

The Climate Question Meets the Agrarian Question Climate, Capital and Agrarian Environments

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[This paper is the fifth chapter in my recent book, *The Political Ecology of Climate Change Adaptation: Livelihoods, Agrarian Change and the Conflicts of Development* (Routledge, 2015). The paper I am presenting on 'climate smart agriculture' wasn't quite ready on time – please email for a copy]

Although climate change adaptation is a relatively new entrant into the contemporary governmental lexicon, the projection of encompassing transformations onto agrarian environments is conspicuously familiar. From the colonial period to the present, rural peoples have repeatedly found themselves as the object of state-driven projects to intensify agricultural production, more fully integrate producers into national and international divisions of labour, and mediate the political discontents that such processes entail. In the present chapter, I map out how the idea and practices of climate change adaptation are situated within this wider context. I argue that there are two parallel narratives of agrarian transformation at work that, despite being held at arm's length, are duly complementary. The first is the standard rubric of adaptation introduced in the previous chapters. This narrative represents agrarian regions as spaces that are disproportionately vulnerable to climatic threats. Arun Agrawal and Nicolas Perrin, for example, highlight a catalogue of incipient risks facing natural-resource dependent households including "droughts, famines, floods, variability in rainfall, storms, coastal inundation, ecosystem degradation, heat waves, fires, epidemics, and even conflicts" (Agrawal and Perrin 2008: 1). The idea of adaptation is then called into being as a series of planned social adjustments to mediate such proximate climatic disturbances including institutional changes, infrastructure building, the diffusion of new technologies and social reforms. Collectively, these adaptation processes are intended to guard against the threats posed by climatic change.

Alongside this account of adaptation as a form of risk mitigation, however, there exists a corresponding institutional narrative of agrarian transformation that coheres around climate change as a threat to global agricultural production and food security. In this framing, the object of adaptation is agriculture as an economic sector and the source of food for an expanding and increasingly urbanised global

population with changing consumption habits. While the first narrative is immediate, localised and reactive, the second is explicitly posited as a vision of socio-economic transformation on a wider temporal and spatial scale. Framed in neo-Malthusian terms of population pressures and future food scarcity, it articulates the need for deep-seated changes to global agriculture that are rendered ever more pressing by the spectre of climate change:

By 2050 the world will need to feed 3 billion more people and cope with the changing dietary demands of a richer population (richer people eat more meat, a resource-intensive way to obtain proteins). This must be done in a harsher climate with more storms, droughts, and floods. And it has to incorporate agriculture in the mitigation agenda because agriculture drives about half the deforestation every year and directly contributes 14 percent to overall emissions. And ecosystems, already weakened by pollution, population pressure, and overuse, are further threatened by climate change. Producing more and protecting better in a harsher climate while reducing greenhouse gas emissions is a tall order (World Bank 2009: 16).

This portrayal of a pressing obligation to increase productivity in the face of an uncertain climatic future restates a familiar vision of agrarian modernisation that pre-dates current concerns with anthropogenic climate change (World Bank 1982; World Bank 2007). Indeed, for the institutions of global governance, climate change simply confirms what they already knew. Agriculture in the developing world needs to become more intensive, efficient and technologically advanced. To do so, it needs better integration into internationalised circuits of commodity exchange and, at the same time, it must lose some bodies by transferring labour out of agriculture into other sectors to create a more rational division of labour.

Although the two narratives of climate change adaptation and agrarian modernisation are not always explicitly brought together, they nonetheless share a common discursive space as part of a wider nucleus of governmental technologies that seek to represent, order and reshape the agrarian world. It is this terrain that I map out below, indicating how the adaptation-modernisation nexus – “producing more, protecting better” in the Bank’s terms – is situated within a conjuncture of governmental initiatives hinged to notions of food security, sustainable intensification, market expansion, environmental resilience and livelihood diversification (World Bank 2007; World Bank 2009; IFAD 2010). While the idea of adaptation focuses on the ‘here and now’ of climatic threats, the narrative of transformation establishes distinct normative parameters for what a suitably adapted agrarian future should look like. In this respect, by integrating the issues of climate change, rural poverty and food production, the modernisation narrative draws the practices of adaptation into a deeply political terrain that is configured by contested visions of agrarian futures.

Although the modernisation narrative presents itself in a quasi-evolutionary schematic of mutually beneficial progress, its projected transformations are mapped out over agrarian environments stratified by strikingly uneven degrees of power and privilege that are unevenly embedded within a global division of consumption that is itself profoundly unequal. In this context, the rhetoric of a mutually beneficial adaptation-modernisation nexus appears to be a problematic discursive device through which to conceptualise how unequal concentrations of control over land, water, bodies, technology and debt structure contemporary agrarian environments. In exploring such tensions, I argue that the emphasis of adaptation inverts the more pressing question that we should pose. Rather than start from the presumption of a rural topography made vulnerable by powerful climatic threats to which we must adapt; I argue that we should instead ask how we empower climate. To answer that question entails examining the politics of scale through which the localised processes that produce, constrain and sometimes obliterate rural livelihoods are intermeshed with flows of materials, energy and bodies within and beyond the agrarian realm. As I map out below, the dynamics of production, vulnerability and power in agrarian environments are therefore intimately wedded into a broader context of productive forces, corporate power and political authority. This allows us to conceptualise how the choices and compulsions rural agents experience are shaped within a field of relations that tie livelihoods to the subsidy decisions made in Washington or Brussels; the commodity futures markets in New York and Hong Kong; and the corporate strategies fashioned in biotech labs in the American mid-West.

Agrarian Modernisation and Climate Change

Over the past three decades, rural areas in much of the postcolonial world have been shaped by a series of transformations driven by the liberalisation of agriculture, the establishment of a new world trading regime for agricultural goods, and the increasing promotion of market-driven forms of organising production and circulation (Goodman and Watts 1997; Bruinsma 2003; Akram-Lodhi and Kay 2009; Clapp 2012). These policy changes have helped to facilitate a new cartography of agricultural production that operates by integrating farming activities into circuits of exchange and accumulation that are progressively more networked on a global scale. Agricultural activities have, of course, long been incorporated into a global division of labour, and the experience of colonialism tenaciously drew diverse peasantries into a world market for agrarian produce (Liu 2010). The current degree of integration, however, is different in both scale and scope. As a recent United Nations report noted, world agriculture is presently characterised by tight interlinkages and economic concentration at almost all stages of production and marketing chains. This includes a consolidated role for transnational corporations that integrate agricultural trade both vertically and horizontally and, in so doing, exercise augmented power over both consumers and producers (IAASTD 2009: 7).

Although uneven across geographical space, these trends have created new ways of producing agricultural goods, affected decisions over what goods to produce, who

can produce them and reshaped the networks used to source and distribute those commodities to consumers. In so doing, they have recalibrated the ways in which agrarian social relations are interweaved into wider flows and transformations of materials and energy at varied spatial scales. Transformative metabolic processes, of course, are fundamental to the basic purpose of agriculture to produce biomass of various forms for human use and consumption. Jan Douwe van der Ploeg puts this point eloquently when he notes that farming is the “ongoing interaction and mutual transformation of people and living nature” (van der Ploeg 2013: 48). As the social organisation of human labour in combination with biophysical forces to produce organic material for human use, alongside multiple other by-products, agriculture is emphatically socio-ecological process. In agrarian environments, flows of energy and water are channelled through both constructed technologies and non-human forces to drive chemical, physical and biological metabolisms that leave all parties transformed. An agrarian environment, therefore, is one of continual production, not simply of agricultural goods but of the landscape itself in both its physical and social dimensions (see chapter one).

Within a context of strong competition between direct producers furthered by the integrative trends operating across global agriculture, there is mounting pressure to continually intensify biological productivity by simplifying, standardising and speeding up production. This has imposed an increasingly industrial metabolism upon farming that rests on fossil fuel driven technologies and the systematic manipulation of the genetic programming of plants and animals. For plant-based agriculture, modern farming techniques have transformed agrarian environments by cultivating extensive monocultures aimed at creating economies of scale through the specialised and concentrated production of a narrow range of crop species (Altieri 1995). These monocultures are enabled through the systematic application of synthetic fertilizer, the control of pests and weeds through chemical inputs, the compulsory provision of irrigation, and the ongoing manipulation of plant and animal genomes, either through crossbreeding or genetic manipulation, to create hybrids with specific traits (Gliessman 2007).ⁱ Van der Ploeg perhaps overstates the point when he claims that farming in this mould is “reduced to a mere conversion of commodities (that might originate from anywhere) into other commodities (that might be destined for any location)” (van der Ploeg 2010: 4). However, he nonetheless captures the sense to which agriculture is increasingly disembedded from localised socio-ecological processes and is fundamentally transformed in an attempt to support ever-increasing aggregate yields. The purpose of this socio-ecology is to make agricultural processes and their underlying dynamics more amenable to human timescales of production, investment, exchange and accumulation (Boyd, Prudham and Schurman 2001).

Within the modernisation narrative of agrarian transformation, these trends are overwhelmingly presented as a natural evolutionary process driven by the creeping rationalization of agricultural production through the ongoing spatial diffusion of efficient technologies and institutional forms (World Bank 2007). The resulting achievements of modern farming are highlighted as far-reaching, socially

progressive and deeply necessary. Measured in terms of yields, the systematic reworking of agricultural practices has resulted in a consistently rising productivity that underscores the abundance of food at an aggregate level. Over the past fifty years, for example, the area devoted to agriculture has grown by around twelve percent whereas overall agricultural production has expanded by more than two and a half times (FAO 2011b). This consistent increase at a rate above that of population growth is attributed precisely to the application of modern agricultural technologies focused on the combination of improved varieties and breeds, specialised synthetic inputs, mechanisation and the controlled delivery of water in a continual drive to improve yields. Securing the provision of relatively cheap food, moreover, is concurrently seen as a foundational pillar of a more efficient division of labour that can support urbanisation, industrialisation and development both nationally and globally (Friedmann 1982).

There are, of course, readily acknowledged tensions with this petroleum-fuelled model of agricultural production. Intensive monocropping removes farming metabolisms from a wider network of biological renewal processes that hinge upon the networked interactions between plants and the wider ecosystem. As a result, a constant and growing application of external inputs are needed to supply crops with nutrient recycling, microclimate control, hydrological regulation, pollination and pest control (Altieri 1995; Altieri and Roge 2011). This raises the related issues of land degradation, toxicity, declining water resources, energy inefficiency and greenhouse gas emissions that are seen to be significant externalities and growing constraints upon modern agriculture. Notably, while yield level increases have remained above those of population, they have tended to taper off over the past three decades while rates of increase in synthetic input usage have surged (Bruinsma 2003). This suggests that the ever-heightening intensity of petroleum-driven farming – with the above-noted consequences for environmental health and climate change – is having less impact upon yield growth and possibly portends an escalating exhaustion of the paradigm (FAO 2011a; UNCTAD 2013; UNEP 2014). At the same time, such industrial farming is manifestly energy inefficient and a major driver of greenhouse gas emissions. According to some accounts, the industrial food system expends 10–15 energy calories to produce 1 calorie of food, constituting a reversal of the original purpose of agriculture (Lin et al. 2011; Martinez-Alier 2011).

Alongside concerns about the potential exhaustion of industrial farming, the growing productivity of agriculture has readily co-existed with the inability of a significant proportion of the world's population to gain adequate access to nutritious food. According to the International Fund for Agricultural Development (IFAD), some seventy percent of the developing world's 1.4 billion extremely poor people inhabit rural areas and frequently experience malnutrition despite their role within food production (World Bank 2007; IFAD 2010). In a world of relative abundance, there remains a large rural underclass that is beset with profound food insecurity and material poverty. It is precisely this population, moreover, that is considered as particularly vulnerable to climate change (IFAD 2013a).ⁱⁱ

Within the framework of agrarian modernisation, the solution to such problems is twofold. First, increasing investment in biotechnological research is seen as necessary to produce a new generation of yield enhancing technologies (Von Braun 2007; Baulcombe et al. 2009; Beddington 2011). Second, existing yields must be improved by accelerating the diffusion of existing techniques and technologies more deeply into the agrarian landscapes of the developing world. As encapsulated in the World Bank's broad yet strident 2008 World Development Report, this is to be achieved by integrating smallholders into global agro-food commodity chains so as to deepen the commercialisation of agricultural production, facilitate more market opportunities for producers, and allow them to better access investment and technology. Smallholders are a particular focus of this strategy because they comprise the majority of the world's farmers, occupy 60 percent of arable land, and produce over 80 per cent of the food consumed in the developing world (IFAD 2013b). Moreover, smallholder farming is seen as the primary barrier to solving the 'yield gap', which refers to the difference between the potential yield in an area under ideal conditions and technologies and the actual yield obtained. While the large differences in crop yields between and within countries can in part be attributed to differing agro-ecological conditions, it is the projection of substandard yields owing to differences in crop management practices including the 'sub-optimal' use of inputs and farming techniques that concerns policymakers (Bruinsma 2003). These traits are often seen as the direct result of an insufficiently modernized smallholder sector, making it a repeated target for development interventions.

From this perspective, it is the failure of agrarian modernisation to become sufficiently generalised that accounts for inadequate productivity and residual rural poverty. The task facing developing countries is therefore to reform the institutional parameters under which agricultural production takes place so as to facilitate a closer integration of smallholders into globalised agro-food chains as a vector of modernisation in the rural spaces of the global South. The projected expansion of market opportunities is envisaged to set in motion a diffusion of practices and technologies that, together, will create a more efficient smallholder sector orientated towards commercial production. As competitive forces and expanded opportunities lead to an increase in entrepreneurialism among smallholders, the resulting diffusion of new technologies are anticipated to help close the yield gaps between smallholders and elite farmers, increasing both productivity and incomes (Van Tran 2002; Toriyama, Heong and Hardy 2005). The ensuing efficiency gains stemming from increased agricultural productivity, moreover, are seen to facilitate a broader rationalisation of rural regions by allowing a more finely graded division of labour in which off-farm employment can expand to absorb the release of labour from unproductive smallholder farms.

For the Bank, the primary policy questions stemming from this framework centre upon how to put suitable institutional structures in place to allow smallholders to access both the technological advances and the market opportunities that they will need to prosper. While the private sector is envisaged to drive the efficient

organization of value chains to increase market opportunities, it is the state that “corrects market failures, regulates competition, and engages strategically in public-private partnerships to promote competitiveness in the agribusiness sector and support the inclusion of smallholders and rural workers” (World Bank 2007: 8). This perspective fits into a broader neo-institutionalist vision of development in which modernisation can only be achieved through overcoming the stultifying effects of traditional social institutions and forms of production that limit the rationalisation of agriculture (Taylor 2010). New institutions that can set appropriate incentive structures are therefore required to stimulate a more efficient agrarian sphere. A combination of price liberalisation, more clearly defined property rights, and financial extension are anticipated to furnish the foundations for such an environment. Once appropriate institutional frameworks are established and increase aggregate efficiency, countries are anticipated to move forward over a typology of stages – agricultural, transitional, and urbanised – in a linear progression of development. The latter reflects a familiar modernisation script that is uncomfortably embossed over the heterogeneity of agrarian social structures present within and across countries. The telos of the Bank’s vision of agrarian futures is clear: “agriculture as a business, driven by entrepreneurship and vibrant markets, linked to a burgeoning urban economy” (Scoones 2009: 14).

A suitably entrepreneurial smallholder sector is therefore heralded as a fundamental pillar of the future global agricultural system. Smallholders can play such a role, however, only to the extent that they adequately adopt a suitably entrepreneurial orientation, integrate with broader commodity chains and embrace technological fixes to improve their productivity. As the Bank notes, most smallholders will not be in such a position and this will inevitably create a process of social differentiation in which uncompetitive smallholders are rendered non-viable under fiercely competitive institutional parameters. The report therefore anticipates a major shift of labouring bodies out of agriculture through the abandonment of farming for either non-farm rural employment or migration to the urban realm. As a result, a principal regulatory task set out for governments is precisely to help rural populations whose labour is surplus to the requirements of a more efficient agricultural sector manage their transitions out of agriculture (Li 2009: 629). For most current smallholders, therefore, the vision of agrarian modernisation projects their future as one outside of farming, in waged labour and petty commodity production through an accentuation of rural-urban migration and the de-agrarianisation of rural spaces (Rigg, Salamanca and Parnwell 2012; Akram-Lodhi 2013).

Climate Change and the Antinomies of Modernisation

The spectre of climate change is inserted into this vision not as a challenge to its embedded assumptions but as a confirmation of its existing biases. This is perhaps not surprising. In 2008, the same year as the publication of the World Bank’s report, rapid price rises for general foodstuffs created a deep subsistence crisis for the world’s urban and rural poor.ⁱⁱⁱ Notwithstanding the call of World Bank president

Robert Zoellick for a 'new deal' on food, a familiar dish was hastily prepared by a combination of G8 countries and international institutions to reaffirm the centrality of agricultural modernisation through a corporate agenda of liberalisation and a second 'green revolution' founded upon biotechnology and transgenic crops.^{iv} This occurred despite little evidence to suggest that a problem in agricultural productivity was behind the crisis or that biotechnological solutions had any immediate role to play in resolving price hikes in the short or medium term (Stone and Glover 2011). Furthermore, it appeared to overlook a number of substantive irrationalities in the global food system that were revealed by a crisis in which agro-corporations enjoyed record profits while the global poor faced deepening food insecurity and increasing amounts of agricultural produce were simultaneously diverted to non-food purposes (Grain 2008). Despite this complex conjuncture of causes, including the growing role of financial speculation in shaping commodity prices, the response of leading international institutions was a emphatic yet familiar call to resolve such problems through increased productivity, with the FAO called for a 70 percent increase in food production by 2050 to stabilise market volatility and high prices (FAO 2011a).

The climate question has been similarly used to further reinforce these discursive parameters. Advocates of agrarian modernisation increasingly emphasise the importance of new seeds and inputs, driven by biotechnologies, to create plants that are more resilient to both adverse climatic conditions alongside biotic challenges such as pests and diseases that may proliferate in a warming world (Baulcombe et al. 2009; McIntire et al. 2009; Beddington 2011). While climatic change did not initiate this longstanding desire to produce new agrarian natures, it has certainly provided a rallying point around which biotechnologies have been justified (Patel 2013). In setting out a 'New Vision' for agriculture, for example, the 2010 World Economic Forum exemplified this trend. This report on the future of agriculture under climate change and price volatility projected the need to harness agriculture to drive a trio of goals including food security, environmental sustainability and economic opportunity. It did so in familiar ways, citing the need for an innovation-driven agriculture wherein new agro-technologies implemented by local entrepreneurs can solve the multiple challenges that climate change poses:

Building this pillar of the New Vision will require improvements across the supply chain to close yield gaps, promote efficient distribution, minimize waste and improve food access ... It will also require technological breakthroughs to help farmers adapt to the consequences of climate change, enable production and mitigate risk under increasingly difficult conditions (World Economic Forum 2010: 12-13).

This discursive emphasis on technology-driven productivity gains as the solution for the problems of the global food system obscures a series of core tensions from which two immediate points stand out. First, while farming is judged according to the efficiency of its productivity, there is no such reflection on the efficiency of

contemporary consumption trends. A significant portion of the world's smallholder farmers are to be sacrificed on the alter of increasing farm productivity to service a global division of consumption that is starkly stratified, desperately inefficient in its use of biomass and energy, and that propagates diets that – while helpful for embedded forms of accumulation – are nutritionally derelict (Patel 2007; Winson 2013). The modernisation narrative appears unable to question the consumption patterns it serves. As a recent UNCTAD report puts it, “[t]he current demand trends for biofuels, excessively meat-based diets and post-harvest food waste are accepted as given, rather than challenging their rationale” (UNCTAD 2013: 7). The idea of producing more represents an anxious desire to avoid having to face troubling questions around sharply uneven distributions of production and consumption through which access to food is highly skewed in a global level. Much as the original Green Revolution was seen as a way to accelerate agricultural growth without necessitating fundamental changes to rural power structures, a biotechnological revolution implicitly offers a means to avoid facing the social barriers to food access within and across nations (Patel 2013).

Second, the push for agricultural modernisation is done in the name of market efficiency at the same time as it constructs institutional frameworks that privilege the oligarchic power of corporate agribusiness. The concentration present at the corporate end of agro-food commodity chains is pronounced, with not only the centralisation of capital within agro-input producers, marketers and retailers, but new interlinkages between such corporate entities and financial entities that readily speculate on changing prices (Isakson 2014). This centralisation and concentration of capital within agriculture ranges from the agro-input conglomerates that presently have oligopolistic hold upon the production and marketing of seeds and synthetic inputs, through to the consolidated power of supermarkets in shaping agro-food commodity chains from the distribution end (Weis 2007; Howard 2009). The United Nations Environment Programme, for example, notes how by 2005 the largest 10 seed corporations controlled 50 per cent of all commercial seed sales; the top five grain trading companies controlled 75 per cent of the market; the largest ten pesticide manufacturers supplied 84 per cent of all pesticides (UNEP 2014: 12).

As a result, the discourse of increasing opportunities that is embedded within the modernization narrative singularly fails to analyze the characteristics of a food regime dominated by global agro-food corporations in which monopoly power across an integrated food system means that food and agricultural markets are “predatory, constraining and indeed forcing the choices of emerging capitalist farmers” (Akram-Lodhi 2008: 1160). These trends include the privatization of knowledge through intellectual property rights which, as the IAASTD notes, operates within a regulatory structure that benefits patent holders – typically corporate product manufacturers – rather than the rural communities that have developed genetic resources over millennia (IAASTD 2009). Indeed, a model of privatized knowledge-driven change translates directly into the strongly projected technological role for climate proofing agriculture, which has opened a new profit frontier for agro-industry through the patenting of ‘climate ready’ genes by the agro-

industrial seed conglomerates (McMichael 2009).

Adaptation meets the Agrarian Question

By situating the question of adaptation within a broader terrain of unequal power structures at a global level, we can better come to terms with the political dimensions of what it means to read contemporary change through the adaptation-modernisation nexus within specific agrarian environments. In this regime of representation, climate change is seen as hastening the workings of longstanding processes of agrarian change in which rural regions must become more fully integrated into global divisions of production and consumption. The project adaptation must simultaneously further this process of mopping up the historical residues of an incomplete transition to agrarian modernity while mediating its most brazen contradictions.

The discourse of modernising rural regions through select governmental interventions, however, is a longstanding narrative rooted in the political economy of capitalist transformation and subsequently reshaped through the colonial encounter (Cowen and Shenton 1996; Li 2007). For colonial bureaucrats in nineteenth century south Asia, for example, the doctrines of classical political economy pointed the way towards a more 'rational' usage of land, labour and water that required a concerted programme of planned engineering that could rewrite both the social and physical landscape in ways that could reform 'wasteful' practices (Gidwani 2008). These technologies were part of what summoned the agrarian into being as a site of governmental regulation that interlaced the administration of agricultural production with the movement of agricultural commodities across vast territories and the concomitant management of surplus extraction. As David Ludden puts it, agrarian history first appeared as a chronicle of state policy whose impact "was measured in the endless dance of numbers on agrarian taxation, rent, debt, cropping, output, living standards, technology, demography, land holding, contracts, marketing and other money matters" (Ludden 1999: 8). Indeed, the essence of the modernist project, both then and now, is to disable 'non-modern' forms of life by dismantling their facilitating conditions and putting in place new conditions to produce governing effects to re-arrange the conditions of agrarian life in a way that obliges subjects to transform themselves in a deliberate and 'improving' direction (Mitchell 1990; Asad 1992; Scott 1999).

While this 'will to improve' has legitimised itself through a perpetual re-ordering of agrarian environments in order to harness their productive potentials, it has simultaneously and irrevocably been forced to mitigate the inevitable dislocations that ensue (Li 2007). The establishment of agrarian capitalism has never been a creeping process of gradual rationalisation through the evolution of increasingly efficient institutional forms. Rather, it has required prolonged, violent and far-reaching transformations tied to the commodification of land and labour and driven by processes of forceful social engineering often undertaken directly through coordinated state power (Cowen and Shenton 1996). The inherently conflictual

processes that such trends have unleashed repeatedly and consistently involved the fusion of expanding commercial integration with historically embedded forms of power. As Gyan Prakash notes, in the South Asia context the rule of commodities and markets took shape in and profited from structures ranging from peasant production to plantation slavery, even though it represented them as its opposite (Prakash 1997: 22). It is therefore necessary to conceptualise the ways in which the formal rationality of agrarian rationalisation has been inextricably entangled with processes that distribute both the risks and rewards of agricultural production in vastly uneven ways. The story of increasing agrarian productivity is simultaneously one of dispossession, accumulation and vulnerabilisation within the ongoing transformation of agrarian environments (Bernstein 2010; Akram-Lodhi 2013; McMichael 2013).

For agrarian political economists, these concerns are often framed under the rubric of the 'agrarian question' that, as Karl Kautsky wrote at the turn of the twentieth century, concerns "whether, and how, capital is seizing hold of agriculture, revolutionising it, making old forms of production and property untenable and creating the necessity for new ones" (Kautsky 1988: 12). The notion of the agrarian question has become a primary analytical passageway into the contemporary transformation of agrarian social relations (Akram-Lodhi and Kay 2010a; Akram-Lodhi and Kay 2010b). There is, of course, no singular form of agrarian transformation under these complex dynamics, but the question nonetheless raises a set of crosscutting concerns about the way in which rural populations experience pronounced social differentiation in which the full or partial proletarianisation of rural labour occurs in complex forms and new forms of surplus extraction emerge through a range of means including waged labour, debt relations, land rentals, monopolised input markets and coerced labour service. Within the framework of the agrarian question, such forces create a pervasive fragmentation of rural social classes. This polarisation occurs not as a failure of modernity to arrive, but as a consequence of its inherently uneven tendencies. Willem van Schendel is emphatic on this point when he argues that, despite one hundred and fifty years of large-scale capitalist production within agriculture, South Asia has refused to bear out the assumption that the agrarian capitalism would produce a clear separation of capital and labour patterned upon a linear transformation in a modernist mould (van Schendel 2006).

On the contrary, while the expansion of wage-labour during and following the colonial period has been considerable, the resulting agrarian social order refuses to replicate any simple model of transition. For much of South Asia, a dynamic and finely graded diversity of labouring relations has emerged in which much of the rural population has been rendered insecure as agricultural producers yet face manifold constraints to becoming waged labourers in either the rural or urban realms. Many households rely upon members operating as transitory labour – 'wage hunters and gatherers' in Jan Breman's (1994) striking term – moving in patterns of circular migration between agricultural activities, labouring as rural wage labourers and temporary employment in urban informal sector. They may also, however,

stubbornly persist in keeping a foothold in agriculture, either for subsistence or commercial purposes, by deploying household labour often at low levels of productivity. Such a bulwark is may be viewed as a partial preserve against the vulnerability implicit within a commodified agrarian environment in which social reproduction is dependent upon fickle and often coercive forces (van der Ploeg 2010). This active recomposition of agrarian environments has frequently led to a situation in which rural households depend – often tenuously – on a diversity of social relationships and forms of labour, from waged work, to market-orientated petty commerce, to subsistence agriculture on small plots (Shah and Harriss-White 2011).

There is no reason to romanticise this proclivity to strategically seek to moderate vulnerabilities within austere agrarian environments. In the provocative words of Russian agrarian economist Vasily Chayanov, “one cannot fail to recognise that in the course of the most ferocious economic struggle for existence, the one who knows how to starve is the one who is best adapted” (Chayanov 1991: 90). What such an emphasis does do, however, is raise the complex politics of land and vulnerability in agrarian environments undergoing complex transitions within which climatic change is one active element. As Haroon Akram-Lodhi and Cristobal Kay put it, processes of de-peasantisation, semi-proletarianisation, re-peasantisation and petty commodity production under capitalist dynamics cannot be seen as aspects of a linear process. Rather, they form “dynamic and recurrent manifestations of multifaceted and contradictorily changing patterns of social and economic relations that continually and complexly reconfigure rural labour regimes, and hence the agrarian question” (Akram-Lodhi and Kay 2010b: 280). As such, the bare elements of the South Asian experience mapped above cannot be seen as a universal paradigm of contemporary agrarian change. Indeed, as the following chapters show, there are notable divergences in agrarian trajectories across South Asia, which demonstrates incredible heterogeneity between regions owing to differing historical processes and agro-ecological characteristics (Banaji 2002). That said, it is useful to pick up on three common elements that emerge as key tensions within agrarian environments in the chapters that follow: the question of labour; issues of power and risk within smallholder production; and the question of ecological rifts.

Labour

A determined aspect of the adaptation-modernisation nexus highlighted above is its emphasis upon a necessary transition of livelihoods away from agricultural pursuits according to both economic rationality and an adaptation imperative in the face of climatic change. As the following chapters note, however, an exit from smallholder farming is rarely a choice made by rational calculating households that simply weigh up livelihood options based upon a simple projection of varied opportunities. On the contrary, smallholders are often reluctant to sever their ties to the land and will often seek to invest further familial labour or incur growing debts to maintain agricultural production on small plots. In the World Bank’s terms, such reluctance to

move out of agriculture reflects a “deep inertia in people’s occupational transformation” that is ultimately a blockage to modernisation (World Bank 2007: 26). This position reflects a longstanding modernist trope that the innate cultural values of peasants are a barrier to efficient rural divisions of labour (Hoselitz 1952; see Taylor 2010). As the following chapters show, far from being irrationally attached to agriculture owing to an enduring cultural atavism, the rural poor are – out of necessity – shrewd in the ways they seek to secure their social reproduction and assert dignity in the face of intractable burdens. Indeed, for Gidwani and Sivaramakrishnan, the rural poor in much of South Asia actively construct livelihoods that mediate the many risks they face, including forms of cosmopolitanism through circular migrations between different physical and social spaces in which they are able to “deploy the technologies of one to some advantage in the other” (Gidwani and Sivaramakrishnan 2004: 345).

It is precisely on the basis of such ‘survival entrepreneurialism’ that some neoinstitutional theorists have been attracted to the informal economy as a latent reservoir of repressed entrepreneurs, forced underground by the arduous regulations of the state (de Soto 1989). There is no need, however, to romanticise the desperately hard choices and strategies made by these social classes. For those forced out of agriculture, they must seek alternative employment on fickle labour markets with few assets, skills or networks. In moving out of agriculture on these adverse terms, their subsequent level of disempowerment makes them subject to conditions of labour that reinforce their vulnerability and poverty. As Jan Breman puts it:

To the extent that these many hundreds of millions are incorporated into the production process it is as informal labour, characterized by casualized and fluctuating employment and piece-rates, whether working at home, in sweatshops, or on their own account in the open air; and in the absence of any contractual or labour rights, or collective organization. In a haphazard fashion, still little understood, work of this nature has come to predominate within the global labour force at large (Breman 2009: 29).

It should be emphasised, moreover, that such informal work is heavily segmented along gender lines with women disproportionately present in the informal sector and specifically in those jobs that are most insecure and poorly remunerative in both rural and urban realms (Chant and Pedwell 2008). Such injustice is reflective of the broader gendered division of entitlements, property and responsibilities that permeates many agrarian environments, and that structures labour across the household, field and off-farm economies in ways that create durable power relations and inequalities between men and women (FAO 2011c).

The fragility of employment opportunities within heavily segmented informal labour markets underscores the reluctance of many rural households to relinquish fully their hold of land as a means to preserve some degree of autonomy against

such conditions of vulnerability (van der Ploeg 2008; Ferguson 2013). Maintaining a direct hold – however tenuously – over the means of social reproduction can facilitate what Sanyal terms a ‘need economy’, an ensemble of economic activities undertaken for the purpose of meeting direct needs, as distinct from activities driven by an imperative towards systemic accumulation (Sanyal 2007: 209). It is the rightful fear that, under full commodification of land and labour, livelihoods are subject to external dynamics and power relations over which households have little form of control. In short, tempering their vulnerability to such forces can provide a strong motivation for smallholder agriculturists to maintain at least a partial hold on land (Shah and Harriss-White 2011). The World Bank appears at times to recognise such issues, noting that for those unable to generate sufficient assets and skills to manage a successful transition out of agriculture, “only social protection can ease their poverty” (World Bank, 2007: 202). This seemingly essential point – made even more vital in the context of climatic change – is nonetheless submerged under the discussion of enabling markets, new technologies and moving populations out of agriculture (Li 2009). As the following chapters make clear, we should be profoundly cautious before we wager the future of those ejected from agriculture on the fanciful idea that informal labour markets can provide a means towards secure livelihoods, particularly as climate change impacts are projected to fall most heavily on the peri-urban slum dwellers precisely because of their socio-economic and physical marginalisation (UN-Habitat 2011).

Power and Risk

Within the parameters of the adaptation-modernisation nexus, agrarian transformation is represented through a seductive imagery of positive sum games in which new opportunities arise for smallholders to avail themselves of new market opportunities and technologies. Establishing the institutional conditions to enlarge the scope of such opportunities therefore represents a win-win situation in which farmers become more competitive, productive and resilient, and consumers gain access to a wider and cheaper array of products. Simultaneously, even those displaced through the consolidation of a more efficient smallholder sector, are ultimately the beneficiaries of a more rational division of labour in which urban and off-farm employment provides a better set of livelihood options (Oya 2009).

For those smallholders that seek to remain – even partially – in agriculture, farming has its own risks and associated power relations. As noted above and detailed in the following chapters, however, the institutional framework imposed upon smallholders is not simply one designed to increase opportunities but a specific means of imposing new constraints and compulsions (Akram-Lodhi 2013). In the face of intense cost-pressures, smallholders consistently encounter stern pressures to adopt commercial farming through input-induced intensification as a means to expand yields and maintain household incomes. To do so, smallholders are increasingly being drawn into markets for key inputs – seeds, land, water, electricity, fertiliser, pesticides, credit and retail – over which they exert little control. These inputs must be sourced from through commercial networks outside the farm and

are often accessed on the basis of extended credit, which draws smallholders into new forms of dependency and surplus extraction. The international peasant movement Via Campesina captures this new dynamic of capital formation in which direct control of land is no longer the lynchpin of capital accumulation within the agrarian environment. Although land control is still important, engrained structures of power are often constructed primarily through networks that “control loans, materials supply, the dissemination of new technologies, such as transgenic products, on the one hand, and those that control national and international product warehousing systems, transportation, distribution and retail sales to the consumer, on the other hand” (Via Campesina, cited in McMichael 2012: 684).

These power relations, it should be emphasised, are not merely the result of ‘institutional imperfections’ or ‘market failures’, as described in the euphemistic terms of neo-institutionalism (Amanor 2009). Rather, they represent specific accumulation strategies in which unequal concentrations of market power are used as a form of surplus extraction and the displacement of risk (see chapter four). They represent the outcome of historically unequal distributions of core assets and are frequently bolstered through the greater political influence that comes with concentrated command over such productive resources. In the modernisation narrative, contract farming offers a way for smallholders to tap directly into a more lucrative relationship with larger-scale agro-food enterprises. This is often represented as a form of beneficial incorporation into wider networks to access opportunities from which smallholders – and particularly women farmers – were previously excluded. Through such incorporation, smallholders are envisaged to plough new and mutually-beneficial routes into global agro-commodity chains that offer better returns for a more diverse range of products (World Bank 2007).

What tends to be lost this representation, however, is how contract farming establishes relations between parties that hold strongly unequal degrees of power to shape the distribution of risks and rewards within the relationship (Singh 2012; Akram-Lodhi 2013). As Muhammad Jan and Barbara Harriss-White note, the contractual relationship between producers and large corporations turns smallholders into effectively wage-labour status. The dominant partner shapes the type of crop, choice of inputs, the amount of credit, and timing of sales (Jan and Harriss-White 2012). For Jan van der Ploeg, this socio-ecological shift results in a notable transformation of power relations within agricultural production. Land that once served as a either a form of landed power of peasant autonomy has increasingly become a link in longer chains that tie smallholders into exogenous and frequently more powerful interests and projects (van der Ploeg 2010: 4).

By its very nature, contract farming requires a strong standardisation of products, detailed quality controls, and a finely graded scheduling of crop production. In short, it presumes an industrialised farming model and the associated inputs, technologies and social relations to standardise, speed up and intensify production. This is why contract farming has historically been associated with larger farms that operated to economies of scale with large production volumes and have better access to credit,

water, technology, labour and informational networks (Singh 2012). Large farms have built upon highly inequitable distributions of such assets precisely to consolidate their position within rural hierarchies in a self-reinforcing manner. To the extent that smallholders can move into contract farming within agro-food commodity chains, their scattered nature, small production volumes and historical marginalisation from stable sources of irrigation and credit, amplify the risks involved. Undoubtedly, the potential rewards of contract farming can be considerable as contracts for high value products can aid investment to produce increased yields and improve incomes. The resulting risks, however, are notable. Farmers often incur significant debts in order to purchase the necessary inputs to facilitate industrial farming and this creates new forms of dependency and surplus extraction with financial operatives while increasing the catastrophic risk of harvest failure (see chapter seven). It is this enduring fragility of smallholder agriculture leveraged on debt and tied to input intensive production that accentuates the threats to the underlying socio-ecology posed by climatic change (Altieri and Koohafkan 2008).

As this makes clear, the relations that structure agrarian environments are not simply predicated upon surplus extraction but simultaneously incorporate a vastly unequal a distribution of risks. Part of the problem is that the deepening subsumption of agriculture within agricultural commodity chains creates the grounds upon which external technological solutions appear to be the only ones possible. For example, as regional biodiversity decreases in the wake of input-intensive monocultures, a series of biological checks upon pest populations is removed, reinforcing a strong dependency upon commodified chemical inputs and the commercial networks between corporations, merchants and farmers that facilitate their sale. The work of Glenn Stone on the generalisation of biotech cotton in the semi-arid region of Telangana, India, exemplifies this trend. Stone charts how the industrialisation of agricultural practices in the Warrangal region created a progressive de-skilling of smallholders who became increasingly dependent upon forms of knowledge and inputs over which they have very little control. A longstanding facet of the Green Revolution model, this trend became entrenched in Warrangal during in the 1990s when, under the liberalisation of agriculture, smallholders increasingly adopted a form of cotton monocropping as response to severe cost pressures on agriculture. Through the reduction of biological barriers to the evolution and spread of pest species, smallholders encountered a cycle of escalating pesticide use that proved increasingly ineffective against rampant bollworm infestations. As Stone terms it, “never before had they relied so heavily on a crop with so many pests, so little natural resistance, and in such apparent need of sprays” (Stone 2011b: 393).

It was in this socio-ecological context that biotech cotton emerged in the mid-2000s as a projected solution to a problem caused by the earlier round of industrial agriculture. For farmers, any technologies that promised to offset the onslaught of bollworms seemed a necessary and welcome entrant into input markets. The deepening dependency upon external technology to counteract field-level problems,

however, raises important questions around vulnerability in an era of climatic change because such technologies profoundly rework the balance of power within the agrarian environment. In drawing agriculture into the ambit of the laboratory, farmers have become embedded at the bottom rung of a highly commodified form of agricultural practice whose implementation rests on bodies of knowledge from which they are systematically excluded (Stone 2011a). While corporate agricultural input producers tend to represent their goods as ‘solutions’ to pressing agricultural issues, the kinds of issues they address are not fixable problems but moving targets. As Boyd, Prudham and Schurman note, “efforts to further control and subordinate biological systems to the dictates of industrial production will almost inevitably generate new risks and vulnerabilities for the production process, not to mention unforeseen externalities” (Boyd, Prudham and Schurman 2001: 562). In this manner, there emerges a fallacy of composition associated with the generalised movement of smallholders onto biotechnologies. As more and more farmers in a given region turn to a particular form of cropping – using a narrow range of seeds, herbicides and pesticides – the quicker the spread of pests that are immune to such technologies. Several years into the biotech era, bollworms had indeed receded only to be replaced with a major aphid problem and, subsequently, the incipient development of resistance in pink bollworm to biotech cotton is an issue of growing concern.

For agro-industry, the active flux of agrarian environments are simply part of their accumulation strategy, generating a constant flow of problems that need new solutions through commodified inputs from which they extract substantial flows of surplus. Stone notes how, for biotech cotton in Telangana, agrarian technologies were increasingly shaped by the commercial dictates of the turnover time of corporate capital, which needed new brands on a yearly basis. For smallholders, this pace of technological change and the resulting generation of new challenges in the field from using these technologies occurs at a pace that prohibits an effective process of social learning. This excludes them from becoming active participants in managing production processes. As a result of this estrangement and dependency, seed purchasing trends were driven not by rational choices based on field conditions, but by corporate marketing strategies and localized fads (Stone, Flachs and Diepenbrock 2013). In Philip McMichael’s terms, the displacement of former agro-ecological farming practices and knowledge generation with commoditised agro-inputs facilitates a ‘real subsumption’ of smallholders to capital. It reduces them to quasi-waged labourers and smoothes the appropriation of agricultural resources along the value-chain as profits for processors, retailers, agro-dealers and traders (McMichael 2013). This opens up not only new accumulation strategies but also a new vector of vulnerability predicated precisely upon the technologies to which agrarian modernisation sees as the saving grace for smallholders. At a time when climate change is altering the socio-ecological parameters of agricultural production, smallholders are increasingly alienated from knowledge and control over the active production of their lived environments.

Metabolic Rifts and Climatic Change

It is useful to note how this emphasis on the dynamic interplay between farmers, pests, synthetic inputs and genetically modified crops, points to lived environments as active sites of socio-ecological production. As the biotech example highlights, while humans have undoubtedly proved to be prolific agents of environmental production, we are nonetheless inescapably drawn into a complex field of relationships with varied elements of the non-human world that fundamentally shape the dynamics of agrarian environments. In this respect, it is necessary to ask where the ecology is hidden away within the agrarian question. It is notable that within the 'agrarian question', the drivers of rural change have tended to be represented as emphatically anthropocentric and the social categories of capital and labour seemingly impose themselves upon the natural substrate of the rural landscape. In their comprehensive review of the field, for example, Haroon Akram-Lodhi and Cristobal Kay (2010b: 269) posit ecology as one of seven 'dimensions' of the contemporary agrarian question. In so doing, they advocate examining the ways in which 'ecological relationships' impinge upon agrarian social relations. While their framework is both sophisticated and encompassing, it nonetheless reinforces a conceptualisation of the agrarian in anthropocentric terms within which ecological considerations may (or may not) set limits or exercise external impacts. This kind of framework has tended to reinforce the idea of nature as a tapestry upon which humanity designs its own, internally contested, plans. Nature becomes a vital resource that can be marshalled as part of social relations through forms of possession and exclusion.^v

As established in chapter one, however, relationships of production and consumption, abundance and scarcity, and security and vulnerability, are made in and through relationships in which the boundaries of nature and society are intrinsically blurred. Our environments do not present simple constraints upon human actions. Rather, they provide the essential metabolic forces upon which human agency is facilitated. For some working within political economy traditions, these socio-ecological relations can best be captured by the notion of a 'metabolic rift' (Foster 1999; Wittmann 2009; Schneider and McMichael 2010). Building on Marx's discussion of a collapse of nutrient recycling between countryside and city within agrarian capitalism, this concept has been generalised to capture a systematic rupture in the metabolic relation between humans and nature under capitalism. It emphasises the essential contradiction between an industrialised agriculture driven by capitalist value relations and the ecological foundations upon which labouring activities are based (Foster, Clark and York 2010). Approaching the issue in this manner does have some utility. It draws attention towards processes that might lead to a tipping point: a moment of crisis in socio-ecological relations in which the particular relationships that produce a lived environment take a radically different turn under the weight of their own contradictions. Although sympathetic to the need to bring metabolism into the agrarian question, however, the idea of the metabolic rift appears to represent a more radical version of resilience theory and suffers from maintaining a similar conceptual framework predicated open the idea of mutually influencing yet ontologically separate social and natural systems (see

chapter four). Like Jason Moore, I am concerned that the metabolic rift framework tends to assign arbitrary boundaries that separate off the 'social' and the 'ecological' dynamics that are seen to pull apart, reaching some sort of absolute point of contradiction, namely 'the rift' (Moore 2011).

In focusing on the metabolic rift as a moment of rupture between society and nature, the approach marginalises how produced socio-ecologies are both productive and destructive of particular forms of life. This returns us to Blaikie and Brookfield's point that "one person's degradation is another person's accumulation" (Blaikie and Brookfield 1987: 14). It is therefore more useful to consider the question raised by the metabolic rift concept in terms of a conjuncture of socio-ecological processes working across scales that generates tension, strain, struggle and constant transformation. In this way, the utility of the metabolic rift notion can be found not in terms of an absolute point of rupture in which intrinsically 'social' and 'ecological' processes fracture, but rather as an analysis of the inherent tendency of capitalist socio-ecologies to create strong and mutual tensions between the valuation of commodities and the processes that underpin their production, circulation and the dispersal of associated waste products. This is to focus on the scalar processes that link the transformations of lived environments across both time and space (Mitchell 2012).

On this score, we must conceptualise the futures of agrarian environments in terms of the ongoing socio-ecological shifts in which biophysical processes and social energies are interweaved, co-productive, uneven and tension-laden. Climatic change enters such landscapes not as an exogenous factor, but as a shift in the socio-ecological parameters by which livelihoods are formed. Across agrarian Asia, for example, the rapid but uneven melt of Himalayan glaciers, influenced by anthropogenic processes including greenhouse emissions and more localised black carbon pollutants, will be a significant driver of socio-ecological change. Himalayan glaciers feed seven of Asia's major rivers – the Ganga, Indus, Brahmaputra, Salween, Mekong, Yangtze and Huang Ho – therein sourcing irrigation waters for over a billion people (Pomeranz 2009; Xu et al. 2009). In the Ganga river system alone, the loss of glacier melt water is projected by the IPCC to reduce July-September flows by two thirds, causing water shortages for 500 million people and 37 percent of India's irrigated land. On this basis, the IPCC projects that India will reach a state of water stress before 2025 when the availability of water falls below 1000m³ per capita, (Cruz et al. 2007: 484). This is not to suggest that such biophysical shifts pose determining social constraints. Water stress is already experienced by large segments of the rural populations in these areas based on questions of access rather than absolute quantities of water in a given setting (see chapters six and seven). Rather, it is to highlight that the shifting socio-ecological parameters of agrarian environments are objects of ongoing social struggles from above and from below that seek to actively reshape the production of risks and rewards. For some, the outcomes of conflicts over changed flows of water may offer new accumulation strategies. For others, they may spell the end of agrarian livelihoods, therein pushing a further flow of bodies out of rural regions into the expanding urban slums.

This is a question that requires historical analysis and I seek to map out precisely these tensions in the following three chapters.

ⁱ Although not a focus of this chapter, modern agriculture is also defined by the factory farming of animals, in which meat production is organised upon industrial techniques of mass production (Emel and Neo 2011).

ⁱⁱ Cheap imports of specific foods are also key to containing the tensions inherent to growing inequalities of income and the expansion of urbanised, gendered and racialised underclasses in Western countries. In particular, a food regime based on cheap yet nutritionally derelict industrial food knits into a broader expansion of precarious low-wage work supplemented by informal coping strategies including corporate-sponsored food banks in the United States, a phenomenon that Ryan Foster has termed 'divide and sponsor' (Foster 2008; see also, Soederberg 2014).

ⁱⁱⁱ Josette Sheeran, the head of the UN's World Food Programme, described the impact of rising food prices as a process of deepening immiseration: "For the middle classes, it means cutting out medical care. For those on \$2 a day, it means cutting out meat and taking the children out of school. For those on \$1 a day, it means cutting out meat and vegetables and eating only cereals. And for those on 50 cents a day, it means total disaster". Cited in 'The New Face of Hunger', *The Economist*, April 17th 2008.

^{iv} G8 Statement on Global Food Security, Hokaido, Japan, July 8th 2008. http://www.g8summit.go.jp/eng/doc/doc080709_04_en.html

^v Part of this latent anthropocentrism is perhaps given by the desire to combat neo-Malthusian projections of intrinsic environmental limits that are seen to strongly determine the warp and weft of social transformation. In circumventing a singular logic of environmental scarcities that impose themselves in a direct manner on forms of social organising and the incidence of conflict, political ecologists have tended to emphasise how localised power structures, connected to global geo-politics of resource utilisation, themselves construct the scarcities that neo-Malthusians then impute to be 'natural' (Peluso and Watts 2001).

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