Mahyco dossier, a

number of scientists - both Indian and foreign - and a number of government representatives, plead for caution in introducing Bt brinjal in India¹⁷⁹. Greenpeace polls 4,000 people and concludes 98% of those polled are averse to consuming food containing transgenic technologies¹⁸⁰, and organizes a protest in Andhra Pradesh against a Bt rice field trial. The protest results in the arrest of 35 members of the public and the press, but protestors feel that “it was an honour to be part of the battle”, and that

[t]he father of our nation, Mahatma Gandhi led by example and showed that some citizen rights are not to be negotiated. (...) The right to safe food is one of them. We must demand from our government to be responsible and be on the side of citizens. I don't think anyone in Hyderabad wants GM *biriyani*¹⁸¹.

A stronger sense of solidarity within the movement emerges. And as long as the views of the public are made clear to those in power in the context of technical risk as voiced by local and international experts, political risk framings will ensure compliance to their end objective; to frustrate and delay release. More mobilizations occur. On the eve of World Food Day, a number of citizens meet in Delhi under the aegis of the ‘I Am No Lab Rat’ campaign. The organizer urges “(...) all Indians and especially Delhi'ites to assert their right to safe food and write to the Prime Minister of India through the website www.iamnolabrat.com to ensure the government takes a policy decision against such hazardous technologies in our food systems¹⁸².”

However, as all of this occurs, the situation in laboratories and the GEAC seems far removed; at this stage, there are 238 varieties of 56 transgenic crops at different stages of trials in India¹⁸³. The MoA states in July in parliament that transgenic tomato, brinjal, and cauliflower will be released within the next three years¹⁸⁴, with Swaminathan characteristically saying the right things at the right time to the right audience. He states that “[t]here is no scientific evidence to prove any [biosafety] concerns as real [given] commercialization of transgenic crops over the past ten years in the world¹⁸⁵.”

Finally, after six years of research, TNAU announces it has successfully developed Bt brinjal¹⁸⁶. One month after the TNAU announcement, the GEAC approves its commercial release - India's first transgenic food crop¹⁸⁷. Crucially however, and in a departure from recent approval events, Ramesh overrules the decision the next day, stating that the government “will have a series of consultations with scientists, agriculture experts, farmers' organizations, consumer groups and NGOs” in early 2010¹⁸⁸. It is a bold move, but one that seems to reflect both a clear sentiment of a

growing section of society, but more pointedly, Ramesh utilizing framing of risk and adopting this contested realm of knowledge strategically in policy form.

A number of NGOs oppose the GEAC release¹⁸⁹, farmer leaders seek a meeting with the prime minister and plan to “launch a country-wide agitation to create awareness about transgenic food crops¹⁹⁰”, former union ministers urge the prime minister to not allow the release¹⁹¹, and the state governments of Orissa¹⁹², Kerala¹⁹³, Tamil Nadu¹⁹⁴, Chhattisgarh¹⁹⁵, and Madhya Pradesh¹⁹⁶ issue statements indicating either their opposition or desire to ban it outright, though subject to the political manoeuvres that accompany any agriculturally related policy decision at the state level. One minister goes as far to argue that “GM crops are the latest version of the way East India Company colonized India¹⁹⁷”, echoing the nationalist neo-colonial sentiments that framed the narratives of older social movements, though adopted and adapted for new technologies.

Conversely, pro-industry representatives such as C.S. Prakash pledge their support towards Bt brinjal, asking people to write to Ramesh urging him to release it¹⁹⁸, and TNAU¹⁹⁹ and UAS Dharwad²⁰⁰ report that Bt brinjal “ (...) offers agricultural produce free from pesticide residues. We believe that the success story of cotton will repeat in Bt brinjal as well²⁰¹.” It is a clear response to growing public scepticism about the “toxins” in Bt brinjal and their effects on human health. However, such admissions from scientists of what appear to be fact - depending what one reads of course - seem to fall on mostly deaf ears amongst an increasingly sceptical public²⁰². The firm responds to a successful transposition of civil society risk framings to a broader public by lobbying Ramesh.

Public opinion has been fully catalyzed, and a battle ensues for all to see. There are two clear camps; scientists and central regulators who are in favour of release, and NGOs, farmer leaders, some state governments, and other scientists who oppose it. The press captures the entire debate with glee, with Bhargava as both scientific expert and new school NGO pin-up being an oft-quoted source of scepticism. He states that

[t]he reports and statements put out by GEAC have been, many times, factually incorrect and full of inconsistencies. (...) [I]t will not stand independent scientific scrutiny anywhere²⁰³. (...) I got the [second Expert Commission (EC2) report on Bt brinjal] in hand on Monday, October 12, and the very next day [the GEAC] met in Delhi. Hurriedly after that, they went public before we could properly go through it and raise any objection. (...) [I]t carried out the entire procedure in favour of the multi-national companies involved²⁰⁴.

Bhargava capitalizes on his unique position, with the media only too happy to quote him, and the new school of NGO rub their hands together in delight. Meanwhile, the battlefield gets more and more populated, and more soldiers emerge. More farmer organizations²⁰⁵ and a new entrant, the church²⁰⁶, state their concern and opposition to Bt brinjal. A letter writing campaign for citizens to write Ramesh, the Prime Minister, and Sonia Gandhi begins²⁰⁷. The Deccan Development Society organizes a community meeting with a number of stakeholders, including Rodrigues, T.M. Manjunath, who has had various links to industry²⁰⁸, and M. Pimbert, programme director of London-based research NGO, IIED and former principal entomologist at ICRISAT²⁰⁹ in Karnataka. The Kerala Biotechnology Commission organizes a similar meeting with both local and international civil society representatives, along with a representative of the private sector²¹⁰.

Yet while a broader public become increasingly interested in the debate, both the firm and the government continue full steam ahead with research on transgenics. In November, Monsanto India announces plans to release Bt corn in India by 2012-13²¹¹. The central government announces an intention to improve the productivity of pulses given the large amount currently imported and the yield benefits that transgenic pulses can provide²¹². It argues "India cannot oppose the use of technology if it wants to increase yields and manage the present agricultural crisis. The crop shortage of key food grains had led to a rise in prices of some food commodities such as sugar and *tur* [pigeon pea] dal this year. (...) The country needs to take scientific and practical steps to improve productivity and bring down cost of production. The GM technology is one way to achieve this²¹³."

All throughout the story up to this point, the risk framings of the government - to do the science, cut the red tape, manage opposition - and most important at the end of the day, to win the race - have not changed that much. The NBRA and its formulation is a clear reflection of this. The industry is not terribly bothered with anything but the bottom line, and they know the government is on their side. But this is only because, to this point, those who make the decisions have toed the same line. There has not been any real, effective opposition to ensuring a future where the promises of the sunrise industry remain intact, apart from the delay tactics employed by the new school NGOs. Risk framings to this point have been fairly static within the halls of the MoEF and MST. The reason is that there has been no real political incentive to shift away from these risk framings as reflected in policy narratives. The public, while increasingly sensitized to the debate, have no reason to doubt the efficacy of the capacity of the state - aside from the status quo of *babu raj* - to manage these risks. Moreover, no one apart from livestock eats cotton. And cows do not vote. As a result, no minister would put his or her career at risk to divert from the stated objective

of bringing Indian agriculture into the future in the name of progress, science, and pride. But, this is all about to change.

First, reports emerge that the chair of the EC2 commission on Bt brinjal succumbed to pressure from the "(...) Agriculture Minister, GEAC and the industry" to approve Bt brinjal, and did not conduct eight of the required tests, as narrated over a phone call to Bhargava²¹⁴. It is covered extensively by the press, and NGOs claim they finally have the basis to bolster their claims of corruption and conflicting interests within the regulatory hierarchy – the economic risk of forfeiting integrity in the context of “winning the race”²¹⁵. Second, and immediately after this story leaks, Ramesh announces his plans to visit seven cities to hold stakeholder meetings on Bt brinjal between January 13 and February 15, 2010²¹⁶. It is yet another unprecedented event – a union minister personally going on a country wide tour to gauge the reactions and perspectives from a wide range of citizens on a hotly debated topic. His rationale, however, is elegantly simple. He states that,

[s]trong views have been expressed on the Bt brinjal issue, both for and against. My objective is to arrive at a careful, considered decision in the public and national interest. This decision will be made only after the consultations process is complete and all stakeholders are satisfied that they have been heard to their satisfaction (MoEF 2010: 2).

It is the political risk of losing leverage made manifest. Suddenly, what once were static risk framings on the part of the government seem to be shifting, reflecting a wider cache of framings.

Over the next month, the entire debate on Bt brinjal - and transgenics in general - ramps up to yet an entirely new level. The consultations are characterized by protests outside the minister’s tour venues against Bt brinjal, with firms occasionally bussing in landless labourers acting as farmers to counter these voices by loudly singing the praises of it. The strategy backfires, and seems specious to begin with given that Bt brinjal is not being commercially grown in the first place²¹⁷. Inside, some attendees claim that Ramesh is “an agent of Monsanto²¹⁸”, prompting Ramesh to nearly leave on several occasions²¹⁹. In Hyderabad, Ramesh does not even get a chance to speak as massive protests surrounding the visit make it impossible²²⁰. In Bangalore, a consultation attendee alleges that Ramesh has commercial interests in his capacity to authorize release, to which Ramesh responds with uncharacteristic frustration; “I want to talk to people from the health sector. I’m sorry, I don’t want to talk to [mental] health patients. Please leave²²¹.” In Bangalore, a former Managing Director of Monsanto India states his position on Bt brinjal during the consultation; a firm no, qualified by his assertion that “private companies only have profit in their mind when

introducing new technologies²²².” He adds later that the problem lies with the GEAC, and their being “completely bogged down by Monsanto²²³”, and that in the past,

the Central Insecticide Board was supposed to give approvals based on the location and crop-specific data from India (...) [b]ut simply accepted foreign data supplied by Monsanto (...) and, at times, the data itself was faked. (...) I retired from the company as I felt the management of Monsanto, USA, was exploiting our country²²⁴.

The lines between scientist and civil society seem to be getting blurred as risk framings are being both transferred and challenged in public spaces. Contested realms of knowledge are driving new processes and outcomes that, due to the very public interfaces that a minister has initiated, are changing the direction that policy was meant to go. All of this makes for great copy.

On the periphery of the tour, the scene is somewhere between chaos and creative inspiration. NGO representatives and the Kerala Minister of Agriculture fast in protest²²⁵, rallies, marches, and speeches are conducted in the lead up to the debates in most cities²²⁶, effigies of the GEAC are burnt²²⁷, 10,000 aubergines are cooked towards making the world’s biggest *baingan bharta*²²⁸, activists visit markets in cities where the tour visits dressed as giant aubergines²²⁹, the leader of the RSS - between stating how Christians should stop converting Hindus and how young RSS cadres should promote nationalism - states his opposition²³⁰, and a Tamil ‘Tollywood’ docudrama on Bt brinjal is scripted, shot, and released²³¹. Farmer leaders are involved as well given the profile of the event; Jawandhia claims farmers are now “on the warpath²³²”, and Tiwari writes to the Maharashtra Chief Minister, pleading that “(...) the genocide after [the] introduction of Bt cotton in this region is very important and one can’t ignore this serious aspect when we talk about food security and food safety. Hence opposition to Bt brinjal from Maharashtra is a must and the state government should not work under pressure from the agriculture minister Sharad Pawar, who is very close to Monsanto²³³.” The industry responds as well; Kiran Mazumder-Shaw – silent until this point - declares her support for Bt brinjal²³⁴, and the FBAE and Shantaram organize counter “protests” where they present information regarding the safety of Bt brinjal²³⁵ and submit a series of 21 recommendations to the central government on why it is safe for release²³⁶. Conversely, another former US government official questioned the need for Bt brinjal in the first place, and cites India’s lacking capacity for proper testing²³⁷. Even spiritual leaders²³⁸ and yoga gurus²³⁹ have a go.

The stakes seem high, and everyone has an opinion. The battlefield is at its height of activity, and on the sidelines, the view depicts regulation - as a process. Technical risk assessment is a concern of

everyone involved, but there is no consensus on it, and if anything, the stated objective of the new school of NGO has always been to complicate matters to ensure consensus can never be attained. That has worked. Regulatory efficiency is similarly compromised, as it appears that the GEAC has been colluding with Monsanto all along, thus throwing the balance of regulatory efficiency vs. capture off. And of course politically, Ramesh has either derived major benefits from it, or serious doubts from his tour, depending who you ask. According to Bhargava,

[t]he minister knows very well that Bt brinjal will have harmful effects on people's health. Either he can be a hero in the eyes of those opposing launch of Bt brinjal by stopping its launch, which, in all probability will lead to his ministerial portfolio being taken away from him, or he can overrule his conscience and allow Bt brinjal and then probably he could gain a promotion to Cabinet's ministerial berth. Now, it is left entirely to him what decision he takes²⁴⁰.

Swaminathan on the other hand speaks of the situation with reference to scientific and economic risk. He recognizes the regulatory challenges and alludes to the limited data that regulators have shared with the public, stating that "[e]very technology has its benefits and risks. But it all depends on our capacity to analyze risks and benefits. We must analyze whether risks are more or benefits are more. There should be an authority to analyze the risks and benefits in a transparent way. Unfortunately, we don't have an authority like that²⁴¹." Clearly, the risk framings of civil society have pushed their way into official narratives, and beyond narratives, actual precedence. This reality of regulation as a practice, as a battlefield, as a consequence of contested realms of knowledge.

The Court still hums with activity. The Rodrigues and Gene Campaign petitions are heard again over the course of the tour, and the Court mandates the legal counsel for the government to come back in four weeks with additional information on the adequacy of GEAC field trial biosafety procedures. The bench opines that

[i]n other parts of the world, when they frame a rule or regulation, it is strictly adhered to. They are very, very strict against those who breach it. But, here [in India] we are generally slack. The rules are only in the book. Hence, [I want to know] (...) how these safeguards and the protection mechanism are being implemented²⁴².

There is an overarching theme here that reflects a certain acceptance of how India cannot be seen as inept relative to “other parts of the world” that drives the opinion of the bench, but this runs concurrently with a desire to ensure accountability as enshrined in legal stipulations is met. From his perspective, there has to be scientific evidence to justify release – he is reading the regulations, and is bound to them as a legal arbiter, but is torn between contested and contradictory risk assessments, most written in a language he cannot understand. Outside the courts, a similar strategy is used. To further bolster their case, seventeen foreign scientists and twenty-four NGO representatives submit two letters to the PMO – similar to the letters that now form annexes to the NGO petitions in front of the Court – countering a previous letter that Prithviraj Chavan, Minister of Science and Technology, had sent to the Prime Minister earlier. Chavan’s letter quotes paragraphs of reports authored by the International Service for the Acquisition of Agri-biotech Applications (ISAAA), a biotech industry promotion group, funded and supported verbatim and presents a wholly positive outlook for transgenics in India²⁴³. The NGO letters provide an alternative framing of the science, referring extensively to articles concluding potentially negative outcomes of the technology²⁴⁴. Finally, at the state level, the political risks begin to trickle down from the centre. The debate begins to take on a politically strategic tack in these spaces as well²⁴⁵, and by the end of the tour, thirteen states voice their opposition to Bt brinjal²⁴⁶.

What happens next was something that not only those in India, but outside India, were waiting for. On February 9, Ramesh holds a press conference. He declares a moratorium on Bt brinjal.

[W]hen there is no clear consensus within the scientific community itself, when there is so much opposition from the state governments, when responsible civil society organizations and eminent scientists have raised many serious questions that have not been answered satisfactorily, when the public sentiment is negative, and when Bt brinjal will be the very first genetically modified vegetable to be introduced anywhere in the world and when there is no overriding urgency to introduce it here, it is my duty to adopt a cautious, precautionary principle-based approach and impose a moratorium on the release of Bt brinjal till such time independent scientific studies establish, to the satisfaction of both the public and professionals, the safety of the product from the point of view of its long-term impact on human health and environment, including the rich genetic wealth existing of brinjal in our country (MoEF 2010: 16)²⁴⁷.

Ramesh’s words are almost a mirror image of the Raghunandan quote that this section began with. If her aim was to “make it more complicated”, she certainly succeeded. Consensus on the science –

which was framed by DBT officials interviewed here as having the capacity to generate bipolar ‘yes’ or ‘no’ conclusions – was impossible to achieve. The multiple framings of risk that were at the core of this battle rendered consensus a pipe dream. However, while the delay she sought was achieved, immediately after the conclusion, scientists at the National Research Centre on Plant Biotechnology express their interest in releasing Bt brinjal with expressing Cry1F as opposed to Cry1Ac, and pursue licensing arrangements with five domestic firms²⁴⁸. And, in May, the GEAC approves 17 new proposals²⁴⁹, the highest in over a year²⁵⁰. It is not that the biotech train has stopped, it’s just been delayed by a red flag a few stations up.

Ramesh still puts his faith in science, but at the same time, he has adopted the precautionary principle as a guiding narrative. His conclusion reads like a classic political statement meant to appease all. This is the result; political risks dictate outcomes. The science is vague, the economics are mirror images of one another, but politics resonate when it really comes down to it. And the kind of politics that emerged could only have happened in the context of a technology with no clear value of what technical risk assessment really means. The uncertainty generated processes that were the result of contested spheres of knowledge in the face of multiple risk framings. These processes, more than any single technical risk assessment or even management, are the hallmarks of co-evolutionary processes of regulation.

4.4 Unity, Urgency, And Uncertainty: Regulation In Practice

The first war was in 1857 which we lost; the second one we won and got independence. We would have had to fight the third war of independence if Bt brinjal cultivation was given the go-ahead. We needn’t fight it now. (...) The biggest lesson is that we showed up the people who are trying to sell our country. Another lesson is that in the end, truth always wins²⁵¹.

Bhargava’s battlefield pits national independence against the introduction of a new technology, ostensibly developed to assist Indian farmers. This is a strong sentiment, but it is also confusing in light of how successful Bt cotton has been, both in terms of the numbers, but also the sentiments of farmers that I have lived with. Where did this come from? Why would Bhargava say this? And what truth is he referring to? It seems to reflect a certain nostalgia for the old school of NGO campaigning. But that is no longer as relevant. I would argue that rather than ‘truth’, what always ‘wins’ is uncertainty. If no one really knows what will happen when something like Bt cotton or brinjal or any transgenic technology for that matter is introduced, then a

co-evolutionary process where no one really agrees but political realities dictate policies that reflect pragmatic needs is what takes over. But, this can only occur when there is a unified social movement underlying and promoting the scale of the uncertainty, framing the risk in terms of urgency. There has to be space where solidarity can articulate these assertions using judicial and non-judicial tools. This is what has happened in India to date.

If regulation is forced to account for the preferences and risk framings of civil society, then what role do the original risk framings of the government play? Do they become irrelevant? Or are they merely adapted? I would argue that by virtue of the democratic rights that citizens have, they have to adapt. They are responsive, iterative concepts that, given the underlying uncertainty of Bt cotton and other transgenic products, have to adapt to a wider cache of risk framings if they are to be considered legitimate. But this is only true if there are underlying legal frameworks that can support the assertion of these other risk framings, and only if the public becomes sufficiently motivated to voice their concerns. Civil society is capable of both, but only in spaces where such voices are constitutionally protected and valued. India is one such space. Almost as a mirror to this however, the current evolution of the NBRA seems to have utilized all civil society efforts to date as signals, as cues. Regulators seem to have merely observed what civil society did, took notes, and drafted new legislation ensuring such barriers do not occur again. Though independent risk assessment is demanded by civil society, the final formulation of the NBRA – or its analogue – remains to be seen at the time of this writing.

However, civil society is not alone in asserting their risk framings and negotiating the interface with government risk framings. Throughout the battle, firms have essentially remained aloof, distant, as observers to the chaos of the battlefield. But that is only because they fight the battle in a different, less public space. Just as civil society has forged links with parties outside of India to further their agenda, the same can be said for the private sector. The difference, however, is in the direction of the linkage. While civil society sought out international experts to assert their framing of risk and hold the government accountable, the firm has welcomed international actors asserting their risk framings onto Indian firms and regulators, with policy – as influenced by these risk framings – taking root. The next chapter will address this in detail.

Endnotes: Chapter 4

¹ There is a fifth that I have not included here – industry friendly organizations like the CII, FICCI, AIBA, FBAE, and ABLE. I relegate my more critical discussion of these entities in the next chapter where I discuss the private sector.

² In 2006, Sahai chaired the Planning Commission sanctioned “Task Force on Biodiversity & Genetically Modified Organisms (GMOs)” The mandate of the task force was to “[r]eview the current laws, policies, procedures and practices related to conservation and sustainable use of agro-biodiversity and proper management of GMOs and recommend correctives,” and to “review the institution and individual capacities available to address issues related to conservation and sustainable use of agro-biodiversity and proper management of GMOs and recommend how they may be adequately strengthened.” Refer to “Recommendations of the Task Force on Biodiversity & GMOs: Assessment in the Environment and Forest Sector for the XI Five Year Plan (2007-2012)”, Planning Commission, November 2006.

³ Refer to <http://www.genecampaign.org>. Sahai occupies a somewhat special place in my evolution as a researcher. When I went to meet her for the first time in 2002, she encouraged me in my shifting interests at the time – away from economics and more into regulation, into farm realities. She gave me office space, read my proposals, and was highly influential in shaping my post graduate interests. She straddled an interesting line; when I first met her, she would scoff at those who reduced the ‘debate’ to being ‘for’ or ‘against’ transgenics in agriculture. I thought it was fantastic; she seemed so pragmatic and grounded. But more recently, she has pledged allegiance to being ‘against’, something I found personally quite surprising, and actually kind of depressing. I had always admired her for being somehow above the simplistic divisions that a hotly debated subject like transgenics presented. Perhaps it is a consequence of the broader debates that have evolved over time. I am not really sure. She’s complicated.

⁴ Interview, S. Sahai, Convener, Gene Campaign, New Delhi, 12 May 2007.

⁵ “Nukes in favour, crops downgraded”, *India Together*, 8 April 2006.

⁶ Refer to <http://www.navdanya.org> and <http://www.vandanashiva.org>.

⁷ There are a large number of scientific studies cited within these submissions. Some of the most common have been Aysun and Akaya (2007); de Vendômois et al (2009); Gurian-Sherman (2006); Pusztai et al (1990, 1995, 1999), Seralini et al (2009); Tabashnik et al (2010).

⁸ The Coalition for a GM Free India is a group of 45 NGOs and individuals (including Shiva and Sahai) that formed in 2007 around a common concern regarding the nature of transgenic field trials in India. Refer to <http://www.indiagminfo.org/contacts.htm> for a full membership list, and <http://www.gmfree.org> for additional information on their activities.

⁹ This is not to be confused with the government mandated MEC, but the civil society “MEC” consisting of Adivasi Ekta Sangathan, AKRSP, CEAD, Centre for Sustainable Agriculture, Grameen Vikas Trust, Greenpeace India, Jan Saahas, Kheti Virasat Mission, Krishnadevaraya Rythu Sankshema Sangam, Krushi, MARI, Navajyothi, Pasumai Tayagam, Prasun, Rashtriya Satyagrah Dal, Sampark, Sarvodaya Youth Organisation, SECURE, VASPS and YUVA. The choice of the same acronym as the RCGM governed MEC is perhaps strategic. In her rejoinder to the response to her initial Writ Petition, Rodrigues argues “...[t]hat on 4th March 2005, GEAC held its 52nd meeting where it was agreed that until an alternate mechanism for monitoring large-scale trials is established; these Bt trials could be monitored by the MEC.” The GEAC minutes she refers to are clearly referring to the RCGM governed MEC, not the civil society “MEC” coalition. It’s unclear if this confusion was deliberate to further confuse lawyers and cause additional delays or whether it was a sincere error. Refer to Rejoinder Affidavit on Behalf of Petitioners, Writ Petition (Civil) No. 260/2005, p.39 and “Decisions taken in the 52nd Meeting of the Genetic Engineering Approval Committee (GEAC) held on 4th March 2005.”, MoEF, p. 3.

¹⁰ Interview, D. Raghunandan, Greenpeace India, Bangalore, 22 May 2007.

¹¹ *Vedanta* refers broadly to the philosophies contained in the *Upanishads*, which, over the course of 200 texts, discusses the interplay between *atman* (the self) and the universal spirit (*Brahman*).

¹² Interview, K. Tiwari, Pandarkhawada, 15 March 2009. Refer to <http://ranaghose.com/thesisvideo/4-1>.

¹³ “Kishore Tiwari: An Encyclopaedia on information on suicides in Vidarbha”, *Times Of India*, 23 December 2008.

¹⁴ Interview, K. Tiwari, VJAS, Pandarkhawada, 15 March 2009.

¹⁵ “Farmers have no hope from this Budget too”, *Business Standard*, 9 February 2007.

¹⁶ *Tamasha* is Hindi for an act, or a play.

¹⁷ Interview, K. Tiwari, VJAS, Pandarkhawada, 15 March 2009.

¹⁸ *Ibid.*

¹⁹ *Ibid.*

²⁰ *Ibid.*

²¹ “Farmers have no hope from this Budget too”, *Business Standard*, 9 February 2007.

²² Tiwari has been blogging actively since July 2006. Refer to <http://vidarbhajanandolansamiti.blogspot.com>, <http://vidarbhacrisis.blogspot.com>, <http://kishortiwari.blogspot.com>, and <http://andolan.blogspot.com>.

²³ Many mainstream press articles are often published within days of Tiwari publishing a blog article. In one example, Tiwari writes 74 words on a reduction of the cattle population in Vidarbha, and another the following week quoting the Gita on the importance of cows. Two weeks later, the Times Of India runs an article on how the cattle shortage is linked to the crisis and quotes Tiwari heavily. His blogs are influential. Refer to “Save Cow - Save Vidarbha”, <http://vidarbhacrisis.blogspot.com/2009/06/save-cow-save-vidarbha.html>, “Why protect cows?”, <http://vidarbhajanandolansamiti.blogspot.com/2009/06/why-protect-cows-srimad-bhagavatam.html>, and “No water & fodder forcing farmers to sell cattle”, *Times Of India*, 25 June 2009. A similar pattern emerges from Tiwari’s press releases on agrarian suicide. There are a wealth of articles published both in India and abroad that refer to his blogged statistics; I have only followed those over the course of the fieldwork that informed this research. See for instance, “4 more funds-starved farmers die”, *Times Of India*, 3 August 2006; “105 farmer suicides in August”, *Times Of India*, 31 August 2006; “Hope has withered for

India's farmers" *Los Angeles Times*, 11 August 2006; "Aid group: 105 Indian farmers committed suicide in August after failing to repay loans", *Associated Press*, 3 September 2006; "India farm suicides hit new high", *BBC News*, 4 September 2006; "One farmer committing suicide every five hours", *Hindu*, 7 September 2006; "Indian farmer suicides 'touch record'", *Reuters*, 3 September 2006; "When death comes first in vidarbha farm sector", *DNA India*, 23 September 2006; "10 more Vidarbha farmers commit suicide", *Hindustan Times*, 17 October 2006; "Farmers suicides in Vidarbha touch 1,000", *Hindustan Times*, 22 October 2006; "Nine more Vidarbha farmers commit suicide", *Hindustan Times*, 7 October 2006; "8 Vidarbha farmers commit suicide in two days", *Deccan Herald*, 3 November 2006; "10 more farmers commit suicide in Vidarbha", *Hindustan Times*, 17 December 2006; "Dark side in India's economic boom", *Chicago Tribune*, 11 December 2006; "Farm activists call for emergency measures", *Times Of India*, 30 December 2006; "3 farmers commit suicide in Vidarbha", *PTI*, 1 November 2007; "Vidarbha farm crisis claims 1,016th life this year", *Hindustan Times*, 12 November 2007; "'Relief for farmers virtually stopped'", *Times Of India*, 18 December 2007; "Seven Vidarbha farmers commit suicide in new year", *Hindustan Times*, 5 January 2007; "13 more farmers commit suicide", *Times Of India*, 10 January 2007; "Five more farmers commit suicide in Vidarbha", *Hindustan Times*, 18 January 2007; "Free trade to blame for farmer suicides: Activist", *Times Of India*, 30 January 2007; "Nine farmers end lives in Vidarbha", *Hindu*, February 4, 2007; "Farmers have no hope from this Budget too", *Business Standard*, 9 February 2007; "One more farmer kills self in Vidarbha", *Times Of India*, 15 February 2007; "11 more Vidarbha farmers commit suicide", *Outlook India*, 27 February 2007; "Vidarbha package is a sham: VJAS", *Deccan Herald*, 11 February 2007; "64 suicides in Feb. '07 alone", *Asian Age*, 23 February 2007; "Vidarbha sits on a suicide volcano", *Times Of India*, 25 February 2007; "Chidambaram neglects suicide belt", *Hindustan Times*, 28 February 2007; "How many deaths will it take till the state government knows?", *DNA India*, 20 March 2007; "The reality behind the relief", *DNA India*, 29 March 2007; "Vidarbha Farmer suicides highest in March", *Hindustan Times*, 1 April 2007; "Farmers commit suicide as Indian PM asks for economic equity", *Associated Press*, 24 May 2007; "Seeds of Despair", *Time*, 17 May 2007; "Bt seeds to gain half of India's cotton area - trade body", *Reuters India*, 22 May 2007; "Sermon in Delhi, suicides in west", *Telegraph*, 26 May 2007; "Farm suicides spiral in Vidarbha, 401 dead since January", *IANs*, 28 May 2007; "Kalam hears woes of ryots' wives", *Hindu*, 16 June 2007; "Six more farmers commit suicide", *Hindu*, 6 July 2007; "Eight more farmers commit suicide", *Times Of India*, 18 July 2007; "Indian Cotton Meadows Turn Into Killing Fields", *Bernama (Malaysia)*, 18 July 2007; "Lure of White Gold: Bt cotton seed still a top-draw in Vidarbha", *Times Of India*, 5 August 2007; "Even now, 100 farmer suicides in Vidarbha each month", *IANs*, 1 October 2007; "10 more farmers commit suicide", *Times Of India*, 3 November 2007; "'This is not suicide, but mass genocide by the State'", *Rediff*, 5 December 2007; "14 farmer suicides in 3 days in Vidarbha", *IANs*, 25 March 2008; "Outside the relief net", *Frontline*, 28 March 2008; "Loan waiver remains on paper", *Times Of India*, 18 April 2008; "Loan waiver yet to trickle down to desperate farmers", *Economic Times*, 13 May 2008; "Complete loan waiver needed", *Hindu*, 24 May 2008; "'New loan waiver scheme not good enough'", *Times Of India*, 24 May 2008; "Farmers' suicides continue in Vidarbha", *NDTV*, 16 August 2008; "Four Vidarbha farmers kill themselves on their biggest day of the year", *IANs*, 1 September 2008; "4,850 Vidarbha farmer suicides in last four years: VJAS", *Times Of India*, 31 October 2008; "Financial aid for widows of debt-ridden farmers", *UNI*, 19 November 2008; "Vidarbha suicides continue", *DNA India*, 25 November 2008; "9 debt-ridden farmers commit suicide in Vidarbha", *UNI*, 12 December 2008; "Seven debt-ridden farmers commit suicide in Vidarbha", *UNI*, 19 December 2008; "Six farmers commit suicide in Vidarbha", *PTI*, 11 December 2008; "12 more farmer suicides in Vidarbha", *Hindustan Times*, 9 January 2009; "The modified truth: India's dead peasants", *Kristeligt Dagblad (Denmark)*, 2 March 2009; "4 farmers commit suicide on Rakshabandhan day in Vidarbha", *Hindustan Times*, 6 August 2009; "Corruption and drought threaten to wither the economy of India", *Times (UK)*, 28 August 2009; "Vidarbha suicides may spiral out of hand", *Mail Today*, 17 August 2009; "11 more farmers commit suicide in Vidarbha", *Hindustan Times*, 6 September 2009; "The Suicide Belt - Thousands of cotton farmers in India are killing themselves in their fields", *Columbia City Paper, USA*, 11 October 2009; "Four Vidarbha farmers commit suicide", *Hindustan Times*, 8 December 2009; and "9 farmers end lives in Vidarbha", *Hindustan Times*, 27 March 2010.

²⁴ Babu Raj refers to the often nepotistic nature of the Indian civil service. Refer to "Battling Te babu-Raj", *The Economist*, 6 March 2008, and "Babu Raj in the government is killing the farmers - Suicide toll at 710", <http://andolan.blogspot.com/2006/08/babu-raj-in-govt-is-killing-farmers-42899.html>, 5 August 2006.

²⁵ Interview, V. Jawandhia, Wardha, 25 March 2009. Refer to <http://ranaghose.com/thesisvideo/4-2>.

²⁶ *Ibid.*

²⁷ "WTO protesters absent during Geneva talks", *Reuters*, 24 July 2008.

²⁸ "Cotton: peril and promise", *New Internationalist*, 1 April 2007.

²⁹ "'There is no politics of farmers in India'", *Deccan Herald*, 23 April 2007.

³⁰ Interview, V. Jawandhia, Wardha, 25 March 2009.

³¹ Interview, N. Bongare, Farmer, Chikhali, September 2008.

³² Interview, V. Jawandhia, Wardha, 25 March 2009. Refer to <http://ranaghose.com/thesisvideo/4-3>.

³³ His reference to their "appetite" is based on his opinion that some NGOs are only in it for the money, and treat the whole business as any other kind of entrepreneurial enterprise. Interview, K. Tiwari, VJAS, Pandarkhawada, 15 March 2009. Refer to <http://ranaghose.com/thesisvideo/4-4>.

³⁴ Interview, K. Tiwari, VJAS, Pandarkhawada, 15 March 2009.

³⁵ "The GM genocide: Thousands of Indian farmers are committing suicide after using genetically modified crops", *Daily Mail (UK)*, 3 November 2008.

³⁶ Interview, C.K. Rao, FBAE, Bangalore, 4 April 2007. Refer to <http://ranaghose.com/thesisvideo/4-5>.

³⁷ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

³⁸ Interview, K.K. Sharma, ICRISAT, Hyderabad, 13 May 2007.

³⁹ Courtesy of footage provided by Greenpeace India.

⁴⁰ "Nestlé India commits to provide GM-free food now & in future: Greenpeace India". *FnB News.com*, 12 October 2009.

⁴¹ Khadi is the simple white cotton cloth that Gandhi championed during his freedom struggle, and is often linked with farmers and the independence movement.

⁴² Devinder Sharma and Kishore Tiwari author two examples of widely read blogs. Refer to <http://devinder-sharma.blogspot.com> and <http://andolan.blogspot.com>.

⁴³ GENET and GM Watch are arguably the two most popular discussion groups for civil society to share press clippings from a wide variety of sources both local and international, personal correspondence between civil society and regulators, petition letters, press releases, and other facets of relevant information.

⁴⁴ "GM Food: Skepticism On The Streets", *D-sector.org*, 8 March 2010.

⁴⁵ "Ministers all at sea over Bt Brinjal", *Times Of India*, 23 October 2009.

⁴⁶ Linking MSPs is especially strong amongst more local, "farmer movements" such as, in Maharashtra, the VJAS and the Shetkari Sanghatna, but has also been voiced strongly by Sainath.

⁴⁷ Interview, P. Bhargava, Hyderabad, 6 June 2007.

⁴⁸ Until May 2010, C.D. Mayee was former GEAC co-chair as nominated by the DBT. In 2006 he became a member of ISAAA Board of Directors, a position he still holds today. He left GEAC voluntarily, due in part to concerns about a potential conflict of interest given his ISAAA affiliation. Refer to "GM regulator on panel funded by biotech majors", *Times Of India*, 13 October 2006; "ISAAA's Structure and Governance", <http://www.isaaa.org>; and "Bt cotton's toxicity data to be made public", *Financial Express*, 2 August 2007.

⁴⁹ Dr. B. M. Khadi is ex-director of CICR, one time director of the 2007 GEAC mandated Subcommittee on Bt Cotton, and a RCGM member. During his tenure at CICR he oversaw the development of Bt Bikaneri Nerma, India's first public sector Bt Cotton OPV. He currently is Principal Scientist & Head, RS at UAS Dharwad. UAS Dharwad was involved in a public-private partnership towards developing Bt Brinjal, with the technology transferred from Mahyco to universities. Dr. Deepak Pental is a professor of genetics and vice chancellor, Delhi University, and was the chair of the first expert committee on Bt Brinjal, and has led a team at DU towards the development of transgenic mustard (DBT Approved Projects 2007-8) using a process he and his team have developed and patented. He argues that while "[t]ransgenic technologies are not a substitute for conventional methods of plant breeding [but] ruling out this option or saying it is okay for cotton and not so for mustard or rice does not make sense for a country like India." He is also a member of the GEAC. Dr. Akilesh Tyagi, is Professor, and Director, Interdisciplinary Centre for Plant Genomics & Department of Plant Molecular Biology, University of Delhi. The institution is working on transgenic rice, tomato and wheat. He is a member of the GEAC. Dr. Ananda Kumar is Principal Scientist in the National Research Centre at IARI, and had worked on a project towards gene stacking in cotton that was approved by the RCGM in 2007. He is a member of the MEC. Dr. T.V. Ramanaiah is currently Biotech Regulatory Affairs Manager at Pioneer Hi-Bred, as well as a spokesperson for the All India Crop Biotechnology Association (AICBA). He previously was the member secretary of the RCGM and director of the DBT. Refer to "Massive conflicts of interest among Indian regulators", *Lobbywatch.org*, 1 February 2007; "Minutes of the 59th Meeting of the RCGM", November 1 2007; "Office Memorandum. No. 12/81/2006-CS-GEAC, MoEf 2006; "Proposed ban on GM food crops not desirable: Expert", *Business Line*, 22 June 2009; "Latha Jishnu: Gaping holes in regulation of GM crops", *Business Standard*, 5 July 2008; and "Decisions taken in the 69th Meeting of the GEAC", 30 June 2006, and "Proposed ban on GM food crops not desirable: Expert", *Business Line*, 22 June 2009.

⁵⁰ Interview, Dr. K.R. Kranthi, CICR, Nagpur, 13 May 2008. Rather than Bt Cotton OPVs, which could be saved and reused by farmers, regulators have opted for hybrid varieties, citing industry concerns as the primary reason.

⁵¹ The concern is that the data used by the Indian system of biosafety analysis uses data provided by the firm, typically Monsanto.

⁵² Interview, K. Kuruganti, CSA, Hyderabad, 11 May 2007. Refer to <http://ranaghose.com/thesisvideo/4-6>.

⁵³ "Babu Raj in the government is killing the farmers - Suicide toll at 710", <http://andolan.blogspot.com/2006/08/babu-raj-in-govt-is-killing-farmers-42899.html>, 5 August 2006.

⁵⁴ Prime Minister Manmohan Singh, as quoted in ISAAA (2009).

⁵⁵ Historically, the principle was initially introduced into the regulatory literature within principle 15 of the UNEP Rio Declaration on Environment and Development in 1992, and further elaborated within the Cartagena Protocol on Biosafety. Principle 15 of the Declaration states that "[i]n order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (UNEP 1992: 2)." India became a signatory to in 2002, six months after Bt cotton was formally released. Refer to "India And The Cartagena Protocol On Biosafety", *Financial Express*, 2 December 2002.

⁵⁶ Interview, K. Kuruganti, CSA, Hyderabad, 11 May 2007. Refer to <http://ranaghose.com/thesisvideo/4-7>.

⁵⁷ Dr. Pushpa M. Bhargava is the founder-director of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and former vice-chairman of the National Knowledge Commission, a government entity formed under the Planning Commission. He is currently a member of the National Security Advisory Board, and has chaired several NGOs, professional organizations and pharmaceutical companies, and has authored over 125 major scientific publications, over 400 other articles on a variety of subjects, four books, and has won several awards including the Padma Bhushan. Refer to "Genetically modified crops: The risk factor", *Infochange Agriculture*, 7 July 2009.

⁵⁸ P. Bhargava, as recorded at a Greenpeace India organized press conference in 2006; footage provided by Greenpeace India. In my analysis of GEAC and RCGM meeting minutes and the list of submissions to the GEAC for approval, I could not find any mention of Monsanto rBST. The LG rBST was submitted for release consideration in July 2003, but was deferred to the Department of Animal Husbandry for further testing in 2005. The last mention of it was recorded in February 2007, where tests requested by the GEAC from LG were pending. Monsanto's rBST is not reflected in publicly available official government documentation, or perhaps predates the March 31, 2004 starting point for the public dissemination of GEAC

minutes. Refer to "Decisions taken in the 61st Meeting of the GEAC, December 14, 2005", "List of Proposals Pending GEAC Consideration, 9 March 2007", and "Minutes of the 51st Meeting of the RCGM, 28 March 2007".

⁵⁹ Interview, K. Tiwari, VJAS, Pandarkawadha, 12 September 2008. Refer to <http://ranaghose.com/thesisvideo/4-8>.

⁶⁰ Interview, D. Raghunandan, Greenpeace India, Bangalore, 22 May 2007. Refer to <http://ranaghose.com/thesisvideo/4-9>.

⁶¹ Supreme Court Of India, Application for Urgent Interim Orders on Behalf of Petitioners, A. Rodrigues Vs. UoI, Writ Petition (Civil) No. 260/2005.

⁶² C.K. Rao, Head, FBAE, as quoted in Jayaraman (2009).

⁶³ Ultimately, the clash between a farmer level organization (KRRS) and a more urban based NGO (RFTSE) led to its dissolution. Refer to Madsen (2001: 3741) and Vishvanathan and Parmar (2002: 2723).

⁶⁴ Supreme Court of India, Writ Petition (Civil) 71/1999, RFTSE Vs. UoI. The petition argued that the Mahyco multi-centric trials at 15 locations in 7 states were not done according to the proper guidelines, rules and systems for evaluating the bio-safety and ecological and environmental impacts of genetically modified organisms used in crops.

⁶⁵ Refer to "Addendum to the 'Revised Guidelines - August 1998'", 24 September 1999, as annexed in the GRTC 1998. The last, unnumbered page of the GRTC 1998 presents the amendment and states "RCGM can approve applications for generating research information on transgenic plants. Such information may be generated in contained greenhouse as well as in very small plots, as research needs to be conducted in such environment for seeking answers to specific environmental safety issues emanating from the use of transgenic plants. The small experimental field trials should be limited to a total area of 20 acres in multi-locations in one crop season. In one location where the experiment is conducted with transgenic plants, the land used should not be more than one acre. Any experiment beyond the above limits in one crop season would require the approval of the GEAC."

⁶⁶ "Field trials planned for new rice variety", *Hindu*, 12 February 2000.

⁶⁷ "Govt. nod for transgenic cotton crop trials", *Hindu*, 22 July 2000.

⁶⁸ "India debate over GM cotton heats up", *Inter Press Service*, 03 July 2001.

⁶⁹ "Green signal for Bt cotton", *Frontline*, Apr. 13-26, 2002.

⁷⁰ Refer to "The Gen(i)e Is Out Again", *Outlook*, 5 November 2001. I mention this only briefly here to complement the series of events that characterize civil society engagement with the story of Bt cotton, but this is a pivotal event, one that I will lend much more attention to in the next chapter.

⁷¹ "On Biosafety Bandwagon", *Down To Earth*, 14 October 2002.

⁷² The appeal was submitted to the Appellate Authority of the MoEF, the ministry that the GEAC is under. Section 19 of the 1989 Rules mandates that if "[a]ny person aggrieved by a decision made by GEAC/SBCC in pursuance of these rules may (...) appeal to such authority as may be appointed by the MoEF", in this case, the MoEF appellate authority. Refer to MoEF (1999).

⁷³ MoEF Appellate Authority Order, Appeal No. 2/2002: RFSTE vs. UoI, 8 October 2003.

⁷⁴ "Farm smuggle in BT cotton in AP", *Checkbiotech.org*, 3 June 2005.

⁷⁵ "Bt Cotton dashes hopes of ryots", *Hindu*, 30 December 2002; "Economists' Report Card On Bt Cotton", *Financial Express*, 9 December 2002; "Bt cotton — bitter harvest", *Hindu*, 24 August 2002; and "Bt cotton prone to leaf curl virus in North India", *Business Line*, 19 August 2002.

⁷⁶ Refer to Arunachalam and Bala Ravi (2003); Sahai (2003).

⁷⁷ "Gene Campaign's Legal Actions on GMOS", <http://www.genecampaign.org/Sub%20pages/GC-PIL=ID1.htm>

⁷⁸ Supreme Court of India, Writ Petition (Civil) 115/2004, Gene Campaign Vs. UoI.

⁷⁹ RFTSE Vs UoI – 2003(9) Scale 303, as quoted in Supreme Court of India, Writ Petition (Civil) 115/2004, Gene Campaign Vs. UoI.

⁸⁰ "Monsanto's BT cotton seed sales soar", *AP*, 7 September 2004.

⁸¹ "Bumper cotton crop: Is it a Bt magic?", *The Financial Express*, 21 February 2005.

⁸² Refer to Barwale et al (2004).

⁸³ "Farmers release Monsanto official, 8 others", *Hindu*, 11 November 2004.

⁸⁴ "Bt cotton growers in AP feel the heat: study", *The Financial Express*, 23 February 2005.

⁸⁵ "Farmers protest in Warangal after Bt cotton fails again", *CSA Press Release*, 21 October 2004.

⁸⁶ "The science of Bt cotton failure in India", *Hindu*, 29 August 2005.

⁸⁷ "Indian GM cotton is 'inadequate'; enquiry demanded", *SciDev.net*, 5 August 2005.

⁸⁸ "14 new veggie varieties approved for limited trial", *Financial Times*, 17 October 2005.

⁸⁹ "Homespun Bt here at last", *The Indian Express*, 30 September 2005.

⁹⁰ "Swaminathan committee report on BT policy accepted", *Times of India*, 16 February 2005.

⁹¹ "Farm bodies cry foul over GEAC stand on Bt cotton", *Financial Express*, 27 April 2005 and "Farmers oppose draft biotech policy", *Financial Express*, 16 May 2005.

⁹² "Is Bt cotton unsuitable?", *Hindu*, 5 September 2005.

⁹³ Interview, D. Raghunandan, Greenpeace India, Bangalore, 22 May 2007.

⁹⁴ The bill is catalyzed in large part from a series of civil society mobilizations that occurred in Rajasthan in the late nineties. Refer to Jenkins and Goetz (1999).

⁹⁵ Refer to RTI Act sections 12 and 13.

⁹⁶ "Farm bodies seek ban on Bt cotton cultivation", *Financial Express*, 24 September 2005.

⁹⁷ Rodrigues had worked in England and Kuwait as a development economist for two decades. She returned to India in 1996 to launch a business enterprise to produce and sell solar electricity, where the ongoing debate around transgenic peaked her curiosity. Refer to Venkatesan (2010).

⁹⁸ Refer to "Regarding F.No.CIC/ WB/A/2006/00548 and my reply for the communication received from the CPIO and appellate authority of the Department of Biotechnology", Response to CIC, D. Raghunandan, 24 March 2007.

⁹⁹ Section 8.1(d) of the RTI Act states that "There shall be no obligation to give any citizen (...) information including commercial confidence, trade secrets or intellectual property, the disclosure of which would harm the competitive position of the third party".

¹⁰⁰ She refers to Greenpeace studies on countries that have banned transgenics or have labeling restrictions, a "MEC" report on wide scale violations of regulations in the context of BGII Bt Cotton field trials in India ("MEC" 2005), and a German court ruling that led to Monsanto releasing biosafety data on MON863 maize. She also argues the Act mandates public release if requested material can be seen in the Parliament or a State Legislature. Refer to Section 8.1(j), RTI Act.

¹⁰¹ The information requested focused on risk and cost benefit analyses and the import of transgenic crops; the nature GEAC approval process, along with information on SBCCs and DLCCs; the educational and professional background of the staff of the RDAC, RCGM, IBSC, GEAC, SBCC and DLCC, and an open question - "What special qualification enables GEAC members to evaluate biosafety data and take decisions on commercial approval?"; and correspondence leading to the approval of Bt Cotton, field trial location data, and biosafety data. Refer to Central Information Commission, Appeal No. CIC/WB/A/2006/0060 to 65, 20 March 2006.

¹⁰² The RTI submission resulted in the release of a number of government evaluatory reports on Bt Cotton and Bt Brinjal, with the exception of certain aspects (the qualifications of the staff were not government documents and the entire correspondence was not covered by the RTI - though ultimately Gene Campaign were invited to peruse the information). Refer to Using RTI Act, <http://www.genecampaign.org/Sub%20pages/RTI-Use=ID1.htm>.

¹⁰³ Interview, Shivani Shah, Greenpeace GMO Campaigner, Bangalore, 18 August 2010.

¹⁰⁴ High Court of Judicature at Mumbai, Nagpur Bench, Nagpur. (Criminal) Writ Petition, 30 January 2006. Refer to <http://andolan.blogspot.com/2006/07/in-high-court-of-judicature-at-mumbai.html>.

¹⁰⁵ "Govt. to launch special rehabilitation package to mitigate the distress of farmers in 31 districts in 4 states", *Prime Minister's Office Press Release*, 1 July 2006.

¹⁰⁶ High Court of Judicature at Mumbai, Nagpur Bench, Nagpur. (Civil) Writ Petition 22/2006, 10 July 2006. Refer to <http://andolan.blogspot.com/2006/07/high-court-ordered-to-furnish-details.html>.

¹⁰⁷ "Farmers agitation: Urgent. Dated 12th July 2006", <http://andolan.blogspot.com/2006/07/vjas-ask-pm-to-vive-requisite-relief.html>.

¹⁰⁸ "Farmers agitation: Urgent. Dated 25th July 2006", <http://andolan.blogspot.com/2006/07/in-order-to-save-farmers-of-vidarbha-28008.html>.

¹⁰⁹ Supreme Court of India, Record of Proceedings, I.A. No 2 in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI, 1 May 2006.

¹¹⁰ Supreme Court of India, I.A. No. 2, Writ Petition 260/2005, Aruna Rodrigues Vs. UoI.

¹¹¹ In that period, 91 field trial plots were sown with 24 transgenic varieties of cotton, cauliflower, brinjal, rice, castor, groundnut, tomato, and potato. Refer to "Decisions taken in the 67th Meeting of the GEAC", 22 May 2006.

¹¹² Supreme Court of India, Record of Proceedings, I.A. No 4 in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI, 22 September 2006.

¹¹³ Supreme Court of India, Record of Proceedings, I.A. No 4, 14, and 15 in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI, 8 May 2007.

¹¹⁴ Citing that "the isolation distance prescribed under the Indian Minimum Seed Certification Standards manual may be followed", the possibility of contamination as "rare", and that the limits of detection (LOD) as stipulated by Rodrigues are "arbitrary", the GEAC continues with field trials. Refer to "Minutes of the Meeting of the Sub Committee to Review the Implications of the Hon'ble Supreme Court Directions", 24 July 2007.

¹¹⁵ Supreme Court of India, "Application on Behalf of the Applicant/Petitioner U/S 12 of the Contempt of Courts Act, 1971 read with Rule 3(c) of the Rules to Regulate Proceedings for Contempt of the Supreme Court, 1975 for Initiating Contempt Proceedings against the Contemnors/Respondents Abovenamed" in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI.

¹¹⁶ Supreme Court of India, "Application on Behalf of the Applicant/Petitioner U/S 12 of the Contempt of Courts Act, 1971 read with Rule 3(c) of the Rules to Regulate Proceedings for Contempt of the Supreme Court, 1975 for Initiating Contempt Proceedings against the Contemnors/Respondents Abovenamed" in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI.

¹¹⁷ See "GEAC for SC order modification", *Financial Express*, 17 August 2007 and "Relax stringent norms for GM cotton trials: CICR", *Hindu*, 27 August 2007.

¹¹⁸ "Indian of the Year: The crusaders", *CNN-IBN*, 16 June 2007. <http://ibnlive.in.com/news/indian-of-the-year-the-crusaders/30432-3.html>

¹¹⁹ "Kalam hears woes of ryots' wives", *Hindu*, 16 June 2007.

¹²⁰ "VJAS moves HC to hike cotton MSP", *Times Of India*, 21 October 2007.

¹²¹ "Govt relief has failed to prevent suicides: HC", *Times Of India*, 6 October 2007.

¹²² "Zero Act Furrow", *Outlook India*, 26 November 2007.

¹²³ The "New Deal" sentiment refers to former US President Roosevelt's "new deal" social spending program during the Great Depression. Refer to "Left behind: Debt relief brings little respite for India's farmers", *Financial Times*, 24 August 2008.

¹²⁴ "Farm bonanza fails to save India's dying farmers", *Reuters*, 13 March 2008.

¹²⁵ "Pawar's bastion reaps most from loan waiver", *Times Of India*, 5 March 2008.

¹²⁶ Supreme Court of India, Record of Proceedings, I.A. No 19 in Writ Petition (Civil) Nos. 260 of 2005, Aruna Rodrigues Vs. UoI, 13 February 2008.

¹²⁷ "SC removes curbs on trial of GM crops", *Times Of India*, 14 February 2008.

- ¹²⁸ "GM panel wants SC-appointed member out", *Business Standard*, 17 September 2008.
- ¹²⁹ See "Panel ignored Bt cotton toxicity evidence", *Times Of India*, 18 May 2008 and "Sheep death: the truth revealed", *Hindu*, 26 June 2008.
- ¹³⁰ The GEAC laments that "(...) Dr. Bhargava should understand the gravity of the situation and should avoid giving distorted views on the regulatory process. There is a certain degree of confidentiality in the functioning/deliberations of the Statutory Committees of the Government. Views and counter views are bound to be expressed by the learned members. However, what the public is entitled to know is the combined wisdom and decisions of the Committee and not the individual views expressed in the meetings." Refer to "Decisions taken in the 87th meeting of the GEAC", 9 July 2008.
- ¹³¹ GEAC chairman B.S. Parsheera, as quoted in "Trouble on the plate for Bt brinjal", *Indian Express*, 8 May 2008.
- ¹³² Personal correspondence between P. Bhargava and R. Warier, 14 May 2008. Refer to "Dr. Bhargava's letter on Bt cotton toxicity", *GM Watch*, 28 May 2008.
- ¹³³ "GM Crops' Biosafety Testing Procedure Questioned", *Hindu*, 7 February 2007.
- ¹³⁴ "We need a moratorium on Bt cotton and new GM testing", *Business Standard*, 11 July 2008.
- ¹³⁵ "Plan for GM regulatory authority may spark a turf war", *Times Of India*, 19 June 2008.
- ¹³⁶ Personal correspondence, P.V. Satheesh and M. Singh, 21 July 2008. Refer to "Total review of Bt cotton sought/Draft National Biotechnology Regulation Bill", *GM Watch*, 21 June 2008.
- ¹³⁷ "Experts against founding of national biotech authority as glitches increase", *Financial Express*, 30 June 2008.
- ¹³⁸ "GEAC should address health and environmental concerns", *Financial Express*, 14 July 2008.
- ¹³⁹ "Dismantling Democracy, Science And The Public Interest", *CounterCurrents.org*, 14 July 2008.
- ¹⁴⁰ Personal correspondence, P.V. Satheesh and M. Singh, July 31, 2008. Refer to "Prime Minister of India told to drop new regulatory authority", *GM Watch*, July 31, 2008.
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CHAPTER 5

ROBIN HOOD AND THE LOBBYIST GO TO MARKET: THE FIRM AND REGULATORY PRACTICE

The industry has had its head in the sand for the past ten years, ignoring the anti-GM industry. They thought it would all blow over. But if we are not willing as an industry to go to the stage where this battle is being fought, how are we going to win? The industry thinks there is too much at stake, there is too much invested in the technology, and they don't want to rouse public suspicion. Already the public doesn't like multinational companies and profiteering, and we can't win a fight against those who are fighting in the name of patriotism. But what is the alternative¹?

A battle that has to be won; this is where the narrative on how the private sector looks at Bt cotton stands in a post Bt brinjal moratorium context. Just as there was an urgency that framed civil society movements and forced entry into spaces of contested knowledge, there emerges a consequential urgency from the private sector. The above quote from Shantu Shantaram, the current head of the Association of Biotechnology Led Enterprises (ABLE), a biotech industry lobby group, is telling. He could not have imagined how the process that he helped facilitate – the adoption and adaptation of Indian policy from USDA frameworks – would have evolved into something far different from the technical risk assessment and management strategies contained within those initial directives. As he alludes to, it is only now – post Bt brinjal and the moratorium – that it has become impossible to ignore how successful civil society has been in transposing their risk framings to a wider electorate.

However, it was not always like this. There is a deeper narrative at play here, and an evolutionary trajectory that has historically linked state and firm together given their often shared risk framings. Beginning in the 1980s, the environment was conducive to this partnership as it was a strategic objective of the Indira Gandhi Congress administration. More recently, the National Biotechnology Development Strategy envisioned a future where regulatory efficiency is paramount. As this chapter will illustrate, private sector actors – both Indian and foreign – had much to do with making that narrative operational. As invitees into that deliberative space – often due to lacking technical expertise on the part of the government, but also given a pro-business climate within this space –

they were able to craft a policy environment conducive to their own framings of risk. However, an unexpected fork in the road emerged. The risk framings of the firm and state – while still in sync at a basic level – have diverged due to the political capitalization of the state on a broader cache of civil society risk framings. The Ramesh moratorium clearly indicates this. Civil society narratives and framings have forced their way in given the dynamic of political risks, and the status quo has changed, perhaps forever. This is the consequence of technologies burdened with uncertainty, played out in a battlefield where risk framings oppose each other.

At what point did the private sector begin to respond to a wider public outside those who purchase their the technologies they invest in and develop? There was – and is – a risk of alienating an already suspicious Indian public who historically has been sceptical of big business (Kochanek 1971: 867), and anyone who enters the battlefield promoting foreign technology runs the risk of being labelled as anti-Indian, particularly given the nationalist sentiment that is linked to the civil society narratives I discussed in the preceding chapter. However – and this characterizes the risk balance that is to be struck – there is just too much money to be made. The illegal release of the Navbharat 151 variety of Bt cotton before the official 2002 GEAC release is a clear indicator of this incentive, but that incident also depicts how the actions of one (small) firm can render formal risk assessment and management completely irrelevant. In the face of these very real incentives and the massive adoption rates that Bt cotton has presented, how could the private sector just wait on the sidelines until it all, as Shantharam puts it, “blows over”?

5.1 The Stage

Short answer: they could not, and they cannot. The market is too lucrative. The numbers speak for themselves, with one observer noting that the “7,000 *crore* (70 billion) rupee Indian market for agricultural seeds is the fifth largest in the world. Of that, roughly Rs. 2,000 *crore* is the market for cotton seeds²,” and another arguing that India is poised to become the world’s largest producer of cotton by 2015³. This all occurs in a global marketplace worth USD 7.8 billion⁴. Incentives to ensure that an environment is firm friendly applies to all the different types of players in the industry; multinational companies (MNCs) like Monsanto and Syngenta, their partners in the public and private sector such as Tamil Nadu Agricultural University, the major Indian players such as Rasi, Metahelix, and Avesthagen, and the many smaller firms, like Navbharat. It is a diverse sector, rich with dynamics that reflect influence, capacity, but most importantly, the interfaces all these actors have with a broader public. And these interfaces apply not only to the other actors I detail in this story, but within the industry as well.

To begin with, and as dealt with in much detail in the literature, the economic liberalization programmes of the Rajiv Gandhi and P.V. Narasimha Rao administrations of the early 1990s set the scene for major changes in terms of how the private sector can conduct business. If the time immediately post independence saw policy embedded in a pro-science Nehruvian vision that was “anti-business” (Timberg 2004: 4324), followed by a shift in the 1970s towards a more pro-business agenda, the 1980s was where the environment really began to change. There was a shift in how the state and the firm could collude and share a common goal, forged on meshing framings of risk based on an explicitly crafted space for the firm and the state to collude, though mostly behind closed doors. This formed the basis for a particular culture that emerged in the early 2000s – ‘India Shining’ - that is relevant here. However, contrary to the oft repeated causal linkage between 1991 economic liberalization and India’s growth, a more rigorous economic analysis has shown (Basu and Maertens 2007; DeLong 2001) that growth was more a consequence of the policies and corresponding business environment that emerged out of Indira Gandhi’s tenure in the 1980s. During her tenure, there were efforts to ensure that business and government elites were working in tandem. A number of observers have argued that rather than a “promarket strategy”, what really was the catalyst for India’s growth post 1991 was a “probusiness strategy” (Kohli 2006; Rodrik and Subramanian 2004:4; Timberg 2004) – an informal contract between the firm and state - as opposed to market liberalization alone. As the chairman of the Federation of Indian Chambers of Commerce and Industry (FICCI), a long established lobby group frames it, their was (and is) ambition for “public-private partnerships” forged on the belief that industry and the private sector should both “be part of the decision making”⁵.

The stage was set for a very lobby friendly environment, something that the story that will unfold in this chapter will further develop as a context. Collusion between the state and the firm created a fertile environment for industry friendly policy formulation in the early days of biotech regulation, and, up to a point, firms were quite content with the situation. Yet, this all began to change in the face of what the previous chapter discussed. When civil society framings began to seep into the halls of governance, many firms were forced to react. The same applies when the central government became aware of the massive illegal sowing of Navbharat 151 in Gujarat, a process facilitated by what has been termed the “Robin Hood of biotechnology” (Shah 2005: 4634), Navbharat Seeds. But what did the firms do, and how did it effect regulation? What were these reactions by firms, and how do they relate to the incentives and risk framings of both the firm and the government?

This chapter will explain in more detail what firms did in the context of a co-evolutionary path of

regulatory evolution rooted in risk interfaces. As in the preceding two chapters, the analytical framework is one of risk framings as the basis for the interface. The incentives to capitalize on farmer demand; the effects of globalization characterized by that initial import of Bt cotton by Monsanto, but also bilateral trade agreements; a certain nationalist fervour to lead and be recognized; and the changing policy and political landscape that both civil society groups and Ramesh fomented all characterize this evolution. Yet, at the same time, the long-term strategy of the firm remained intact. India still presents a huge market for farm inputs and new technologies, and everyone involved in the business of regulation – domestic and multinational firms, scientific experts who look at transgenics as the holy grail of poverty alleviation and food security, policy makers aiming to modernize Indian agriculture, and, as I will discuss in more detail in the next chapter, farmers themselves – know this. However, the battlefield here is forged in a space where other parties not traditionally included in the biotech industry and those it supplies and end users have entered. And as a result, strategies have changed in the face of the corresponding clashing of risk framings when other parties contesting these spheres of knowledge enter the battlefield of regulation.

In what follows, I will present a sketch of who the players are. The ‘firm’ is certainly not a homogenous entity; there are different types of private sector agents, all entering the market at different levels depending on their capacity. With the players characterized, I then move to risk framings and the battlefield that emerged. Finally, I conclude with an analysis of how these dynamics have characterized co-evolutionary, co-constructed process of regulation.

5.2 The Actors

Just as civil society cannot be considered as one homogenous entity, the private sector consists of different actors, though all unified with similar framings of risk and a series of entrepreneurial incentives that motivate their actions. Over the course of this research, I have observed three main categories. In what follows I will describe whom they are, along with an analysis of where they come from, the kinds of ambitions that are at the root of their current involvement in this story, and what they have been doing about it.

5.2.1 Domestic Seed Companies

Well, Monsanto is a 26% partner in Mahyco. I mean every partner comes with assets, which [both of us] had – Mahyco were leaders at that time [here in India].

But as Monsanto was not in the seed business [in India], they needed help. They had the experience in the U.S., so together we were well suited to actually introduce [Bt Cotton] due to our respective advantages. Though there were definitely certain issues that came up in to the process⁶.

The 1995 entry of Monsanto into the Indian market via the partnership with Mahyco seems like a long time ago, and I suppose in the context of the story of Bt Cotton in India, it actually is. That partnership set the stage for a number of similar partnerships, both public-private and private-private. This is not an industry mired in stasis. The progress is either remarkably impressive or somewhat shocking depending on your predisposition. At the time of this writing, there are currently 38 firms selling around 840 varieties of Bt Cotton in India, all based on one of the six Bt expression events approved by the GEAC⁷, with about 430 varieties currently available in the Maharashtra market alone⁸. But, as the Managing Director of Mahyco alludes to above, this progress was not an entirely smooth process. It was a sustained process of negotiation based around meshing - and in the face of lacking technical capacity among regulators or simple economic incentives outside the purview of regulatory reach - sometimes clashing, risk framings.

Among domestic firms, there are two types; those that have the capacity for in-house research and development and can produce proof of concept prototypes, and those that focus more on sublicensing events from others. In the words of DBT regulator S.R. Rao, there are:

[t]hose who do their own R&D, those who have links to multinationals, like Rasi. There are five or six. The other dirty dozen are just businessmen. All this regulation means nothing to them. Mahyco first developed Bt cotton using their own in-house R&D, then Rasi copied them, then Vibha, then Advanta and so on. But the rest are all sellers. I mean, I could do it - quit my job here, and I'd make more money actually⁹!

The two are distinct not only in their business models, but also in how they influence regulation. As Shantaram argues,

[t]hose small seed companies are the ones who have influence with local MPs. Look at the Seed Bill! (...) The local companies can speak that language, talk to [regulators] whenever, buy them off. It's so easy. Bt cotton sellers in India over the last eight years have increased their revenues by 2000%. A company that used to make 50-60 *crores* turnover now makes 500-600 *crores* (5-6 billion). These guys have

become the new rich. If they make 500 *crores* profit, what's the big deal in giving one *crore* (10 million) to a local MP? They can mobilize half a dozen MPs and make arrangements to meet the Prime Minister and Agricultural Minister and insert all kinds of amendments¹⁰.

Or more generally, as C.K. Rao of the industry friendly Foundation for Biotechnology Awareness and Education puts it, “[f]irms have their own practices to get things done in the government. I can’t comment about bribes, but sure, that is there. They know how to manipulate the government agencies. When things come to a boil, they know what to do¹¹.”

But there are other, less suspect means by which the domestic seed industry has initiated regulatory reform. While the number of varieties released nearly doubled every year from 2002 to 2008¹², 2009 saw a shift in the approval regime, fostering a more rapid approval timeframe. As reflected in the Swaminathan report¹³, rather than assessing every variety submitted to the GEAC for approval, a new event based approval mechanism (EBAM) regime was recommended, and ultimately established¹⁴. This resulted in a new surge of approvals, given that release was now based on one of the four EBAM approved events as opposed to the particular variety itself. The post EBAM regime has seen 280 varieties released within a month of the policy shift in 2009, while to date, 2010 has seen the release of 310 varieties. Without a doubt, many more will follow.

The movement to an EBAM regime is perhaps the most obvious example of how firms have successfully lobbied for a sustainable policy climate that is more conducive to their business interests. While the Swaminathan report formally stated the case for such a regime, the negotiations for such an approach took place well before the report. As one regulatory affairs manager of a multinational firm who declined to be named stated,

(...) we have to know a bit about how the Swaminathan report itself was commissioned. There was a need felt in general by the public sector, but only based on an initial push from the private sector. That’s how the task force was set up. Industry had made a number of presentations to the task force, on the draft and all that. And considering Swaminathan’s knowledge of agriculture and the science-based facts behind it, he saw the merits in our calls for an EBAM. After it was approved by the government, they had to find a way to institutionalize it - that’s where industry came in. I myself remember three committees at different levels where we were invited to make presentations¹⁵.

Using the U.S. notification regime as a template¹⁶, the role of industry in facilitating such a regime was key.

All of this has facilitated an environment very conducive to investment and collaborative partnerships between Indian and international firms, something that the DBT itself has been keen on fostering as well, though at varying levels of success. In 1990, it formed the Biotech Consortium India Ltd (BCIL) as a public limited company in order to promote, transfer and commercialize of technologies (Chaturvedi 2005: 18). Representing a combination of financial institutions, corporate, and multilateral, national, and state bodies of governance¹⁷, and envisioned as a consortium that could link start-ups with funding opportunities, it “(...) work[ed] for accelerated development and commercialization of biotechnology¹⁸”, and acted as a clearing house of sorts for new public-private partnership opportunities in research that are of interest to the DBT via providing research funding via the Small Business Innovative Research Initiative (SBIRI)¹⁹. Like the EBAM and many aspects of the current regulatory framework, the model was based on similar state mandated partnership facilitation as seen in the U.S.²⁰” But most of the beneficiaries of this scheme have not been engaging with transgenics in agriculture; rather, the focus has been bio fuel and pharmaceutical applications, mirroring the current DBT director’s driving interest in medical applications of biotechnology²¹.

In the face of the growth of domestic industry, the number of partnerships, mergers, and acquisitions of these firms with foreign firms have also grown, with a corresponding increase in their R&D capacity and access to transferred technology. Mahyco did almost single-handedly pave the way for regulatory reform via applied implementation, but that was only possible with a technology transfer from Monsanto. This partnership presents a template of sorts, both in terms of where industry is going, but also how individual firms can and have affected regulation. The only way they can wield true influence is via domestic firms meshing their incentives with the incentives of multinational firms looking to partner with them. Judging by the interest of multinational companies (MNCs) and the flurry of lobby activities in Delhi, the desire to gain a foothold in the Indian market is huge, and such partnerships are becoming more and more common.

5.2.2 *Multinational Companies*

I never tell people come to India because it’s cheap, I tell them to come here because of the opportunities for success²².

The lucrative nature of the Indian market is characterized by the captive market that lies both within - but more beguiling, beyond - urban India. “Unlocking India’s Rural Sector²³” is a theme. The stakes are high, the potential benefits impossible to ignore, and the time is now. This is a fact that is clearly not lost on both international investors as well as the Indian government, as the above quote from the secretary of the DBT, M.K. Bhan, serves to indicate. While some observers earlier on had questioned the hype surrounding the emerging biotechnology industry in the beginning of the last decade in the context of addressing poverty alleviation and sustainable development, those two pretexts were never part of the equation to begin with (Scoones 2002: 2728). Biotechnology as seen by potential private sector investors in India is a business opportunity – pure and simple – and these parties do not take poverty alleviation or sustainable development into their decision making calculus, though their promotional materials may state otherwise. Entry is urgent. There are two doors to unlock in order to enter this market, and the keys are held by both India as well as foreign multinational investors.

First, India has to sell “India Inc.”, which they do aggressively. While Bhan would argue that cost savings may not be the primary selling point, an analysis of the kind of information presented by industry bodies in presentations worldwide certainly trumpet the “competitive edge” of doing business in India, often in comparison to China²⁴. The ‘win the race’ narrative runs through these sentiments, as does a certain nationalistic pride in the rise of India. Under the banner “Business is moving from west to east²⁵”, these narratives are all forged on how investors and indeed countries can derive “(...) benefits from economic engagement with India²⁶”, given how it “(...) is poised to become a global hub for transgenic crops given the positive mindset of farmers and globally competitive seed production costs²⁷”. In such a context, it is imperative that economies should work “(...) together to stimulate a global economic revival, to strengthen global economic and financial institutions, to work toward a balanced and ambitious outcome in the Doha Round negotiations, and to promote global food security²⁸.” Within this narrative, the role of ministries, lobby groups, and industry associations are key here in attracting multinational investment across a wide variety of sectors, invariably including biotechnology.

Second, the governments of other countries are aggressively pursuing bilateral negotiations that are often outside the purview of multilateral frameworks, to ensure favourable terms of engagement for both Indian as well as international firms (Newell and Glover 2003; Newell 2008). Holtbrugge and Berg (2004: 304) have argued that MNCs working in India see success in their business initiatives as being most dependent on interacting with the central government, which is certainly reflected in recent developments. This is fostered by cultivating mutually beneficial relationships with the Indian government itself; something that, for the most part, the Indian administration is

more than happy to facilitate, but only on the terms of the administration. This insistence on playing by Indian rules sets India apart from a number of developing economies (Newell 2008: 134).

The future is based on public-private partnerships (PPP) and bilateral trade negotiations, with the aim of operating in an environment that is, as much as is legally possible, free of the constraints of multilateral prescriptive measures. This is echoed both in the opinions of the regulators themselves²⁹ as well as private sector actors. One representative from Avesthagen, a Bangalore based “life science”³⁰ company, argues that,

[t]here has to be some support from the government to industry, and if we come together, it becomes much easier for each other. One can complement the others deficiencies. (...) [We have] to face the challenge together - strength is success. A lot of the regulations that have been put forward to the government are the result of tremendous pressure from both the scientific community as well as the general public - or sections of it - who may or may not accept that technologies are being introduced, like what is happening with [Bt brinjal]. So if industry and the public sector can come together, then maybe that part of the battle can be addressed³¹.

But this sentiment does not come from the mere benefits of partnership for partnerships sake. There is an underlying perception that the public sector is essentially incapable of conducting professional, market viable research. As Shantharam observes,

(...) there is [the public sector Bt cotton OPV] Bikaneri Nerma, but it was a disaster. No one even talks about it. If you were in a company and you came out with such a poor product, you’d be fired. But not in the public sector. In the public sector, they can’t get out of their mindset, they’re frozen in time. They don’t understand what commercialization means. It’s not just about selling seeds, there are a whole slew of things, groundwork that you need to do to bring it to market. And it all takes money - money that isn’t there. The ICAR budget for biotech is 20 million, compared to one million for Monsanto. There is no comparison. If you have a dynamic public sector that tries to partner with a dormant public sector, you will have PPP on paper. But how will they deliver? I mean, the public sector is a huge drag - the private sector is sceptical of this³².

In his view, the need for PPP is premised on two points. First, the culture within the public sector is

not capable of generating successful technologies, and second, that the financial resources that can sustain the R&D needed is not there. Regardless of his scepticism of the tenability of PPP in practice, recent trends within the last five years paint a picture where the future is based heavily on PPP, due both in part to the benefits of collaboration, but also the possibility of the public sector becoming more familiar with what it takes to succeed in the industry. As the deputy U.S. trade representative to India suggests,

(...) what is hurting India's agricultural sector now is not liberalization, but its absence, including a lack of effective domestic reforms in areas of agricultural marketing, price policy, infrastructure, food processing, subsidies, and agricultural research, education, and extension. (...) The fact is that economic reform and liberalization works. It works for India and it works to strengthen the bilateral economic ties that tie our two great countries together³³.

In practice, this sentiment became a reality via the 2005 US-India Knowledge Initiative on Agriculture (AKI). Though the dialogue in its present manifestation began in 2001 during the Vajpayee administration³⁴, the current Singh administration took that initial discussion to a completely new level. As a bilateral agreement, it exists outside of any multilateral framework, and aims to be outside the purview of international law³⁵. The primary objective of the initiative is to promote "(...) teaching, research, service and commercial linkages to address contemporary challenges" and to facilitate "(...) public-private partnership[s] (PPPs) where the private sector can help identify research areas that have the potential for rapid commercialization, with a view to develop new and commercially viable technologies for agricultural advancement in both countries³⁶."

The 2005 AKI mirrors the official mandate of the Indian government as read in both the 2005 National Biotechnology Development Strategy and the still ongoing formulation of the NBRA bill³⁷. There is recognition within the AKI board of how the post 2005 wave of civil society actions rooted in the 2005 RTI Act "(...) will make it harder for both public and private sectors to deliver beneficial biotechnology products to farmers and markets³⁸." Yet at the same, the overall sentiment within the AKI Board is that "(...) regulatory and IPR issues will be worked out appropriately over time, while respecting the rules, regulations and agreements of both countries³⁹." This is all welcome news to both U.S. and other firms keen to capitalize on a market where they know they can exert influence in a regulatory context. In the words of Dr. Sachin Chaturvedi, a senior fellow at the Research and Information System for the Developing Countries (RIS), an organization that has facilitated many spaces for the AKI process to unfold in terms of meetings and seminars,

[i]f we look at the way PPP has come through, there is more and more investment in vegetables and less and less in staple and cash crops. That's where the effort for getting approvals is going. Mustard is almost done, and as such, the push is to get public sector organizations involved. Because in involving the public sector - I mean there are 22 products in the pipeline now - that kind of partnership is like a green card for regulatory approvals⁴⁰.

India Inc. and the AKI present a clear means to witness how technical, economic, and political risks all frame a regulatory ambition in terms of industry friendly policy. The framings of the government, MNCs, and domestic firms all meshed, and the policy followed suit. Yet, while PPP, lobbying, and bilateral agreements do characterize much of the formal processes in terms of policy from the perspective of MNCs, there are other events outside the direct control of both the firms who own or legally license the technologies, or the state as a manager of business conduct. There is another element of risk framings that did mesh, but resulted in a contested space in terms of economic risk framings given the nature of who capitalized, and how.

As briefly discussed in the preceding chapter, prior to the official release of Bt cotton in 2002, massive amounts of unauthorized Bt cotton - 10,000 hectares or 10,000 acres, no one really knows - was sown in the state of Gujarat in 2001 (Carl, Bengali, and Ramaswami 2005: 278; Herring 2007a: 132). The expression event was the same as that owned by Monsanto and licensed by Mahyco; somehow (no one is really sure how exactly) someone managed to gain access to the then unauthorized event and pass it on to a small seed company in Ahmedabad, Navbharat Seeds, who then crossbred it with local varieties and capitalized on the technology. While the story of how and why has been addressed at length in the literature⁴¹, I want to limit my focus to illustrate how the firm and state interacted in the context of risk framing interfaces, as a way to look at regulation as a process.

Here is a local firm having absolutely no regard whatsoever for any kind of formal regulation taking advantage of the R&D of an MNC and reacting purely to economic risk incentives. Navbharat knew that the variety would be a huge success in the market, and they released it arguably three years before official release (Shah 2003), though the Gujarat government approved it in 2000 (Carl, Bengali, and Ramaswami 2005). Moreover, the grand irony being that though the technology they somehow acquired - or stole - from Monsanto was, the same as the official first three varieties approved in 2002 in terms of the event, Navbharat got the crossings with local varieties right, and for half the price (Sadashivappa 2009). A number of observers have concluded

(David and Sai 2002; Sahai and Rehman 2003, 2004; Shah 2003) that in practice, the illegal Navbharat 151 variety outperformed their legally approved counterparts in terms of both resistance and yield.

Farmers used the technology, validated its benefits, and word got out quickly. This all occurred completely independently of any formal regulation or policy – it was an informal contract framed on meshing economic risks between the firm and farmers. Both saw a lucrative opportunity and grabbed it. The technical risk framings so cherished by the GEAC meant nothing in the face of these economic risk framings. In the end, all the centre could do was punish Navbharat for not adhering to the formal regulations and order the illegal cotton to be destroyed, though the Gujarati government was reluctant to do so given their own political dynamic with farmers (Lianchawii 2005: 4285). However, this post regulatory violation damage control mattered little. A cottage industry was born, other firms were nearly put out of business, and by 2003, some 600,000 acres of cotton in Gujarati fields were awash with variants of the Navbharat variety (Carl, Bengali, and Ramaswami 2005: 278).

5.2.3 *Lobbyists, Industry Representation, and Regulatory Affairs Managers*

In years to come, Indian biotechnology will add to your country's prosperity, create new career opportunities for India's young people, and improve the quality of life for all Indians. BIO and its members look forward to a lasting partnership with our Indian colleagues, as we work together to heal, fuel and feed this world we all share⁴².

As I have depicted, multinationals and domestic seed companies can go about their business, and do, but if you want to play by the rules, it certainly helps to have someone on the inside making sure that the government is sufficiently malleable to agree with you. Bilateral agreements like the AKI aim to provide mutually beneficial platforms by which investment can cross borders. But what happens inside the borders of India is equally key – as the Navbharat episode clearly illustrates – but also in terms of the domestic lobby industry. Organizations like the Federation of Indian Chambers of Commerce and Industry (FICCI)⁴³ and the Confederation of Indian Industry (CII) work hard to sell 'India Inc.' both abroad, but also domestically. The sentiment of the director of BIO as quoted above echoes Bhan's assertion in the preceding subsection. But the difference lies in who acts out these ambitions – from agents of government to lobbyists. There are a series of events both international and local that are worth noting here.

The starting point in discussing how lobbying has affected multilateral regulatory instruments surrounding transgenics in agriculture is the early 1990s. As early as 1986, the OECD Blue Book recommended the minimization of barriers to trade, (OECD 1986: 7), but it was really the 1992 Earth Summit that provided an impetus for the private sector to get more directly involved in the process, which they did in a then unprecedented manner (Clapp 2003: 6-8; Prakash and Kollman 2003: 632)⁴⁴. This trend continued in how the precautionary principle was negotiated in both the WTO and CBD in the late nineties, with the result being a dilution of the principle, and a stronger reliance on scientific proof as a basis for risk assessment, namely the SPS and TBT agreements of the WTO (Newell and Glover 2003: 9). The starting points on which India based her regulatory frameworks were already tailored for private sector benefit through a concerted and successful lobby effort. This was the starting point for the domestic lobby industry.

The nature of the Indian lobby industry has changed significantly post 1991, and then again post Bt Cotton⁴⁵. Established lobby groups such as FICCI and the Associated Chambers of Commerce and Industry (Assocham) are still active, but the dismantling of the 'license-quota raj' has fostered a change at the level in which they operate, reflective of the changing patterns of investment that characterize much of the rise of 'India Inc'. Newer lobby groups such as the CII and the Association of Biotechnology Led Enterprises (ABLE) operate in a different milieu, embedded in a distinct environment where liberalization, bilateral agreements, and PPP have opened the floodgates to a completely new group of investors⁴⁶. There are two main types of lobby groups domestically: regulatory affairs managers (RAM) who work primarily with multinationals, and groupings of firms who collectively lobby the government with one voice.

RAMs work the Delhi scene hard, and play a key role. Their interactions go in both directions. On the one hand, regulators may call them for clarifications on applications, and on the other, they are in regular touch with regulators. Concerning the first direction, an example provided by one RAM is illustrative.

I got a call yesterday that I am working on today. We had filed an application for a stacked event. The assistant to the member secretary of the GEAC doesn't have any scientific background. So she can't differentiate between a single and stacked event. In fact, we had an application a month before for GM tomatoes, but given that we applied again for the stacked event, she got confused between the two - 'why are you applying again?' So basically I had to explain from scratch; this is this, this is that. (...) [S]ay [we] have an application coming up at the next GEAC

meeting. There is an option for anyone who is a competent representative from [our company] to field queries based on the application. We do get a chance. We won't be present for the whole meeting, we'll be there in another room, but we can add clarifications that way. I think that's better than nothing. But still, ideally, the company would be there in the GEAC itself, but we don't have that kind of a system now. It's so nice of the assistant to the member secretary of the GEAC to call me at least, otherwise there is no way to get those issues where she lacked clarity addressed. Otherwise, it goes for a toss⁴⁷.

This was a common complaint among many I spoke to; in the face of lacking scientific expertise among the regulators themselves, the RAM's role is to fill that gap. Which of course may seem suspect to an observer given their stake in the technology itself. This counsel also applies in countering the influence of civil society efforts pointed towards regulators. The same RAM argues that regulators often

[c]an't decide if an activist or a green says, 'oh, Europe has not approved GM crops', but that's not true, there are EU countries growing GM crops, and they are using it for food and feed purposes. So if an NGO or an activist gives information to the government saying 'why are you following the US, look at the EU, they are GM free, so why are you in such a rush', that particular government official may not have enough of an awareness to make an informed decision.

This is where the RAM comes in; this is the other direction. They are in regular contact with DBT and MoEF regulators, and their job is to ensure that a conducive environment is created for their business interests; to mediate technical risks in a way that is tractable for regulators not versed in the science. As Shantharam characterizes them,

[t]heir only duty is to get licenses cleared to do business. Monsanto has a team of them, some have one; they are all based in Delhi, and they are in touch with regulators on a regular basis to find out where the government is going, what the pulse is. The moment the government thinks of doing something they feel might hurt company interests, they all gang up. They call on their contacts. But I mean, why shouldn't they? They want to ensure they get what they want, and they want to ensure the government wants the right thing. It's the same as how NGOs do it through public campaigning⁴⁸.

However, in working independently, there is the risk of being seen as getting too cosy with the government. As the same RAM puts it,

even if we have the best intentions, it's always assumed that you are trying to influence matters. (...) When an individual company approaches them, it's always taken like 'oh, you have some vested interest in this. [That said, the situation now has changed compared to five years ago, where] (...) even though industry wanted to [make contact], it would have been in a kind of in a hide and seek manner as opposed to [the] more transparent manner [we have now], where you can write a letter and get a response. But still, I think there is a lot of room for improvement⁴⁹.

Lobby groups work at a more coordinated level; their aim is to collectively represent the interests of the firms, in a consolidated, unified manner. Unlike FICCI or CII, newer lobby groups have tailored their focus on transgenics in agriculture. There are two main players, reflective of the distinction made by observers of firms capable of generating proof of concept research and the "dirty dozen". While the first iteration of ABLE was formed in 2003 and led by India's 'biotech queen', Kiran Mazumdar-Shaw, there were sentiments that, by 2006, too much focus was being lent to the pharmaceutical side of the industry, reflective of their dominance in the industry. As a result, in 2010 ABLE-AG was established, to allow for the interests of the agriculture side of the industry to be addressed.

ABLE-AG represents technology developers. It is split between Indian firms such as Metahelix, Global Transgenes (formerly Nath Seeds), JK Seeds, and Mahyco, but also include multinationals such as Pioneer, Syngenta, Dow, Bayer, BASF, and of course "(...) the target company [of public hatred towards biotechnology], a company called 'M'⁵⁰." The National Seeds Association of India (NSAI) on the other hand focuses more on traditional breeders and those who sublicense the events from larger domestic firms. Because of these distinct memberships, the strategic relevance of these two groups differ. I have not discussed the role of the NSAI here, and for the following reason: according to observers, they do not have a long term strategy in terms of regulatory reform. In the words of a K.K. Narayanan, former director of ABLE and the current director of Metahelix,

(...) seed companies are more focused on the short term – getting state approvals, things like that – where ABLE-AG is more interested in streamlining the regulations and getting them more science based. Getting good IP protection is another example⁵¹.

ABLE-AG was formed in early 2010 in the midst of the Ramesh tour, taking over the mantle from the now defunct All India Crop Biotechnology Association (AICBA), with the mandate of fostering “(...) a comprehensive dialogue with different stakeholders, particularly the Government (...) [to create] an enabling environment for the development and introduction of superior biotech traits in India⁵².” AICBA did have earlier successes, such as lobbying for an EBAM regime and being consulted for the Swaminathan task force, but their prominence waned in the context of representing technology adopters as opposed to developers. AICBA teamed with the NSAI during the Rodrigues hearings to represent industry interests, but “(...) got subsumed by the NSAI, given that technology developers and seed companies [licensing technologies as opposed to developing them] were not aligned⁵³.” In practice, most of ABLE-AG’s successes to date have been with lobbying chief ministers at the state level as opposed to the centre⁵⁴, with the centre less than impressed with their interactions to date. In the words C.K. Rao at the FBAE, “ABLE just isn’t that organized. They seem mostly happy if they get funds for PPP collaborations⁵⁵.” But this reflects their recent entry into the fray. The space for a group like ABLE is open, and the timing is based on what has been happening, the Bt brinjal moratorium in particular. As Shantharam puts it,

I haven’t seen much interaction in terms of CII and FICCI in the context of biotechnology. I mean, they dabble in it, but they won’t take a public stand. See, biotechnology in medicine is doing really well, but agriculture is really small. I mean you can make money, but not like in pharmaceuticals, aircraft, automobiles⁵⁶.

Similarly, C.K. Rao argues that “CII is different, there are too many influences there. It’s not just biotech. They are powerful, but their interest in agriculture is marginal⁵⁷.” But the future will tell how effective ABLE becomes; they certainly have a presence, with Jairam Ramesh presiding over their official opening in August 2010.

What is particularly interesting about ABLE is how the director refers to the formation of the group as a sort of response to civil society mobilization. While on the one hand, there was a gap after the dissolution of the AICBA that needed to be filled in the context of a focus on transgenics in agriculture, on the other, there was a perception that if industry did not act, the battle might be lost. In the words of Shantharam, civil society

(...) wants to raise the bar, and they have clearly understood that one way to stop and kill the technology is to increase regulation to such an extent that you can tie it up in knots, with firms quitting in frustration. So I am trying to tell the government not to fall for that. Sit down and do proper risk assessment; determine

what level of risk is presented to society, and see how those risks can be managed - see if there is an overwhelming benefit to be had, and then see whether the benefits outweigh the risks. We can manage the associated risks via institutions and policies, as opposed to throwing the baby out with the bathwater approach.

He refers almost verbatim to Divya Raghunandan's quote from the preceding chapter regarding their strategy of making consensus impossible, thereby delaying release. ABLE recognizes that strategy borne of a new school NGO risk framing, and aims to respond to it pragmatically. He continues:

[t]o use a term from American football, it's more than halftime, and your team is not on the ground. And the whole framing of the debate has been built by the anti-GM lobby. (...) We should [counter that] and explain our view. I've met [former] President Kalam, many Chief Ministers, MPs, and guess what. They all say 'uhhh, hmmm, I see...well, we are not against technology, it's not about money.' But I will tell you - it is about money. Saying you are not against technology is an excuse - you are against technology. Especially if it is from the outside, if it's peddled by the multinational companies. That's what's going on in Jairam's head. 'Everything has to be indigenous, we are a proud race, we have so much intellectual capacity, we are everywhere, most institutions can't run without an Indian - labs, universities, companies - they've all taken over slowly. We have such intellectual power here and we should harness and create an Indian revolution. We should not let foreigners come in.' That's the psyche. But we can't fight every battle alone. We need to form a coalition of like minded people⁵⁸.

Nationalist sentiments run through this discourse of transgenic research and ambition, and in Shantharam's view, it threatens to delay the industry. It is a political and economic risk that needs to be mitigated.

To counter this, and unlike the CII or FICCI, ABLE-AG forges a direct relationship with firms in order to speak with one voice. These new lobbyists reflect an evolution towards a specific focus on biotechnology, reflective of the massive growth of the industry as observed by both Indian and international observers as framed by the Bt Cotton experience. The primary rationale of organizing is premised on strategic tack:

[i]f you form a coalition of people and slowly assert your position in a diplomatic,

dignified, and professional manner, your decibel level rises, and people will hear you. Public policy framing as it happens now is influenced by many people, but I think basically those who have money to pay off politicians and influence bills are the ones who make the biggest difference. But we will never resort to corrupt practices. We are not going to bribe anyone. Though, if you don't do that, well, they'll receive you for ten minutes, and you'll get two, but still...⁵⁹

Shantharam asserts what I have been arguing throughout this research. The “public policy framing” he refers to is analogous to how civil society has transferred their risk framings to a broader public – both the state as well as the general public. The strategies of what firms do in response to such a context – lobbying as well as “Robin Hood” varieties with no regards for formal regulation – set the scene for the battlefield.

5.3 The Rules Of The Game: Civil Society Risk Framings And Politics

You have to play by the rules of the game. And those rules [to date] have been set by NGOs. (...) I have to hand it to them, they really did a number on this. They are doing a great job in projecting their image [of risk]. They say it's not about biotech, it's about Monsanto. But if you take Monsanto out of this, there is no biotech⁶⁰.

The private sector has always been involved in the development of transgenics in agriculture to capitalize on farmer demand. More than any other actor in this story, their ambition is clear and unified. But this relates more to economic risk framings, which are at the centre of decision making calculus, but not the only factor. There are other factors at play that render this ambition far more complicated to achieve due to the interface of the risk framings of the firm with those of a broader public. It is not as though the firm and the state see eye to eye all the time; though both have a vision for Indian agriculture broadly premised on technological innovation and adoption. It is the interface of economic risks with political and technical risks that more accurately characterize the core of regulation in practice, as considered in the context of the firm. But what are these other risks?

5.3.1 Technical Risk: Resistance and Stress

The first two variants of Bt cotton both were engineered for pest resistance. The next iteration will see herbicide tolerant double stacked Bt cotton in the market, most likely for the 2011 season. In this

context, there lies a technical risk: the risk of biotic stressor resistance. This risk plays out on two levels. First are within laboratories that argue long term resistance is inevitable, forthcoming, and already occurring, and second are based on applied observation in farmers fields.

While a number of scientific observers have argued that Cry1Ac resistance is possible, it was more recently that these studies began to have a more pronounced affect on regulatory deliberation. As discussed in the preceding chapter, the petitions filed by NGOs provided reams of evidence sourced of international studies regarding, among other factors, resistance. The release of a study by Tabashnik (2008) however was remarkably well timed. While Mahyco responded to the Tabashnik study arguing there is nothing of the sort in India⁶¹, two years later, evidence emerged of resistance in Gujarat. Mahyco was forced to respond. They conclude that while “(...) pink bollworm resistance to Cry1Ac was confirmed in four districts in Gujarat (...) [t]o date, no insect resistance to Cry1Ac has been confirmed outside the four districts (...)”⁶². However, some observers note that this was likely known by Monsanto all along. They argue that inbuilt resistance was a technical switch to capitalize on economic incentives - for the projected massive demand for future technologies such as BGII⁶³, and in the near future, herbicide resistant Roundup Ready BGII as developed by Monsanto. And if the significant adoption of BGII can be viewed as any indication of this assertion, there certainly seems to be empirical evidence to verify such a strategy.

I would argue that developers are very aware that resistance is imminent, as it meshes with their framing of economic risk. There is massive demand from farmers, and while there may be hurdles to overcome within government to ensure the regulations are suitable for expansion at minimal delay, as long as farmers have access to newer technologies, their bottom line will continue to grow. It is, in a sense, a form of planned obsolescence. Taking the focus away from the Indian experience for a moment, similar trends have emerged among farmers who have been noticing glyphosate resistance among weeds in the fields of herbicide tolerant cotton in the US⁶⁴. Recent studies have argued that the amount of resistance has increased more than four times from 2007 to 2010⁶⁵. Since the introduction of herbicide tolerant cotton in 1997⁶⁶, farming practice has taken herbicide tolerance as a given in the form of Roundup Ready crops. From the perspective of both the firm and farmers, there is little option in the face of glyphosate resistance, but to either rely on the firm to provide a next generation solution, or to revert to more costly and labour intensive means of weed control. In essence, resistance is a sound business strategy, and the technical risk of resistance is less a technical risk, but more an economic risk as framed by longer term strategies that ensure continued demand for other weed control technologies, either in the form of engineered crops or in new sprays.

5.3.2 *Economic Risks: “Cut The Red Tape”*

But more firmly in the realm of how the regulations were framed by economic risks is the narrative of excessive regulation as a burden. As with civil society and the government, biosafety frames much of how risk is understood by private sector actors. In complying with government regulations, technical risk assessment has to be undertaken by firms. But this dynamic curiously goes in two directions. In one direction, the RCGM formally, but in practice, the GEAC, is mandated to undertake formal biosafety assessment. Yet that capacity is simply not there – recall the RAM who had to explain the science to a regulator who could not speak that language. In the other direction, biosafety assessment data is often provided to the GEAC by firms themselves. In the words of C.K. Rao, founder of the FBAE,

[p]resently, the GEAC has no facilities to verify data from the product developer. Moreover, the developer might not present all the data. The expertise for proper assessment is not much, about two hundred scientists in various public sector institutes. For India to invest that money and hire more people, as suggested in the NBRA, is a stupid idea. Swaminathan also said that. Simply because it is coming from the developer shouldn't make the data suspect⁶⁷.

But that is a somewhat contradictory assertion, given that there is a tacit acceptance that the firm may not present all the data required. Though some regulators may have known about this all along, why would a firm state that the technology does have inbuilt obsolescence? The framing of risk mirrors the biosafety risk framing of the government, but it relates more to the economic as opposed to technical manifestation of this risk framing. Time is money, and money is constrained. If too much time is spent on deliberating on the biosafety assessment of a new technology, opportunity costs accumulate – it would be strategic to be selective with information to minimize delays.

The movement to an EBAM regime and the domestic lobby pressing for the ‘single window clearance’ NBRA also presents another means to mitigate economic risk. The aim is to minimize the accumulation of opportunity costs by making biosafety assessment more efficient. Thus, the risk is framed as an economic risk - the delays due to excessive technical assessment and the opportunity costs of these delays. The risk is that too much red tape will render private sector efforts at commercializing products to be mired in red tape. In tracing the ongoing story of how regulation evolves in practice, the Bt cotton story is rich with examples, both of how excessive red

tape has deterred entry, but also how regulations have been lobbied to be more business friendly. As always, the story begins with Mahyco, Monsanto, and those 100g of seed.

While Monsanto did apply as early as 1990 for the import of the 100g of seed for backcrossing, it was in 1993 that the application was formally rejected on the basis of excessive technology transfer fees (Newell 2007: 187). That is the official story. In reality, it had more to do with the state of the regulatory system in 1993, which was still in its early days. In the words of M.K. Sharma, managing director of Mahyco,

[o]nce we started talking to Monsanto, there was a DBT in place, and when [we at Mahyco] started in 1994 – well I guess 1992-93 is when we started – and in 1994 we finalized...anyway, we did meet with DBT before that, as a heads up, to tell them, ‘Well, if it is us, how will it be introduced?’ We knew there were the Guidelines, so we started the technology in 1995 with the 100g import, and based on the first trials, things had to change. But this isn’t new, this always happens here. This all happened with regards to our experience in using the Guidelines, but it was somewhat ambiguous⁶⁸.

In speaking with S.R. Rao at the DBT, the basis for those initial steps in regulatory evolution became clear⁶⁹. In his view, the “1994 Guidelines were not sufficient. But you know, the whole basis of our changing the Guidelines was due to that 100g import. (...) The emergence of Bt Cotton is what really shaped the regulations.” 1996 saw the first real push of Monsanto into India, given their interest in engaging with India as an “emerging market”, and the recognition that Mahyco was “quite aggressive in the past” among regulators. At the same time, Mahyco was trying to engineer the Cry1Ac event in India, but without success.

It appears to have been a mutually beneficial situation to capitalize upon, and one which forms the basis for regulatory evolution. However, there is an additional perspective, one not fully proven, but alluded to by other observers. Perhaps the delay in the release was not only due to lacking regulatory capacity, but either the pesticide industry negotiating delays behind closed doors to protect their market against pest resistant varieties of cotton, or a “nationalistic competition” (Scoones 2005: 253) between MNCs and domestic firms. The argument is that in fostering delays, the state bought time in the hopes that Indian industry could develop their own solutions. However, if Bt Bikaneri Nerma is any indication of what the public sector can do – it has by all accounts been a failure technically, economically, and politically⁷⁰ – perhaps such a strategy reflected pride more than practical capacity.

5.3.3 *Political Risk: Regulatory Capture*

Just as civil society has raised concerns regarding the independence of the government in forming regulation, arguably within the context of the efforts of firms as noted in the preceding subsection, firms share an analogous concern. The notion of regulatory capture is a two way street. Recent words enunciated by Ramesh might depress even the most hardcore lobbyist; he argues that the current draft of the NBRA bill presents a conflict of interest, given that the DBT should not be the nodal authority given their interest in promoting biotechnology. He also cites the bill articles that overrule the RTI Act as representative of a “deeply flawed” piece of legislation⁷¹. While civil society may frame an economic risk as where the government is no longer independent and is sidetracked by the risk of missing the boat, the private sector has concerns relating to political risks. Namely, the government may not be able to objectively maintain scientifically based rigour as the basis for biosafety assessment given the influence of civil society. Evidence of this is most recently seen in the current Bt brinjal moratorium. This is not welcome news to industry. Shantharam argues that

[b]asically, [Ramesh] didn't have the courage to support the GEAC, as it was the easy and popular thing to do. He's now hailed as the most courageous politician. He changed the name [of the GEAC from approval to appraisal committee] but the mandate is the same as designed [in the 1989 Rules]. It's kind of hoodwinking the public – 'I promised to change it, and I did'⁷².

This risk of capture also applies to states intervening in the market and using instruments such as the Monopolies and Restrictive Trade Practices Commission (MRTPC) to set the price of Bt cotton at a lower rate than what the firm would wish for. Such price interventions are often based on the political risk of potentially alienating a vote base, which translates into a disincentive for further entry by firms. In 2006, evidence of how states can intervene in the market emerged, much to the frustration of private sector firms. In May, the MRTPC ruled that Mahyco must reduce the price of Bt Cotton to no more than INR600 for 450g⁷³. Mahyco appealed five days later⁷⁴ but lost the case at the Supreme Court⁷⁵. Soon after, Maharashtra and two other states capped the maximum price for 450g at INR750⁷⁶. Yet, the MRTPC remained vigilant; three months later they ordered a probe questioning why Mahyco is getting more money than they should from Monsanto⁷⁷, which escalates in the months to come⁷⁸.

This all serves to frustrate the private sector, and shows how state level political risk framings can render the regulatory machinery a complex process. One observer characterized the difference between working with state governments as “tougher. (...) We don’t like the constraints on pricing in terms of new technologies; it scares away firms⁷⁹.” This is evident in Monsanto expressing an interest in entering the India soybean market, but remaining reluctant given evidence regarding how individual states can manipulate prices, thereby rendering their return on investment lower than they would like⁸⁰.

Political risks dictate and narrate how susceptible the government, as a democratic, responsive institution of governance, and how civil society (inclusive of the media), given their role as detailed in the preceding chapter, can deviate objective scientific and economic deliberation into the subjective realm. It is the risk of subjective regulation, and it mirrors the regulatory capture concerns of civil society. Though in the context of the firm, the roles are reversed. Though what is to be captured remains the same – the objective, deliberative processes enshrined in government regulation – the party that is doing the capturing switches, and with it the direction of who is responsible.

5.4 Science vs. Money: Regulation In Practice

In effect, regulation as a practice from the perspective of the firm diverges from economic incentive pursuit alone. What emerges from the experience to date via the Bt cotton story is a rich series of technical and political interfaces that create new spaces for engagement, and ultimately policy formulation. Given the stated lack of technical expertise within the MoEF and DBT, firms have a certain advantage – they can portray technologies as having certain risks, but can also tailor this portrayal to suit their economic incentives. This all occurs in spaces ripe for such leverage. As K.K. Narayanan of Metahelix recalls, “(...) a firm can apply, but there is no real consolidated set of guidelines. They’ll say ‘OK, refer to this, refer to that study, give us this...I mean, it’s all ad hoc⁸¹.” In adapting regulation to be less cumbersome and more streamlined, the firm has lent great efforts towards facilitating such a space among regulators. And while this effort was complementary to where the government wanted to go in the first place, there was a space that was vacant – a space where firms could enter and fill in gaps where regulators in these ministries did not have the immediate capacity to fully comprehend the technical risks involved. This is not to say that such capacity is not present in the government, but given the rigid timeframes in which approval is warranted and the overarching climate of pressures from the firm, civil society, and perceived demand from farmers, there is an urgency. Again, ‘time is money’.

And money speaks. Whether it is small firms paying off MPs to meet with regulators to ensure business friendly policy, the Indian government luring foreign investors in the name of cost savings, or bilateral agreements like the AKI that assist local capacity, but embedded with an automatic and well placed position in the Indian market post product release, the incentives are massive. And regulation responds. This applies to foreign firms, but also to domestic firms. Navbharat is a relatively small player in the Indian seed industry – more akin to the “dirty dozen” that S.R. Rao characterized earlier relative to the six major domestic licensees. And yet, this firm alone forced the government to react, given the massive adoption of their “stealth seed” (Herring 2007a) by farmers. Though Mahyco applied for release in 2001 and was refused on the grounds of insufficient technical risk assessment, the illegal release made a mockery of technical risk assessment as a precondition for release. Just ten months after this initial request, and clearly as a political consequence of the Gujarat state government allowing farmers in that state to grow it regardless of central directives (Roy, Herring, and Geisler 2007: 160), the GEAC released the first three varieties. The link is impossible to ignore. No matter what the GEAC may have wanted in terms of technical risk assessment, economic risks – farmers sowing the Navbharat varieties in huge numbers, and political risks – looking like fools in light of states ignoring the centre – framed the (hurried) 2002 official release.

But post release, another form of political risk framing began to emerge. Contrary to any formal regulatory regime, many of the rules of engagement of late have been determined by civil society. An organization like ABLE-AG exists not only to lobby the government, but also to counter similar “lobbying” by civil society. The effects of the brinjal moratorium forced the private sector to acknowledge this fact, and they have by organizing more effectively to counter any further delays. It was a wake up call of sorts. No longer was the status quo of a “pro-business” policy environment something that could be taken for granted. As Narayanan of Metahelix puts it, “(...) we are accountable to civil society whether we like it or not, but the government has to be held accountable politically. This has all been the consequence of Ramesh and his being so media savvy⁸².”

All the manoeuvres within and outside of India by the private sector have resulted in spaces where regulation changes, adapts and is enforced in light of the risk framings of the private sector. These manoeuvres are tempered and overseen by the other three agents involved, and the accountability dynamics that result do affect formal regulation. But to date, most of the discussion has focused on the government, civil society, and the firm. At the core of the entire basis for regulating the technology is a demand. This demand is sourced from farmers.

But this cannot imply that it is market incentives alone that mesh with technical, political, and economic risks to include farmers in the process of regulatory deliberation. All of these factors results in different market epistemologies. But in looking at farming communities, one has to move from this triangle of risk framings. The farm presents a radically different arena in which incentives, risks, decisions, and accountability is sought. Regulation on the farm in the context of Bt Cotton presents a very different view of how these factors come together to both present a practice of regulation, but also an interface with the other three parties I have considered. The next chapter will address how and why.

Endnotes: Chapter 5

¹ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

² "Ready to Germinate", *Forbes India*, 7 August 2009.

³ "India poised to become world's top cotton producer by 2015", *BioSpectrum*, 20 August 2009.

⁴ "India urged to expand biotech crops mkt", *Financial Express*, 19 February 2008.

⁵ "Duty mower from Montek", *The Telegraph*, 28 December 2004.

⁶ Interview, M.K. Sharma, Managing Director, Mahyco, Mumbai, 25 May 2009.

⁷ All statistics that follow in this paragraph are based on my consolidation of a number of documents found at "Status of GMOs and Products - Commercially Approved", http://igmoris.nic.in/commercial_approved.asp. The six events are "MON 531" (Bollgard I) and "MON 15985" (Bollgard II) developed by Mahyco, "Event 1" or "JK Event 1" developed by IIT Kharagpur, "GFM Cry1A" developed by the Chinese Academy of Sciences, the "Dharwad Event" (Bt Bikaneri Nerma) developed by the CICR and UAS Dharwad, and "Event 9124" developed by Metahelix (Karilahoo and Kumar 2009: 10). While all successfully express the Bt toxin in a combination of four ways, as of July 2010 nearly 85% of all varieties on the Indian market are licensees of the two Mahyco events, with nearly 60% of all varieties being Bollgard II.

⁸ The GEAC has developed a zonal system of release for Bt Cotton. The north zone consists of Haryana and Punjab, the central zone consists of Gujarat, Madhya Pradesh and Maharashtra, and the south zone consists of Andhra Pradesh, Karnataka and Tamil Nadu. Refer to "Yearwise list of commercially released varieties of Bt cotton hybrids by GEAC", DBT 2007.

⁹ Interview, S.R. Rao, DBT, 24 August 2010.

¹⁰ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

¹¹ Interview, C.K. Rao, Director, FBAE, Bangalore, 18 August 2010.

¹² To put this into perspective, in 2002 and 2003 there were three varieties available, increasing by one in 2004. In 2005, the number grew to 20 and more than doubled in 2006 to 58. In 2007 the number doubled again to 131, while 2008 saw another a similar scale of increase – 274. Refer to James (2006: 2, 2007: 43, 2008: 57).

¹³ Refer to para 12.5 of MoA (2004).

¹⁴ "New Procedure for Commercial Release of Bt Cotton Hybrids Expressing Approved Events", MoEF Revised Office Memorandum F. No. 13/39/2007-CS-II, 17 April 2009.

¹⁵ Interview, Anonymous Regulatory Affairs Manager of a firm, Delhi, 24 August 2010.

¹⁶ Interview, S.R. Rao, DBT, 24 August 2010.

¹⁷ Refer to "BCIL Clientele", <http://www.bcil.nic.in/clientele.htm>.

¹⁸ Refer to the description of the BCIL as stated on the back of Biotech Bulletin.

¹⁹ Refer to "Small Business Innovation Research Initiative (SBIRI) for Public Private Partnership", http://dbtindia.nic.in/uniquepage.asp?id_pk=136.

²⁰ Interview, S.R. Rao, DBT, 24 August 2010. However, SBIRI did not achieve these stated aims to the extent that was envisioned, and has since been replaced by the Biotechnology Industry Partnership Programme (BIPP), which is more tailored for "high risk, transformational technology/process development. Refer to "Biotechnology Industry Partnership Programme (BIPP): An Advanced Technology Scheme", http://dbtindia.nic.in/uniquepage.asp?id_pk=680.

²¹ Interview, S.R. Rao, DBT, 24 August 2010. This echoes a trend. While the big money is really in the pharmaceutical side of the biotechnology industry, the sector gets little attention in the press, and for that matter, in the literature. To put this into perspective, almost 75% of all industry revenues are generated by pharmaceutical applications, with only 10% in agriculture. And unlike the popular stereotypes of Hyderabad and Bangalore being the hubs for the industry, half of all revenues are generated in the Mumbai-Pune and Ahmedabad-Vadodara industrial belts where 40% of all pharmaceutical industry turnover is generated, compared to just under a third of the revenues generated in the Bangalore, Hyderabad and Chennai triangle (CII 1994).

²² M.K. Bhan, Secretary, DBT, as quoted during an address to the BIO 2007 International Convention in Boston, US. Refer to "Panel: Biotech boom will drive India's growth", *India New England*, 25 May 2007.

²³ Walmart, Cargill, the Coca-Cola Company, John Deere, Monsanto, PepsiCo, and other firms are all significant players eager to capitalize on "the partnership of American and Indian expertise that will revitalize the Indian agricultural landscape and provide sustenance for our countries and for the world." Refer to "Unlocking India's Rural Sector: US Industry Contributions", US-India Business Council, October 2009.

²⁴ This is based on a Power Point deck presented by FICCI to the commissioner of Miami-Dade County, Florida, US, 5 October 2007.

²⁵ This was the tagline found on a brochure for the "International Crop Science Conference and Exhibition, Bangkok, Thailand, 27-28 July 2006". The conference was sponsored by a mix of Indian ministries, firms, industry associations, and FICCI.

²⁶ This is the title of a June 2010 report authored by the India-US World Affairs Institute.

²⁷ As quoted from a CII presentation "India – Knowledge Powerhouse: Presentation on the Biotechnology Industry" given at New Business Opportunities in the Indian Biotechnology Sector, Zurich, Switzerland, 22 October 2004.

²⁸ Refer to "Stimulating Global Economic Revival: U.S. – India Cooperation in Economics, Trade, and Agriculture", *White House Press Release*, 24 November 2009.

²⁹ Interview, S.R. Rao, DBT, Delhi, 29 April 2009.

³⁰ Refer to <http://www.avesthagen.com/about.htm>.

³¹ Interview, J. Mittur, Avesthagen, Bangalore, 19 August 2010.

³² Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

³³ Karan K. Bhatia, Deputy US Trade Representative, as quoted in a speech given to a CII luncheon, New Delhi, 28 November 2006.

³⁴ "Indo-US biotech alliance launched to boost fund flow", *Business Line*, 9 November 2002.

³⁵ "Joint Declaration of the Ministry of Agriculture of India and the United States Department of Agriculture Regarding Support for a United States-India Knowledge Initiative on Agricultural Education, Research, Service and Commercial Linkages", 12 November 2005.

³⁶ "Joint Declaration of the Ministry of Agriculture of India and the United States Department of Agriculture Regarding Support for a United States-India Knowledge Initiative on Agricultural Education, Research, Service and Commercial Linkages", 12 November 2005.

³⁷ Recent events as a consequence of the AKI have been, among others, Indian agricultural universities bolstering their research capacity via faculty exchange with their American analogues, the rise of management consultancy firms like Sathguru who manage these partnerships, and a slew of PPP arrangements in the form of biotech parks and the exchange of privately developed technologies to Indian agricultural universities. For example, a fellowship program at Michigan State University, which invites twelve Indian scientists from agricultural universities and government institutes, to learn about "research and development, biotech regulations, international organizations, global economy, marketing and consumers, and food security and technical assistance." Along with the transfer of technology from Monsanto to TNAU towards Bt Brinjal development, there have also been transfers for transgenic papaya. The most relevant example of the latter has been the development of Bt Brinjal. Though the timeline of the 2003 PPP between Mahyco and TNAU (Shelton 2010: 413) predates the AKI and was more a consequence of the Agricultural Biotechnology Support Project II (ABSP2), the overarching elements are firmly embedded in the AKI narrative. The ABSP2 is a collaborative effort between Cornell University and USAID. The objectives of the effort in India are to support the "(...) development of expertise in the areas of research, policy development, licensing and outreach to help reduce poverty and hunger through agricultural biotechnology. Current initiatives relate to development of Tobacco Streak Virus Resistant (TSVR) groundnut, Late Blight Resistant (LBR) potato, Fruit and Shoot Borer Resistant (FSBR) eggplant, drought tolerant rice and salinity tolerant (DST) rice." The same applies to the South Asia Biosafety Program (SABP), an "an international developmental program" supported by USAID and including IFPRI and the Canadian consortium AgBios as collaborators. The primary aim is to strengthen regulatory capacity in the context of biotechnology³⁷, with particular recommendations all falling in line with the AKI-NBDS narrative: PPP, a focus on scientific biosafety assessment in regulatory norms, and support of the NBRA. Refer to "India - U.S. Agricultural Knowledge Initiative: Board Minutes- Third Meeting of the Board, June 6-7, 2006"; <http://www.livemint.com/2007/10/24001328/Monsanto8217s-gift-to-Tamil.html>; "TNAU developing genetically modified papaya", *The Hindu*, 9 December 2008; "Advancing Science for Safer Food and Environment", ABSP II (4:2), April 2009; "Cornell helps develop pest-resistant eggplant, the first genetically modified food crop in South Asia", *Cornell Chronicle*, 19 September 2007; "South Asia Biosafety Program Newsletter", 3:2, 1.

³⁸ "India - U.S. Agricultural Knowledge Initiative: Board Minutes-Third Meeting of the Board, June 6-7, 2006."

³⁹ There are a number of salient features of the initiative that will leave an impact in terms of technical risk assessment capacity. Biosafety risk assessment training, training for the Indian Patent Office as a response to "to the growing number of patent applications submitted by local and international biotechnology firms to the Indian government", training on the U.S. and international system of trade regulation in the context of agriculture and SPS as well as "science-based risk analysis", training on the logistics of growing crops under contract farming agreements between the US and India, and university faculty exchange are all components of the AKI. In the context of training, one regulator opined that "[p]eople are preferring government jobs again. When the NBRA emerges in one or two years, there will be a massive increase in the need to fulfill staff requirements. So the aim is send people abroad, and bring them back to the NBRA as experts; get ten trained, and keep the best two (Interview, S.R. Rao, DBT, Delhi, 29 April 2009). Refer to "USTDA Initiative Promotes Cooperation in the Development of India's Biotechnology Market", Fact Sheet, USTDA; "Fifth U.S.-India Agricultural Knowledge Initiative Board meeting. Washington D.C., June 14-15, 2007 - Joint deliverables"; and "India - U.S. Agricultural Knowledge Initiative: Board Minutes- Third Meeting of the Board, June 6-7, 2006".

⁴⁰ Interview, S. Chaturvedi, RIS, Delhi, 23 August 2010.

⁴¹ A number of observers have considered what this event means in terms of technical performance, regulation, farmer preferences, globalization, and citizenship. Refer to Carl, Bengali, and Ramaswami 2005; Gruère, Mehta-Bhatt, and Sengupta 2008; Gupta and Chandak 2005; Herring 2007a, 2007b, 2009, 2010; Indira, Bhagavan and Virgin 2005; Roy 2007; Shah 2003, 2008; Lianchawii 2005; Linton and Torsekar 2009; Ramaswami 2007; Sadashivappa 2009; Sahai 2002; Sahai and Rehman 2003, 2004; Stone 2007.

⁴² James C. Greenwood, President & CEO, BIO, as quoted from his keynote address at BioInvest 2009. Mumbai, 5 November 2009.

⁴³ FICCI takes a balanced approach, though firmly rooted in the interests of business. The groups notes some concerns about the EU market and India's limited access in light of the ongoing EU moratorium on most imports of goods containing transgenic technologies, but also notes that the GEAC has too much power. Refer to "Exporters Of Agro-products Keeping Fingers Crossed", *Financial Express*, 19 April 2004, and "Biotech Sector Wants GEAC Wings Clipped", *Financial Express*, 16 July 2004.

⁴⁴ The efforts of the Global Industry Coalition⁴⁴ - a unified and well coordinated lobby effort by a number of private sector firms formed both of countries belonging to the "Miami Group" and others - all with a vested interest in furthering their own market interests, were particularly effective.

⁴⁵ During the period after the first three varieties of Bt cotton were developed and tested, the first calls from industry regarding the excessively bureaucratic nature of the regulatory system began to emerge. The now defunct AIBA stated that

"India's regulatory system is too bureaucratic and [it] will disallow India to compete in the Asian market." Refer to *Nature Biotechnology*, 19:2 105-106.

⁴⁶ While the older school lobbyists like FICCI cut their teeth on cultivating close relationships between "business houses" and government decision makers to affect policy (Kochanek 1971: 870-873), the new lobbyists have a far wider cache of clients that aim to foster such relationships, reflective of the far wider range of parties that have entered the Indian market and fostered so much of its rapid economic growth.

⁴⁷ Interview, Anonymous Regulatory Affairs Manager of a firm, Delhi, 24 August 2010.

⁴⁸ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

⁴⁹ Interview, Anonymous Regulatory Affairs Manager of a firm, Delhi, 24 August 2010.

⁵⁰ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

⁵¹ Interview, K.K. Narayanan, General Manager, Metahelix, Bangalore, 8 September 2010.

⁵² "ABLE-SIGAB: Special Interest Group on Agricultural Biotechnology", Promotional Brochure.

⁵³ Interview, K.K. Narayanan, General Manager, Metahelix, Bangalore, 8 September 2010.

⁵⁴ Interview, C.K. Rao, Director, FBAE, Bangalore, 18 August 2010.

⁵⁵ *Ibid.*

⁵⁶ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

⁵⁷ Interview, C.K. Rao, Director, FBAE, Bangalore, 18 August 2010.

⁵⁸ Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

⁵⁹ *Ibid.*

⁶⁰ *Ibid.*

⁶¹ "No signs of bollworm resistance to Bt cotton in India: Mahyco Monsanto", *Financial Express*, 25 February 2008.

⁶² "Setback for Bt cotton; main pest develops resistance", *Business Standard*, 6 March 2010.

⁶³ "Bt cotton failure a profit ploy?", *Times Of India*, 12 March 2010.

⁶⁴ "Roundup's potency slips, foils farmers", *St. Louis Post-Dispatch (US)*, 25 July 2010.

⁶⁵ "Congress takes up weed resistance hearings", *Journal Star (US)*, 2 August 2010.

⁶⁶ "Pigweed threatens Georgia cotton industry", *South East Farm Press (US)*, 6 July 2010.

⁶⁷ Interview, C.K. Rao, Director, FBAE, Bangalore, 18 August 2010.

⁶⁸ Interview, M.K. Sharma, Managing Director, Mahyco, Mumbai, 25 May 2009.

⁶⁹ This paragraph draws on an interview conducted with S.R. Rao, DBT, Delhi, 29 April 2009.

⁷⁰ "Govt variety of Bt cotton bombs, causes losses", *Hindustan Times*, 15 October 2010.

⁷¹ "BAI should be with environ or health ministry: Jairam", *Economic Times*, 25 February 2010.

⁷² Interview, S. Shantharam, Director, ABLE, Delhi, 20 August 2010.

⁷³ <http://www.ndtvprofit.com/homepage/storybusinessnew.asp?template=&whichstory=n&id=31189>

⁷⁴ "MRTPC order to Monsanto on Bt cotton prices", *Tribune*, 12 May 2006.

⁷⁵ "Monsanto loses India court appeal over genetically-modified seeds price -report", *Forbes*, 6 June 2006.

⁷⁶ "3 states fix price of Monsanto's Bt cotton seeds", *Times Of India*, 1 June 2006.

⁷⁷ "Monsanto: MRTPC orders another probe", *Times Of India*, 8 October 2006.

⁷⁸ "Monsanto in trouble for over-pricing herbicides", *Business Standard*, 5 January 2007. There is further evidence of how political maneuvering at the state level can deviate from science based regulatory framings by capitalizing on the "failure" of Bt Cotton; towards the end of the year the MRPTC submits a demand from the Andhra Pradesh government to Mahyco requesting compensation for the "failure" of Bt Cotton. Tamil Nadu follows suit and succeeds. Refer to "MRTPC issues notice to Monsanto", *Financial Express*, 9 December 2006; "AP to continue legal battle against Monsanto", *Economic Times*, 6 March 2007; "Bt cotton crop fails in Tamil Nadu", *Financial Express*, 5 January 2007.

⁷⁹ Interview, M.K. Sharma, Managing Director, Mahyco, Mumbai, 25 May 2009.

⁸⁰ "Soya not viable option for Monsanto in India", *Business Line*, 6 September 2008.

⁸¹ Interview, K.K. Narayanan, Director, Metahelix, Bangalore, 8 September 2010.

⁸² *Ibid.*

CHAPTER 6

ON THE FARM: DESTINY, (IN)DECISION, INFORMATION AND RISK

I knew the bulk of my time conducting the fieldwork that informs this research would be in a farm setting. It was where I felt I would derive the most profound elements of my analysis – where I could really gain an understanding of why farmers are using Bt cotton. On the one hand, I could not get a sense from the extant literature of what was really going on with Bt cotton. Though the performance of the technology was never really an element of this research, I was personally curious as to how it was doing. Were farmers happy with it? Was it performing as badly or as well as some observers were claiming? What was going on?

Of course, the answer to that is complicated and depends on a variety of factors – landholding sizes, access to irrigation, the existence of extension services (both state mandated that the proxies provided by agrodealers), new insects like the army bollworm and new viruses like red leaf curl, and of course, the rains. And the more I understood the sheer number of factors that determined whether or not a farmer had a positive or negative experience with Bt cotton, the less importance and interest I had in such bipolar dynamics as success or failure. Though there are a wealth of studies that claim to present a clear picture, the truth seems to be that it really depends, and in any case, all parties publishing their findings have their own vested interests in presenting the truth. To me, the only really interesting questions are in the context of decision making. It was not so much “is Bt cotton doing well or poorly”, but rather, “why are farmers using Bt cotton in the first place, and how do they understand risk and respond to it”? It was the underlying decisions that propelled the adoption of Bt cotton that were really interesting. And it was that decision making process that lay at the core of what I wanted to understand.

As with all the other actors I have considered up to this point, the driving factor behind decision making processes are risk framings. I needed to understand how exactly risk was constructed by farmers. And what I found was far, far different from what I have detailed up to this point. While the state, civil society, and the firm can frame risk according to political, economic, and technical dynamics, there is something else entirely going on at the farm level. Given the fact that farmers do interact with all of these parties, there is an element of overlap. But at the same time, there are other factors – notions of destiny, multiple references to the *Mahābhārata* and the *Gita*, the role of faith and fate, trust in agricultural “experts”, notions of representation, and of course quantitative factors such as landholding sizes, incomes, and observed yields – all which render these three

broad groups of framings inadequate to fully capture the complexities of the interfaces between new technologies like Bt cotton, the variety of parties who have a stake in the adoption and use of them, and how farmers ultimately decide whether or not to adopt.

For these reasons, I spent six months in Chikhali; almost a third of my fieldwork. It was conscious, a culmination of both personal and professional ambition. In retrospect, perhaps I spent too much time there, and perhaps I could have acquired the insights I gained in less time. I'll never know. But what I do know, both then and now, was that beyond just gathering information, I wanted to live there. I wanted to spend time there, to build relationships, to observe, to speak and listen, and to try to reallocate who asks questions. Of course, such an ambition will always be framed with the challenges of being the outsider, something addressed at length in the anthropological literature (Geertz 1973; Clifford & Marcus 1986; Rosaldo 1986; Scheper-Hughes 1995). My attempt to address these challenges and mitigate the burden of positionality was via using digital video as participatory research tool as I discussed in Chapter 2, but also via actually growing Bt cotton myself.



Participatory Video: Scripting and Shooting.

In Chikhali, I stayed with the Chikhalkar family. Manoj is four years younger than me; his wife, Chaaya, is four years younger than he. They live with Manoj's parents and two young daughters. Manoj's best friend is Kiran Raut. The two families go back a long way; Kiran was born in the same house that Manoj lives in now, the same place where I stayed. I met Kiran and Manoj in July 2007 when I was with Arati Pankharaj from YUVA. At that time, Kiran and Manoj were on a "tour" organized by YUVA – they were cast in the role of organic model farmers. I initially assumed that to be the case, and it was only in the days soon after our first meeting that I realized they also grew

Bt cotton. Over the course of the next two years, I spent most of my time with Kiran, Manoj, and his family. They stand out in many ways from their peers. Manoj works the land that has been passed on to him over generations, but he doesn't see that bright a future in farming, especially since his family has only four acres. When he was 21, he went to Ahmedabad, the capital of the neighbouring state of Gujarat, to get training as an electrical repairperson. Two years back, after working out of his home in Chikhali, he managed to rent shop space in the neighbouring village of Adegaoon – where Kiran lives – and he does everything from repairing TV sets to selling gas cylinders. And he's always had an interest in photography, so he freelances as such for the local paper, as well as for weddings and other events where the moment is to be captured. He keeps himself busy, is resourceful, and above all else, wants to ensure that his family is well taken care of. He sees the inherent risk of farming and has trained himself to ensure that he is never depending on one source of income alone.



Kiran Raut (left) and Manoj Chikhalkar (right).

Kiran, on the other hand, sticks to farming entirely as a source of income. His family has six acres, which his younger brother primarily tends to. Which is not to say that Kiran does not work it as well, but he has other things that keep him busy. His cousin Gajanand in Yavatmal, about a three hour bus ride away from Chikhali and the capital of the neighbouring district, sells laptops and computers for a living, and gave Kiran an older computer four years ago. Kiran has a natural talent and a lot of interest in learning new software packages, and since he had the infrastructure, he managed to forge a link with the land revenue department to provide records to farmers when they need it. Which they do for any wide number of administrative hurdles; bank loans, proof of assets, and so on. But aside from his work, Kiran has an amazing knack to get along with most everyone. He has no allegiances to anyone – politically or otherwise – and he is well liked by everyone. Both Kiran and Manoj were my immediate sources of feedback for ideas I may have had, people I wanted to meet, and throughout, a source of support when things were not going the way I had

planned or hoped. Without them, this research would not have been the same. They allowed insights into the people, practices, and politics of Chikhali that would have been impossible otherwise.

For these reasons, this chapter is a kind of departure from the others. The underlying themes are the same as the preceding chapters – how understandings of risk create and facilitate decision-making spaces that characterize regulation – but the modality of my analysis differs. This chapter is based on a number of case studies that will aim to portray not only these risk constructions, but also the characters of the people themselves who provided a basis for my understanding; characters that without the help and support of Kiran and Manoj may have proved less willing to spend the amount of time with me that they did. In doing so, a more embedded picture of risk framings will emerge out of these characters. It is based on interactions between farmers – resource rich, income poor, male, female, and so on – and those parties that also have a vested interest in farming as a practice.

The real story of regulation, as I have argued previously, is never based on top down biosafety assessment alone. It is based on how different parties negotiate the battlefield of regulation, each armed with their own distinct framings of risk. There are environmental risks, borne of environmental learning, but there are also social risks borne of social learning. One farmer who took to the stage during a post screening “talk show” had this to say about the kinds of risks he faces.

There is no security in farming; there are so many potential threats. Pigs and cows damage the crops. There are snakes, foxes, tigers and mice that threaten us in the field as well as the crops. And these migratory people who come and go damage and even rob our crops. Then there's the rain. It will rain either too much, or not enough. Right now, there's too much! The bolls are rotting on the plant. What can we do? This all depends on nature. I mean before we'd borrow money from a moneylender, and he'd charge one and a half percent. But now the government banned that! If someone gets sick at home and you have no money, that person might die! I went to the bank so many times to get a loan, but they always turn me away, saying I defaulted before. It's crazy, I have twenty five acres! I mean, I do think about suicide sometimes. Other farmers have just given up; they sell booze instead. All of this leads me to consider suicide¹.

And while this sketch captures many of the environmental risks, it is also the more social constructions of risk that are what this chapter will depict. There is a balance between the two, and in depicting this, a more holistic picture of risk framings, as a root of farming practice given the emergence of Bt cotton – regulation at the level of the farm – will emerge. At the level of the farm, regulation becomes even more distinct from biosafety. It is more a matter of deeply entrenched historical practices of farming, of the interface between that and new technologies loaded with notions of progress, of getting the right information and of knowing the right people at the right time, of faith based systems of decision making, of notions of order in the universe, and perhaps most of all, of trust. And whom exactly one can trust is never clear.

6.1 The Setting

Chikhali is home to just under 700 people; there are 153 households. It is relatively remote. The nearest state bus stand is about 10km down recently paved roads, and there is no way to get to Chikhali aside from getting in a shared rickshaw, on a motorcycle or bicycle, or walking there. That said, the remoteness of the village does not relate to such spaces where Bt cotton is out of the reach of farmers. Since 2005, farmers here have been using Bt cotton, and judging by my observations of trends over three growing seasons, it is becoming increasingly popular.



Chikhali, Wardha district, Deoli *taluka*, Maharashtra. The Chikhalkar residence is located by the black dot near the middle.

Seeds are purchased from the nearest town where the state buses run regularly – the *taluka* administrative centre of Deoli. Though the nearest agrodealer is in the next village down the road, Adegaon, this shop just stocks basic inputs of a limited range. Deoli is home to almost all the administrative services that are relevant to farmers – land records, the agricultural extension offices, and the Agricultural Produce Market Committee (APMC) – the state sanctioned purchasing yard for raw cotton. But beyond that, it is also home to four major agrodealers, and one in particular who has been around for ages. Aside from the district capital of Wardha, Deoli serves as the first link to the broader state machinery that links farmers to both the Maharashtra government machine as well as the private sector. And both compete for farmers’ attention.

According to my the data I collected in Chikhali between August 2007 and July 2009, just under two-thirds of those in Chikhali are engaged as farmers, while one-third engage as labourers, both on and off farm, and about 3% own shops or drive rickshaws. Of those who own farmland, the average size of landholdings is five acres, and half of the land is devoted to soybean cultivation and half devoted to cotton. Of the half devoted to cotton, 40% is Bt cotton, with the remainder non-Bt. The decision of what to grow post monsoon is divided between soybean and cotton – two crops with guaranteed rates set by the government. Soybean is the other major crop, and depending, it actually comprises most of what is grown, along with millets, vegetables, sugarcane, and pulses. The choice primarily hinges on the time between sowing and harvest – soybean and cotton are both planted in July during the onset of the monsoon, but soybean is ready for harvest by October, while cotton continues to produces “flashes” until January. Cultivating soybean allows for an additional sowing opportunity of vegetables, pulses, or grains, but there are other factors, which depend on a seasonal basis. For example, minimum support prices, election schedules (which invariably affect the MSP), and what other farmers are doing in a particular year. In such a small community, everyone knows what everyone is planting, and decisions made by individuals are nearly impossible to hide.

But everyone has an interest in cotton. There are caravans that come to the village prior to the monsoons when farmers are buying seeds extolling the virtues of Bt cotton, posters plastered on the walls, even plays put on by seed companies where actors depict the horrors of not using Bt cotton amid much pathos. Conversely, NGOs visit the village, loaded with literature, LCD projectors screening videos depicting the benefits of “organics” as opposed to Bt cotton, and bring (hire) “model farmers” to proselytize on the evils of Bt cotton. Everyone competes for the attention of farmers, depending on their respective framings of risk. Bt cotton does represent a technology, true, but beyond that it serves to represent something else. Many I have spoken do not refer to it

merely as a pest resistant variety, but rather as an indicator of progress, of the efforts of an altruistic state that has authorized Bt cotton in the best interests of farmers, as a vehicle for firms to capitalize on demand and make their money – just as farmers wish to capitalize on the purported benefits and make their money. It is the future. This view of what Bt cotton can present is precisely where the interfaces I consider here lie, and it depicts the battlefield of regulation at the level of the farm.

Generations have been planting cotton here, and yet here is a new variety, sold on the premise of doing something that no other variety has done before; lessening the amount of pesticides that need to be applied. While perhaps in 2005 some farmers simply did not spray pesticides, they quickly found out that Bt cotton does need pesticides. Not only that, there are viruses that need to be controlled, fungal infestations, new spacings between plants, and soil compositions that have to be considered. These are not necessarily new concerns for any cotton farmer, but this sudden leap – first from OPVs saved and reused by farmers, to heavily subsidized local varieties offered by the government, to hybrid varieties offered by the private sector, and now Bt event hybrids primarily licensed from Monsanto, the rapidity at which farming practice has changed – or at least has ought to have changed – has been unique and unprecedented. And herein lies the challenge of using Bt cotton: how do you use it? No one farmer appears to be really sure.

But everybody is paying attention. Farmers either check out what other farmers are doing, they seek out information from agrodealers, they try, make mistakes, learn, and try again – whatever they do, the fact remains that they are using Bt cotton. Of course, some choose not to, and the reasons why are firmly embedded in their own framings of risk, but overall, there is a greater risk at stake – that of being left behind. In adopting Bt cotton, a number of different risks are encountered, internalized, and navigated between interfacing parties. This chapter will explain what, why, and how.

6.2 The Practice

Given the nature of the community, I wanted to ensure as much as possible that I engaged with farmers on a day to day level, both as someone who was also growing Bt cotton, but more generally, as a fixture in the village. It was the only way I could gain the insights that I have; by spending as much time as possible with people, and by ultimately using these understandings to characterize better how risk is understood in practice. There are a diversity of elements of decision making practice that are distinct from those that the others I have profiled here adhere to; there are elements of faith, notions of destiny, and a much more intimately known series of individuals who

have distinct impacts on how new technologies are to be used, understood, and applied. But all these parties have an impact on what farmers do. In this way, regulation at the level of the village is quite a different process than what I have detailed earlier in the context of the government, civil society, and the firm.

As a result, the nature of how this chapter will unfold reflects these interactions; both those I did informally - over (many) cups of *chai*², bowls of *poha*³, in mornings, afternoons, or evenings - and those where I formally recorded the interaction on video. I used video to record all those I interacted with, where possible, though most government officials were wary of being recorded. But in Chikhali, it was different. If anything, it allowed for insights that I never would have got otherwise, and for one main reason: I not only shot the interviews, but I also forged a space where farmers would also use the camera. Farmers scripted their own narratives regarding Bt cotton and what it meant to them, and as I was not involved in the scriptwriting process aside from explaining a six to ten pane storyboard format, something quite unique occurred. In screening these pieces to Chikhali at night, more discussion would occur, and more insights were gained. Elements of these interactions weave their way into the case studies I present here. The case studies are all linked to video content, and can be accessed by the hyperlinks embedded in the text.

6.3 Characters: Growing Bt Cotton - Or Not

Over the course of eight profiles, a picture will emerge where risk is linked to factors wholly unique to the rural, farming context. This is key to establish. Although Chikhali may appear geographically removed from the administrative centres of Nagpur, Pune, Mumbai, or Delhi, all of the deliberations that take place in these spaces resonate in Chikhali, and for one simple reason: this is where Bt cotton is used, tested, validated, and accepted. And these deliberations *do* affect what happens in these centres - not only from an administrative perspective, but also in terms of the firms that supply seeds, as well as the civil society groups that are closely watching (and trying to influence) what farmers do. This is the interface (Long and Long 1992). But to better understand the underlying context of the interface, and then by extension what is at stake in the battlefield of regulation, a picture of risk needs to be painted. Chosen based on personal connections, income distribution, and Bt cotton adoption (or not), these case studies are here to achieve precisely this.

6.3.1 More Land Means More Choices: Risk, Assets, and Adoption

Walk out of the main entrance to Chikhali. Take a left. Keep on the road for about ten minutes, and you'll soon see a pathway to your right, leading to a large cow-shed. That's the way to Gajanand Patankar's land, and chances are you will see him there if the sun is out. If he's not there, he might be in Deoli talking to the extension officer, or maybe at home; but the latter is rare. Gajanand's rather high-pitched voice is in contrast with his rather large physical stature. Usually wearing a flash of vermillion on his forehead, he mostly keeps to himself, his wife, and his two daughters. He lives in one of the bigger homes in Chikhali, just off the main stretch; a relatively newly constructed home with his own well in the front, a thresher usually parked outside, and his black and blue Hero Honda Super Splendor motorcycle parked inside.

Gajanand is somewhat unique as a farmer in Chikhali, and for two reasons. First, he has the capacity to farm on far more land than most – eighteen acres based on a combination of sixteen that he owns, and two that he leases. Second, unlike most farmers in Chikhali at the end of my fieldwork in mid 2009, he does not use Bt cotton, and refuses to use chemical fertilizers. While the former is a personal choice based on the seed costing more than non-Bt hybrids, the latter is embedded in a somewhat different economic reality – the fact that he owns more land than others in Chikhali, and has a relatively larger space to experiment. In short, his owning more assets affords him more pathways to mitigate risk in the face of new decisions on new processes. The catalyst for these experiments is rooted primarily in his larger asset portfolio. And everyone knows this. As Sureshrao Chikhalkar, Manoj's father, puts it:

[h]e has a lot of land. So he can take many crops. He can bear the loss, as he'll make up for it in other crops. He can gain it in soybean - he does well with it - and the same with pulses and wheat, so he can grow non-Bt cotton. But it's not affordable for those farmers who have few acres of land. How can a farmer afford it if he only has four acres? He can't take the risk. I mean, I can't because I don't have enough land⁴.

Gajanand strives to ensure that he gets the most out of his investment, while minimizing the facets of what may present unwanted outcomes – in his case, ensuring that his land remains as fertile as possible by avoiding chemical fertilizers, and educating himself about non-chemical methods as suggested by a government extension officer. As he proudly states,

[y]ou see, those farmers who are using chemical fertilizers are getting less income than those who use organic fertilizers. Most people get three quintals per acre on soybean, but I get five. And because I don't use chemical fertilizers, my land is

really soft. When the guy I hire with the tractor plows it, he's amazed how soft it is. It's the same with Bt cotton; some of these guys get only five or six quintals per acre, but I get seven easy using non-Bt. So what's the problem? Look at [Janardhan] Kakde [another larger landowner in Chikhali] – he sowed Bt last year and did OK at first, but then it all fell apart. Even I tried it once, but then I left it. I don't need it⁵.


But apart from his assets, there is another less quantifiable parameter – the kind of person Gajanand is. The way in which Gajanand has made decisions in the face of new technologies is rooted in two complementary facets of his personality, something that no model of rational decision-making could really capture. While risk can be stylized within a decision-making model, it is illustrative to understand exactly how these risks are constructed, and who interfaces with him in the context of decision-making and trust. There are two dimensions that I will consider, based on two interfaces that Ganajand has in the context of Bt cotton adoption and two parties who purport to offer their expertise – the agrodealer and the government extension officer. While one lies at a point of conflict due to clashing framings of risk, the other forges a more welcome space, the result of more matching risk framings.

First, Gajanand has a very particular worldview, one that differs from most of the farmers I encountered in Chikhali. He is wary of the advice of the agrodealer, and goes as far as to say, “you can't trust anyone”. In his words,

Farming is our responsibility, not [the agrodealer's]. Your soil may deteriorate, you might get the income you expect or you might not – but no one really cares. Look, we just have to make money. That's our responsibility. [Agrodealers] will say anything; ‘give this much fertilizer per acre’. But see, that's how they get paid. Meanwhile, our land gets destroyed forever, along with the cash we earn. Getting decent yields is our job, those guys will say anything, so forget them. Dealers can't tell us what these chemicals might do to the land. I mean, if a dealer did, how could he make money⁶?

In this way, he is wary of allowing the incentive structures of an input dealer to interfere with his own decision-making processes. Both the farmer and the input dealer are entrepreneurs, and both are most concerned with the bottom line – turning a healthy profit. The difference lies in what happens post decision and outcome, and who is ultimately responsible for the outcome. In his view, an agrodealer has little interest in whether suggested inputs are effective or not. Farmers are

ultimately accountable to themselves, and themselves alone. This is further illustrated by his response to a query regarding the existence of a guarantee. When asked if he felt that there was such a thing, he opined that:

[t]here is no guarantee on anything. Nothing. If we buy something today, what will happen to it tomorrow? No guarantee. If we plant seeds today, we have no idea how much we will get tomorrow. I mean, life has no guarantees. I might die tomorrow. Some people want a guarantee. Some people say, 'I'll do well this year for sure'. But if you ask them why things didn't work out they'll say, 'oh, there was poor rain', or 'I should have sprayed one more time, that's why it didn't go so well.' But you know, really, there are no guarantees. And you can't believe in anyone either, especially in this current age of *Kali Yuga* .

Gajanand presents a picture of a farmer who has internalized the risks of farming as much as he can, but does so given his richer asset portfolio. While he recognizes that there are certain risks that he cannot account for – “I mean, this year I had to sow cotton twice because the rains were bad. But whatever I spent is spent – it's not coming back” – when it comes to those elements of his enterprise that he can control, he places the responsibility of steering it effectively squarely on his shoulders, and his alone. As he further argues, “who drowns, the farmer or the dealer? If you owe money to the dealer, will he forgive that? No. You have to pay it back, today, tomorrow, sometime⁸.”

However, and unlike his distrust of the agrodealer, Gajanand does place trust in government extension officers, based on his observations of how the advice that the officer gave him has been of benefit to him, but also due to how he perceives the role of government. Again, this sets him apart from most other farmers I encountered in Chikhali, who have a fairly sceptical view of how useful and relevant information shared by these agents are. Unlike most other farmers, he has been using non-chemical methods for five years, as based on an interaction he has had with a state official. It is here that his understanding of risk take a detour. In his view, the state does have valuable information to share, and in this way, it also serves to mitigate his risk burden. In his words:

“I started using cow dung for fertilizer about five years ago. I mean, it's cheaper than chemical fertilizers, but it's also better for the soil. I never used a lot of chemical fertilizers anyway, but the real change happened after speaking with Mr. Parathe (the district agricultural officer). He gave me a book on organic agriculture⁹, and I read it. So the first year I tried it as an experiment, and for the

past four years I've kept doing it. But, that kind of experiment is only possible because I have a fair bit of land – I can diversify my risk¹⁰.

While this is, he argues, reflective of his own asset portfolio, it is also reflective of a somewhat contradictory relationship between himself and those who can provide advice, mandated or otherwise. While he is wary of the agrodealer given what he perceives as his self-serving incentive structure, the same does not hold true for a government official. When pressed as to why this seeming contradiction exists, he responded:

Well, OK, but the government is working for the welfare of farmers. It's doing good work. But you know, only some people will get benefits. That's the way it works – the government is trying their best and some things will work out, others won't. But I trust them. As far as corruption, well, it's kind of our own fault. If we pay them bribes, we just make them greedy. If we give them 2000 or 5000 rupees for something to be done, it becomes a habit. So they take liberties with us, stop the work until we pay them. So we pay them; 'here take this 4000, do it fast'. I mean, who wouldn't take the money? These guys can't work against the government, but they possess power, so they will use it. But still, we have to have some faith in them. I mean, we should. Right now, I'm building a shed on my land that will cost one *lakh*, and I am counting on getting a 30,000 rupee subsidy. I will get it. Maybe in one month, maybe two, but I filled out all the paperwork, and I have faith. Some people are in far worse shape than me. They really need subsidies. Poor people have expectations, but sure, they're not all the same. Say today you are not doing well financially, and I am. But if you get assurance from the government, you have to have hope. We're not all the same in terms of opinions and assets. If someone borrowed cash and did his best, well, he has to be concerned about it. I mean, what else can he do? He has to have these expectations¹¹.

This all serves to illustrate one thing – in owning more land, a farmer like Gajanand can afford to take more risks, and most crucially, to avoid Bt cotton. In his view, Bt cotton not only implies a higher cost burden, but also presents the risk of damaging his primary asset – his land. But at the same time, it is coupled with a distinct relationship between those that are in a position to give advice; the agrodealer and the extension officer. While he recognizes the entrepreneurial drive of the dealer – in many ways it is quite similar to his own – he also recognizes that the dealer can never be held accountable to anything he suggests. Conversely, the extension officer, as a

representative of the state, *is* accountable. And though he is aware of the corrupt nature of many of these state agents, he again places the burden of how and who generates such perverse incentive structures on farmers themselves.

In this way, Gajanand constructs risk as a function of his relatively higher asset holdings, which allows more room to experiment, just as he has done with the advice of Mr. Parathe. But, the underlying theme is that higher asset holdings allow for not only a greater capacity to experiment, but also perhaps a more agreeable interface between a farmer and an extension officer. In terms of regulation, this is the consequence of his particular framings of risk – his decisions are affected by his asset holdings and his view of two sources of expertise – the agrodealer and the government extension officer). In short, regulation here is a function of how much risk one can take based the amount of assets you own, which interfaces with a source of expertise that has been validated due to a measure of trust. But, there are more places to place trust in that a person alone.

6.3.2 *Decisions and Faith: Destiny, Decisions, and Dharma*

There is one Hindu temple in Chikhali, located at the opposite end of the main entrance. It serves not only as a place of worship, but also a meeting point, a source of shade on hot afternoons, a place to sit, chat, and call those passing by to join you in a cooler place. But it is not the singular focal point for faith based worship. All Hindu households in Chikhali have their own shrines within their homes, where food is offered on a daily basis, framed prints of Ganesh and local saints are hung and adorned with flowers, coloured lights are turned on at night to illuminate them in the absence of sunlight. There are similar points of worship in farmers' fields, particularly after the onset of the summer monsoon, when seeds are first sown. The first thing that farmers do before beginning the day's work during the July sowing season are to break a coconut, offer a piece and a spoonful of coarse sugar to everyone present as *prasad*¹², and to then apply a mix of vermilion powder and rice to ones forehead.

But this is not merely about adhering to historical-religious practices. In the context of risk, such practices are a window into how farmers here locate duty and faith into farming practice. Performing such activities prior to sowing allows a means to ensure – from the perspective of faith – that the season's crop will be a good one. As Sharadrao Chikhalkar, a close family friend of Manoj and his father in particular, puts it, "if we don't perform our duties, if we don't worship God, then God will not do anything. If we do, then whatever God has written will unfold. And we can just relax, be secure in that knowledge¹³." There may be order in the universe, but the only way to

ensure that the future unfolds in a predictable, manageable way is not based on one's current action alone. There is a deeper design at play, and there are roles that are to be adhered to if one wishes to acknowledge this design and allow it to guide one's path.

As the quote in the introduction makes clear, farmers look at the notion of risk as being central in farming regardless, and such practices are borne not only of tradition and nostalgia, but a keen awareness of the uncertainty that farming presents. While Gajanand represents someone who holds himself entirely responsible for his own decisions and frames risk accordingly, other farmers in Chikhali work around these parameters in different ways. Risk means something distinct to someone who believes that future outcomes have a predetermined trajectory. This is particularly relevant when a means to manifest these future outcomes is perceived as presented in a particular text – in this case, the *Mahabharata* and the *Bhagavad Gita*. In a similar way that the government frames risk according to losing the biotech race, faith based risk framings establish that the interfaces that characterize the battlefield of regulation are not merely between individuals, but also with practices, beliefs, and as a vehicle, ambition. In this context, decisions are framed by doing the 'right' thing now to manifest the 'right' outcome later. This certainly applies to all the parties detailed here. But the departure on the farm is that what is 'right' is often based on what these texts dictate.

The interface this case study will illustrate is between new technologies and faith based systems of decision making. If there is perceived order, then the established narrative of expected utility theory in the context of the microeconomic "rational agent" becomes less tenable. Risk averse behaviour becomes more difficult to assume when faith dictates actions that may appear to counter the decisions that risk averse, rational agent is supposed to make. In particular are how decisions are to be made in the context of duty, or *dharma*. An older farmer, one of the oldest residents of Chikhali argues,

[f]armers must work in his field whether he faces a loss or a profit from it. God says that man must not have any expectations while performing his duty. Farmers must do his work even if he plunges into the pond of debt. If one enters the field of agriculture, he can't divert from that path. It is the kind of web in which we are caught. Just like Abhimanyu¹⁴ was caught in a maze and died there, we are in the same situation¹⁵.

While an ideal that many aspire towards, forgoing expectations is far more difficult to manifest in practice. However, the level of faith one has in sticking to the "path" can offer a sort of insurance

against undesired outcomes. One can internalize the potential of harm by concluding in the face of an unwanted outcome that “it was God’s will”. In the end, if the farmer has performed all of his or her duties to the best of his or her ability, then observed outcomes are, a consequence of these actions. In this way, the risk present within farming becomes something that is reflective of two dimensions. On the one hand, how past observations are used as a means to project future consequences. Farmers are acutely aware of the experiences of their peers in using Bt cotton, and they base their decisions on these cues. This mirrors the rational agent of conventional economics of risk. But on the other – and this is what distinguishes the farmers I have met from the rational agent, and why this case study is key in the larger picture of rethinking regulation – future consequences are not always determined by past and current action alone. Destiny complicates matters. As Sharadrao further argues,

[l]ook, God won’t tell you to do anything. It’s our responsibility to think and act for ourselves. But at the same time, whatever does happen is God’s will. I wouldn’t want to know the future. If you came to know, it would just disturb you. But the future is written in the scriptures, in the *Gita*. It doesn’t matter if you are Hindu or Buddhist; if you read what Ambedkar says and follow it, your life will unfold smoothly¹⁶.

In such a framework, the emergence of Bt cotton presents a conundrum. How does faith based practice interface with technology adoption? If farming is a duty, and the future is predetermined and manageable based on doing the “right” thing now, where does Bt cotton fit in the decision making process? Does it offer a way out of the maze? And if it does, then would it not be in the interests of a farmer to capitalize on it in order to take care of themselves?

In explaining why Bt cotton has been so widely adopted, another farmer, Gopal Virpate, links the emergence of the technology to the current age of *Kali Yuga*, something Gajanand also referred to. In his words:

This is the age of science – Krishna told this to Arjuna. It’s written in the scriptures – in these times, everything will be hybridized, and nothing pure will remain. Look around – what’s original now? This all started 20 years ago. We used to grow our own cotton, but not anymore. We’re losing our traditions, and nature is not pleased. And if we upset that balance, everything will be lost. We aren’t controlling our own temptations, and that’s why we are suffering. If we took control of our temptations, we wouldn’t use Bt cotton. It costs more, and though

we get higher yields from it, it's destroying our soil. But people don't think about the future. They just want to get by today. But the thing is, we can't really predict the future anyway, because tomorrow is out of our hands. There are no guarantees. But: if you want to change this situation, you'll have to put your faith in God. Though you'll suffer along the way¹⁷.

Gopal argues that tradition withers in the face of the promise of higher yields, but with consequences – the balance of nature will be upset. This notion of “nature” appears here rooted in religious belief, but also meshes with how NGOs such as YUVA frame the adoption of Bt cotton as being “unnatural”. Yet at the same time, this is not merely a product of decisions made by farmers; it is reflective of the current age. Rather than Bt cotton being a product of intensive research and development, of a deliberative process of technical risk assessment, political risk manoeuvring, or economic risk mitigation, it is merely a predetermined fact of life – it is reflected in a broader plan. And according to that plan, it will be successful as both a marketed good as well as a technology. Gopal recognizes the technical benefits that Bt cotton can offer, but also recognizes the power of temptation; after all, farmers in this current age are prone to avarice and vice. Given that, any decision-making time horizon is bound by immediate needs, with little consideration for future gains. While some would argue this is reflective of income limitations and asset portfolios, Gopal would disagree – this is not about what farmers can or cannot do, but rather the fact that such behaviour is reflected in what the scriptures have indicated. Bt cotton and the rapid adoption of it are less a consequence of market dynamics and risk assessment. It is more a consequence of the time that farmers like him find themselves within.


The nature of regulation on the farm is firmly bounded by notions of risk, but this particular construction is wholly unique to any of the other constructions that have preceded or will follow. This is something no formal system of regulation can capture, and yet it significantly propels the decision making calculus of farmers like Gopal and Sharadrao. The interface here is between faith and new technology adoption, and it does not exist in a vacuum. Demand in such a context is not merely a parameter that can be estimated – it is a function of something far less quantifiable. The emergence of Bt cotton fits in the wider scheme of things. Adoption is merely a matter of following the cues – cues that are either accepted as being part of a larger, predetermined picture, or cues that are observed empirically in the present.

6.3.3 *Everybody Likes To Watch: Intra-farmer Exchange, Progress, and Risk Mitigation*

While the previous two cases addressed assets and faith respectively, the next three cases will consider a more instrumental basis for making decisions under uncertainty; the actual information that farmers have access to, either via watching other farmers, word of mouth, or technical information gleaned from agrodealers and agricultural extension officers. While on the surface, it might seem that these elements of information would be the most obvious place to look in characterizing the complex web of risk framings that farmers weave in the context of regulatory practice. But as these cases all point out, there are far from simple characterizations that render this picture clear. This first case study will address something that others have considered in some detail. For instance, in Stone's study on Bt cotton in Andhra Pradesh (2007a: 72-73, 2007b: 208), he refers to a process of agricultural deskilling; where farmers do not simply observe outcomes and decide, but rather develop new methods on how best to use the technology under variable conditions – it is, as he puts it, “the disruption of an ongoing process of skilling”, a “disruption of the balance between social and environmental learning that is instrumental in farm production”, and ultimately, a “degradation of the farmers’ ability to perform”. But while the arguments of these studies are recognizable in this work, there are other elements that these studies have not captured. Aside from the “fads” that Stone (2007a: 78) has observed, there are more embedded means that farmers I have observed use to navigate the new farming landscape that Bt cotton presents. And unlike Stone, I have observed farmers being quite critical, evaluative, and observant of the agro ecological realities of what they observe around them.

First and foremost, farmers are keenly aware of what everyone else is doing. This either happens by way of conversations, or by way of stealth. In such a small community like Chikhali, it's hard – indeed impossible – to not know the details of what is going on in the next house. This applies to marital troubles, drug abuse, extramarital affairs, earnings, and all the elements that make up for juicy gossip anywhere in the world. But along with this is farming practice. It is central as a means of livelihood, and if someone is doing something well – especially if they are doing it differently – others will get to know about it. As Bhimrao Wasekar is another rather unique farmer in Chikhali – he is utterly convinced of the benefit of Bt cotton, and frames its adoption on the premise of progress. His wife, someone who sells her services as labour during the growing season, depicts the following picture of how information spreads:

[w]hen we go to work in the fields we ask farmers, which variety is this? Where did you get it? What is the name of it? I collect all that information from them. Whether it is wheat, gram, or any other type of crop. And then when I go to meet women, I also tell them, ‘this variety is grown in that farmers field’. We have discussions like this. I also tell these things to my husband at home, that we went

to that farmer's land and the cotton is doing really well over there, each plant has a lot of bolls. It has become my habit now, when I go to any field, I count the bolls and ask about the variety. I always take such information, because I'm interested in farming. Sure, some farmers are reluctant to share information; they think that other farmers should not get income like that, so they keep quiet. But see, we can bring the labels [of that which we planted] home. Once there was a wheat crop in a farmers' field, a new variety, and it looked good. But no one was prepared to tell us when we asked. We asked both men and women, but no one was ready to tell, until finally a third partner came and told us that this variety is called "Baliram". So we got the information anyway  ¹⁸.

You can't really keep secrets. But the desire to know what is going on in the fields of other farmers is not just for the sake of curiosity alone; farmers compete with one another. There are elements of pride, of outdoing the other, of showing the other farmer up. And this is especially the case with Bt cotton. As Dilip Taywade, a former sarpanch and someone who has close political links notes,

look, farming is what we do. And since everyone knows each other here, sure, there is an element of competition. Everyone wants to be successful, and if you are, people want to know why and how. So we do compete. The thing is, some people are willing to share their secrets, and others are less willing. But that depends on the kind of person you are¹⁹.

Or, as Prashant Raut, a relatively successful farmer who uses his political contacts as well as possessing a strong work ethic observes, "sure, many farmers ask me how I do what I do, and I have no problem in telling them what they want to know. But others don't share that information because they are selfish."

Farmers know that there is something special about Bt cotton – they know that it has been very successful for some farmers, based on a combination of what they have observed when firms invite them to see trial plots, of news articles they may have seen or read, and of course word of mouth. And beyond word of mouth is something more applied; it is the capacity to observe first hand how Bt cotton has performed in the fields of other farmers in Chikhali. As Ravi Thool, a recent convert to Bt cotton, recalls,

I had visited a trial plot of cotton once [outside of Chikhali]. It had large branches, two to three feet in width, and it was as taller than a man and with around one or

two hundred bolls to each plant. I went there myself to visit. I'm not lying. And the quality of cotton was very good. Generally cotton doesn't get bolls until it is mature, and usually, after twenty-five bolls, the cotton plant dries out. But there was something special about this variety. And it's not like it was a limited plot, it was eleven or twelve acres of it. So if the question is whether or not there some farmers who are doing that well: yes, there are - it's true. But the thing is, farmers here will select it based on their experience, not just because they have faith in what others have done. An illiterate person or a person like me will purchase it as an experiment, not as a belief or trust at very first - because it's a private good. Thinking like this, people will use it for the experience. Then next time we will come to know what really it is. In this case, I will not trust it at once - it's still something sold by a private company. I'll let someone else buy it and then I will see what the result is. That way I can observe his experience and see what happens²⁰.

But this does not occur without a bit of soul searching. While Bt cotton does present the possibility of something new and exciting, there is also an embedded conflict between Bt cotton as a new technology burdened with what many have previously argued as detrimental effects on the soil, and then observed experience where empirical evidence seems to counter that. Again, from Ravi:

[w]ell, I used to think that our land is our mother, and that we can't spoil it. But now everyone is growing Bt Cotton, saying that there are no side effects of it. Those people that used to say it was bad are now growing it. I figured if they were doing so well, why shouldn't I? So even I have been growing Bt and I haven't seen any side effects. Sure, we have to make some changes while growing it, like the agrodealer said. I heard 95% of all the cotton in India now is Bt. Anyway, here, so far, it seems to be doing well. Farmers are getting good income from Bt. Maybe here in Chikhali the cultivation of cotton is less [compared to soybean], but those that do seem to getting more income from it. And if we are getting more benefit from changing our practice and using Bt cotton, there should be no objections. If we try it, then we can get to know what the problems might be. And we can then change our practice in the future, or keep on using it in the same way. This is the decision I have made²¹.

Risk here is mitigated by direct observations on the one hand – environmental learning as Stone would characterize it – but it is also tempered by social learning, underpinned by a desire to succeed and to achieve progress. And progress means something fairly explicit.

During one exercise where a number of farmers scripted a video storyboard on what progress means, the following picture emerged over fourteen “scenes”. Historically, farmers were indebted to crooked moneylenders, and due to illiteracy, were not able to gauge who is truly effective and trustworthy in terms of information. The main problem was illiteracy – it led to not using birth control, large families, and due to income constraints and the inability to send children to school, and more illiteracy among the younger generation. This illiteracy also plagued farming practice, with farmers not realizing how to use new inputs, and wasting resources in the face of this lacking awareness. As a result, farmers would resort to theft and other illicit means to make ends meet. Fifty years ago, farmers were embedded in tradition, and due to lacking technological innovations, would only get a quintal per acre. They would have to borrow money from moneylenders – not only for farming, but also for their other needs; namely a desire for status. But often, this money would be wasted on alcohol, gambling, or marriages instead. The farmer would default on the loan, and would lose his land. But through it all, the farmer did (and does) possess the skills needed – the issue is literacy. Farmers want to become educated, but society “pulls you down” – education is freedom, and others discriminate against those who seem poised to progress, especially based on caste lines. However, the 1970s saw the emergence of the Green Revolution, which allowed many farmers to prosper. And that was progress – economic freedom. Now, however, things seem to be getting worse again. Illiteracy is still rampant, and Bt cotton requires a particular way of doing things, something most farmers are not doing. It seems costs are going up, yields are going down, and the soil is suffering. As a result of all this, there is less and less interest in farming, and more quarrels among farmers; history seems to be repeating itself.

Social learning and environmental learning are thus complementary, and both are occurring, but behind it all are constraints, primarily access to information on how to use new technologies. And this is what characterizes the relatively slow rate of progress as stated by the preceding storyboard. The risk here is thus an analogue to the economic risks faced by the government – to “win the race”. The difference here is that the “race” is more localized; winning in Chikhali means doing better than your neighbour, being informed, and achieving “progress” in the face of real challenges. Regulatory practice in this sense is based on what farmers observe – environmental learning – but is equally tempered by the localized factors that emerge out of intra farmer dynamics – the desire to progress and to show it to others. The environmental learning aspect addresses how information is shared, and the social learning aspect addresses how (and why) it is used. The risks are not only

borne of encountering a new technology like Bt cotton, but also that of proving that you, as a farmer, can keep up. And if you have the right connections and the right information, then your chances of doing so increase. This is something that the next two cases will illustrate.

6.3.4 *The Agrodealer: Expertise, Entrepreneurship, and Incentives*

The town of Deoli is centred around the state bus terminal, and is home to about 16,000 people. Directly opposite the bus stand is a “T” junction. If you stand with the bus stand behind you, to the left is the road to Wardha, the district capital, and on the way you will pass the *taluka* administrative offices, then the APMC yard, and finally the district KVK before a 20 kilometre stretch to Wardha. To the right is the road to Yavatmal, and if you take the first left down that road, you’ll eventually get to Chikhali, though not after a few more lefts, rights, newly installed cell phone towers, temples, and field after field of cotton and soybean.

One can get most things in Deoli; shoes, clothes, rope, farming tools, and sweets. But most importantly in the context of this research, Deoli is home to four agrodealers. Out of the four, one in particular stands out – the shop owned by Sushil Umre. I came to know of Sushil early during my time in Chikhali, as he is the most trusted agrodealer in the area. Many farmers in Chikhali referred me to him. He has been there for twenty years, and he is both respected and quite successful as a farmer himself. His shop serves as a combination of a retail outlet, a walk-in crop clinic, and to a lesser degree, a meeting place. He’s usually there, a man in his mid fifties, either on the phone, considering the leaves of disease affected cotton or soybean that farmers from around the *taluka* bring to him for his diagnosis and remedy, or tending to customers, visitors, and fellow agrodealers. When we initially met and I explained to him what I was doing, he seemed to wonder what I could possibly want to know; clearly, Bt cotton has been a success, so what more does one really need to know? But over the months to come, he took a keener interest in what I was trying to do. Especially when I decided to grow Bt cotton myself. But I will address that aspect of this story later.

Sushil is both a successful farmer as well as a savvy businessman. He has been abroad on the ticket of Bayer to visit agro business trade fairs, he can recite the names of pesticides and fungicides like poetry, and he does know what he is talking about. He is genuinely excited about these new products, and he does want to help farmers. These are all factors that locate where his success lies. But one does not become a successful businessman on being an altruist alone. He has his own

incentives – as Gajanand has clearly indicated – that propel his enterprise on distinct parameters. On one hand, he sees himself as a source of information. In his words,

[f]armers come here to get more information and to get guidance. Whatever it might be – on cultivation methods, pest infestations, or fertilizers. We discuss it, and I provide proper guidance. So I've forged relationships with many farmers. Extension workers on the other hand neglect their problems, because they only know about the older methods. We all know private sector companies are doing research towards new ways of dealing with diseases. So farmers come to me for good on proper guidance on that, because someone has to. They need it²².


In this way, he sees himself as filling a gap of sorts. When farmers are faced with the novel challenges that arise from the adoption of new technologies, he is there to address and mitigate their risk – in this case, the technical risks of the efficacy of the technology in the face of a paucity of information on how to use it. In this way, he is a risk broker; he provides information to farmers who face new, previously unforeseen challenges in their craft. But, he also possesses a desire to capitalize on an information gap that the government should be filling. As he sees it, he bridges a gap that the government is mandated to fill in theory, but is unable to given their parallel mandate of only providing assistance on government sanctioned varieties. And aside from the CICR developed Bikaneri Nerma variety of Bt cotton – which by all accounts has been a failure – there are no government varieties of Bt cotton. So someone like Sushil is, in many ways, the only channel farmers have to get up to date information on how to use Bt cotton. But at the same time, he has his own frustrations about how farmers look to him to mitigate their risk.

Look, the soil needs fertilizer. If a farmer doesn't apply it, how can he succeed? But these farmers only know about the give and take – they don't really pay attention to what you have to do in between. And as long as they don't understand what you have to do between planting and harvesting, they'll think that Bt cotton is defective. If a farmer makes the right decision at the right time in terms of when to apply these inputs, they will earn more money. But of course all that said, it only really works if nature works with us. That's the first thing, and the second is assuming the government system works with us. But so far, the government is really guilty – all their programs have failed²³.

And while there is also the information included the packets itself, farmers are wary of following those directions given the assumed cost burden that such instructions imply. As Sharadrao

Chikhalkar puts it, “look, I don’t have that kind of money today, so I can’t go by the book. I’d have to borrow money from a moneylender, but then what happens if I can’t pay it back? He’d make my life miserable. I just do my work according to my own methods.” But interestingly, asking Suresh for what essentially amounts to the same advice does not pose the same problem, partially perhaps due to the fact that Sushil lends money in the form of inputs against future yields. Though, when Sushil was asked how often he does this, he appeared somewhat uncomfortable and stated he only did that with “friends”.

And this presents the other side of his personality, or his role of an actor in this story. While on the one hand he does serve as an effective source of information in light of the challenges faced by farmers noted here, he is also a businessman on the other; one who is ultimately propelled by the incentives present in any entrepreneurial activity. He sells farm inputs to assist farmers, true, but he also does it to earn money. Vittalrao Sarvakar, one farmer who ran in the *panchayat* elections but lost, had this to say about his activities and the nature of his incentives.

Those private seed sellers, those shops, they’ll say ‘this is the best variety, use this.’ So we do, and later he’ll ask, ‘how did it go?’ Basically, he’s collecting information from us, and then he can sell it not only to ten, but a hundred farmers. But at the same time, those shops provide the most accurate information regarding all these varieties  ²⁴.

Vittalrao’s comment points to the other dimension of his service – the explicit and accepted fact that, as Gajanand pointed out earlier, Sushil wants to make money, bottom line. And this points to a more instrumental facet of his role. While he is there as a trusted source of information, this is underpinned by an awareness that he also stands to gain a lot from farmers as a source of not only income, but of market information. But all of this is known – this is not something that is kept under wraps. It is accepted, because ultimately, his services are known to be of value. It is a mutual exchange of information based on an interface of risks; Sushil mitigating the risks involved in maximizing profit subject to both cost but also, less tangibly, his desire to help farmers, and farmers mitigating the risk of using a wealth of new technologies with a source of advice that appears to be most feasible and up to date.

The battlefield here is one of knowledge, and the terms of engagement is information on how to deal with new problems in the field. Sushil possesses the expertise, and farmers have the resources to propel his enterprise forward. It is a mutually beneficial arrangement in many ways, with both sides benefiting from the interface that arises when new technologies loaded with new risks

emerge. But, underpinning this is one factor that can tip the balance to Sushil's favour – he can prescribe whatever he wants. New products, new varieties of Bt cotton, and new biotic stressors enter the realm of farming every season. The only person who can really offer guidance is the agrodealer, someone like Sushil. And he knows it. There are many products that essentially do the same thing; for instance, domestically produced varieties of pesticides licensed from Japan, the EU, or the US. But how can a farmer distinguish between them all?

He can if he has a guide. Enter Sushil. It's a great spot to be in. Regulation in the context of private sector expertise is thus forged on decisions that are made under information asymmetries. In such a context, the agrodealer maintains a particular bargaining advantage – he holds the cards, so to speak, and can lead a farmer who is facing new and unprecedented diseases down any road he pleases. I have seen farmers come to his shop with soybean leaves that look like mosquito netting, the consequence of the army bollworm infestation that hit the region in 2008. In such a situation, what can a farmer do? He hasn't seen this before, he does not know how to deal with it, and he needs to salvage what he can immediately. And he'll pay. So he does. Because there is no one else, apart from the government extension officers, who can help. Regulation in the face of information asymmetries thus relates to who appears to have the most viable and effective means of navigating the uncertainty that new products and both abiotic and biotic stressors presents, and selecting this source of information based on the value of this information versus the explicit cost of it, tempered with an awareness that yes, Sushil does profit on such an enterprise, but the information is worth it. But what of the extension officers who have been mandated by the state to provide such advice?

6.3.5 *The Right Person at the Right Time: Government Extension, Schemes, and Contacts*

Girish Nagargoje is 27. In 2007, he took the posting as the *Taluka* Agricultural Officer (TAO) for the circle of villages that Chikhali belongs to. He's new at it, and though he studied for the posting, he does not, by his own admission, have years of experience to draw upon. Moreover, he never really had aspirations to work as an extension officer – he comes from a television broadcast background, and his true (or at least earlier) ambitions reflected a desire to work in the broadcast industry. But, as he says, "I am married now, and I needed a job. A regular source of income was attractive – I get 9000 rupees a month – and so I took this job." He hails from the Marathwada area of central Maharashtra – an area not known primarily for cotton, but more for soybean and pulses. It possesses a different agro climactic profile, a different dialect (which was the source of much mirth for many farmers listening to Girish speak), and a different history. Wardha district is not his home turf, and everyone knows it; he is starting from this handicap. But that is not the only one.

Girish is considered young, and as a result is perceived to be inexperienced. As one particularly inquisitive farmer, Babarao Thool, puts it, “[w]ell, Nagargoje’s appointment hasn’t been so effective. I mean, he comes here but no one even says ‘hi’ to him. No one knows him²⁵.” Babarao discussed how, in the past, he and the prior TAO had a working relationship, one based on mutual admiration. And it’s not as though government extension is not valued by farmers. As Bhimrao stated that “if [the government] organize programmes and spreads information to farmers, then our economic benefits will increase due to more income. People won’t accept new technology immediately. And it’s not easy to accept new technology. But it is necessary to inspire farmers²⁶.” It is not that farmers have no faith in the government – quite the opposite. In the words of Sharadrao, “the government is king. It wants the best for us, and it’s trying to solve our problems – I mean what’s better than Bt cotton? Why else did they authorize it? They give us benefits, like direct grants with 75% up front. Why? Because they want development²⁷!” But then, there are frustrations as well. As Babarao says, “besides from just ‘eating their breakfast’ [earning a steady income], they should improve our lot – I mean, that’s their job, right? This PM package was supposed to get us goats, nothing happened. Cows, same thing – nothing²⁸.”

These sketches of how the government is perceived presents a picture of farmers having expectations of the state, but ultimately being let down. And this also translates to how Girish is perceived. The problem is that Girish is new, and judging by the reaction he gleans from farmers in Chikhali, he is not particularly inspiring. He is not considered on the same level as Mr. Parathe, the previous TAO that Babarao refers to. The issue here is legitimacy – most farmers do not see him as a source of potential information that could be used to mitigate risk. But that’s not due to his not trying. I’ve seen him come to the three villages in his circle early in the morning – Chikhali would usually be the second – going from house to house, trying to round up people for an in field training session. And, sadly somehow, based on the clear signs of disappointment on his face, hardly anyone would turn up, or they would make him wait, he would have to leave, and the end result would be him leaving increasingly jaded and frustrated. In his words, “look, these farmers are lazy. They don’t come to the farmers’ field schools I arrange, they just come for the free food. I try, but no one comes!²⁹” But as Ravi Thool, a farmer who during the last season I was in Chikhali finally changed his mind and decided to give Bt cotton a try observes, it’s a bit more complicated than that. It’s not that farmers are lazy, but more that they know of the limitations that Girish faces. He opines:

the information can’t get to everybody. [Girish] will know you, and he’ll give information to you only. If he doesn’t get into contact with others – if they are

unknown to him – well, they won't get it. But he has to try to reach everyone. I mean, you could tell people ten times the same thing, but really if you focus on those who really are interested, you only have to tell them once. And you know how it is; if that information is useful, and if others see that it works, the word spreads amongst everyone then everyone will benefit. The government is trying to provide this information but it has not reached everyone. Because farmers can't go here and there, leaving their present work. Someone will get proper information, but not everyone will get the same information. If the government employees will come here then two or three farmers will get proper information. And more and more people will get to know about it³⁰.

On a similar theme, Babarao continues:

He should give that information to farmers of course, but I just don't think he's particularly effective. They should train at least ten farmers, and then those ten can educate others. I mean, one person can't teach the whole village. That's how he can be effective. But you know, that last TAO was great; this new guy is just not as cooperative³¹.

So Girish tries his best, and while Ravi might argue that he can't get through to everyone and that's not entirely his fault, and Babarao actually values the information but feels it's not being shared effectively, it also appears that few seem really interested in what he has to say, at least when it is not backed up by empirical evidence on the farm. So what role does he really play?

Girish knows what schemes have been mandated by the state for his provision to farmers in his circle of three villages, of which Chikhali is one. Girish and I spent a fair bit of time informally with one another, as I often was with Kiran, and Kiran and Girish became fairly close friends. While on the one hand, Kiran is not above making connections with the right people (he would often tell me "I want to make friends with him as he knows what schemes are available"), the relationship was not purely strategic. They were peers, and Kiran being his usual gregarious self would just pay him visits in the evening. It was in the evenings that we would usually meet. I had asked him how he actually decides who gets access to the schemes that he is in charge of managing. It was clear that not everyone could – many wanted to, but there just was not and are not enough resources to go around. That said, farmers navigate this reality in their own ways, something the next case study on political connections will detail. But from his perspective, how could he choose one farmer over the other? Was it a matter of playing "favourites"?

Well, yes, I have to have favourites. In the sense that I can't just allocate these schemes to every farmer. I have boundaries I have to adhere to. Believe me, I would if I could, but it just doesn't work that way. So the only way I can do this is to make relationships with particular farmers. Some approach me and have an interest, and others don't. I mean, some just want to talk to me because they know I have access to schemes. But those people aren't the ones I select. I select those that seem capable of doing these things. People like Gajanand for instance, and others as well, like Babarao Thool. I think there are about five or six that I can select here in Chikhali. Is that fair? Well, it's all I can do. How else could I choose who gets the benefits³²?

As Ravi has observed, Girish holds the key to government schemes. And this presents a potential way to mitigate uncertainty via gaining access to short-term concessions – subsidies or grants – that take an economic burden off those farmers that seek to court him. In this way, his presence relates to economic risks as perceived by farmers, and so when they get wind of such an emergent scheme – well allocations, seed subsidies, or other more infrastructure related elements as opposed to practice based – he is sought out. But the response to his seeking out the attention of farmers is far less successful, which relates to the second role he plays – that of providing pragmatic solutions to the challenges of farming; new means of pest control such as integrated pest management, vermiculture, and so on.

Although there are a handful of farmers who have faith in his advice, it is the first role that really characterizes the interface between what his expertise means in pragmatic terms between himself and farmers in Chikhali. And given the preference that most farmers have of seeking information from someone like Sushil Umre, Girish has a hard time competing as a knowledge broker. The information he is mandated to share just does not offer the same capacity to mitigate on farm risks in the eyes of most farmers, and though he is sincere, his efforts – and by extension, those of the state extension machinery that forms the basis for his work – are not particularly effective.

In this way, the presence of Girish and the interactions that occur between him and Chikhali farmers in the context of risk mitigation are based less on what he could offer in terms of potential advice, and more on quick access to short term financial concessions. This reflects a trend – voiced by Gopal in the second case study – that short term and long term planning horizons are dramatically different arenas. Moreover, it presents the basis for how farmers interact with those agents that are in a position to offer these concessions. Mitigating risk is as much about what you

know as it is about whom you know. And this presents a different angle to the practice of regulation in the context of farming practice.

With all the uncertainties present in farming, a strategic farmer will make sure he knows who holds the keys to making that effort less risky by offering financial concessions. It is less about what someone like Girish can provide in terms of information to counter these new risks – that’s something that Sushil offers. It’s more about knowing the right person at the right time. And Girish knows this; he also has favourites, and he knows who is more apt to listen to what he has to say and the opportunities that he has access to. The interface here is based less on technical information on farming as a means to mitigate risk, but more on the economic incentives offered by the state to lessen the risk burden of farmers. But there isn’t enough for everyone. And the only way to make sure that a farmer gets a piece of it is to make friends with the right people. Girish is one such person, but as the next case study will illustrate, there are other interfaces where risk is mitigated via personal connections.

6.3.6 “Corruption is Social Etiquette³³”: Politics, Bribes, Booze, and Benefits

The *panchayat* elections occurred in Chikhali just after the summer monsoon ended in 2009. The stakes were high. Whoever was elected was guaranteed access to the schemes – the *sarpanch* represents a direct connection to central and state government sanction schemes, and if you get in with the *sarpanch*, you potentially get a fast track to these schemes. As Girish argued, there isn’t enough to go around, and it comes down to who you know. But beyond this, it’s also how you know, as it presents a means to mitigate the inherent risk of farming, and the risk of adopting Bt cotton in particular. Political connections come to the forefront during an election, and there is a lot at stake. The election frames risk in a way similar to the means by which it is mitigated via being in Girish’s good books, but it differs in the nature of how these connections are made. Though in theory, *panchayat* elections are not based on political party affiliation, in practice it is what really distinguishes one candidate from another. The political allegiances of farmers in Chikhali – either BJP or Congress – are known to all. Again, it’s a small place, and nothing remains a secret for long. During a *panchayat* election, these allegiances are often what link votes to candidates. The risk here is also about who you know, but beyond that, it is about how you know them in the context of political party affiliation. And one has to choose if one wants access.

In a similar way as the previous interface was about mitigating risk via personal connections to those who have access to schemes, in this case study, a different dimension on a related theme

emerges. The interface is again primarily about material concessions as the *sarpanch* is the link to village politics and the broader *taluka*, district, and state machinery; he or she knows about the schemes and the value of what they may purport to offer. But, he or she is again constrained by limits, because in the face of scarcity, not everyone can access the schemes. The most immediate means by which connections are made here are via political support. As a result of such a dynamic, the election I witnessed was an intense time. There were fights, people were drunk on illegal alcohol given by either candidate to potential voters to woo their support, and no one really wanted to venture too far; the police were out in force and had little patience for drunken behaviour. All of this at ten in the morning.

The nights before saw serious campaigning; from house to house, the two candidates and their cadre of close supporters passed leaflets, urged each household to vote for them, and continued until ten in the evening. The reactions were mixed, but for the most part, it was very much along the lines of “oh, this again...sure, I’ll vote for you. Or him. What difference does it make? Are you really going to do the things you say you will?” Everyone seemed conscious of the fact that, yes, whoever does get elected is going to be that conduit to these schemes. But the general sentiment was “are they really going to help me, or just their close knit groups of supporters?” They had seen it all before. But this is the process. You campaign hard, do whatever you have to do to get as many votes – give people money, get them horribly drunk, or both – and hope it all works out. Sharadrao was particularly descriptive of his perspective on the nature of the stakes.

In any village, there are going to be two different parties. And if one votes for one party and not the other, the word gets out. Even if they used to be friends, those connections may be severed. Because, whatever new schemes may arise, the *sarpanch* is the first to know. But, he doesn’t tell everyone, and the government doesn’t tell farmers directly. If anything, they can just take the money themselves, and we’ll never know about it³⁴.

Again, the decision to adopt Bt cotton or not hinges on a number of variables, but they all serve to shelter farmers, in as much as possible, against the new risks that technologies like Bt cotton present. In the face of these new risks, mitigation strategies arise, and to this point, I have depicted asset holdings, the role of faith in decision making, access to valid technical knowledge, and access to monetary concessions as elements of the playing field. But the political dimension is distinct. The risk here is to not align yourself with the right party in the face of the introduction of new technologies, uncertain weather patterns (i.e. access to well subsidy allocations), and new pest attacks. Financial incentives offer a buffer against these uncertainties by mitigating cost burdens,

but as access to these schemes is not universal, there is an element of ensuring the right connections are made, and with the right people. As another farmer who did manage to get a well sanctioned for his land, Prashant Raut, puts it:

I applied to the irrigation office, after which I got the letter to sanction it from the district office in Wardha. The officer is the husband of my wife's sister. It's how things get done – you can't get these things sorted yourself. He's also a Congress party member like me. So it all came together. I'm happy about it, I'll get water this year. You have to schmooze with these leaders; work for their party. That's the only way. I don't really see any problem with it. It's better than being on some waiting list. It's all politics – corruption is social etiquette. At the end of the day, these schemes are really only meant for rich people, political leaders, and their relatives. So you need to make those connections. Just make sure that after you get them on your side, you don't cross their path³⁵.



Prashant Raut.

Again, access to political connections is useful for anyone, arguably anywhere in the world – no society is immune to back door negotiations and “fast tracking”. But this example is distinct, because of the underlying context – Bt cotton is not suited for rain fed land. Ask any farmer in Chikhali what their biggest challenge might be, and the answer will more than likely be “water”. Clearly, access to irrigation is valuable indeed. Add to this the uncertainty that surrounds Bt cotton, and water becomes even more valuable. And extend that to any of the other schemes that the government provides in limited amounts – credit facilities, grants, and so on – and the risks of not making that effort to link yourself to the right person at the right time becomes quite clear. Moreover, in the face of lacking information on how to best use Bt cotton, these connections become even more important. As Sharadrao further argues,

I don't really know where to get this information. I mean, one farmer says 'go here', the other says 'go there'. The only sure bet is to align yourself with the leaders; they have contact with the government officials. And they know where to go and what works. Remember, farmers won't get anywhere acting alone, that just wastes your time. People like Dilip Taywade, they know what's up and have the contacts³⁶.

Dilip, the former *sarpanch* of Chikhali puts it another way,

Look, everyone wants the ability to exert political pressure and have power. I had influence not only here in Chikhali but also at the *taluka* level. I also had influence over who became MLA and MP, because they all need village level support. But look; the main reason why village level elections are so important is because it is the only way people can get access to those schemes. So everyone wants to be a leader³⁷.

Politics in Chikhali has little to do with anything outside the immediate area of Chikhali. National elections mean little – “those guys never come here anyway”, and state level politics only matter in the context of MSPs for cotton. But when it comes to representation and the more direct material benefits of what it can offer, politics mean everything. Add to the mix a new technology like Bt cotton that is loaded with not only a lacking awareness about how to use it, but the threat of hitherto unknown diseases and pest attacks, and a farmer is going to do all he can to address these new uncertainties. This includes ensuring that someone who is both capable of passing on the schemes and a “close friend” gets into the coveted *sarpanch* circle. Because, as Sharadrao says,

“whatever new schemes are available will be first known by the *sarpanch*, and he’s not going to tell everyone.”

This is the interface between local political processes and new technologies like Bt cotton. As in the other cases, risk is mitigated by capitalizing on opportunities. In this case, political allegiances offer a risk buffer against the uncertainties of farming in general, and given the emergence of Bt cotton and the corresponding uncertainties of how best to use it, a means to insure against future losses. What you know is key in understanding these regulatory processes, but who you know – be it Girish or the *sarpanch* – is equally as important.

6.3.7 *Civil Society: What Have You Done For Me Lately?*

Aside from government extension, the firm as locally represented by the agrodealer, and other farmers, there is one additional party to consider in the context of interfaces, in line with the parties I have identified in this research: civil society. In July 2007, I first made contact with YUVA (Youth for Voluntary Action) Rural³⁸, based on a recommendation from Divya Raghunandan of Greenpeace. Affiliated with the Coalition for GM Free India (as discussed in Chapter 4), YUVA Rural works primarily under a mandate to provide alternatives to Bt cotton and input intensive farming. They are supported by a wide variety of funders – both Indian and international – and their mandate is focused on sustainable agriculture, tradition knowledge preservation, alternative livelihoods, and gender issues. This is a fairly wide mandate, but all of it fits nicely in the types of activities that donors are likely to support. Their annual report boasts of anywhere between five hundred and one thousand villages that have been successfully targeted for their initiatives, with over 240,000 thousand farmers directly affected by their work³⁹. These are impressive numbers no doubt. Of course, the reality of their outreach is somewhat less impressive.

I explained to Divya that I was looking for an organization that was open to the use of digital video in their work, and she suggested them. I first met the director, Datta Patil, and soon after one of their field workers, Arati Pankharaj. We met in Nagpur, I trained their staff in digital video production over a few days, and the following week I and Arati went to visit three villages in Wardha district. Chikhali was one of these villages. The context was to “educate” farmers about the benefits of “organic” cultivation. With Arati were three model farmers: Kiran, Manoj, and Sharadrao. It was my first time meeting these three. We went to two villages, Arati did most of the talking to sparsely attended “information sessions” in farmers’ fields, and Kiran, Manoj, and Sharadrao (though for the most part Sharadrao didn’t say much, but he rarely does anyway) would

narrate how their experience in avoiding Bt Cotton has been a positive experience for them. That night, we all slept at Manoj's house. And the next day, after discussing it with Manoj, I was given an invitation to stay.

Over the next few days, I quickly came to realize that the "model farmers" tag was a sham. All three of them grew Bt cotton, happily. I found this somewhat confusing initially, then highly entertaining, and finally quite interesting indeed. All three farmers got a meagre stipend for working with YUVA in the capacity they did. This became apparent as the primary motivation for their wanting to work with YUVA. In terms of YUVA's objectives, no farmer I spoke to really took it seriously at all. Which is not to say that there are no farmers that pursue "organic" methods, as Gajanand and initially Ravi have indicated. And there are benefits that are potentially accrued. As one farmer says,

Non chemical farming is profitable because we wouldn't have to buy seed – we could just use our own. And organic fertilizers can be obtained easily. Essentially, there are no real expenses, just hard work⁴⁰.

However, at the same time, others look to the kinds of suggestions that someone like Arati as being old and outdated. As someone convinced that Bt cotton is the future, Bhimrao recalls that:

in the old days, we used to do that kind of agriculture – what they call 'organic'. We know all about that. It's not that I don't trust NGOs, it's just that I can't really take them seriously. I mean if there was popular support – in the sense that farmers were really adopting what they are saying on a larger scale, then maybe I could take what they say more seriously. But as no one really does, it just strikes me as kind of silly. Besides, I'm not going to listen to some NGO type tell me about farming unless I can validate it myself. They're not farmers, so why should I trust what they say⁴¹?

A farmer taking advice from an NGO worker like Arati is akin to a car mechanic taking advice on how to fix a transmission from a *paan-wallah*. In the opinion of those interviewed here, they just do not possess valuable information based on real experience. There is a major disconnect; the risk framings just don't mesh, and moreover, there are often undercurrents of an almost condescending attitude among some NGO workers that does not help. As one NGO worker not affiliated with YUVA mentioned,

First of all, farmers don't know much about Bt Cotton. They don't know about chemical farming. They basically don't know how to farm on their own land, though as farmers they are their own boss. When they sow seed, they consult with shopkeepers. They get pesticides according to the opinions of the shopkeeper. They'll ask for any kind of chemical fertilizer. They are essentially ignorant about farming, and they don't think they should be aware of these things. They don't know about Bt Cotton or its side effects. Today's farmer is different from the earlier farmer. Therefore, it is the work of NGOs to disseminate the truth of Bt Cotton among farmers, and by doing so, they will stop using Bt Cotton.

But this appears naïve in the face of the evidence I present here. As he further states, "I don't think farmers really want development. They are not interested in new technologies. So we need to change their minds – we have to facilitate a change in mindset." But this focus on changing mindsets neglects a fundamental parameter of on farm decision-making – the fact that the time horizons and resource constraints of farmers in Chikhali just don't match up with the requirements that the kind of farming someone like Arati promotes. No farmer holding four to five acres of land can afford to leave an acre or more fallow for the two seasons required to allow the soil to regenerate. Although farmers do appreciate the long term benefits that these methods can present, current needs outweigh long term benefits. A model organic farmer might see the potential of the technique, but at the end of the day, that farmer is more than likely going to grow Bt Cotton. It makes sense in the short term.

In essence, the role the NGO on the ground is minimal. They do not hold enough perceived expertise to be taken seriously, and as such, do not really figure into the regulatory practice of a farmer faced with the opportunity to adopt Bt cotton. Their strategies of risk mitigation do not register with farmers who are faced with resource constraints, the fact that everyone seems to be growing Bt cotton, and the perception among many that Bt cotton represents progress – the future – as opposed to dated and old ways of farming. This is interesting given how effective civil society has been on a national level, as Chapter 4 has detailed at length. However, at a local level, they do not hold merit. Yet this does not apply to civil society as a whole. As discussed in chapter 4, the role of the farmers' leader is taken far more seriously.

When the first PM relief packages started to come through to farmers in Vidharba, it was big news. Here was the central government actually trying to directly help farmers by giving them direct material concessions. While of course there were the underlying political benefits of doing so, farmers welcomed access to fresh grants, subsidies, and other short-term material concessions. But

as I have discussed in Chapter 4, this did not come out of nowhere. It was both a response to what was perceived as a crisis, but it was sustained by the actions of others – notably Kishor Tiwari.

Tiwari is well respected by farmers not only in Chikhali, but all over Vidharba. When I first went to his office, I found him speaking to a number of women regarding a challenge they were having with the forestry officials in the context of timber collection for their fuel purposes. There were three other farmers from the surrounding area waiting in his office. One farmer, Tattranji Bhagate, had this to say about Tiwari:

My problem is that I didn't get reimbursed by the government for the land - my land - that came under the dam they built. Others did, but the government has been playing with my life by not giving me the money. Because of this, we are really in a mess. I came here to get justice. No one can do an injustice to me and get away with it. I came here to find out what is going on, why the government has not paid me. Other's have, why not me? If I don't get a fair price, I'll commit suicide. I don't have a choice. The government should think about it. They should pay me. Tiwari can help me, I can only hope he'll see this through for me. I trust him - he's the messiah of the poor. If I don't have my land, how can I get access to those relief packages? I can't. And then my only option is to drink that poison or tie the rope around my neck⁴².

And this is the distinction. While NGOs like YUVA are not seen as offering viable information – or more specifically, a viable strategy to mitigate the risks of farming broadly in the face of Bt cotton as a vehicle of progress and wealth - someone like Tiwari does present such solutions. They are admittedly short-term financial concessions, but as with all short-term concessions – coupled with how farmers make decisions across time horizons – this is of pragmatic use. Civil society has relevance not so much with regards to farming practice, as their prescriptive measures are interpreted as belonging to the past. The relevance relates to representation.

Again, in the face of the novel challenges that Bt cotton presents the context of performance and use, someone like Kishore Tiwari can navigate the often tricky political terrain and ensure that farmers get material concessions. As such, he is revered and trusted; farmers have seen what he can do, and in effect, the concessions he has generated serve to mitigate on farm risk. It is a successful interface because Kishore is keenly aware of the nature of the time horizons that farmers frame risk by. This is unlike what YUVA, whose suggestions are not based on empirical evidence per se, but rather a suggested means to combat the uncertainty of Bt cotton. Unfortunately, the

strategy fails, because the framings of risk do not match. It is a matter of trust, and simply put, a farmer will trust someone who can deliver, not someone who is politely suggesting going back in time.

6.3.8 *The Outsider: Risk And Starting From Scratch*

While all of these case studies illustrate dynamics that I have observed, this final case will focus on a somewhat unique character in this research: myself. In the 2008-9 season, I leased two acres of land to try to grow Bt cotton, much to the interest and support of farmers in Chikhali. **I did this for two reasons. First, I wanted to know what implications growing Bt cotton had, and I wanted to capitalize on both what I did and did not possess. I had never grown anything – let alone cotton – and I saw the effort as a way to come to grips with what kind of information was available to someone who wished to do so. As a novice, I would be starting from scratch, a position that would present me with the chance to “figure it out”, and, along the way, gain an understanding of exactly what other farmers do when faced with new, attractive technologies. In many ways, it was an exercise in exploring my capacity to grapple with the wealth of information sources that are available to farmers, and to better understand by way of action what sources were trustworthy, relevant, and applicable in practice. And while I did not possess prior experience in growing cotton, I did (and do) possess a theoretical training in the principles of action research (Greenwood and Levin 1988, Carson and Sumara 1997, Reason and Bradbury 2001). This is what lies at the core of the second reason; I wanted to involve those living in Chikhali with my research. Not merely as observers, and not to merely allow for the record of my research – this thesis – to be the only artefact of the work we did together. I wanted to allow the insights of farmers in Chikhali to become as much a component of my research as the observations I was making. While the use of video addressed that in one form, the act and process of my taking two acres on lease provided a more pragmatic and enticing way for those in Chikhali to offer additional insights on what I was doing. They were as curious as I was in seeing what I did, whether it could allow new insights into their own practice, and how I would fare in the end – both as an “outsider” but as well as someone who, after one year, was now a familiar fixture in the community.**

I think my deciding to try it myself somehow validated my time in Chikhali in the eyes of some farmers. It made my role there more interesting, and I know from discussions that I had with farmers informally they all wondered – as they wonder about any other farmer in Chikhali – how my enterprise was going to unfold. I had to ask around for land; I was not initially sure how I was

going to do this. But Manoj and Kiran also helped me out, and eventually, the husband of the current *sarpanch*, Janardhan Kakde – who had 18 acres – decided to lease me two, under the condition that I pay for all the inputs, he collects all the produce and sells it, and whatever is leftover in terms of income derived from selling the yield would be his. I would just get my cost back. So it was a pretty good deal for Janardhan. I just wanted to break even and see what would happen and was not aiming to make any cash.

Of course, what happened was characteristic of many of the challenges that farmers face. I had two acres divided in four squares – two of Bt cotton and two of non-Bt. One of each – Bt and on-Bt – was meant to be irrigated, and the other two not. Initially, all seemed to be going well. I hired labour to sow the seeds, and everything seemed to be fine. Until the pump broke. And then my non-Bt got infested with bollworms. And I could not find labour to spray because everyone was having the same problem. And then the rains did not come. **Compounding these uncertainties that I could not account for were those that I could account for, but was bound to for my own financial security; I was not always present in Chikhali over the 2008-9 season. I had outstanding contractual work obligations which took me back to Bombay. I imagine this may have caused some farmers to question my sincerity, but then on the other hand, those I spoke to about it mentioned that it was normal – many in Chikhali have other obligations that take them out of the village for extended periods of time. Ultimately, Kiran assured me he would make sure things were going smoothly on my behalf. But of course, he had his own land to tend to.**

But in the end, I still broke even. Unlike farmers in Chikhali, I never had any ambition of turning a profit; my ambition was more to talk to farmers to see what they would say in terms of providing “expert” advice, and also, who they would refer me to. Unsurprisingly, most queries led to Sushil. When I told Sushil what I had set out to do, he was also very interested. I had done a combination of asking farmers in Chikhali what inputs and seeds were best suited for the kind of soil of the land I leased as well as my own research on the internet, and so I came prepared with a shopping list of sorts. Sushil read the list, considered it, and then began to suggest alternatives. And more specifically, more costly alternatives.

Granted, there is a particular dynamic at play here – perhaps Sushil assumed that as a Canadian, I would either have more income at my disposal on the one hand, but more pressingly – as it was clear that I was doing this for the first time without any prior experience – perhaps he thought he could take advantage of me. We joked about this, but I held firm and pressed for lower cost options. I knew there were domestic alternatives to BASF, Bayer, and other technologies imported

and distributed in India by foreign multinationals. He relented, gave me what I wanted, but not without a certain element of “you’ll be sorry”.

My experience in attempting to grow Bt cotton was never about the end result. I was not concerned with the performance of the crop per se. The exercise was all about information gathering – how would I manage to figure it out? Who would I speak to? How would I account for the risks of growing Bt cotton? All roads lead to Sushil’s shop. Everyone I spoke to suggested I seek out his advice. It was not that farmers were wary of helping me, but more that they all agreed that Sushil was better placed. Granted, as Gajanand mentioned earlier, there is his own incentive structure at play, something I also noticed and navigated, but no one would or did deny his capacity to share his knowledge. And neither does he.

Ultimately, I found myself also trusting Sushil, and placing less trust in Girish, though I respected both a lot for their respective skills. Perhaps it was because I also noted that more farmers trusted Sushil. Perhaps it was because I also wondered about Girish’s cache of personal experience. The whole experience was fascinating and challenging, but one thing seemed to occur that I cannot help but notice – in spending enough time with farmers in Chikhali, I also began to adopt their framings of risk and regulatory practice. I found myself speaking to someone like Dilip, because he had the right connections. I also started to ask Manoj and Kiran what other farmers were planting to get a sense of what was the best option. I shopped around for the cheapest source of labour, and found myself hiring not the cheapest, but rather someone who was close to Manoj’s family.

Regulation seems contagious. In the face of uncertainty – in my case an even deeper uncertainty as I was essentially making it up as I went along – I had to find out what varieties were best suited for the land I leased, which pesticides were appropriate, who I could trust in terms of their commitment to show up the next day to do the weeding, how much was a fair price for that labour, and so on. But this is what every farmer in Chikhali does. No one knows what pests will attack, how much and when it will rain, and how much the MSP will be come harvest time. But everyone accepts that. I know I did.

6.4 Farmers In The Drivers Seat: Regulation In Practice

What I experienced and saw in Chikhali – the localized nature of the terrain, the belief systems that dictate so much of day to day life, the girth of what is at stake (life or death in the words of some noted here) are so very different to what a bureaucrat in Delhi, an NGO representative in Nagpur,

or a firm executive in Bangalore encounters. No doubt they also encounter and frame risks and interact with one another, but the arena in which they do so is often removed from the farm. But, the farm is the epicentre of all this. This is why regulatory practice as framed by distinct understandings of risk is so key to unpack. The literature I reviewed in chapter two addresses some aspects of this, but again, there is a lack of a focus on the how farmers engage with the state, as opposed to the more common focus on civil society and the firm. Yet I would argue that farmers are at the centre of the entire enterprise – they are what drive the market, the research, and ultimately, the formal regulatory process of evolution. This is why a co-evolutionary, co-constructed model of regulation is central to this thesis.

Ultimately, all the decisions that farmers make are what propels a booming domestic biotechnology industry. Someone has to buy these products, and of course, that someone is a farmer. But what of the greater interface between farmers and these other three parties? They are there, but given the locality, they again differ. Civil society occupies two worlds; that of urban spaces, courtrooms, and television reports on one hand, but also spaces linked to the farm. And the grand irony is that while what happens in the former space has a direct effect on formal, government regulation, it has little effect on farming practice – that regulatory system that farmers base their decisions on as reflected by their own unique risk framings. The state is omnipresent, but the relationship between farmers is seemingly contradictory. This is what sets the co-evolutionary process somewhat apart at the level of the farm; it is distinct in its direction, but at the same time, is completely premised on market demand.

While on the one hand, farmers look to the government to ensure their welfare and characterize Bt cotton as something that only a benevolent state would sanction, they also are wary of the advice the state provides. That role is best left to the private sector, who, though characterized as being profiteering, are also easy to relate to – after all, farmers are also entrepreneurs. It is quite different in Chikhali in terms of regulatory practice, something that this chapter has illustrated at length. In effect, this all feeds back into formal regulatory practice as conducted by the state and tempered by the firm and civil society, because everyone is watching farmers. It is the true testing ground for all the deliberations that the other three parties engage in.

Regulation as a process is characterized by spaces where the other actors detailed in this research may force their way in, premised on contested realms of knowledge and distinct framings of risk. This still applies at the farm. Yet, farmers, by virtue of the urgency of their livelihood, enter these spaces automatically. There is an urgency at hand, just as with firms and civil society, but it is localized in terms of the stakes of farming under uncertainty. That urgency is at the basis of

farmers' demand, and that is how they enter the spaces. Save for farmers' leaders who claim to represent farmers and are more forceful in interfacing with the government, farmers co-construct regulatory processes by virtue of their market preferences. Granted, their framings of risk are much richer than the welfare optimizing agent of economics. However, it is precisely these more locally embedded framings of risk that serve as the basis for their decision making.

Ultimately, regulation as a process incorporates all of the different dynamics and interfaces that all the actors detailed and discussed here engage in. It can never be about policy alone; it is the process, one forged on the battlefield of regulation.

Endnotes: Chapter 6

¹ "Talk Show" guest, 18 September 2007.

² *Chai* is the ubiquitous sweetened milky tea found all over India. In Chikhali it was often served in very small cups, and was offered generally when entering someone's home. I easily drank at least five to six cups daily.

³ *Poha* is a preparation of flattened rice, cooked in the region I was living usually with peas, potatoes, and chillies, often served with a bit of mango pickle. It is usually served for breakfast or as a snack.

⁴ Interview, S. Chikhalkar, Farmer, Chikhali, 7 April 2009. Refer to <http://ranaghose.com/thesisvideo/6-1>.

⁵ Interview, G. Patankar, Farmer, Chikhali, 12 March 2009. Refer to <http://ranaghose.com/thesisvideo/6-2>.

⁶ *Ibid.* Refer to <http://ranaghose.com/thesisvideo/6-3a>.

⁷ Interview, G. Patankar, Farmer, Chikhali, 12 March 2009. *Kali Yuga* is the last of the four stages that the world goes through as part of the cycle of yugas as described in the Indian scriptures. It is referred to as the Dark Age because in it people are as far removed as possible from God, with notions of *dharma* deteriorating. Refer to <http://ranaghose.com/thesisvideo/6-3b>.

⁸ *Ibid.*

⁹ The book was published by the Maharashtra Organic Farming Federation, an umbrella organization supported by a number of NGOs and the DBT. Refer to <http://www.moffindia.org>.

¹⁰ Interview, G. Patankar, Farmer, Chikhali, 12 September 2008. Refer to <http://ranaghose.com/thesisvideo/6-4>.

¹¹ *Ibid.* Refer to <http://ranaghose.com/thesisvideo/6-5>.

¹² *Prasad* is food offered to a deity or to a spiritual teacher, and is also distributed to devotees as a blessing. Refer to <http://www.miraura.org/lit/skgl/skgl-16.html>.

¹³ Interview, S. Chikhalkar, Farmer, Chikhali, 25 September 2007.

¹⁴ Abhimanyu is a character in the *Mahābhārata*. Relatively young at the age of sixteen, he was chosen to fight a battle that was to be fought by Krishna and Arjuna, but they were otherwise engaged in battle on another front. Moreover, he was chosen as this particular battle was to be fought in a labyrinth like structure, the Chakravyuha, which Abhimanyu was familiar with; he knew how to break into it, but not how to break out. Ultimately, he fought bravely and alone, and killed most of his opponents. He was finally killed himself when a number of his opponents, in full defiance of the rules of war as presented in the *Mahābhārata*, attacked simultaneously, ultimately dying when he was literally stabbed in the back, another violation of the rules of war.

¹⁵ Interview, Farmer, Chikhali, 24 February 2009. Refer to <http://ranaghose.com/thesisvideo/6-6>.

¹⁶ Interview, S. Chikhalkar, Farmer, Chikhali, 25 September 2007.

¹⁷ Interview, S. Chikhalkar, Farmer, Chikhali, 7 April 2009.

¹⁸ Interview, B. Wasekar's Wife, 21 March 2009. Refer to <http://ranaghose.com/thesisvideo/6-7>.

¹⁹ Interview, D. Taywade, Farmer Chikhali, 12 March 2009.

²⁰ Interview, R. Thool, Farmer, Chikhali, 2 May 2009. Refer to <http://ranaghose.com/thesisvideo/6-8>.

²¹ *Ibid.* Refer to <http://ranaghose.com/thesisvideo/6-9>.

²² Interview, S. Umre, Agrodealer, Deoli, 10 November 2008. Refer to <http://ranaghose.com/thesisvideo/6-10>.

²³ *Ibid.*

²⁴ Interview, V. Shivarkar, Farmer, Chikhali, 10 May 2009. Refer to <http://ranaghose.com/thesisvideo/6-11>.

²⁵ Interview, B. Thool, Farmer, Chikhali, 12 February 2009.

²⁶ Interview, B. Wasekar, Farmer, Chikhali, 3 October 2007.

²⁷ Interview, S. Chikhalkar, Farmer, Chikhali, 25 September 2007.

²⁸ Interview, B. Thool, Farmer, Chikhali, 12 February 2009.

²⁹ Interview, G. Nagargoje, TAO, Chikhali, 8 September 2008.

³⁰ Interview, B. Thool, Farmer, Chikhali, 12 February 2009.

³¹ *Ibid.*

³² Interview, G. Nagargoje, TAO, Chikhali, 19 March 2009.

³³ Interview, P. Raut, Farmer, Chikhali, 20 September 2008.

³⁴ Interview, S. Chikhalkar, Farmer, Chikhali, 25 September 2007.

³⁵ Interview, P. Raut, Farmer, Chikhali, 20 September 2008. Refer to <http://ranaghose.com/thesisvideo/6-12>.

³⁶ Interview, S. Chikhalkar, Farmer, Chikhali, 25 September 2007.

³⁷ Interview, D. Taywade, Farmer Chikhali, 12 March 2009.

³⁸ Refer to <http://www.yuvaindia.org/subrural> for more information on YUVA Rural.

³⁹ Refer to <http://bit.ly/eLPRrf>.

⁴⁰ Interview, Farmer, Chikhali, September 2007.

⁴¹ Interview, B. Wasekar, Farmer, Chikhali, 20 September 2008.

⁴² Interview, T. Bhagate, Farmer, Pandarkhawada, 9 March 2009.

CHAPTER 7

RETHINKING REGULATION: PRACTICE AS A PROCESS

Co-evolution and co-construction. These are two themes that others **working within the realm of Science and Technology Studies (STS)** (Jasanoff et al 2001; Scoones 2003; Millstone 2007, 2009;) have used to describe the process of regulation. There is no realm of knowledge that exists in a vacuum, and there is correspondingly no way that policy – as a necessary reflection of these contested realms of knowledge – can be formed without inputs from a wide variety of actors, of stakeholders, of risk framings. As these framings of risk co-evolve given the interfaces between these actors – whether versed in the science that generated the technology or not – policies change. This is why regulation as a process co-evolves according to events, and is co-constructed by actors who have a stake in the technology and the policy that surrounds it.

While this holds true with regards to all aspects of governance in a democratic form of government, this argument is amplified when the technologies enter the public sphere embedded with incalculable uncertainties. Perhaps more than any other example in recent memory, transgenically derived products – genetically modified food, crops, pharmaceuticals, the list goes on – provide real evidence of why. This thesis has used the story of Bt cotton since 2002 as a case study – a uniquely Indian experience – and it aims to present a different way of looking at how policy is formed in practice. By doing so, it presents a rethinking of regulation – that process that unfolds on a battlefield where multiple risk framings interface, clash, dominate, and change policy.

This thesis showed, by carefully pulling apart spaces, events, characters, and most importantly, constructions of risk, the process of regulation is not just about formal policy. Policy and regulation are distinct; where policy may be a set of guidelines, regulation is that process of how policy actually crystallizes. As I stated at the outset, the policies that India developed in the early stages of the evolution of the regulatory process certainly were premised on the assessment of scientific, technical risk. But – and this is a point that I have repeated throughout this thesis – biosafety is just one aspect of the risk assessment and management of transgenics in agriculture. This is what lies at the core of the co-construction that I argue in this research. Scientific representations of risk co-evolved on the battlefield, regardless of whether or not those parties involved possessed scientific expertise. The still ongoing battle has changed and will continue to change policy. Some warriors were – and are – more adept on the battlefield than others, and the process of policy change – regulation – was and will continue on the basis of this dominance. Risk management in the form of

policy changed given the nature of risk interfaces, and regulation is what this process of change encapsulates.

This is the distinction between policy and regulation. Policy may be what is on paper, but the process of how that policy forms - co-constructed and co-evolutionary on the basis of the interface of risk framings - is regulation. Of course, if policy does not change, I am not arguing that regulation does not exist. Rather, I argue that within democratic systems of governance, policy inevitably does change in the face of contested realms of knowledge, as premised on multiple framings of risk - here the uncertainty of Bt cotton - and that the battlefield of regulation characterizes that process. And while this is the story in many jurisdictions, this thesis is about the Indian experience, something that no one has considered through this lens to date. The Indian experience shows how civil society dominated the battlefield, transferring their framings of technical, economic, and political risks to an accepting public and a government that had to comply given political risks and newly enshrined legal tools used by a civil society claiming to represent farmers and the general public. Politically, this presented a context where policy had to change. And while the firm certainly was successful in presenting their framings of risk to a formal regulator that was eager to comply, given a successful meshing of these risk framings, the still ongoing battle has seen a evolution of these policies given the actions of civil society.

Constructions of risk are deep and ingrained in all of us. It is what allows us to place value on unknown outcomes, and it is the only way by which we can navigate the constantly changing world around us. Whether our constructions are based on past events as a basis for projecting a future, as the standard economics literature and practice argues, or based on some notion of order in the universe, as farmers interviewed here alluded to, we all are faced with decisions at every moment in our lives. Our capacity as humans to be analytical hinges on our capacity to make these decisions, and it sets us apart from all other living things on this planet. This thesis looked carefully at how these constructions of risk are formed, and more specifically, how they co-evolved and were co-constructed. At the core may have been science, but in practice, the nature of co-construction put scientific expertise against non-scientific considerations. The battlefield was rife with interfaces of multiple framings of risk, and scientific expertise was not a precondition to enter the battlefield. What happened was more based on dominance, on particular risk framings gaining traction via the complex interplay between political, economic, and technical risks, and with the still very much ongoing story framed by these dynamics. The years to come will see the Indian experience further develop, especially with the inevitable onset of transgenic food crops. And the

framework I adopted here will still apply as a means to pull apart and better understand these dynamics.

I arrived at this conclusion via my interactions with the four parties I profiled, but the means by which I interacted with them were unorthodox methodologically speaking. I merged two passions into one applied trajectory – my desire for analytical rigour on one hand, and my desire to use the moving image on the other. Cameras present a unique tool – as a disinterested and inanimate third eye, they create a very different dynamic in how people respond to queries. Cameras are mute observers devoid of an ego, and as such, I have found that those I spoke with were more forthcoming with their responses. The tool presented an air of permanence to the interactions; thereby fostering what I felt was a more involved series of interactions. The use of video in the classic sense – documenting realities by way of an outsider entering a space and interacting with people on camera – may have influenced what was documented in the video footnotes embedded within this text. But I would argue no more than if the camera was not present. Any interaction is based on trust, and trust takes time to forge – any “outsider” doing ethnographic research out of his or her element is prone to this dynamic, as the anthropological literature on positionality has discussed at length. Granted, the third eye of a camera lens creates new dynamics that may generate responses that those I interviewed would expect I “want” to hear. But my methodology was precisely a response to that potential bias. I trained people to document their own realities themselves. That was the point; to minimize that bias, that influence, that outsider perspective.

In this research, members of the community – familiar to all – scripted, shot, and shared their own content, thereby minimizing that bias and placing what I have termed the purity of perspective at the core of the effort. While those I spoke to knew the documentation was for “the record” – that my capturing those moments, expressions, and remarks could and would be shared to a wider audience – they also knew that they possessed authorial agency. In training farmers in Chikhali how to use video and tell their own stories, thereby allowing new spaces for their own narratives to emerge, I gained distinct insights. And in attempting to grow Bt cotton myself, I entered a new space as a researcher in Chikhali. I was no longer merely an observer, but a participant. Farmers were not merely subjects in my research, whose sentiments would filter into my writing via my own interpretation of their meaning, but they were given tools to actually author their own sentiments, on their own terms.

This combination of methodological innovation and a focus on how risk fosters the co-evolutionary and co-constructed process that embodies regulation is what sets this research both

firmly embedded within, but also apart, from the extant literature. The theoretical underpinnings of this thesis draws from an interdisciplinary palette of references and frameworks. Drawing from the STS literature, I have considered how social, political, and cultural contexts affect innovation. The introduction of Bt cotton is as much a response to a perceived demand by farmers for a material innovation as it is a function of a desire within the halls of the Indian bureaucracy to be taken seriously on a global stage. And this is of course forged on a far wider series of incentives than economic ones alone. Moreover, I have considered how these material innovations – once released into the market, either legally or illegally – have acted as a catalyst for a range of social, political, and cultural engagements.

For an urban middle class to become sensitized to transgenics in agriculture; for political parties to capitalize on their newly framed understanding of risk as a political tool; for civil society to carefully forge a culture of uncertainty and arguably fear among a newly sensitized public – all of these aspects of how the introduction of a material good borne of a rigorous scientific procedure resonates with a wider public are aspects I considered in detail. In an STS context, I wanted to address how new technologies that come loaded with the capacity to affect these social, political, and cultural changes, and how policy evolution responds to these changes. That is, can regulation still be considered a top down process of enforcing policy based on scientific fact alone?

Clearly, it cannot, and I have argued throughout this research that the answer is no. Rather than a top down process, regulation evolves according to the multiple risk framings that those parties I have considered here possess. Their framings of risk contribute to the construction of the process, and their actions forge new evolutionary paths of regulatory change, development, and application. While STS does consider risk in great detail in the context of new innovations, and how these risks interface between the multitudes of parties whom all frame risk differently, this research stands as unique given the nature of my carefully tracing the evolution of these interfaces in a developing country context. India has presented an ideal case study to historically detail how regulation has evolved on the battlefield. While others have focused on these collisions in the context of science and governance, precaution, participation, and risk framings (Jasanoff 1987; Wynne 1991, 2001; Levidow 1998; Levidow, Carr, and Wield 2000; Levidow and Marris 2001; Collins and Evans 2002; Wolf, Ibarreta, and Sørup 2004; Millstone et al 2008), there is a lacking focus on the experience of the battlefield in a developing country context.

Drawing from STS, this thesis has considered in detail what “expertise” really means in the context of how new technologies burdened with uncertainties emerges; the story of how civil society risk framings asserted dominance on the battlefield, rendering the notion of scientific risk as the crux of formal regulation less convincing. It has addressed how “science” relates to a broad public in terms of how the parties I have profiled here frame risk, and how policy has been affected given the nature of how this public has responded to the introduction of these technologies. But as this thesis argues, it is exactly how policy is affected that actually represents regulation in practice – co-evolution and co-construction. By delineating what I mean by a “public”, and by pulling apart how each of the four parties I consider have constructed risk, a clearer picture emerges as how regulation as a process evolves and is constructed. The collision of risk framings on the battlefield changed formal policy, and as I have argued here, those battle manoeuvres and the ways in which certain framings dominated characterize the process of regulation. While this is not necessarily novel in the context of the STS literature (Thompson and Scoones 2009), the still evolving case of Bt cotton in India has not been considered at this level of detail, and I would argue, not with the attention to detail in terms of the interfaces between the parties I have delineated and deconstructed.

Similarly, the biotech literature focuses mainly on performance studies (Weaver and Morris 2004; Chand and Raju 2008; Sarkar et al 2009). Where the literature addresses risk, it is through the lens of framing of risk as biosafety; either consumer preferences based on notions of safety (Chen 2008; Costa-Font, Gil, and Traill 2008; Knight and Paradkar 2008), the costs and efficacy of maintaining biosafety regulations (Pray and Bengali 2005; Bagavathiannan, Spok, and Van Acker 2011; Kothamasi and Vermeulen 2011), or how farmers characterize technical and economic risk in the context of adoption (Ho, Zhao, and Xue 2009; Zhao, Ho, and Azadi 2011). Yet, as I have argued throughout, risk in the context of regulation is not biosafety alone. Such a limited perspective is just not reflected in practice.

Granted, the starting point of regulation in India looked at risk through a biosafety lens, but as soon as that process of regulation began as an applied exercise – the introduction of Bt cotton – other framings of risk entered the equation. Risk could no longer be accepted to be biosafety alone – the notion of what it meant evolved given the risk framings of other parties; that is, their constructions of risk. While some observers have considered the role of political risks, the precautionary principle, public opposition to transgenics, and the resultant limitations of reductionist approaches to risk assessment in the US and the EU (Wynne 1995, 2001; Wrubel, Krinsky, and Anderson 1997; Levidow and Carr 2000; Krinsky 2000; Levidow 2001; Krinsky and Murphy 2002) they have not lent a focus on the Indian experience from the perspective of

unpacking co-constructions of risk and the co-evolution of regulation based on empirical evidence, and the forceful entry of non-scientific risk framings into the battlefield. This research does.

The effects of a scientifically derived marketable good like Bt cotton left the halls of science as soon as it left the lab. And while the technocratic process of managing the risks of Bt cotton may have been at the core of the policy that surrounded it, new risks emerged when others outside the realm of biosafety experts began to engage with the technology. As the literature I have reviewed has indicated, there was certainly a wealth of often conflicting quantitative studies on whether or not Bt cotton was a success, and indeed, much of the criticism against it was forged on an argument that the technology is not 'safe'. But again, in the limited worldview that presents risk as biosafety alone, safety can only be defined on these correspondingly limited terms. As this research has pointed out, there are many ways of framing risk. And given the nature of the technologies at hand, these other framings force their way in, forging the battlefield of regulation. The battle rages in India, but the process will remain one where the process is co-evolutionary and co-constructed by those who enter the battlefield.

While the vast amount of literature on regulation that I have reviewed in Chapter 2 certainly offers a firm bedrock on which to base any deep consideration of what regulation really means, there are some areas within that canonical literature that have not addressed the elements that I have. As discussed at length in chapter 2, the economics literature has considered regulation from the perspective of relationships between the firm and state. However, there are other parties that have relationships with the firm and state; more than two sides populate the battlefield, and public-private partnerships (Kinde 2008) – though a key trend in the ongoing Indian story – is not the only lens through which to consider these interfaces. Armed with distinct and opposing risk framings, the state has a far more complicated role in governance than the economic literature I have reviewed here presents. The formal policies it administers co-evolve with the risk framings asserted by parties outside the halls of the Indian government given the diversity of market epistemologies that mirror the different framings of risk.

This is a distinct take on the Bt cotton story in India from the perspective of the economics literature. Some observers of this technology have concluded that regulation is still forming in a developing country context (Raney 2006), while others have noted the political risks implicit in implementing policy (Qaim 2005). But there is little that encapsulates the interfaces between all four parties systematically via deconstructing risk framings. And while quantitative risk is addressed in the literature, the vast amount of culturally embedded reference points renders

probabilistic calculus insufficient to better understand the framings of risk involved. The economics literature is dominated by such assessments of economic risks (Chen and Tseng 2006; Shankar, Bennett, and Morse 2007; Bryant et al 2008; Crost and Shankar 2008; Shankar, Bennetta, and Morse 2008; Morse and Mannion 2009; Lybbert and Bell 2010; Eggert and Grecker 2011). Those that do address non-quantitative risk may consider technical, economic, and political dimensions (Guehlstorf 2008), but not the interfaces between the four parties I have considered here, and how these interfaces trigger regulatory evolution.

While governance has been addressed in the political science literature in the context of metaregulation, much of this discussion has focused on the role of civil society. Of course, this cannot be ignored – in the story that this research presents it has been key, and their framings of risk have often dominated the battle. The reasons why the notion of metaregulation ring true here is made more tractable – the Indian experience as I have detailed it offers a basis to apply this notion in an applied fashion; again, something that has not been done previously. While some observers have considered risk in the context of governance (Chataway 2005) or along the lines of the role of civil society and political and technical risks (Ramaswami 2007) they have not pulled apart the story in India along the lines of interfaces, have not identified the three streams that I have, and have not focused on the Indian experience.

Political risks often trump all others. There are many more who enter the arena of battle, and their involvement forges far more complex evolutionary pathways. Given this, while the international relations literature certainly presents a way to see how the international frameworks that govern transgenics found their catalyst and eventual structure, there is a heavy bias towards the US/EU experience (Gonzalez 2006; Falkner 2007; Sheldon 2007; Disdier and Fontagné 2009) as opposed to a tracing of how India had adopted, adapted, and enforced these guidelines. Some observers may have (Scoones 2005; Falkner and Gupta 2009), but not through the lens of risk interfaces as I have.

This is the novelty of this thesis with regards to the economic, political science, and international relations literature. The Indian experience is so unique, so rich with players, and so constantly evolving, that tracing it in detail and through the lens that Millstone has argued was timely, engaging, and perhaps most crucial, previously not done. Millstone's model holds, but in this research, there is a sharp focus on applying it through the observed experiences of risk interfaces. India certainly had and has those formal policy prescriptions on paper, as guided by a series of internationally recognized frameworks, but again, these took a backseat to the ongoing battles; battles premised on opposing ways of understanding the risk of technology.

This research is certainly inspired and guided by an understanding of the work on STS, biotechnology, and regulation, but it goes one step further: it presents risk interfaces as a means to consider how regulation co-evolved and is co-constructed, and what that really means in practice in India given the Bt cotton experience. And that is why it is distinct.

Bt cotton was a perfect case study of how these risk constructions play out in practice given the nature of the uncertainty embedded in the technology and the incentives at the root of its release. As I stated earlier, any scientist who argues that they can characterize the risks involved with transgenics is lying. No one can. But, these technologies are loaded with massive economic incentives. So what can the government as a manager of economic conduct – the classic formulation of regulation from the political science literature – do? According to that body of work, they have to let the reins slacken somewhat. Not that it is a choice they have control over however; the nature of the technology, as one that moves into the public sphere, forces the government to let some control go. They have no choice, because, and as I have shown, other parties enter that space of regulatory deliberation, based on their asserting their own constructions and framings of risk. In a context where no realm of knowledge is sacrosanct, the contested nature of these technologies creates interfaces where other parties force their way into processes premised on these realms of knowledge. They contest the knowledge, enrich it, and policy evolves. This is why regulation is a co-evolutionary and co-constructed process.

7.1 Diverse Regulatory Practices

This process has been driven by the government, firms, civil society, and farmers, though each in their different ways. Of course the diversity of actions reflect the diverse risk framings that each actor possesses. While the government may premise the risk framings on doing the science, winning the race, and controlling descent, it was forced to react to a far wider series of inputs, whether they liked it or not. Even within the government, there is not one common stance, as the Ramesh moratorium and current state of play indicates. Given the technical risks being held hostage by economic, and ultimately political risks, the mirage of biosafety as the guiding principle for policy formulation appeared. It did not last long.

Civil society had much to do with this, but not because they do not frame technical risks in the same way the government did and does. The difference lies in the contested knowledge that informed these technical risks. Civil society did not agree, and using the courts, forced the state to recognize their distinct technical risk framings. In the end, the courts were not sure how to handle this onslaught of technical information, but politically the information was capitalized upon. Just

as the economic risks of winning the race were inverted so as to present the risk as a liability as opposed to an asset, political risks were reassigned to entice a full scale moratorium on a technology that seemed to have passed science, but failed politics.

In a similar manner, the firm also had real effects on policy, but only because their risk framings meshed with those of the state. In a post 1980s pro-business environment, there were spaces ripe for interactions between the government and firms that created a policy and series of interfaces that were mutually beneficial. If the Indian government wanted to win the race, they needed help, and firms were more than willing to assist in the drafting of the Swaminathan and Mashelkar reports, the catalysts for the still yet to be finalized NBRA regime. Yet, the battlefield changed post 2005 with the introduction of the RTI Act, and the more recent actions by ABLE to counter civil society 'lobbying' are a testament to truly how much it has changed. Even if these technologies are developed with planned obsolescence in mind, the risk framings of civil society can no longer be ignored. Economic risks have to take a backseat to political risks, because civil society has proven how effective they can be in terms of influencing which direction the government goes.

And of course, it is farmers who still remain at the core of why the government wants to go somewhere to begin with. They buy the technologies, sow them, and sell them, and any effort at assessing technical risk pales in comparison to the millions of acres under Bt cotton in India today. But underlying this process of adoption is a detailed series of risk framings, distinct from the technical, economic, and political realms alone. Knowledge is also contested in this space, but it interfaces with a far richer set of cultural practice and cues. These risk framings are locally derived, but find their influence among the three other actors because they propel an entire industry.

A co-evolutionary model of regulation (Millstone 2007, 2009) is what best characterizes elements of this story. Beyond that however, risk framings pin down the trajectory that this evolution occurs within. That is where this research departs from the extant literature, and offers something novel. The battlefield of regulation is premised on risk framings. Because we all look at risk in different ways, consensus about how effective Bt cotton may be as a pest management strategy or whether it has helped or harmed farmers is impossible. Because other parties can enter these deliberative spaces armed with contrasting technical views – either borne of their unique incentives to frame it as 'good' or 'bad' or as based on contrasting technical risk assessment, assumed knowledge is contested. The battlefield is premised on this conflict. Anyone who still argues that Bt cotton is a 'success' or 'failure' misses the point entirely. There are just too many factors on farmers' fields that render such bipolar conclusions cursory and ultimately irrelevant. What I argue is that rather than succumbing to such simplistic parameters, the real parameters to consider are how all these actors

actually frame risk. It is the interface of technical, economic, and political framings of risk that characterize this dynamic, and that is what drives the co-evolutionary, co-constructed process of regulation. And again, this is only because Bt cotton was a technology that no one could accurately characterize the risks it came with.

7.2 The Balancing Act

But given that the government is ultimately manager and arbiter of these technologies, they still have to enact policy. It is their mandate, constitutionally enacted, and premised on a wealth of policy instruments. They are held accountable to these policies by judicial institutions and instruments, and nonjudicial techniques of forcing accountability to occur. Because the technical risks are contested, event interfaces such as using the RTI act on the one hand, or burning trial plots on the other have forced the government to incorporate the technical, but more importantly, the economic and political risk framings of civil society. Similarly, though the Mashelkar and Swaminathan reports set the scene for the current - and yet still unreleased - NBRA act, those recommendations did not come out of technical risks alone. The private sector - both Indian and international - ensured that those recommendations fit their economic risk framings, which meshed with that of the government. While the government may have framed it according to their own nationalist ambitions - not wanting to 'miss the biotech boat' parallel with a desire to be regional leaders - the firm just wanted to make sure there was not too much red tape. So, it was mutually beneficial to have such policies enacted, and it came from a meshing of these economic risks.

But, the economic risks of civil society forced their way in. In their view, missing the boat should never take precedence over what they saw as incalculable risk premised on immeasurable hazard. There was (and is) an urgency forged on nationalist pride (just like the government), of a battle that has to be won (just like the private sector), all bolstered by an unprecedented display of solidarity within a movement that was forged around Bt cotton. Politically, they forced the government to respond to their framings. Which the government did - why else was Bt brinjal stopped dead in its tracks? And similarly, why else would the NBRA have clauses to limit how effective civil society can be in the future in forcing their way in? However, the economic risk meshings of firm and state are quite resilient. I personally think it is just a matter of time before Bt brinjal comes out. Again, the economic incentives are just too significant; the economic risks too pressing to ignore.

Which brings us to farmers as those actors that provide the basis for these incentives. At the core of the entire regulatory framework is one thing: the demand of farmers themselves. Again, there is a

real political risk at play here. Farmer leaders act as accountability brokers in this space and know the political game; they know that in terms of electoral power, both the dominant political party in power or the opposition cannot ignore farmers. They can play both off each other, with the end result being that farmers get short term financial concessions, which serves to mitigate their economic risk on the ground. But away from these brokers, and closer to the fields themselves, there is something entirely different going on. It may appear to be unique – and it is in many ways given the lacking capacity of the literature I have reviewed here to explain it in detail – but actually, it is what really drives the entire story. Their framings of risk reflect a different decision-making time horizon, forged not only on very pressing economic realities and environmental risks, but also something no model of risk here can really effectively capture. How can one argue with a farmer who sees Bt cotton as a function of a cosmological prediction? If the age of *kali yuga* is premised on avarice and a neglect of nature, then Bt cotton fits right in. Besides, so many other farmers are prospering from it, and it is impossible to ignore these observable realities in a community where everyone knows what everyone else is doing. And, if farming is indeed like the *chakravyuha* – the maze that Abhimanyu had to break in the *Mahabharata* – what choice do farmers have? Is it not merely their destiny? From such a perspective, regulation as policy means very little to a farmer. This applies both as result of their worldview, but also as a result of firms who just release technologies with little regard to the formal policy like Navbharat seeds. In doing so, policies are forced out of the government.

7.3 The Process Of Regulation

But this is the point. It is shortsighted and false to view regulation as policy alone. It is not. Regulation is always negotiated between different parties, each with different constructions of risk, different views of what is safe, what is not, and what technologies are useful. Knowledge and so risk is thus always contested. And when knowledge is contested, spaces are forged and entered where the premises of this contested knowledge are countered – sometimes enriched, sometimes as a basis for capitalization, but constantly interacting. This is due to the uncertainty embedded in technologies like Bt cotton. Ultimately, regulation has to incorporate the views of many armed with multiple framings of risk. And that process *is* regulation.

Yet, this ambition to not miss the biotech boat drives the country forwards. It still presents the overarching theme. Win the race. Do the science. Manage opposition. But it hits speed bumps. And unlike my hitting speed bumps fast, slow, by accident and accountable only to myself, alone, India has to respond to a wider series of people who have a stake in making sure that transmission

does not fall out. It has to react, manage, assuage, cajole, force, and demand. There are political risks that have to be accounted for. Ask Jairam Ramesh or Kishore Tiwari. There are economic risks that have to be checked. Ask Divya Raghunandan, or ask anyone in Chikhali. There are technical risks that are seen in very different ways. Ask S.R. Rao or Pushpa Bhargava.

Though my focus over the course of this research was on India, the framework of analysis and the conclusions of this research are applicable to a wide variety of countries and contexts, as the nature of the implicit uncertainty of these technologies is universal. While agro climatic, geographic, and biotic and abiotic stress factors will differ across regions, the uncertainty of the long-term effects of using transgenics in agriculture will remain uniform. Of course, the precise nature of these uncertainties is diversified given contextual realities - the nature of the technology authorized, the absence or presence of democratic representation, and the strength of civil society being some parameters that this research considered. But that does not detract from the framework of analysis that I have deployed here. Risk framings will always remain diverse, they will clash, and science may not be at the core of any co-constructed policy. The battlefield can emerge anywhere..

The diversity of those who have a vested interest in the technology generates a multiplicity of risk framings, regardless of geography. Maharashtra may have been unique given the history of growing cotton in Vidharba and the nature and scale of central and state level financial concessions in the face of the agrarian crisis. And from a wider lens, India is unique given the remarkable rate of economic growth that has changed so much of the landscape - urban, rural, and in between. Yet many emerging markets have seen similar changes. Brazil (Pelaez and Albergoni 2004; Campini, Sampaio, and Avila 2005; Da Silveira and De Carvalho Borges 2005; Cardarellia et al 2006; Zepeda 2006; Hall, Matos, and Langford 2008), South Africa (Freidberg and Horowitz 2004; Aerni and Bernauer 2006; Gupta and Faulkner 2006; Viljoen, Dajee, and Botha 2006), and China (Marchant, Fang, and Song 2002; Chen and Qu 2002; Pray et al 2006) have all adopted transgenics in agriculture along similar timeframes, and are all facing similar evolutionary paths (Scoones 2005, 2008). Even in established markets like the US and the EU, regulation changes, evolves, and responds to the framings of risk as held and asserted by a wide variety of parties (Levidow et al 1997; McLean and Charest 2000; Lynch and Vogel 2001; Vogel 2001; Vogt and Parish 2001; Wiener 2002; Wiener and Rogers 2002; Löfstedt and Vogel 2002; Skogstad 2003; Sheldon 2004; Guehlstorf and Hallstrom 2005). Risk knows no geographic boundaries, and though the particular context and nature of these challenges may differ, the interplay between technical, economic, and political risks will remain.

Yet again, it must be stressed that much of what has happened in India in terms of evolution does find its catalyst in a very vibrant – and from 2005 onwards – a very unified civil society. While this is not necessarily unique to India, whether or not this framework is applicable to those countries where such a vibrant civil society does not exist, or more pointedly, is discouraged, is perhaps unlikely. Entry within regulatory spaces is not always by invitation, as the Indian experience has shown. But in the absence of legal culpability and mechanisms open to all, or coercive action against civil society organization, the interfaces I have explored and documented here may not be as tenable. Regardless, the consequences of these interfaces do provide remarkable insight into co-evolutionary regulatory reform, excepting those countries that do not allow for such evolutionary trajectories to occur.

But this research has focused on India. And that experience has presented a unique story where such trajectories have been fostered, championed, and forged, with civil society risk framings dominating and being a primary catalyst for regulatory evolution. In such a context, it does not matter what a centralized plan may be on paper. Because that is not what is going to propel the decision making calculus that characterizes formal policy. It is not the underlying science of Bt cotton. The overarching risks that surround that science remove the focus from science. The only thing that really makes a difference is the unexpected things that are going to happen on the way. Add a technology like Bt cotton that had, at the time of its introduction, uncertain consequences, and any effort of science based regulation is even more compromised. Place India in a global context where rules were adopted from other countries, where rules had to be made quickly, where rules outstripped capacity, and you get...the story of Bt cotton in India. This was and is a battle.

No one – farmers, firms, the government, or civil society – could predict the future. But they all had an idea of where they wanted things to go. They all looked at the risks in their own way. As an aggregate, you end up with a very complex system of interfacing dynamics that makes a mockery of some semblance of predictive regulatory rule making frameworks. That just did not happen.

And this is fantastic. Because, this is the way it should be. Yet, at the same time, the NBRA is being discussed in Parliament. I think it will be passed. But, then civil society will file a slew of new PILs. The NBRA will be amended. Farmers will plant BGII Roundup Ready cotton next year. It will be a resounding success. More startups will go public; IPOs will be massively oversubscribed and they will all be thrilled. Bt brinjal will be approved, along with mustard, potatoes, and any wide number of transgenic technologies. The public and private sector will cooperate to make this happen. There will probably be more bailouts, more agrarian suicide, and more and more young farmers getting out of farming. What will the government do?

I think they will just adapt. Yes, they will keep the focus on biosafety. They will continue to want to win the race. And they will respond to the surges of political incentives that such risks present and exacerbate. But they will not be alone in being in charge. They will have to adapt. And I think they accept this.

S.R. Rao at the DBT told me the last time I saw him,

[y]ou know I'm really glad you came by today. All these idiots have been calling me to some meeting or another, some perspective, I can't keep track. But I just wanted to relax a bit you know. This whole NBRA thing is making my life miserable. Everyone has a stake, and it's all turf wars now. But I have to say, it's been very interesting to me. So it was perfect that you came today. I just wanted to talk about all this. There's all these people making my life difficult, but you know, that's the story. Meanwhile I'm waiting for the Ministry of Health to call me. They said they had some issues with some clause or the other...(sighs)...ah, who knows. I hardly sleep nowadays. My wife is getting impatient with my always coming home at 10 at night and going to bed soon after. But it's still a great job.

For the most part, one person has written the NBRA bill. He has. This is the bill, the piece of regulation that is going to oversee the entire biotech industry for the years to come. One person. Granted, there have been consultations, but really, it is him. He loves it. It is "his baby". Of course, once it is leaked to the public again, a custody battle will ensue in the courts. Yet, I do not think he is that possessive about the baby. He is ready to see it go out into the world. He knows about the co-evolutionary and co-constructed processes that characterize regulation. He accepts it. Though it creates a lot of late nights and foments impatience within his wife.

Dr. Rao sits in this small office in the eighth floor of the CGO Complex in Delhi. He smokes a lot in there. Wills Navy Cut. I smoke a lot. *Chhoti* Gold Flake. We smoked a lot. No one else was allowed to. Well, I suppose rules are meant to be broken. I always liked Dr. Rao.

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APPENDIX 1

INDIAN REGULATION ON TRANSGENICS WITH REGARDS TO PLANT GENETIC RESOURCES

The management of transgenics in Indian agriculture via regulation reflects ambitions within two spheres. First, an almost nationalistic fervour to lead, be recognized as a leader, and to be self sufficient; *to become a regional player in the biotech industry by providing incentives for domestic innovation via intellectual property rights*. Second, to ensure “biosafety”; *ensuring scientifically sound best practices within a system of stringent checks and balances for the “safe” management of the technology in the context of commercial release and R&D*. These ambitions manifest themselves via a regulatory framework that is both ambitious in scope as well as technically comprehensive.

India’s regulatory framework spans science and technology, the environment, agriculture, food and health, and trade. With the exception of the Patent Act, Biological Diversity Act, and Plant Variety Protection and Farmers’ Rights Act (which are not expressly concerned with transgenics but are still linked), all the existing frameworks refer back to the **Environmental Protection Act (1986)** as the basis for all regulation surrounding transgenics¹.

The objective of this appendix is to characterize and summarize all the relevant mechanisms within the management of transgenics in agriculture in India. They are presented in three sections: Rules and Policies, Guidelines, and Acts and Bills. This distinction does not indicate that some are legally binding and others not; with the exception of bills, all are legally enforceable. It should be noted that in what follows, only those domestic frameworks that have implications on agriculture are considered; pharmaceuticals and aquaculture are not considered, nor are the international fora that have often (but not always) acted as a catalyst for domestic regulation.

A1.1 Rules and Policies

A1.1.1 The 1989 Rules

In 1989, the Ministry of Environment and Forests (MoEF) notified the **Rules for Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Engineered Organisms or Cells (1989)**². The stated rationale for the 1989 Rules are to protect “...the environment, nature and health, in connection with the application of genetechonology and micro-organisms”, and to

address activities involving the manufacture, use, import, export, storage and research of transgenics including microorganisms, plants and animals (Damodaran 2005, MoEF 2006)³. In practice, two ministries are responsible for the implementation of these rules, the MoEF and the Ministry of Science and Technology (MST) via the Department of Biotechnology (DBT)⁴. The 1989 Rules mandate and characterize the role of six competent authorities for the management of transgenics.

MoEF and MST Authorities as Mandated by the 1989 Rules

Authority & Accountability (Policy)	Primary Role
Recombinant DNA Advisory Committee (RDAC) MoEF→DBT	Presents recommendations for upholding safety regulations for GMO research and management; authored the Recombinant Safety Guidelines (1990) (RSG 1990) ⁵
Review Committee on Genetic Manipulation (RCGM) MoEF→DBT (RSG 1990)	Provides guidelines to those interested in transgenic R&D, use, and application; reviews and permits all high risk rDNA experiments; restricts the import/sale/use of transgenics; authorizes field trials up to 20 acres in size; visits trial sites; ensures safety measures are met as per RSG 1990
Genetic Engineering Approval Committee (GEAC) MSE (EPA 1986)	Permits transgenics commercial products and applications; authorizes large scale transgenic production and release, authorizes punitive action under EPA 1986
Institutional Biosafety Committees (ISBC) MST→DBT→GEAC, RCGM	The nodal point within the DBT for all parties intending on transgenic R&D; alerts SBCC, DLC, and GEAC about experiments; reports to and seeks approval from RCGM for category III risk or above experiments; ensures experimentation occurs on mandated areas based on protocol
State Biosafety Coordination Committees (SBCC) <i>Chief Minister→Relevant State Ministries</i>	Inspects and takes punitive action if policy violation occurs via state ministries; periodically reviews institutional safety/control measures, acts as the nodal agency within the state in case of damage caused by transgenics, is the main link to Centre

	Ministries in the transgenic context, can nominate state representatives for transgenic field inspection
District Level Committees (DLC) DISTRICT COLLECTOR→SBCC→GEAC (EPA 1986)	Monitors safety regulations in installations; reports to SBCC or GEAC in case of violations, acts as nodal agency at the district level to assess potential damage

Source: MoEF 2006a

The IBSC, RCGM, and GEAC are the primary agencies involved in the approval of new transgenic crops in the context of biosafety; in general, the IBSC acts as the nodal point for receiving the initial application submitted by any party interested in research activities, with the final decision being made by the RCGM, except in “large-scale” experiments where the application is directed towards and considered by the GEAC⁶. With regards to monitoring and safety concerns, the Monitoring and Evaluation Committee (MEC) acts under the RCGM to visit small-scale field sites and to recommend safe and viable crops to the GEAC and RCGM.

A1.1.2 The Seed Policy

India’s **Seed Policy (2002)** has seen a number of amendments since 1988, with the catalyst being both the advancement of transgenic technologies and the need for regulatory frameworks as well as the prescriptive commitments that India is bound to as a member state of the World Trade Organization. The salient aspects of the Seed Policy (SP) with regards to transgenics are found in Chapter 6 under “Transgenic Plant Varieties”, where linkages are made to the EPA 1986, and thus the 1989 rules.

- All transgenic seed will be tested prior to commercial release as per the EPA 1986.
- The importation of transgenic seed into India must be received only by the National Bureau of Plant Genetic Resources (NBPGR), and only after GEAC approval.
- Transgenic seed must be labelled as such, and must be tested for at least 2 years by the Indian Council for Agricultural Research (ICAR) in coordination with all other tests as stated in the EPA 1996. After commercial release, the Ministry of Agriculture and State Departments of Agriculture will monitor transgenic crops for five years.
- Transgenic varieties are afforded the same IPR protection as non-transgenic varieties as stipulated in the Protection of Plant Varieties and Farmers’ Rights Act (2001).

It should be noted that the Seed Policy (2002) is distinct from the Seed Act (1966) and the proposed successor to the Seed Act, the Seed Bill (2004)⁷. The Policy is primarily of interest to those firms involved in commercial R&D as a procedural indication of what the Centre will require of them as suppliers, whereas the Act covers all aspects and users of seed.

A1.1.3 The Prevention of Food Adulteration Rules

The Prevention of Food Adulteration Act (PFA) was enacted in 1954 for ensuring the quality and safety of food marketed in the country. It is managed by the Ministry of Health and Family Welfare (MoHFW) under the central PFA Division, and has seven salient features.

1. Enhance the availability of safe and wholesome food.
2. Consumer protection from deception, fraud and food-borne diseases.
3. Risk analysis, risk management and risk communication.
4. Ensure safety of genetically modified food.
5. Enhance the involvement of NGOs and Home Science Institutes.
6. Educational authorities to ensure better consumer protection.
7. Promote a voluntary management system, the Code of Ethics, through principles of Good Manufacturing Practices and the Hazard Analysis and Critical Control Points⁸.

Of particular interest here are the third, fourth, and fifth points. In May 2006, the PFA notified the **Prevention of Food Adulteration Rules**, which amended the PFA act⁹. There are two relevant additions that relate to the labelling of GM food products. Rule 37(e) states that:

GM food [...] whether it is primary or processed or any ingredient of food, food additives or any food product that may contain GM material shall be compulsorily labelled without any exceptions.

Similarly, rule 48(f) has been added, which states that:

No person shall, except with approval of and subject to the conditions that may be imposed by the Genetic Engineering Approval Committee (GEAC) constituted under the Environment Protection Act, 1986, manufacture, import, transport, store, distribute or sell raw or processed food or any ingredients of food, food additives or any food product that may contain GM material in the country: Provided that in case of imported genetically modified foods, the importer shall submit documents supporting the purported clearance at the time of import.

The GoI press release that released this information also stated that “the draft rules in the notification will be taken into consideration after the expiry of 60 days. [O]bjections or suggestions in respect of draft rules may be addressed to the Secretary, MoFHW.

A1.1.4 The Plant Variety Protection and Farmers Rights Rules

The 2003 Rules manifest a framework for undertaking the provisions of the Plant Variety Protection and Farmers Rights Act (2001)¹⁰. Refer to section A.3.3 for the salient features of the 2001 Act.

A1.2 Guidelines

A1.2.1 The Recombinant Safety Guidelines

The DBT formulated the **Recombinant Safety Guidelines** (RSG) to address risk and safety concerns in light of research activities undertaken by Indian institutions and industry. The 1990 guidelines were then revised in 1994 “...to cover R&D activities on GMOs, transgenic crops, large-scale production and deliberate release of GMOs, plants, animals and products into the environment, [and the] shipment and importation of GMOs for laboratory research” (Ahuja and Jotwani, Undated)¹¹. The guidelines are classified into three categories based on the level of the associated risk and requirement for the approval of competent authority.

EXPERIMENT CATEGORIZATIONS WITHIN THE RSG

Category	Characterization
I	Experiments involving self cloning and interspecies cloning belonging in organism in the same exchanger group; exempt from approval
II	Containment levels II, II, IV
III	Toxin gene cloning, gene cloning for vaccine production.

Source: Ahuja and Jotwani

These guidelines draw from principles of “good laboratory practices” as noted in the World Health Organization laboratory safety manual on genetic engineering techniques involving microorganisms¹². Specifically, the RSG requires those parties involved in transgenic R&D to evaluate risk in terms of “...possible interaction with other disease causing agents and infected

wild plant species” and that an independent review be conducted to assess risk on a case by case basis prior to release (MoEF 2005).

A1.2.2 The Guidelines for Research in Transgenic Crops

In 1998, the DBT established the **Guidelines for Research in Transgenic Crops** (GRTC) 1998 due to the “...enormous progress that has been made in rDNA research and its widespread use in developing improved microbial strains, cell lines, and transgenic plants for commercial exploitation” (DBT 1998). While similar in scope to the RSG, the GRTC has a specific focus on transgenic PGR, unlike the RSG which also covered animals. Specifically, the GRTC addresses areas of rDNA research on plants including the development of transgenic plants and their growth in soil for molecular and field evaluation. The guidelines also deal with import and shipment of genetically modified plants of research purposes (Ahuja and Jotwani, Undated). In this context, the GRTC outlines three categories of experiments on plants.

EXPERIMENT CATEGORIZATIONS WITHIN THE GRTC

Category	Characterization
I	Routine cloning of defined genes, defined non-coding stretches of DNA and open reading frames in defined genes in <i>E. coli</i> or other bacterial/fungal hosts which are generally considered as safe to human, animals and plants.
II	Lab and green house/net house experiments using defined DNA fragments non-pathogenic to human and animals for genetic transformation of plants, both model species and crop species.
III	Experiments where the escape of transgenic traits into the open environment could cause significant alterations in the biosphere, the ecosystem, plants and animals by dispersing new genetic traits which cannot be judged precisely. This also includes experiments having risks conducted in green houses and open field conditions.

Source: Chapter 4, GRTC (1998)

A1.3 Acts and Bills

Aside from Rules, Policies, and Guidelines, there are also exist a number of legally binding acts and not yet enacted bills that exist within the context of transgenics.

A1.3.1 The Food Safety and Standards Bill

In 2005 the Ministry of Food Processing Industries introduced the **Food Safety and Standards Bill** (FSSB) to facilitate scientific standards for food articles and regulate their manufacture, storage, distribution, sale and import. As per the provisions of the Bill, no person shall manufacture, process, export, import or sell genetically modified articles of food, organic foods, functional foods, nutraceuticals, health supplements etc. except in accordance with the regulations made under the FSSB. Moreover, the salient aspects of the PFA 1954 (and presumably the 2006 PFA Rules) and the EPA 1996 are to be considered in tandem with the FSSB, thereby implying testing and labelling.

A1.3.2 Plant Quarantine (Regulation of Import into India) Order

The Destructive Insects and Pests Act (1914) was notified in 2003 via the **Plant Quarantine (Regulation of Import into India) Order**, and has been amended several times to meet the SPS guidelines of the WTO¹³. The relevant portions of the order are in section 8, which assigns the role to the National Bureau of Plant Genetic Resources (NBPGR) as the sole party that can receive GMOs via importation, conditional on RCGM approval and the 1989 Rules.

A1.3.3 The Plant Variety Protection and Farmers Rights Act

As a response to the WTO mandated prescriptions of plant variety protection under Article 27.3(b) of TRIPS, India introduced the Plant Variety Protection and Farmers Rights Act (PPVFR) in 2001, which was notified in 2005¹⁴. The salient aspects of the PPVFR with regards to transgenics can be found in section 29.2, which disallows the formal registration of Gene Use Restrictive, or “Terminator”, Technologies (GURTs). Moreover, section 39.1(iv) details Farmers’ Rights provisions, and disallows farmers to sell seed that is “branded”. However, Indian farmers are allowed to save formally protected seed under the PPVFR, regardless of the protection conferred to that seed in other countries. This has implications on the saving of formally protected transgenic varieties of seed by Indian farmers, which, according to the PPVFR, is allowed, provided the farmer does not sell it. Yet the stipulation of “branded” is unclear and seems to imply that farmers are free to repackage branded seed and sell it as “non-branded” with no legal implications.

A1.3.4 The Seed Bill

The 2004 **Seed Bill** forms the basis for the revised Seed Act, which is expected to replace the existing 1966 Seed Act¹⁵. In terms of transgenics, the bill has two relevant aspects. First, section

12.1 details the modalities of a Registration Subcommittee, whose primary role is to maintain a National Register of Seeds encompassing "...all kinds and varieties of seed"¹⁶. Second, section 15.1 by states that "...no seed of any transgenic variety shall be registered unless the applicant has obtained clearance in respect of the same as required by or under the provisions of [the] EPA (1986)". Third, as in the PPVFR (2001), GURTS are banned under section 18.2. Fourth, farmers are provided with an accountability mechanism in Section 20, whereby if "...such registered seed fails to provide the expected performance under such given conditions, the farmer may claim compensation from the producer, distributor or vendor under the Consumer Protection Act, 1986". Fifth, it establishes culpability for those parties supplying spurious seed in Section 38.2 by stating that "...[i]f any person furnishes any false information relating to the standards of genetic purity, misbrands any seed or supplies any spurious seed or spurious transgenic variety, [or] sells any non-registered seeds he shall, on conviction, be punishable with imprisonment for a term which may extend to six months or with fine which may extend to fifty thousand rupees or both."

A1.3.5 The Patents Act

Under the Ministry of Commerce and Industry, the 1970 Patent Act (PA) has been amended in 1999 and 2002¹⁷. The 2002 amendments removed the term "plants" from section 3(i), which previously disallowed patents on "...any process for the medical, surgical, creative, prophylactic or other treatment of human beings or any **process** for a similar **treatment** of animals or plants or render them free of disease or to increase their economic value or that of their products." Further, section 3(j) was added, which disallows patents on "...plants or animals or any part thereof other than **microorganisms** but including seeds, varieties and species and essentially **biological processes** for production or propagation of plants and animals"¹⁸. These amendments are reflected in the current 2005 **Patent Act**.

While the PA 2005 still disallows patents on plants, animals, and seeds, a precise definition of "microorganism" and "biological process" is not defined¹⁹. Moreover, it has been argued that only those microorganisms that are the result of human invention, or due to an "inventive step" as opposed to those commonly found in nature, can be patented (Sharma 2005). In light of the amendments to 3(i) and the addition of 3(j), it could be argued that patenting of processes such as the insertion of the Bt gene into Cotton are now admissible, though the actual resultant seed (i.e. Bollgard) is not.

The other salient feature of the 2005 Act is the move from a process to product patent regime; India was mandated to ensure their IPR policy was fully TRIPS compliant by January 1, 2005²⁰. The two

amendments addressed plant variety protection; the only other TRIPS compliant measure was the enactment of a product patent regime, which the 2005 act now addresses²¹.

A1.3.6 The Foreign Trade (Development and Regulation) Act

Aside from patents, the Ministry of Commerce and Industry also regulates export/import (EXIM) activities, and as such, notified the 1992 **Foreign Trade (Development and Regulation) Act** (FTDR) in April 2006 to amend Chapter 1A in the context of the import of transgenics²². The salient aspects of the notification are:

- imports are governed by the EPA 1986 and the 1989 Rules
- import approval can only be given by the GEAC
- parties wishing to import must submit their proposal to the RCGM
- imported goods must be declared (but not necessarily labelled) as transgenic
- penal action as outlined in the FTDR can be taken against those to parties who knowingly export GMOs to India without the proper declaration

A1.3.7 The Biological Diversity Act

The **Biological Diversity Act** (BDA) was enacted in 2002 in light of the best practices outlined by the CBD in the context of access to PGR and details the procedural hierarchy that exists for those parties interested in doing so²³. The objectives of the Bill are:

- The conservation of biological diversity
- The sustainable use of its components
- The equitable sharing of benefits arising out of the use of biological resources.

These are precisely the three objectives of the CBD, with one small change; rather than genetic resources, the third objective refers to biological resources. The Bill defines biological resources as “plants, animals and micro organisms and parts thereof, and their genetic material and by-products, with actual or potential use or value, but does not include human genetic material.” The stated objective of the act is to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources and knowledge. In the context of transgenics, section 36.4 outlines the duties of the central and state governments in the context of the act, and states that the central government shall undertake an environmental impact assessment of any project “... which is likely to have adverse

effect on biological diversity, with a view to avoid or minimise such effects and where appropriate provide for public participation in such assessment". More specifically, the central government will "...regulate, manage or control the risks associated with the use and release of living modified organisms resulting from biotechnology likely to have adverse impact on the conservation and sustainable use of biological diversity and human health.

Endnotes: Appendix 1

¹ Refer to <http://dbtindia.nic.in/policy/act1.html> for the text of the EPA 1996. Briefly, the relevant sections of the EPA in the context of GMOs are sections 6 (relating to environmental pollution), 8 (adherence to safety standards in the context of hazardous substances), and 25 (the power of the Indian government to enforce).

² Hereafter referred to as the "1989 Rules". Refer to <http://dbtindia.nic.in/policy/rules.html> for the text of the 1989 Rules. More recently, there appear to be moves to amend the 1989 Rules within the context of importation and GEAC approval. A recent public notice by the GoI has suggested that GEAC import approval would only be required in the context of LMOs, and that some GMOs (i.e. Round up Ready Soybean oil) would not require GEAC approval (MoEF 2006b).

³ The approvals and prohibitions of the rules can be summarized along twelve points: 1. No person shall import, export, transport, manufacture, process, use or sell any GMOs, substances or cells except with the approval of the GEAC. 2. The use of pathogenic organisms or GMOs or cells for research purpose shall be allowed under the Notification (1989) of the EPA (1986). 3. Any person operating or using GMOs for scale up or pilot operations shall have to obtain permission from GEAC. 4. The ISBC is the contact for experiments on GMOs for the purposes of education, as per the guidelines of the Government of India. 5. The deliberate or unintentional release of GMOs is not allowed. 6. Production processes in which GMOs are generated or used shall not be commenced except with the approval of GEAC. 7. GEAC supervises the implementation of rules and guidelines. 8. GEAC carries out supervision through SBCC, DLC or any authorized person. 9. If these orders are not complied to, the SBCC/DLC may take suitable measures at the expenses of the person who is responsible. 10. In the context of immediate interventions to prevent damage, the SBCC and DLC can take suitable measures and the expenses incurred will be recovered from the person responsible. 11. All approvals shall be for a period of 4 years at first instance, renewable for 2 years at a time. 12. The GEAC shall have powers to revoke approvals in case of: a) Any new information on harmful effects of GMOs. b) GMOs causing damage to the environment not envisaged when approval was given. c) Non-compliance of any conditions stipulated by GEAC. Refer to Ahuja and Jotwani, p. 3.

⁴ While two ministries are directly involved, in total six ministries are indirectly involved, along with a host of other committees and agencies.

⁵ Refer to http://dbtindia.nic.in/policy/guidelines_90.pdf for the text of the RSG 1990.

⁶ In terms of size, the RSG states that experiments above 20 L for research and industrial purposes and above 20 acres for agricultural purposes is considered large-scale, and require approval from the GEAC. Large-scale agricultural trials are conducted by the Indian Council for Agricultural Research (ICAR), who the report their results and findings to the GEAC. Refer to Chapter 7 of the RSG 1990.

⁷ Refer to <http://agricoop.nic.in/seedsact.htm> for the 1966 act and http://agricoop.nic.in/seeds/seeds_bill.htm for the 2004 bill. Initial preparation for the 2004 Bill began in 1998; refer to Sharma (2005) for a useful review of this process.

⁸ GMP and HACCP are standards and guidelines developed by the US Food and Drug Administration. Refer to <http://www.fda.gov/oc/guidance/gmp.html> for an overview of GMP and <http://www.cfsan.fda.gov/~lrd/haccp.html> for an overview of HACCP.

⁹ Refer to <http://pib.nic.in/release/release.asp?relid=17941> for the text of the PFA Rules. The PFA Rules appear to be a direct consequence of the best practices detailed in the Codex India Procedural Manual, prepared by the National Codex Committee under the PFA as a consequence of membership to the Codex Alimentarius Commission, created by FAO/WHO in 1963 to develop food standards, guidelines and related texts (i.e. codes of practice) under the Joint FAO/WHO Food Standards Programme. Refer to [http://codexindia.nic.in/Codex%20\(India\)%20Procedural%20Manual.pdf](http://codexindia.nic.in/Codex%20(India)%20Procedural%20Manual.pdf) for the Indian Procedural Manual and http://www.codexalimentarius.net/web/index_en.jsp for the Codex Alimentarius website.

¹⁰ Refer to <http://agricoop.nic.in/seeds/farmersact2001.htm> for the text of the PPVFR Rules.

¹¹ Refer to http://dbtindia.nic.in/policy/guidelines_90.pdf and http://dbtindia.nic.in/policy/guidelines_94.pdf for the RSG 1990 and 1994 respectively.

¹² Refer to <http://www.who.int/entity/csr/resources/publications/biosafety/en/Biosafety7.pdf> for the manual.

¹³ Refer to http://plantquarantineindia.org/PQO_amendments.htm for the 2003 order and successive amendments.

¹⁴ Refer to <http://agricoop.nic.in/PPV&FR%20Act,%202001.pdf> for the text of the PPVFR 2001. While the PPVFR opts for a plant breeders/farmers' rights regime on plants and seeds as opposed to a patent regime, patents on PGR are admissible under the Patents Act (2005).

¹⁵ Refer to http://agricoop.nic.in/seeds/seeds_bill.htm for the text of the Seed Bill.

¹⁶ At this stage, it is unclear which parties the Registration Subcommittee will be comprised of. Some critics have noted that registration in the context of the subcommittee could subordinate the registration process detailed in the PPVFR via the Protection of Plant Varieties and Farmers' Rights Authority outlined in section 3.1 of the PPVFR, namely the registration activities outlined in section 8.2 (Kuruganti 2005). Moreover, the PPVFR Authority is mandated to contribute to a Register of Plant Varieties, which appears to be distinct from the National Register of Seeds mandated in the Seed Bill. The spectre of duplication requires consideration. Similarly, while the PPVFR allows for anyone (i.e. farmers or public/private sector breeders) to intimate registration (as per Section 16), the Seed Bill does not contain this explicit provision. Essentially, critics consider the Seed Bill to be directed towards those seeking to register GM seeds (i.e. private sector firms) as opposed to the PPVFR which has a broader mandate of plant variety protection, and there are concerns as to how the two frameworks will interact in tandem (Shiva 2005a).

¹⁷ Refer to <http://www.patentoffice.nic.in/ipr/patent/patAct1970-3-99.html>, http://www.patentoffice.nic.in/ipr/patent/patact_99.PDF, and

<http://www.patentoffice.nic.in/ipr/patent/patentg.pdf> for the original 1970 Act and the two amendments respectively.

¹⁸ Note that this language is almost a verbatim transfer from article 27.3(b) of TRIPS, where these terms are similarly left undefined. Apart from WTO obligations, the amendments also reflect obligations to the WIPO Patent Cooperation Treaty (PCT). Briefly, the PCT aims to facilitate a process whereby parties wishing to invoke a patent in many countries can do so with one application, though WIPO itself cannot grant protection.

¹⁹ Refer to http://www.patentoffice.nic.in/ipr/patent/patent_2005.pdf for the 2005 act. The Technology Information, Forecasting & Assessment Council (TIFAC), an autonomous authority under the Department of Science and Technology, recently released a report titled "Patenting of Microorganisms". This report states, *inter alia*, that bacteria does constitute a microorganism (i.e. *Bacillus thurengensis*) and patents have been allowed on them in other countries. Refer to <http://www.tifac.org.in/discus/dispfc.htm>.

²⁰ A process patent allows the same products to be produced by different producers with different processes, whereas a product patent does not allow other firms except the patent holder to produce a particular product.

²¹ This has serious implications for the pharmaceutical industry in the context of the production of generic drugs, or treatment regimes based on drugs that are, in essence, domestic "copies" of drugs developed elsewhere but made in a slightly different manner so as to avoid litigation under a process patent regime.

²² Refer to <http://dgftcom.nic.in/exim/2000/not/not06/not0206.htm> for the text of the amendment.

²³ Refer to <http://grain.org/brl/?docid=322&lawid=1378> for the text of the BDA.

APPENDIX 2

LIST OF ACRONYMS

ABLE	Association for Biotechnology Lead Enterprises
AICBA	All India Crop Biotechnology Association
AKI	US-India Knowledge Initiative on Agriculture
APMC	Agricultural Produce Marketing Centre
BGII	BollGard 2
BIO	Biotechnology Industry Organization
BJP	<i>Bharatiya Janata Party</i>
BKU	<i>Bharatiya Kisan Union</i>
Bt	<i>Bacillus thuringiensis</i>
CBD	Convention on Biological Diversity
CIC	Central Information Commission
CICR	Central Institute for Cotton Research
CII	Confederation of Indian Industry
CIRCOT	Central Institute for Research on Cotton Technology
Cry1AC	The toxin produced by <i>Bacillus thuringiensis</i> that is used as a pesticide
CSA	Centre for Sustainable Agriculture
CSIR	Council of Scientific and Industrial Research
DBT	Department of Biotechnology
DLCC	District Level Co-ordination Committee
DNA	Deoxyribonucleic acid
EBAM	Event Based Approval Mechanism
EC2	Expert Commission 2
EPA	Environmental Protection Act
EU	European Union
FBAE	Foundation for Biotechnology Awareness and Education
FDA	United States Food and Drug Administration
FICCI	Federation of Indian Chambers of Commerce and Industry
GATT	General Agreement on Tariffs and Trade
GE	Genetically Engineered
GEAC	Genetic Engineering Approval Committee
GM	Genetically Modified
GURT	Gene Use Restrictive Technology
ICAR	Indian Council for Agricultural Research
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
INR	Indian Rupees
IPR	Intellectual Property Right
ISAAA	International Service for the Acquisition of Agri-biotech Applications
IT	Information Technologies
ITO	International Trade Organization
KRRS	<i>Karnataka Rajya Raitha Sangh</i>
LMO	Living Modified Organism
MGMPs	Maharashtra Government Monopoly Procurement Scheme
MNC	Multinational Company
MoA	Ministry of Agriculture

MoEF	Ministry of Environment and Forests
MRTPC	Monopolies and Restrictive Trade Practices Commission
MSCCGMF	Maharashtra State Cooperative cotton Growers Marketing Federation Limited
MSP	Minimum Support Price
MST	Ministry of Science and Technology
NAFTA	North American Free Trade Agreement
NBB	National Biotechnology Board
NBRA	National Biotechnology Regulatory Authority
NCP	Nationalist Congress Party
NGO	Non Governmental Organization
NSAI	National Seeds Association of India
OECD	Organization for Economic Co-operation and Development
OPV	Open Pollinated Variety
PIL	Public Interest Litigation
PMO	Prime Ministers Office
PPP	Public-Private Partnerships
PVP	Plant Variety Protection
RAM	Regulatory Affairs Manager
RCGM	Review Committee on Genetic Manipulation
RFTSE	Research Foundation for Technology, Science, and the Environment
RSG	Recombinant Safety Guidelines
RTI	Right To Information (Act)
SBCC	State Biotechnology Coordination Committee
SBIRI	Small Business Innovative Research Initiative
STS	Science And Technology Studies
TNAU	Tamil Nadu Agricultural University
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UAS	University of Agricultural Sciences
UNDP	United Nations Development Program
USDA	United States Department of Agriculture
VJAS	<i>Vidarbha Jan Andolan Samiti</i>
WHO	World Health Organization
WTO	World Trade Organization

APPENDIX 3

LIST OF INTERVIEWEES

- 1 Anonymous Regulatory Affairs Manager, Multinational Firm. New Delhi.
- 2 B. Thool, Farmer. Chikhali.
- 3 C.K. Rao, FBAE. Bangalore.
- 4 D. Raghunandan, Greenpeace. Bangalore.
- 5 D. Taywade, Farmer. Chikhali.
- 6 G. Nagargoje, TAO. Chikhali.
- 7 G. Patankar, Farmer. Chikhali.
- 8 J. Bhutade, Joint Director of Agriculture (Vidarbha Region), Government of Maharashtra. Nagpur.
- 9 J. Mittur, Senior Vice President of BioAgriculture, Avesthagen. Bangalore.
- 10 K. Kuruganti, CSA. Hyderabad.
- 11 K. Tiwari, Farmers' Leader, VJAS. Pandarkhawada.
- 12 K.K. Nayaranan, General Manager, Metahelix. Bangalore.
- 13 K.K. Tripathi, DBT. New Delhi.
- 14 K.R. Kranthi, Director, Central Institute for Cotton Research. Nagpur.
- 15 M.K. Sharma, Managing Director, Mahyco. Mumbai.
- 16 N. Bongare, Farmer. Chikhali.
- 17 P. Raut, Farmer. Chikhali.
- 18 P.M. Bhargava. Hyderabad.
- 19 R. Thool, Farmer. Chikhali.
- 20 R. Warier, Director, MoEF. New Delhi.
- 21 S. Chaturvedi, Senior Fellow, Research and Information System for the Developing Countries (RIS). New Delhi.
- 22 S. Chikhalkar, Farmer. Chikhali.
- 23 S. Sahai, Convener, Gene Campaign. New Delhi.
- 24 S. Shah, Greenpeace GMO Campaigner. Bangalore.
- 25 S. Shantaram, Director, ABLE. New Delhi.
- 26 S. Sreenivasan, Director, CIRCOT. Mumbai.
- 27 S. Umre, Agrodealer. Deoli.
- 28 S.R. Rao, Scientific Advisor, DBT. New Delhi.
- 29 T. Bhagate, Farmer. Pandarkhawada.
- 30 V. Jawandhia, Farmers' Leader. Wardha.
- 31 V. Shivarkar, Farmer. Chikhali.