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The Green Revolution and Poverty in Northern Tamil Nadu: a Brief Synthesis of Village-Level Research in the Last Half-Century

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Acronyms

BMR	Basal Metabolic Rate
GHG	Greenhouse Gas
GR	Green Revolution
HYV	High-Yielding Varieties
IFPRI	International Food Policy Research Institute
IVV	Inter-Village Variation
JNU	Jawaharlal Nehru University
MIDS	Madras Institute of Development Studies
NTN	Northern Tamil Nadu
RDA	Recommended Daily Allowance
SC	Scheduled Caste
SRI	Systems of Rice Intensification
VLS	Village-Level Studies

Abstract

Between 1972 and 2014, in Northern Tamil Nadu (NTN), India, the Green Revolution (GR) in agriculture was studied through five rounds of village-level studies (VLS). Over the decades, the number of villages dwindled; from 11, rigorously and randomly selected (together with a 'Slater' village first studied in 1916), through to a set of three villages in a rural–urban complex around a market town, to one of the original eleven, in the fifth round. During the reorganisation of districts in 1989, the villages sited on the Coromandel plain shifted administratively from North Arcot, a vanguard GR district, to Tiruvannamalai, described then as relatively backward. A wide range of concepts, disciplines, scales, field methods and analytical approaches were deployed to address i) a common core of questions about the economic and social implications of technological change in agriculture and ii) sets of other timely questions about rural development, which changed as the project lengthened. Among the latter was poverty.

In this paper, this corpus of research is revisited to reinterpret how poverty was theorised and analysed, and to synthesise and compare the findings. The extensive scope of poverty concepts and processes studied over the decades constitutes the appendix.

Poverty is scaled from the district level, through the set of eleven villages to distributions of income and land-holdings, institutions like social classes and caste, household characteristics such as alcohol expenditure, forced dependence and kinship costs, extending to individual attributes such as work capacity and gendered subordination.

Persistently differentiating processes involve agricultural development and its multipliers as it gained and lost revolutionary momentum, hydro-ecological crises, pollution, agrarian diversification, exchange relations and debt in production and consumption, segmented markets, gendered labour demands of the expanding non-farm economy, ratchets such as occupation-related disability and debt, triggers such as ill health and social pressures incentivising perverse expenditures that deprioritise food. While poverty has been associated with landlessness throughout, and landlessness has doubled as agriculture sheds labour, precarity has forced out-migration among poor labour households, while remittances have been exiguous.

The state has played contradictory roles in poverty. While public expenditure on infrastructure, production and social welfare drives rural transformation and incomes, anti-poverty policy and neoliberal reforms can have pauperising and exclusionary outcomes.

Outcomes such as poor education, nutrition, health and life chances feed back into poverty processes. Though income poverty has declined by about two-thirds, and is focused on low caste, landless households, the VLS show that the multiple dimensions of poverty have not evolved in ways consistent with general principles of economic development

Keywords: Green Revolution, Technological Change, Village-Level Studies, Tamil Nadu, Poverty, Simultaneous deprivation, Agency, Institutions, Rural-urban complex, Non-farm economy

1 Introduction

Any analysis that aims to synthesise has to bring together primary research (which may use quantitative and/or qualitative evidence) to illuminate a general question or a specific question that is posed from a position that requires the re-interpretation of primary research. In this paper, the body of research consists of five rounds of village-level studies (VLS) in Northern Tamil Nadu (NTN), starting in 1972 and ending in 2014, with the main purpose of tracing technological change in agriculture. The questions that call for a synthesising approach are the nature of agrarian poverty, its relation to technology, and the theoretical and methodological ways through which we have come to understand how it has changed over decades of agrarian transformation.

1.1 Problematising socio-technical change and poverty

The Green Revolution (GR), involving seeds, agrochemicals and water management,[1] is generally thought to have started being diffused in India in the mid-1960s, having been publicly introduced as relevant to Indian agriculture five to seven years previously (Ford Foundation 1959) after nearly half a century of US-dominated scientific work (Cullather 2010). Early planning for India's GR was at the scale of selected districts and their hydrological endowments (Harriss 1972). Despite claims of a 'new GR' or 'gene revolution' led by corporate agri-business and developing genetically modified technology (Alagh 2018) or an 'evergreen revolution' through developments in organic farming systems (Visvanathan 2003; Sharma 2019), it is very unclear when the GR ended (or even whether it has ever done so).

The celebrated grand claims for the GR, its retrospectively labelled 'epic narrative' (Cabral 2019), were made at a point in the history of science and of social science that was marked by lack of theoretical consensus. 'Since the crises in grand theory a generation ago[2] (when powerful criticisms were made of neo-classical economics and neo-liberal politics on the one hand, and of Marxism and socialism on the other) understandings of development have been shattered into subfields, swaddled in discourse analysis and frequently driven by technique' (Harriss-White and Harriss 2007:1).[3] The village-level studies of the GR in Northern Tamil Nadu have been no exception and have been studied – as have all the other long-term village-level studies in India (Breman *et al.* 1997; Himanshu *et al.* 2015) – with an array of practical objectives and resources – and from many different theoretical and normative standpoints.

This brief summary of the VLS through which knowledge of the *GR and poverty* in NTN has been produced[4] has involved laying a double analytical grid from the evolving study of poverty and from questions about concepts and method from science and technology studies onto a stratigraphy of evidence collected since 1973. These VLS have been focused throughout on the adoption of new technologies in agriculture and their economic and social impacts, but in each successive round specific research concerns have been added that have changed over time. The second round (1982–4) sought to model the growth linkages from agriculture through developing evidence to populate a social accounts matrix for the entire economy of the region, and then post-dicting the effects of a counterfactual without the GR. The third round (1993–5) sought to situate changes in agriculture in a

[1] Though in practice also tractors, threshers, and pump-sets (Farmer 1977).

[2] Referring to the 1960s and 1970s.

[3] 'Development' here refers to its study in several social science disciplines as both an immanent process involving states and markets and as an aid-driven project after the Second World War (Cowen and Shenton 1996; Baud *et al*. 2019).

[4] There is a great deal more to the research in NTN (for core texts see: Farmer 1977; Hazell and Ramasamy 1991; Harriss-White and Janakarajan 2004; Harriss-White and Harriss 2007; and Harriss-White 2015).

diversifying rural economy and in an expanded set of policies for economic development and social welfare, not just conceived as policy intentions but also analysed as they unfolded on the ground in the villages. It also examined the social impact of the hydro-ecological crisis. The fourth (early twentyfirst century) round was sited in, but not focused exclusively on, villages – extending to local market towns and the rural–urban complex. Agriculture was woven into analyses of a range of commodity relations. These contributed to socioeconomic theories of institutional character and specificity. The fifth round re-focused attention on the relations of agriculture to its environment, especially water, energy, and Greenhouse Gases (GHGs).

2 ROUND ONE: THE 1970S

2.1 Organisation

The GR Project started in 1971 when B.H. Farmer from Cambridge reconnoitred South India and Sri Lanka to identify comparable semi-arid regions where dramatic changes in rice production technology were reported to have been taking place. Farmer put together teams of Sri Lankan and Indian scholars led in Tamil Nadu by Nanjamma Chinnappa, then in the Department of Economics, Madras University (chaired by V. Shanmugasundaram). Eastern North Arcot District commended itself due to its semi-arid tropical climate, its relatively flat topography with subterranean aquifers, its red (rainfed) and black (irrigated) soils, its rainfed groundnut and irrigated rice economy, and its agrarian structure dominated by small *ryotwari* owner–occupiers with little tenancy – and thus its 'relative poverty' (Farmer 1977).

A team of field researchers, trained in economics, was supervised by V. Rengarajan. At the same time, three British researchers carried out focused research. Robert Chambers studied development administration and water management; John Harriss lived in a village for a year and studied the socioeconomics of agricultural transformations (Harriss 1982); and both studied inter-village variations (IVVs) in development.[5] Over the course of a year, Barbara Harriss sampled and surveyed the inputs and product markets (Harriss 1981). The team also collected all the relevant and available official data, reports, and statistics.

2.2 Objectives and context

The original questions for NTN were concerned with the diffusion and social impact of high-yielding varieties (HYVs) of rice. 'We wanted to understand the ecological, economic and social constraints on the diffusion and adoption of HYVs of rice, and their economic and social implications' (Harriss-White and Harriss 2007: 6). Between 1972 and 1974, using detailed survey evidence from 11 carefully and randomly selected villages and the Slater village of Dusi,[6] together with ethnography, village case

[5] See chapters in Farmer (1977a) and see Section 4.3.1 here for factors invoked in the development of theories of IVV.

[6] Care was taken in a two-phase two-stage sampling design. In the first phase, from the 1971 population census, 11 villages were selected with equal probability from a list of 989, avoiding hilly and reserved-forest parts of the district, and ordered by contiguous *taluks*, distance from towns, 1971 population, proportion of agricultural labourers to cultivators, and spatial proximity. The 12th village was Dusi, a Slater village (see Harriss and Jeyaranjan 2015 on Slater villages studied since 1916). Households in the selected villages were then listed, basic data elicited, and a 50 per cent equal-probability simple systematic random sample of the households was conducted on the basis of four livelihood groups: 57 paddy cultivators, three non-paddy cultivators, 77 agricultural rentiers with non-agricultural livelihoods, and non-agricultural households including landless labour. In the second year-long phase, detailed schedules about livelihoods were administered one to three times as appropriate for each of these groups (Chambers *et al*. 1977: 37–42).

studies, and extensive surveys of agrarian markets, the first round of fieldwork explored the basis for the contentious expectations – and the emerging evidence – about what seemed to be a 'small farmerist' agricultural policy. On the one hand, the new technologies were expected by aid-driven and US foundation-driven research and agricultural development policy advocates to commercialise agriculture, raise incomes, and therefore reduce poverty (Brown 1970; Cullather 2010; Swaminathan 2017).[7] On the other hand, early field studies led analysts to argue that, while productivity would be raised, relations of debt, investment, and labour displacement by mechanisation and by changes in land tenure might do exactly the opposite (Johnston and Cowrie 1968; Mann *et al.* 1969; Cleaver 1972; Sharma 1973). The hypothesis governing the first round of VLS was derived from political economy: size and scale mattered positively to adoption (Farmer 1977a: 4–5). The counter-hypotheses emerging from deductive reasoning in agricultural economics were that size and productivity were inversely related or that the GR technology was neutral to scale (Narain 1972; Hazell *et al.* 1991: 33). A more nuanced conjecture at the time was that the propagation of the concept of 'scale neutrality' for GR technology might have hidden an agenda for accelerating the capitalist penetration of agrarian society (discussed in Harriss 1982, chapter 5).

The modest philosophy governing Round One of the VLS was that interdisciplinarity was a weapon against 'disciplinary dogmatism',[8] that the 'micro' level of field research provided a corrective to the 'macro' level of generality at which debates about agricultural policy were pitched, and that – generally – debates in development needed more rigorously sceptical treatment (Farmer 1977b: chapter 1; Harriss 1977: chapter 4). Locality and diversity mattered and could be used to criticise and refine theory. In Round One the collective field research therefore embodied the transdisciplinary[9] eclecticism of the 1970s, incorporating agricultural economics, hydrology, agrarian sociology, and geography. It invoked theories of innovation, of agrarian change, of market behaviour and commodification, and of development administration and management (Chambers 1992; Cornwall and Scoones 2011).

2.3 Findings relevant to poverty

At the outset, the GR research was troubled by 'alternative facts' shrouded in 'unreliability and confusion' (Farmer 1977a: 414). First, the diffusion of the new technology reached only one-third of the land area claimed in the officially published statistics for the region (Harriss 1977: chapter 4) – 13 per cent of the paddy area, in fact. Second, the small producers it was supposed to be intended for were not adopting it. 'The much discussed scale-neutrality of the new technology is … belied by the greater access which the larger cultivators have to the crucial factors of production involved – cash, pump-sets and fertilisers' (Chinnappa 1977: 122–3). Chinnappa found that both the cultivators who adopted HYVs and the labourers working for them benefited from the introduction of the new technology, but the former about twice as much as the latter. This inequality in adoption, benefits, and income was consistent with the results of field research based on ethnographic methods (Harriss 1982).

[7] In development economics, income is the variable governing poverty. Although less well-behaved statistically than its proxy expenditure, income is widely understood. It is possible to compare income over time (with adjustments for inflation and in terms of purchasing power parity) and it is a continuous variable that is easy to integrate into the regression model approach to understand economic phenomena.

[8] See reviews in Harriss (1979), Harriss, J. (1991a), and Lele (1971), which advocate a limited state regulatory role and, by contrast, anthropological studies of deprivation in agrarian society (Gough 1977; Harriss, J. 1991b) in which market exchange relations did not reduce poverty – further confirmed by technical, science-based field reports and statistical analyses (Sen 1967, Cullather 2010).

[9] Terms for research involving more than one discipline are confused and fuzzy. From Choi and Pak's (2006) systematic review, transdisciplinarity is found to span science and social science; multidisciplinarity (the commonest) adds insights from more than one discipline; and interdisciplinarity (the rarest) aims at a holistic fusion of more than one discipline. In the twentyfirst century, subfields in both science and social science have proliferated within and across disciplines, with outcomes that may impede communication. Of course, within and across disciplines, incompatible differences in theories and paradigms also coexist.

Technological innovation and productivity rather than poverty was the central concern of the first round of VLS (Farmer 1977b). Couched in terms of income (though not yet a poverty line), poverty was associated with *non-adoption* and with *landlessness*. The dynamiser of economic mobility was the new *agricultural technology* plus an assured supply of water (Chinnappa 1977). 'Agency' was not conceived as an individual capability. Instead, as in much social science then and now, agency was analysed in terms of social and political relations scaled up to the level of social groups and structures about which theories were created. In Round One, agency was seen as the capacity to adopt innovations and was analysed, not using case studies, but in terms of groups of adopters versus non-adopters; it was further subdivided between small and large farmers (Chinnappa 1977: 93), scheduled caste (SC) households versus the rest (Chinnappa 1977: 116), four income categories, and between six and 13 operational landholding size groups (Chinnappa 1977: 119, 129). A classification in terms of 'leaders' and 'laggards' was also used (Harriss 1972) and a body of literature from early business studies on leadership and entrepreneurship celebrated the fertiliser dealer and the grain trader as 'change agents' (Broehl 1973; Harriss 1981). 'Agency' in technology *d*e-adoption was noted after adopters experienced failures when experimenting with seed varieties, soils, and seasons and experiencing costly pest attacks (Chinnappa 1977: 98–100). Adopters and de-adopters were implicitly male, because Round One was pretty gender-blind; only passing mention was made of female casual labour (replacing attached male labour) (Chinnappa 1977).

Harriss's authoritative ethnography of Nesal village[10] in 1973 (Harriss 1982) does not mention poverty in its index but is suffused with insights about poverty relations and with examples of individual agency. In a scholarly context stressing contemporary transformations in social structure, Harriss found land and water relations still substantially structured through the village's social hierarchy of caste (126–30). Rates of profit in agriculture were differentiated by caste-stratified landholding. While returns to elite, HYV-cultivating wage labour exploiting farmers matched those from moneylending or local urban industry, the cash accounts of the hardly landed revealed poverty and precarity converging with that of the incomes of landless labour (183–5).

Pauperising relations and events also had greatest impact on the low-caste, hardly landed class. These included the costs and consequences of accidents and sickness and the social compulsions of conspicuous expenditure, not only in death rituals but also for marriages (chapter 5). Uniquely among the rounds of VLS, Harriss analysed the varied roles of kinship and of caste ideology in legitimating the social order of poverty. Households were not isolated entities, he argued, but niched in kinship relations. Cross-cousin marriages locked assets within a close circle of kin and acted as a counterweight to land partition at inheritance. Among the locally dominant caste,[11] kinship norms were slowly being subordinated to the search for economic and political power; marriage distances were increasing, spatially and socially. Among the lowest castes, cross-cousin marriages were more prevalent and localised; they helped in the mobilisation of labour for agricultural operations (138–46). Social relations in the village of Nesal were still ordered substantially through status rules about the social handling of defiling liquid and solid substances, rules that were then not always obeyed. Inside and outside the village *panchayat*, the dominant caste was the legitimate authority for resolving disputes and allocating village resources. In accepting this legitimation, low castes/SCs participated in their own oppression (chapter 6). They internalised dissonant explanations for their pauperised condition – on the one hand in terms of origin myths, reincarnation, and behaviour in past lives, and on the other in terms of material conditions – protests about which, despite Dravidian politics, they expressed in verbal grumbles and not through political mobilisation (ibid). In the 1970s, the monetisation/commodification of caste-based services and artisanal activity – which constituted the non-farm village economy – was starting to

[10] Also known as Randam.

[11] Dominance is a term from anthropology denoting the wielding of most economic and political power. Dominant castes are not necessarily the highest castes – the NTN villages have witnessed struggles for dominance between Agamudayar Mudaliars and Vanniars, respectively among the backward and most backward castes in the official classification of the Tamil Nadu government. See www.bcmbcmw.tn.gov.in/bclist.htm for more information.

disturb the rights of such workers to subsistence and the protections of patronage (236–8), making their exiguous livelihoods more insecure.

At the same time as this granular account was researched, a novel 'in-depth' analysis of the entire set of sample villages that treated them as social and economic entities while accepting that their self-sufficiency was a myth[12] generated a *different scale* for the explanation of poverty and agricultural productivity. Remoteness from towns, population pressure against land resources, the seasonality or 'industrial' continuity of agricultural work, and social relations (of patronage, bondage, and caste) shaped the extent of innovation adoption in agriculture and thus the degree of seasonal 'saturation' (of the demand for labour) such that, in some villages, pauperised 'surplus' labour had to migrate out (Chambers and Harriss 1977: 321). Villages were classified into groups on the basis of these agricultural parameters; two of the 11, or 'substantial rural pockets ... exist[ed] at a low level of livelihood and constantly export[ed] people to the remainder of the economy' (Chambers and Harriss 1977: 321).[13]

3 ROUND TWO: THE EARLY 1980S

3.1 Organisation

For Round Two, the baton passed to the International Food Policy Research Institute (IFPRI) in Washington DC, from where a team of agricultural, food and nutritional economists led by Peter Hazell collaborated with a team of agricultural economists from Tamil Nadu Agricultural University, Coimbatore, led by C. Ramasamy. John and Barbara Harriss contributed focused 'repeat research' and Sudhir Wanmali examined the spatiality of infrastructure.

3.2 Objectives and context

In stark contrast with Round One, Round Two – which lasted in the field from 1982 to 1984 – was theoretically driven by a response from US development economics to the now little-remembered but then threatening Maoist focus on agriculture as the first priority for development.[14] John Mellor's *New Economics of Growth* (1976) had privileged the agricultural sector in development planning – with a small-farmer focus for agricultural research and policy. Not only did this theory invoke the inverse size–productivity relation, with its positive implications for land reform; it also argued that the consumption linkages (especially the increased expenditures made by 'small farmers' who benefited from the GR, although *not* in 1970s NTN: see Harriss 1987a) would generate demand for decentralised, small-scale, labour-intensive forms of industrialisation. This would not only reduce rural poverty by tightening rural labour markets; it would also address the problem of rural–urban migration and slum development by offering potential migrants alternatives, thus blocking migration.

By then, the GR's multiplier effects had already emerged in India. On the one hand were income inequality and persistent poverty (researched through development economics), the differentiation of rural producers into the polar classes of capitalism, and the struggles of landless labour (then the central concern of agrarian political economy).[15] On the other hand, problems of the disposal of state-procured

[12] For the critical exposure of this myth, see Srinivas and Shah (1960).

[13] The dynamics of rural–rural migration were noted as a research need outside the scope of the first round of VLS (Farmer 1977: 398). Surplus labour commutes from villages to work in market towns; the non-farm weaving industry also absorbs labour (Harriss and Harriss 1984).

[14] Despite the end of China's cultural revolution, Maoist revolutionary activity was spreading in South and Southeast Asia (Mohanty 2006).

[15] See Government of India (1993) for poverty figures, Tendulkar (1992) for inequality, and the extensive discussion in Thorner (1982) for class differentiation.

grain surpluses were developing and led to '*Garibi Hatao'* and a slew of *distributive policies* targeting the poor, in a variety of measures against the kind of rural income inequality that had been exposed in Round One (Harriss *et al.* 1992). Meanwhile, new questions about appropriate post-harvest technologies joined old questions about the welfare objectives of the organisation of post-harvest distribution.[16] The latter were 'forward production linkages', in Mellor's terminology, but when the concept of the agrarian was expanded to encompass *post-harvest marketing systems*, the scope of the poverty question was also expanded to encompass technological change and employment in product markets (Harriss and Kelly 1982).

The core aim of the Round Two VLS was to use the villages to gather evidence for constructing an ambitious computable general equilibrium model of social accounts, which could be activated to 'post-dict' Mellorian growth linkages (in production and consumption) of the GR in rice. Evidence was extrapolated to the level of the *district* – the unit of the model. Nevertheless, secondary spin-off VLS achieved fine-grained resolutions. Detailed village surveys[17] and case studies, repeat ethnographic visits to villages, survey research in a market town, and data collection from every government department and all the banks generated a critical engagement with theory, methods, and substance in this branch of development economics, which could be used to check the results of the regional models. The environmental research of Round One[18] was not developed. A very severe drought in 1982/3 had to be compensated for by an additional partial survey in 1983/4 when the region had somewhat recovered. Otherwise, the GR would have been associated with negative agricultural growth. Post-drought, 90 per cent of the paddy area was found to be cultivated with HYVs.

The social accounts simulation and extended input–output modelling generated the following overall result. While agriculture continued to supply the region's economic base,[19] the GR in NTN did not generate a dramatic step change in production, nor did it worsen rural income inequality (Hazell and Ramasamy 1991: 55–6, 238–47). Every rupee added by agriculture generated about an equal amount in the non-farm economy, though final conclusions qualified it downwards to Rs 0.6–0.7 (Hazell and Ramasamy 1991: 245). Consumption linkages were weaker than found in comparable rice areas in Malaysia (which was attributed to the effects of higher incomes there: Hazell and Ramasamy 1991: 174), whereas production linkages were relatively stronger in North Arcot and the benefits of growth linkages accrued mainly to non-agricultural households. In the decade following 1973, small farmers obtained a third of their income increases from non-agricultural activity, while landless agricultural labour households obtained a fifth, a result interpreted as showing that growth linkages alleviated agrarian poverty (Hazell *et al.* 1991c: 174–80).

3.3 Results relevant to poverty

In Round Two, poverty was again described using continuous variables, not in relation to a poverty line (which by 1991 had become standard practice in poverty studies) but principally in terms of absolute and relative poverty of household incomes and their trends. In addition, however, the itemised

[16] See Harriss (1976), Pacey and Payne (1984), and Mani *et al*. (2019) for counterintuitive histories of cost-increasing technological change and labour displacement.

[17] In the same set of 11 villages as Round One, 345 households were sampled and stratified using Round One definitions into 160 paddy cultivators, 25 non-paddy cultivators, and 160 non-cultivating households, 120 of which were landless labour (Ramasamy *et al*. 1991: 25–6). The five most drought-affected villages were re-surveyed in the 1983/4 recovery year.

[18] Madduma Bandara (1977), a hydrologist, had measured well depths in and around all the sample villages in 1973 and predicted the rate of water table decline and the hydrological crisis that eventually added dysfunctionally to the costs of production.

[19] In 1982–3, 44 per cent of the district's income, 68 per cent of its 'exports', and 72 per cent of all commodity transactions came from agriculture. Inward remittances were unimportant at 4 per cent of the average household income. The government generated 70 per cent of its own revenue from within the district, but one-fifth of savings fled the district (Hazell *et al*. 1991b, chapter 7).

consumption components of households' incomes were converted to nutritional values. Agricultural production and its linkages were the analytical master keys to poverty. During the 'post-drought' decade from 1973 to 1983/4, paddy production had increased by 82 per cent on small farmers (under a hectare) through yield increases and by 143 per cent on those over a hectare through area expansion and multiple cropping (Hazell *et al.* 1991a). While the IFPRI team found an inverse size–productivity relationship, they found that the yield gap between large and small producers had closed and concluded the HYV technology was scale-neutral (Hazell and Ramasamy 1991: chapter 11).[20]

They found other trends pointing towards the gains of small farmers converging on those of larger farmers. Since 1973, small farmers had increased their incomes by 90 per cent and landless labour by 125 per cent, whereas the incomes of non-paddy farmers had risen by 18 per cent and that of non-agricultural households by 55 per cent. The last two categories were losing out relatively from lack of direct uptake of GR technology and were labelled the '*new rural poor'* by Hazell and Ramasamy (1991: 55, 241–5, 262–3). Nevertheless, the GR had enabled landless households to gain parity with small farmers through earnings from wage work.[21] Despite the entrance of women into the labour market on low wages, and however much the wage gap between labouring men and women had widened (Harriss 1991a: 61), this was taken as proof of the tightening of labour markets predicted by Mellor.

The new poor notwithstanding, Hazell and Ramasamy also found that direct and indirect (consumption-linked) benefits were widespread in the *non-farm economy*. Harriss listed paddy trading, petty business, weaving, livestock herding, services for men and low-level government jobs, clothes washing and tailoring, and domestic service for women (1991a: 62–5).[22] However, the extent of the non-farm economy appeared to vary directly with proximity to towns and small-service centres (Harriss 1991b: 115; Wanmali 1991).

Out-migration had picked up somewhat, to local towns and South Indian metros for casual labour and textile work, tightening local labour markets and easing incomes through remittances (Harriss 1991a: 65–7), including those from military service. Despite relative poverty in rural non-agricultural households, Hazell and Ramasamy concluded from trends (and from inequalities) in real consumption expenditure and diets that trajectories of upward mobility out of poverty were evolving, not just in agriculture, but also outside it and as an indirect result of the GR (1991: 243).

Round Two contained limited information about the roles of social institutions in relations of poverty. Harriss's repeat field study of IVVs found a general relationship between the proportion of SC households and the incidence of hired labour, but the proportion of SC households varied from 18 per cent to 67 per cent. Meanwhile, earnings from wages were also determined by factors other than caste: seasonal demand for labour was shaped by irrigation and further tightened by the labour demands of the non-farm economy (Harriss 1991a). The non-farm economy formed a barrier to female participation. Nonetheless, a trend of increased – albeit segmented – economic participation by women was observable. While in local towns, women's wages in rice mills and twisting workshops were 20 per cent to 30 per cent lower than those of men; in villages, on average, the gap was 40 per cent (Harriss,

[20] Of course scale-neutrality does not mean resource-neutrality. With respect to resources, landlessness was classified as having less than a quarter of an acre. 'Small' was defined as operating under one hectare (sic), while 'large' covered the rest (Hazell and Ramasamy 1991: 31), ignoring the impact of both proximity to roads and soil–water status on land resource values and operational scale. The Hazell-Ramasamy volume also used the categories of small paddy farming households; large paddy farming households; non-paddy farmers; landless households; and non-agricultural households (Hazell and Ramasamy 1991: 42). Gainers and losers of land and capitalists, rich peasants, middle peasants, and poor peasants were also used as analytical categories (Hazell and Ramasamy 1991: 72), as were small peasants (Hazell and Ramasamy 1991: 82).

[21] However, Harriss (1991a: 117) found much IVV from his village ethnographies and mixed evidence for rises in real wages.

[22] And see Wanmali's (1991) list of 134 non-farm services in the district.

B. 1991: 200). The village ethnographies posed challenges to theories of class differentiation consequent to the GR. While there was no clear trend in the agricultural labour force, there was also little evidence for dispossession or for further concentration of the landholdings of the dominant agrarian caste. Instead, case material suggested processes of partitioning, miniaturisation, and stabilisation of landholdings (Harriss 1991a; Hazell and Ramasamy 1991: 241–2).

The concept of poverty, meanwhile, had been enriched with scholarship on basic needs. Round Two examined a basic need, about the vital importance of which there is consensus: nutrition.

3.3.1 Nutritional poverty

Postdating conceptions of development as 'basic needs' (Jolly 1976), but predating the emergence of 'human development' (Griffin 2000), Round Two, initiated by the IFPRI, would have been rather amiss had it not examined food consumption and nutrition as an expression of poverty. This was analysed, not anthropometrically, but through expenditure on food converted into the cost of calories for a subset of five villages in 1973 that were re-surveyed post-drought in 1983/4. Trends in nutrition poverty were extrapolated. The threshold of nutritional poverty was an income consistent with food expenditure at 80 per cent of 'recommended levels'.[23] In Round One, 70 per cent of households had consumed less than 'requirements',[24] but only an average of 20 per cent did in Round Two – 30 per cent among landless labour households. In 1983/4, in all Round Two households, food amounted to 70 per cent to 80 per cent of total expenditure, yet all households were found to be diversifying their diet into calories generally considered to be income-elastic coming from oil, milk, vegetables, lentils, fruit, and bananas. Much of the analysis reduced food to calorie equivalents, ignoring protein and micronutrients, which are now regarded as of much greater significance for nutritional health. The project noted the rising cost of calories for landless labour households, which consumed 20 per cent (450 calories per caput) less than small-farmer households. 'Only' 10 per cent to 15 per cent households were severely calorie deficient (at less than 80 per cent requirements). The strong implication was that rising incomes were driving down nutritional poverty, consistent with growth linkages theory (Pinstrup-Andersen *et al.* 1991: 85–97).

At the same time (1984), a field case study of the Noon Meals Scheme (the world's largest school nutrition programme) in Dusi – the suburbanising 'Slater village' added to Round One – and in Veerasambanur – a small backward sample village[25] – produced a different account of food insecurity and scarcity (Harriss, B. 1991b). Nutrition poverty was found to be more prevalent. Against a low-end requirement of 1.2 Basal Metabolic Rate (BMR) (1,700 calories, 30 per cent less than IFPRI's Recommended Daily Allowance or RDA), 55 per cent of poor households with children under 10, a group with under one hectare of land plus landless labouring households, suffered calorie deficits of between 14 per cent and 23 per cent below the BMR requirement. They also lacked the dietary diversity picked up by Round Two.

Alcohol consumption also contributed to nutrition poverty. While in the IFPRI re-survey it was recognised that a few cases of alcohol consumption caused some debt and downward mobility (Harriss

[23] These were not specified and were then the object of considerable debate (Pacey and Payne 1984; Harriss, B. 1991b: 44).

[24] The calorie 'requirement' is found in a footnote to Table 5.9: 94, in the form of the RDA of 2400 per adult equivalent (a 55kg man). Large farmer households (above one hectare) consumed 1,724 calories per person (not per adult equivalent) in 1973/4 and 2,884 calories per person ten years later. Small farmers consumed 1,386 calories per person in 1973/4 and 2,606 calories per person ten years later. Landless labour households consumed 1,426 calories per person in 1973/4 and 2,154 calories per person ten years later (Pinstrup-Andersen *et al.* 1991, Table 5.3: 91).

[25] Called respectively Lakshmipuram and Eraiyur in Harriss (1991b).

1991a: 67), in the two-village case study, one-third of households had a member consuming alcohol and this consumption behaviour was not confined to SCs (as it was widely thought then). Ten per cent of the households had both inadequate food supplies and the presence of an *arrack* drinker. When the estimated cost of alcohol consumption by male adults was translated into potential spending on the cheapest cereals, the food scarcity of these households would have disappeared. In the same region, different subsamples of villages, classifications of households, and modes of measuring undernutrition and diet produced different substantive outcomes.

3.3.2 Diversification and growth linkages

An additional aspect of Round Two had a bearing on conceptions of poverty. This was the declining role of agriculture and the diversification of this region's rural economy. How did it conform to the theory of agricultural growth linkages – labour-intensive, poverty-reducing activity responding to production and consumption linkages? Focused case studies running simultaneously alongside the village-level sample surveys generated nuanced arguments about the multipliers of agrarian change. The concept of diversity therefore deepened from the Round One concept of IVV to grapple with diverse non-farm livelihoods. For a start, despite the IFPRI habit of 'pooling villages' (Hazell and Ramasamy 1991: 5) for model parameters and estimates, IVV – in terms of levels of development measured by irrigated land, agricultural mechanisation, demand for labour and wages, access to urban centres, and livelihood diversification – was found to have increased. However, land control shaped poverty, and entire *villages that also had the most unequal land distributions and the largest proportions of assetless households* (hence lacking direct uptake of GR technology) were now classified as poor (Harriss 1991b).

In Tamil Nadu Agricultural University's outdoor laboratories for rice research during the 1980s, the GR's key technological component and production linkage – seeds – had traded robustness to environmental stresses (like water, soil, temperature, and photoperiodicity) for adaptation to the local agro-ecology and climate.[26] Quick-maturing, photo-period insensitive, better-tasting HYVs were now widely available (Hazell *et al.* 1991a: 42) and GR technology had been generally adopted across the agricultural economy. However, the case material strongly suggested that the economic diversification that had occurred 'could only partially be explained by agricultural growth'. The need to justify the GR had combined with the disciplines of SAM modelling to lead the test of Mellor's theory of growth linkages from agriculture to neglect non-GR drivers of growth and other anti-poverty processes (Harriss 1987b).

While the centrality of agriculture in the cause–effect relations of growth was undeniable, the importance of other causes of livelihood diversification were revealed – through fieldwork rather than through theory. The first cause of livelihood diversification was the behaviour of markets for labour, since no increase in overall agricultural employment was recorded and average on-farm demand for wage work declined by 25 per cent (Hazell and Ramasamy 1991: 240).[27] If real agricultural wages were rising, this trend was caused by the pressure of labour demand in other segments of the labour markets. Caste and gender structured these markets in ways that were both crude and contradictory. On the one hand, *Dalits*[28] and women were trapped in the villages, confined to casual agricultural work and not allowed into the non-farm economy. On the other hand, men and non-*Dalits* were able to leave, thus reducing the local labour supply.

[26] In the seed-breeding vocabulary, whereas first-generation HYVs maximised environment-genotype interaction, the second generation minimised it.

[27] For the outcome of the voluminous literature on the labour-displacing effects of mechanisation and tractorisation versus the labour-creating effects of (private well) irrigation and the threat the latter poses to employment in public (tank) irrigation, see Binswanger (1986).

[28] The word *Dalit* originally meant 'shattered' and is now used for the lowest SCs in the Indian constitution, either outside the caste system or at the lowest point in the status hierarchy. *Dalits* are also called 'untouchable' and, when this research started in the 1970s, self-identified as *harijans* (Gandhi's term from 1933 – 'people of god').

Second, *forward agricultural production linkages* were found to be labour-intensive and local but often producing for national rather than local demand. Conversely, industry with local production linkages was neither labour-intensive nor small-scale (Harriss 1987b). A third non-agricultural force diversifying livelihoods was public expenditure in *subsidised state employment programmes,* notably the Noon Meals and National Rural Employment Schemes/Food for Work.

Research on the region's money markets also identified the hand of the state in *low-interest* (subsidised) *credit,* which added another organisational layer to the complex informal money markets in which poor rural people rolled – and still roll – credit and debt (Guerin 2014). Village ethnography showed competition in moneylending in local money markets (between traders, pawnbrokers, 'private parties', chit funds, etc.) and between market and state organisations (cooperatives and nationalised banks). This generated further 'anti-poverty effects' by reducing the interest rates on transactions for borrowers with proven assets,[29] which in turn increased the nominal incomes of borrowers (Harriss 1991a: 75–80).

These 'growth linkages' – to the state and to local agri-business – were stronger than Mellor's theory predicted. Persistent rural inequality, however, accounted for the existence of mechanisms such as *savings/bank deposits that were drained* from the district to the metropolis and inhibited investment in local production (Harriss 1987b). These findings called for regionally specific and more nuanced models of growth linkages – although such models did not directly or indirectly address poverty.

Policy for reducing poverty was inferred from the empirical findings and addressed to the government, as an 'economic actor' whose influence was theorised to be mediated through its direct impact on agriculture and its indirect impact through growth linkages. Policy recognised as pre-empting poverty in the early stage of releasing HYV technology included subsidising water, credit, and fertiliser, together with policy for infrastructure: electrification, transport and telecommunications, subsidised food and nutrition programmes, regulated markets, and food for work employment schemes (Hazell and Ramasamy 1991: 244–7).

Round Two, remarkable in terms of its models from development economics, was also remarkable for the scant attention paid to the way people participated without objection in processes leading to their poverty – such as when precepts of Brahmanical Hinduism, preventing deferential labour from perceiving their exploitation, enabled employers to increase their profit at the expense of wages (Harriss, J. 1982, chapter 6: 356–7). In fact, subsequent rounds have tended to treat institutions such as caste and gender – even households – 'mechanically' and categorically, as is conventional practice in development economics, and have reinforced this neglect, as is conventional practice in political economy.

4 ROUND THREE: THE 1990S

4.1. Organisation

Round Three saw yet another switch of research institutions with a thin line of continuity. It involved an international collaboration between a fieldwork, data processing, and analytical team from the Madras Institute of Development Studies (MIDS) directed by S. Janakarajan, with D. Jayaraj and M.V. Srinivasan, and a team directed from Oxford University by Barbara Harriss-White with Diego Colatei, focusing on

[29] For landless and poorly asseted borrowers, interest rates had become more oppressive: on jewels, it rose over the decade following 1973 from between 14 per cent and 18 per cent to 24 per cent to 36 per cent; on watches and brass vessels, it rose from 60 per cent to 120 per cent (Harriss 1987b: 36).

analysis. With a remit grounded in political economy and development economics, at its maximum a group of 40 worked on Round Three in Oxford, Chennai, and the field, creating the village censuses and sample survey supplemented by individual research in and around three villages and in one market town.[30]

4.2 Objectives and context

This round was set against an intellectual and historical backcloth that had changed in three major ways.[31] First, there was a theoretical movement towards the 'dematerialisation' of development. By 1990, Mahbub ul Huq had published the first human development report in which the object of development was no longer growth or industrial transformation *per se*, but human wellbeing and the social conditions under which generalised wellbeing was to be achieved (prime among which was, for Amartya Sen [1999], freedom).

Second, in agriculture, despite the positive conclusions of the IFPRI project, the view persisted among agrarian scholars that the GR had not succeeded in 'transforming the conditions of insecurity and poverty that characterise the Indian rural economy'. Small and marginal producers 'remained highly dependent upon advances of credit, and downturns in yields and/or prices (had) ratchet effects, pauperising them and locking them still further into debt' (reviewed in Harriss-White and Harriss 2007: 13). Similar ratcheting credit relations were emerging in the rural non-farm economy. Having acted as an exceptional labour sponge compared with other economic sectors, agriculture started to shed labour (Sen 2002). The rice economy of Tamil Nadu was now on course for growth rates half those of the first decades (Harriss-White *et al.* 2004: 3; World Bank 2004). One aspect of the physical environment, water, was thought to play a major role in this relative stagnation. The rate of well digging and electrification slowed[32] and processes of energising wells were balanced by ones abandoning them due to the costs of reaching the lowering water tables.

Was the GR finished? Certainly not in Tamil Nadu. Between the early 1980s and the 1990s, fertiliser use had increased by 30 per cent (Harriss-White and Janakarajan 1997: 1470). Research also remained revolutionary in its momentum: in the late 1980s and early 1990s, agricultural research had turned to develop HYVs for the 'minor' seasons. Half of the new varieties were now bred entirely in India, with no foreign seed imports; the rate of obsolescence of new varieties accelerated, and a new approach to technologies for integrated nutrient management, integrated pest management, and efficiency improvements in the utilisation of water and soil resources was being developed (Harriss-White and Janakarajan 1997).

In an economic revolution, however, costs per unit of output would decline. Nevertheless, despite the 100 per cent subsidy on agricultural electricity, by 1993–4, real costs of HYV paddy production had risen by 63 per cent over costs in 1973. By this yardstick, the GR was not revolutionary (Harriss-White *et al.* 2004a: 24–31, Tables 16–19). Further, given the findings about diversification in Round Two, agriculture in Round Three was no longer assumed to be the dominant driver of growth and household mobility in the village economy. So, the scope of the design of questions about agriculture and the rural non-farm economy was widened.

[30] In 1993–4, the third census was taken of all 11 villages originally selected in 1973 to generate a long-term core of questions about household composition, kinds of poverty, assets, labour, and livelihoods (including agriculture) (see details in Srinivasan 2004).

[31] The intellectual landscape was changing in other ways, but the full implications of the Brundtland Report on environment and development, published in 1987, had yet to penetrate development economics, let alone VLS.

[32] By 1991, there were about 300,000 energised wells – up from 230,000 in the early 1970s (Harriss-White and Janakarajan 1997).

Third, in 1991, the government of India started to implement structural adjustment policies that had been forced on Africa ten years previously without conspicuous success, but which were the precursors of an era of liberalisation in India. First to be transformed were trade and exchange rate policies and corporate and financial sector regulations. Meanwhile, there was considerable policy continuity in sectors of the Indian economy dealing with essential commodities and utilities – notably food, electricity, and agriculture (Harriss-White 2004a). States resisted electorally sensitive reforms in sectors – such as power supplies – over which they had constitutional responsibility. Although the informal economy or unorganised sector (in which agriculture is officially classified) continued to be neglected nationally while informal labour, finance, and commodity transactions ballooned (Sinha *et al.* 2007), nothing stopped the stagnation of public expenditure and the deprioritisation of agriculture in public investment (Kakarlapudi 2010).

Experiments in agricultural liberalisation, such as reduced subsidies on fertiliser and agricultural electricity and calls for the privatisation of agricultural electricity, had to be rapidly withdrawn. The Indian state nevertheless failed to protect agriculture against price and output volatility and intercrop instability, while the 1990s All-India growth rate of yields continued to slow down (Kakarlapudi 2010: 13). To the extent that agriculture was included in liberalisation,[33] it was the post-harvest system of distribution that was first liberalised: storage and movement restrictions were lifted early on (Harriss-White and Janakarajan 1997).

While the third round, therefore, continued to collect a common central core of agricultural data over a period that had begun to qualify as 'long-term', the VLS team expanded its conceptual frame to cope with the diversified economy: diversified in agricultural production, in the non-farm economy, and in household livelihood portfolios. It moved towards a focus on infrastructure, on enabling diversification in rural development, and on the institutions and organisations through which market exchange and commodification had intensified and through which changes in the 'politics of policy' were to unfold.

For the first time, the team also engaged with theories of human development and their implications for poverty, now conceived in multidimensional terms. It confronted the practical need to be selective in what aspects to study and how. While All-India urban- and corporate-biased policies of structural adjustment led to reduced rural infrastructural subsidies and social expenditure (data in Ghosh 1997), in Tamil Nadu a skeletal social safety net was in the making (Guhan 1992). Round Three chose to examine relatively neglected infrastructure that supplied public services, affecting private poverty at the household level: sanitation, drinking water, and waste disposal. It selected aspects of individual human development variously theorised as 'basic needs' or 'elementary capabilities': gendered life chances, health and incapacity for work, undernutrition, education and the shocks to wellbeing that justified state provision of social security (for motherhood, unemployment, sickness, breadwinner death, and income poverty in old age).[34] This round was framed more explicitly in the constitutive context of political economy and its institutions than had hitherto been the case.
In 1989, the earlier unit of policy analysis from which the villages were selected – the district – was split. Most villages that had been randomly selected for study now found themselves arbitrarily sited in a relatively underdeveloped district. Entire villages could not only be classified as poor; the new

[33] Except negatively through public expenditure stagnation.

[34] Information about the detailed, three-village census of 745 households is given here in Section Two. See also Colatei and Harriss-White (2004: 119) for their scope. Official census data for the three villages were also used and helped simplify the classification of non-farm activities, given that Wanmali (1991) identified 134. Village-level wages data were collected. Detailed questionnaires covering production, exchange relations income, and consumption, as well as access to utilities, were canvassed at regular intervals over a 12-month period in 1993–4 with 115 households drawn from each village proportional to its number of households (48 per cent in Nesal; 30 per cent in Vinayagapuram; and 22 per cent from Veerasambanur) and randomly selected proportionally to households in the cluster-analysed class stratifications (Harriss White and Janakarajan 2004: 36–7).

Tiruvannamalai district also became 'poor', officially classified in the bottom five of Tamil Nadu's 35 districts for human development (Tamil Nadu State Planning Commission 2007).

Developing the insights of Schaffer (1984), policy was not seen as a residual 'implication', as it is in conventional development economics, nor was policy failure reduced to corruption, as in rational choice political science. Instead, policy was understood as reflecting its necessarily complex bureaucratic politics: its discourse and agenda, its law and proceduralisation, its politics of resource mobilisation and of allocation and access. The approach zoomed in from the national-level through the state-level to the local-level of policy practices and outcomes. The analytical approach of Round Three was critical and incrementally prescriptive. It did not result in policy implications. Rather, it examined room for policy manoeuvres within the existing political economic structure, as well as awareness of the 'policy preconditions'[35] and institutions that needed to be in place for policy prescriptions to be effective as intended.

4.3 Results relevant to poverty

Concerned as it was with rural development, Round Three had most to report about poverty, opening up seven different dimensions, including their evidence and their analytical methods.

4.3.1 Inter-village poverty

First, the analysis of IVV took a further original twist relevant to an understanding of poverty (Srinivasan 2004). From the 11-village census of 1993–4, village-level variables indicating household demography, human development (e.g. gendered literacy; child sex ratios), the incidence of landless households and wage and family labour utilisation, the proportion of small farmers, irrigation intensity and cropping patterns, household and per caput incomes from agriculture and the non-farm economy, and debts and liabilities were used to compare villages, both between themselves and over the 20-year period.

Subsequently, 37 variables pertaining to these dimensions of village economy and society were analysed using principal components analysis and a varimax rotated factor matrix, generating four factors. These factors systematically shaped the variations in the village economies stylised through this set of variables. Variables were grouped statistically as follows (Srinivasan 2004: 107–10) and were interpreted as dimensions of village-level development:

1. Irrigated and dry agriculture with non-farm economic activity;
2. Poverty, social backwardness, and low levels of human development;
3. Gender and caste;
4. Inequality in the assets distributions.

Unlike Round Two, this third round did not find a 'new poverty' among non-agricultural households associated with lack of direct engagement with GR technology. Quite the reverse: villages with relatively large non-farm economies were the more developed and the least poor in the set. Factors 2 and 4 were most relevant to the way in which Round Three focused on poverty. In Factor 2, the 'syndrome' of associated variables included low levels of male and female literacy, child sex ratios adverse to girls, low agricultural income, and low well-dependence. Factor 4 focused on the large proportion of small-farmer households, the area they owned and operated, and their debts and those of landless labouring households. The factor loadings were then analysed through hierarchical cluster analysis, from which five groups of villages emerged.[36]

[35] See Schaffer (1984) and Fernandez (2012) for discussions of the constitutive context for policy.

[36] Labelled as suburban; developed; remote but commercialised; agricultural and underdeveloped; and SC and poor (Srinivasan 2004: 111).

Among these groups, three out of the 11 villages displayed poverty associated with a dependence on agriculture, lack of economic diversification, and low levels of human development. In another three out of the 11 villages, poverty was associated with 'remoteness', the lowest levels of female literacy, and high frequencies of low-caste and SCs 'reflected in the economy' through high rates of male and female participation in wage work (Srinivasan 2004: 110–1). Average incomes in the richest three villages were 60 per cent greater than those in the poorest three villages (Srinivasan 2004: 105).

Only three of the original 11 villages were taken for the second stage of detailed survey: Nesal (classed as 'developed'), Vinayagapuram, and Veerasambanur (classed as poor with a high incidence of SC households). All had economic relations with the local market town of Arni that involved flows of people for commuting and migrant work, plus flows of money, commodities, and investment. The analytical unit for the in-depth re-surveys became the rural–urban complex. Even within this small subset of villages, however – although trends towards convergence in small-scale production, increases in landlessness, and concentration among the elite could be found throughout – the IVVs in the development of assets and incomes had increased. The 'developed' village, Nesal, had become a suburb, yet it harboured the most acutely differentiated assets inequality and poverty. The wealthiest household in the village declared assets of US$ 150,000, while the poorest (living nearby) had US$ 6. Nesal's Gini coefficient for assets was extreme – 0.81 (Harriss-White *et al.* 2004a: 13; Srinivasan 2004: 89, 1–306). Meanwhile, the most remote village, Veerasambanur, had the most generalised and most persistent income and assets poverty. It was home to people with leprosy one mile away from a specialist leprosy hospital but unable to access treatment there (Srinivasan 2004: vxi).

Responding to social science theories of poverty scaled at levels of abstraction above – and largely ignoring – the relations and agency of individuals, dimensions and relations of poverty were uncovered in the forms of outcomes and correlates of social units. These varied from collectives of individuals (e.g. age and gender) through households (e.g. caste; income and assets) to groups of households with similar economic interests (e.g. classes). In the analysis of Round Three, case material from fieldnotes was interleaved illustratively.

4.3.2 Water and poverty

The production of paddy depends on water – up to five tonnes per kilogramme of HYV paddy (Gathorne-Hardy 2013). Water for agriculture comes from three sources in the region studied: rainfall, surface sources (tanks; rivers; canals), and underground aquifers exploited using wells energised by electricity or diesel. Janakarajan (2004) reports rapid changes in all three sources: increased instability in rainfall distribution and increased frequencies of drought, the drying up and decay of surface water-sources, and the rapid depletion of subterranean water with declining dry-season water tables, faster in dryland tracts than for wetlands.

Janakarajan attributes these changes to a series of social and economic factors, notably the exit and replacement of Brahmin landowners by lower-status, locally dominant agrarian castes who lacked authority to manage the collective organisation of surface water resources (which had involved paid *Dalit* labour and which had become inactive by the 1990s). A second set of relations through which water management deteriorated was encroachment onto common property: dried-up surface water bodies, cultivation in catchment areas, and non-removal of tank silt. Subterranean water tables also reeled from the competitive sinking and deepening of privately owned wells, incentivised by power subsidies and in defiance of the regulations about well spacing. As John Harriss had already concluded for the 1970s (1982: chapter 3), this was an agro-ecological crisis decades in the making, and for Janakarajan (2004) it was one that caused agrarian poverty.

In the early 1990s, in Tamil Nadu, private investment in well-water exceeded that of surface irrigation by a factor of 2.5. Investment in wells, well mechanisation, and well maintenance spiralled in real terms, placing stress disproportionately on small and marginal landowners. Janakarajan records their increased debt and the emergence of water markets mediated through interlocked contracts for water, labour, money, and commodities disadvantageous to water purchasers. In such arrangements, dominated by water-lords, labour was underpaid, commodity prices were lower than market rates, interest rates were higher than prevailing ones, and reversed tenancy and even plot sales were forced on producers tied up in interlocked contracts.[37] He concludes strongly that the hydro-ecological crisis was differentiating and that it caused poverty.

4.3.3 Class and poverty

For the first time in these VLS, it was possible to identify social classes rigorously through pattern-seeking statistical computations.[38] Village household census data appropriate for the analysis of three major theories of mobility and differentiation[39] were submitted to cluster analysis. To denounce this as a sterile static exercise would be to miss its dramatic and robust result.

In each of the three villages, agricultural livelihoods were increasingly wage labouring ones (Srinivasan 2004: 56–8, 95). Between 70 per cent and 80 per cent of households relied on agricultural labour with zero to one acre of land. Within this labouring class, the average incomes of landless labouring households were 40 per cent lower than those of landed labouring households; the small set of non-agricultural households were 60 per cent lower than landed labouring households. By contrast, the top 15 per cent of households dominated the ownership of both agricultural and non-agricultural assets and accumulated capital in a diversity of ways (Colatei and Harriss-White 2004: 130 *et seq*).

Between the big labouring class (also termed the poor peasantry in Round Three) and the rich elite, agricultural cost structures and the prices received for the marketed surpluses driving profits were class-specific – often statistically significantly so. The marketed surplus of paddy grown by the elite was found to be 150 per cent per acre of that of the landed fraction of the labouring class. Whereas paddy sales of the elite were price-responsive, those of the hardly landed labouring class were inelastic to price. The elite captured 85 per cent of formal credit (Harriss-White *et al.* 2004a: 22–37). A threshold of five acres enabled access to the formal sector to approach the status of an entitlement. While village-level uniqueness in the configurations of credit institutions[40] is masked by generalisation, elite borrowers lent at cascading interest shaped by the urgency of demand, disparities in assets, caste, education, micro-monopolist social authority, and the capacity to enforce interlocked contracts using threat and force (Harriss-White and Colatei 2004: 257–62). Labouring households were increasingly unable to reproduce themselves socially without engagement with such markets; their means of production were being commodified through exchange relations on adverse terms.[41]

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[37] Reverse tenancy is the renting out of small-holders' plots to larger tenants; it upends the norm of tenants being small-scale and landlords being large-scale operators.

[38] Although John Harriss dismissed these approaches, after E.P. Thompson, as 'mechanical' (1982: 216) and unrelated to human relations (Harriss, J. 1982: 134), the class classification of Round Three was an advance on ignoring social class completely (Hazell and Ramasamy 1991). It also generated meaningful results.

[39] Those of capitalist transition and class differentiation, reviewed in Thorner (1982); those of differentiation due to exchange relations, theorised in Bhaduri (1983); and those due to the demographic cycle of worker-dependent relations in households over generations (Chayanov, reviewed in Harriss, J. 1982).

[40] These include state-managed credit and banking schemes (e.g. Integrated Rural Development Programme; land development banks), state-regulated private and public banks, moneylending dynasties, pawnbrokers, grain and silk traders, shopkeepers, elite farmers, chit fund organisers, and itinerant moneylenders (Harriss-White and Colatei 2004: 278–9).

[41] The exchange relations of labouring households were on terms involving higher input prices and lower product prices than those for the agrarian elite class. These relations were often seasonally specific.

Patterns of expenditure were also clearly differentiated by class (Harriss-White and Janakarajan 2004: 36–8). Until recently, quantitative studies of village economies have relatively neglected divisions in rural society not mapped by class or income.[42] In Round Three, caste was analysed: local agrarian dominant castes (Agamudayar Mudaliars and Vanniyars) comprised the village elites, together commanding 90 per cent of the land and non-land assets of the three villages. These castes were also found in the labouring class. By contrast, SC households were excluded from the elite. Rarely owning any wetland, they predominated in the labouring class and were disproportionately poor in assets and incomes (Colatei and Harriss-White 2004a: 140–52) – just as Harriss had explained for the 1970s. Caste-related conditions of work persisted as shapers of poverty.

4.3.4 Income and expenditure poverty and its gendering

For the first time, household incomes and expenditure were analysed statistically in relation to a locally specific official poverty line that was set at levels of expenditure, thus ensuring a dietary/calorie minimum. From village to village, between 29 per cent and 36 per cent of households were below this poverty line; 20 per cent to 30 per cent had regular expenditures exceeding their incomes and the largest gaps were among the households below the poverty line.

The gendering of households also shaped income poverty. 'South Indian women have had higher economic status than elsewhere ... due in material terms to their economic participation … to supportive patterns of cross-cousin, short-distance marriages and relatively low marriage expenses' (Harriss-White 2004b: 144). Declines in fertility, however, as well as in the rigidity of kinship rules and the replacement of bride price by dowry was increasing the costs of raising girls, reducing the support to and from women and reversing improvements in child sex ratios (Agnihotri 2000). The era of reforms had selectively intensified rather than dissolved the primordial structure of gender. Women's workloads continued to be heavier than men's; socially reproductive work took priority over labour market participation; and gendered productive tasks fetched lower returns for women, who were disproportionately casual agricultural labour and disproportionately hired by the elite class.[43] Possessing less (or less valuable) collateral for loans than men, female debts tended to be male-mediated. Not all female-headed households where the breadwinner was a woman were entirely assetless, but they were 63 per cent (disproportionately) landless. Female-headed households tended to be poor, entirely female households were even poorer, single women on their own were poorer still, and single women over the age of 61 on their own were poorest, eking out an existence from gleaning, collecting and drying cow dung, and receiving charity (Agnihotri 2000: 144–56, 440).

The agency of women in these forms of female households took active and passive forms. Female agency was restricted to lower-paid tasks in agriculture and faced significant barriers to participation in the non-farm economy (Jayaraj 2004). Their capacity to contract debt (which, *pace* Guerin's later 2014 findings, was found to be compromised by their gender: see Harriss-White and Colatei 2004: 265) could not protect against slipping into conditions of income poverty. Passive agency meant that aged, widowed, or abandoned women were unable to prevent their exclusion from the right to be dependent on working sons, or had no working sons.[44]

Among the poor, credit and debt triggered upward as well as downward mobility, the trajectory depending on collateral, interest, use, and risk. Tiny patches of land secured double the size of loans than those for landless borrowers. The latter were routinely excluded from pawnbrokers' loans and

[42] See Himanshu, Lanjouw, and Stern (2018) for the inclusion of caste in the econometric study of the UP village of Palanpur. Harriss (1982) has been an authoritative corrective for the NTN VLS.

[43] Despite some improvement in the gender elasticity of tasks, returns were shown to be unrelated to productivity in task-sequential systems and even less so for activities where women and men worked together, assumed to be due to the subordinating effects of gender ideology (reviewed in Harriss-White 2004: 159–66).

[44] Nor were they able to broker access to meagre social security entitlements (Harriss-White 2004c).

traders' credit (Harriss-White and Colatei 2004: 271–3). While land was the most generative collateral, the poorest did not deploy land as collateral because of fear of losing it. Instead, land screened eligibility. In place of land, poor borrowers had distinctive collaterals: pledges of future labour, utensils, gold, appeals to caste reputation, gender, or third-party reputational guarantees. The interest rates they faced were shaped by urgency, but also by the marketability of their collateral. Every village had several unregistered chit funds structured by landholding, occupation, caste, gender, and even political party allegiance. In Vinayagapuram and Nesal, women lenders and borrowers formed informal networks of finance unknown to their menfolk involving household items as collateral for petty amounts (e.g. Rs 200) at annualised interest of up to 60 per cent (Harriss-White and Colatei 2004: 257–9).[45]

4.3.5. Rural diversification and poverty

From Round Two, a spate of diversification into income-elastic crops – vegetables, flowers, silkworms, fruit, milk – was predicted (though the processes of science and technology and the extension lying behind their diffusion lay beyond the scope of Round Two). Instead, Round Three found water table depletion incentivising diversification into rainfed cereals such as millet, while male out-migration encouraged the production of labour-sparing crops, such as tree crops. Starting in agriculture, new practices also included intercropping, production of diverse varieties of the same crop, more complex cropping patterns, agro-pastoral mixes, and occupational diversification into rural industries, crafts, and services. This process was hardly detectable when data were collected for households as an aggregate of livelihoods. Village and field diaries revealed these processes at the granular level of individuals, seasonal shifts of activity, and uniquely diverse trajectories (Srinivasan 2004: 87).

Since the moment research revealed the emergence of the non-farm rural economy (Vaidyanathan 1986; Chandrasekhar 1993), incentives and constraints on agency – variously theorised as social mobility, differentiation, and accumulation – have received much attention. Binary pathways have been stylised: of compulsive (or 'distress' or debt-related) diversification or diversification pushed by water scarcity (e.g. into waste-work, shepherding or domestic service) versus voluntarism (or 'speculative') diversification (e.g. into trade or labour-contracting for construction). In Round Three, in the early 1990s, de-agrarianisation and rural industrialisation were revealed as providing a mass of livelihoods to the lower agricultural castes that constituted the small peasantry and agricultural labour force,[46] with a resulting proliferation of household forms of production such as handloom silk weaving, glove sewing, and petty-scale paddy processing, dependent on commercial finance and on (black) investment capital seeping out of urban areas. These investment and occupational opportunities are heavily screened by class, caste, and gender (Jayaraj 2004).

The hotly debated question – whether income poverty was exacerbated by the terms and conditions of traders' interlocked contracts (Bhaduri 1983, Janakarajan 1992) – now had to be asked of the non-agricultural credit of urban non-agricultural traders, which was ostensibly lent for activity like weaving but which could also be diverted to agriculture and household consumption.

Decentralised rural industrialisation (agricultural processing; handloom weaving; pottery) and services (from tuition and quackery to carting and snack-making) were characterised by technological

[45] Contrasted with 12 per cent to 14 per cent for formal targeted credit and 24 per cent to 36 per cent for bazaar credit.

[46] Jayaraj (2004) finds that, out of 703 households censused in the three villages with at least one source of income, of the 60 per cent with land, half considered non-farm economic activity to be their primary source of income and 75 per cent considered it to be a secondary source. Of the 40 per cent with no land, a third got their primary income from the non-farm economy and 55 per cent of households had non-farm work as a secondary income source. These statistics are both more nuanced and more dramatic than All-India ones, which find the rise in rural non-farm employment between 1972 and 1991 to be 17 per cent to 30 per cent for men and 11 per cent to 15 per cent for women (Jayaraj 2004: 175).

backwardness, even by the use of children prised from school into the barely-paid household labour force. This suggested that this rural industrialisation would not be a base from which a classic industrial capitalist labour process would emerge (Thorner 1982). Locked in to markets and unable to withdraw into subsistence, however, these forms of unregistered petty production, trade, and services could not be dismissed as non-capitalist, as scholars like Sanyal (2013) have suggested . Rather, petty production is an analytically awkward and numerically large capitalist class form (Jan and Harriss-White 2019).

4.3.6 Multiple dimensions of human development poverty

Human development poverty diverges from income poverty in particular ways, which were researched in Round Three (and contributed to generating a cross-continental project: Stewart *et al.* 2008).[47] Round Three research into the multi-dimensionality of poverty revealed the tendency to a paradox of acquisition of even small assets (such as clothes, cupboards, and stoves, of a kind sufficient to need to padlock a thatched hut against theft), nevertheless resulting in increasing the poverty of life chances for girls, who were starting to be culled in infancy (Nillesen and Harriss-White 2004). It revealed that health poverty (defined in nutritional terms as households living below 40 per cent of the food expenditure level of the local poverty line) was frequently caused by catastrophic expenditure for the shock of sickness, which pitched households into income poverty.

Disability, which is subject to medicalised definitions and models (Lang 1999) but was understood by local people as the incapacity to work, often results from conditions – such as deteriorating vision or deafness – that are not accepted by the state or the medical profession as impairing. Incapacities such as visual impairments developed from years of staring at the reflection of the sun while weeding in wet paddy fields, as well as impairments to mobility resulting from accidents at night in poorly maintained and unlit village streets, can develop in adulthood as well as in old age. In a rural economy depending on manual labour, mild to moderate incapacities have been demonstrated to trigger downward mobility and dependence (Harriss, J. 1982; Erb and Harriss-White 2002, 2004). In Round Three, in the 11-village census, one-fifth of total households had at least one member who was chronically sick or disabled. By contrast, a spin-off field project in three nearby villages revealed that between 35 per cent and 50 per cent of people lived in households with a family member who had been disabled in adulthood from occupation-related accidents, diseases, and injuries (Erb and Harriss-White 2004: 357–9).

Though most impairment was never treated and did not result in stigmatising loss of social status,[48] the onset of disability in two-thirds of male cases and in one-third of female cases triggered downward mobility for entire households through the social mechanisms of savings draw-down, increased debt, lack of earnings, and direct and opportunity costs for other family members. Disability was economically differentiating, increasing intra-village inequality and affecting landless labouring households worst (Erb and Harriss-White 2004: 362–3). Elite households were better able to bear the extra costs and changes in workloads.

Undernutrition persisted. While nutrition poverty had halved compared to its levels in the 1980s (using the same nutrition indicators), around 30 per cent to 40 per cent of poor peasants and landless labour households (varying depending on village) still experienced nutrition stress and food insecurity (Harriss-White 2004d: 387–8). Against the hypothesis that educational attainment would improve over time and using cross-generational evidence of primary education, Round Three showed that educational deprivation/poverty persisted across generations in poorly educated households (Gold and Harriss-White 2004).

[47] This round of research into multiple dimensions of poverty long preceded the multi-dimensional poverty index, also created in Oxford: ophi.org.uk/wp-content/uploads/G-MPI_2018_2nd_INDIA_ch.pdf.

[48] See Lang (1999) on the social stigma associated with disability, particularly among children in South India. In the villages we studied, only one child born with disabilities survived.

Finally, Round Three examined the pauperising access to the state of those poor people who were eligible for social protection, taking the old age pension as an example. Delayed payments (officially by three months, but actually varying between villages by between six to 18 months), bribes paid to a range of officials and professionals, transactions costs amounting to three to four months of the expected benefit, party politicisation, errors of inclusion of the ineligible, and a far worse error – the exclusion of the eligible – were routinely experienced. On average, only one-third of those eligible for pensions received them. The remote and relatively poor village of Veerasambanur seemed to have a lower proportion of over-65s in its population, as well as fewer eligible beneficiaries, and was less advanced in its demographic transition. Widows' pensions were found with few exceptions to be captured by ineligible people. Bureaucratic and social barriers and relations of exclusion meant that pensions provision was pauperising (Harriss-White 2004c: 437–43).

4.3.7 Poverty modelling

Another novelty in Round Three was that processes of poverty were modelled – not as a general equilibrium system of equations, as in Round Two, but in terms of specific relationships. The models of Round Three were calibrated[49] at levels above the individual, but showed how institutions[50] and social structure[51] matter to individuals. Though there is no consensus in social science on the institutions that are vital to the economy (Wolf 2007), they were studied more systematically in Round Three than in other rounds either before or since.

The first institutions modelled were money, private property, labour, technology, inputs and product markets, infrastructure, and gender norms. Income poverty as the condition of surplus labour was modelled in terms of structures for which official data were available (Jayaraj 2004: 178–94). Tests of the model confirmed that pressure of population on land, labour-displacing technical change in agriculture, distress commercialisation of agriculture mediated through changes in the institutions of labour markets (casualisation; caste; gender), state policies (e.g. reservation incomes starting to be supplied by social sector and food policies; the (non)existence of infrastructure and transport), and household/social norms (e.g. the lack of female education) generated income poverty.

Income below the poverty line was also modelled using class probability tree rules (Saith and Harriss-White 2004). In eight out of 11 villages, the data were sufficient to split the sample households into halves above and below the poverty line. A household's self-classification as poor or not-poor could be compared with the results of 478 variables assessed by the probability tree. Robust predictors of poverty were little land, low production, small loans, and female participation in agricultural labour (Saith and Harriss-White 2004: 316). Re-run with a smaller set of 75 'non-fudgeable' variables, the predictors of income poverty were 'being SC', high ratios of dependents and sick family members, low agricultural assets values (such as land or pump-sets), low values for agricultural tools, houses/huts, and very little involvement in the non-farm economy.

[49] Set and adjusted to allow for comparison.

[50] In a review of the multiple meanings of institution across a range of social science disciplines and paradigms, Hodgson justifies a Veblenian definition consistent with its use in Round Three: institutions are potentially codifiable social rules structuring social interaction, existing through social agency even when not actively enacted but facilitating individual agency and shaping the changes individual agency produces (Hodgson 2006).

[51] Structure is also a concept subject to multiple meanings. Structure may transcend the social realm, as in a demographic structure that is uncodified in discourse or as in the structure of language acquired in infancy, or what Lawson calls natural mechanisms (Lawson 2003). It may indicate a matrix of institutions that are not reducible to individual behaviour, as in the social structure of accumulation, theorised to interact to stabilise capital crises due to their unravelling (McDonough *et al.* 2017). In Round Three, structure was introduced for the first time in the latter sense of a matrix of institutions but without the implications for crisis, which were outside the scope of this – or, to this day, of any other – study of India (Harriss-White 2003).

A third approach to modelling involved the feedback relation between disability and poverty (Erb and Harriss-White 2004: 353–5). Disability was roughly estimated as affecting 10 per cent to 20 per cent of the population, though if mortality from disability was maximised among the poor, the incidence of disability would appear lower among poor people. Since villagers understood disability as the incapacity to work, the relation between disability and poverty was considered to be direct. But poverty raised the probability of disability through malnutrition, higher exposure to accidents and occupational injuries, and lack of access to health care. Such feedback relationships are the manifestation of what Arun Sen (1992) conceptualised as simultaneous deprivation.[52] Households with disabled members were more likely to have incomes below the poverty line and smaller assets. Direct and opportunity costs – losses – to the economy from self-reported disability were simulated at 8 per cent, twice that estimated for malnutrition and evaluated as 'horrifying' (Erb and Harriss-White 2004: 364). A poverty trajectory was then stylised for a model household drawn from case material tracing the economic impact of disability: loss of earnings and increased costs, savings draw-down, increased debt, debt at increasingly high interest, sale of female assets, and begging. It bore a resemblance to the strategies of coping and survival during the onset of famine that were researched and theorised in the 1980s, along with their irreversible ratchet effects (Rangasami 1985; Devereux 1988; Erb and Harriss-White 2004: 362).

The fourth model examined the reproduction of income and educational poverty across generations through educational deprivation. Poor educational attainment (under five years of education) was modelled and confirmed by village-level evidence as resulting statistically from three kinds of characteristics: first, proximate factors such as the attributes of the individual (e.g. parental education; birth order); second, social institutions shaping the economic returns to education (such as gender barriers to many types of work); and third, factors theorised in development economics as 'structural' and which work at the household level (e.g. income; economic class and social status or caste).

While these modelling approaches moved away from a focus on GR technology, they showed how agricultural technology was nested in many other constitutive features of the rural economy and society. First, although not claiming exhaustiveness, the institutions comprising the rural social structure and conditioning agrarian and rural poverty – as conceived and explored by the Round Three team – involved the following: villages; property relations and control over the social and technological production of the biosphere and its dangers; institutions of capitalist production, markets, and exchange (water, land, labour, money, inputs, and commodities); household demography and kinship; productive agricultural and non-agricultural assets; reproductive institutions of education; health and age; social norms of caste, class, gender, income, and self-identification of poverty; and the state – productive institutions of infrastructure and electricity, inputs provisions and their subsidies, market regulation, and reproductive institutions (including social security). The institutions operated at different social scales and other finer-grained ones were bundled with them (as can be seen in the many formal and informal institutions comprising rural money markets and arrangements).

Second, these models focused on downward mobility and economic ratchets. Round Three showed how the contexts of poor education, insults to health, calorie scarcity, and low-caste and gender subordination interrelated in a syndrome of multi-dimensional poverty merging with Sen's (1992) 'simultaneous deprivation'. In turn, the close negative relation between land ownership and poverty showed how households with poor levels of human development made less productive use of GR technology: their yields were lower, they diversified least, their use of inputs – especially pesticides – was least intensive, and their debts were at higher interest than among the agrarian elite. *Pace* Bruno

[52] Simultaneous deprivation is a syndrome involving the combination of poverty, low caste, large or very small household sizes, poor adult care, the ideological reinforcement of low status and stigma, punitive expectations, cognitive and verbal constraints, psychological extinction, and stimulus deprivation, which shapes the terms and conditions of socialisation and work (Sen 1992).

Latour, quoting the architect Rem Koolhaas (2005), context does not stink but it does matter – and context includes the state.

4.3.8 Anti-poverty policy that pauperises

Round Three unearthed sets of relations inside the state that caused policies formally intended to create and/or secure livelihoods, incomes, or wealth to have pauperising effects. One mechanism operated through the very architecture of government. Over and above the Tamil Nadu state agriculture department, a productivist policy for agriculture could be found in four other departments, five parastatal corporations, and even more banks and finance institutions, with responsibilities further divided between central and state governments. Massive problems of coordination between ministries and departments resulted, which could result in botched linkages excluding the poor. Wage protection for labour, for instance, avoids agricultural labour. Credit for rural development does not include loans for land purchase by SC landless producers. Rural health ignores the occupation-related incapacities of agricultural workers (Harriss-White 2002). Regulative law is rarely implemented so as to cover its formally intended reach, leaving citizens unprotected. We now know that post-independence regulative law protecting labour was deliberately restricted to the larger firms, leaving most of the economy formally unprotected (Dietrich Wielenga 2019). Policies need enabling conditions if they are to be implemented as intended,[53] and these enabling conditions in turn will need policies. But policy advocacy, while institutionally shaped, rarely incorporates its institutional preconditions, many of which are informal. To illustrate, the maintenance of social status distances means water towers are sited out of reach of *Dalit*s; and, because women remain relatively unskilled under patriarchal relations, they tend to be debarred from the non-farm economy. Threats and reforms to policy such as the Public Distribution System and the Noon Meal Scheme, which are driven by neo-liberal ideology (Swaminathan 2009), weaken its vitally important redistributive effects. The Round Three field studies of social security in Tiruvannamalai villages showed how officials themselves practise predatory and extractive agency on poor clients.

5 ROUND FOUR: THE EARLY TWENTYFIRST CENTURY

5.1 Organisation

Round Four was never intended to resemble the first three. Instead, it emerged from a set of small, individual field studies in three villages studied in depth in Round Three together with their local market-town. It took place over the 'long decade' between 1997 and 2009, carried out mostly by research students from India (Jawaharlal Nehru University (JNU) and MIDS), Italy (Rome University), and the United Kingdom (Oxford). Eight scholars worked alone or in small groups with much smaller research resources. In this round, having a much smaller team affected how the village research was conducted. Individual researchers studied different themes in different ways.

5.2 Objectives and contexts

In the twentyfirst century, two kinds of context forced further radical changes to the field research that were planned after reconnaissance/'piloting'. The first involved the distinctive characteristics of regional economic development in NTN over the previous three to four decades: i) the generalisation of commodity exchange combined with a chronic agrarian crisis; ii) the persistence and growth of the informal economy amid the development of long distance commodity flows into and out of national

[53] See Trubek and Galanter (1974) for the implications of not examining the legal preconditions necessary for law and development. In India, most policies at a minimum require the elimination of fraud and corruption and prompt and full finance, preconditions that are airbrushed from policy (Guhan and Paul 1999).

markets and the emergence of international agro-exports; iii) rural–urban commuting and migration; and iv) two-way flows of rural and urban investment stratified by caste. In response to these characteristics, the centre of gravity of Round Four shifted decisively to the local market town[54] and the question of agrarian poverty became, literally, peripheral.

The second change in context was that, in line with the underlying philosophy of theoretical pluralism in previous rounds, the twentyfirst century project developed concepts such as institutional competence, which coped both with general processes and with the complex local particularities through which the local economy and society developed a *specific character*. No attempt was made to generalise above the area researched or to compare with other regions. The fourth round explored rural–urban relations and structural transformations,[55] as well as the social character of local capitalism and the competence of the capitalist class. Earlier rounds of research were also mined and interpreted for their insights into the processes that led to what was observed in the twentyfirst century.

Local capital accumulation was analysed, first through a Gramscian lens of hegemony that was creatively reinterpreted for caste society as caste–corporatist development (Basile 2013), and second through questions about innovation and the matrix of informal economic institutions in which invention and adaptive and adoptive innovation take place (Roman 2008). In specific sectors of the economy (rice, silk, and gold), researchers explored the '*quiddity*' – the social and physical character – of the commodity in question and the cultural constructs and practices through which quantitative calculations of operating costs, wages, prices, interest, and rents were both enabled and constrained. The economic and political roles of concepts of individual merit, honour, and trust mediated through caste loyalties were researched (Harriss-White 1996b; Cavalcante 2015). Their explorations of individual sectors led team members to engage with theories of the dynamics of spatially clustered development, including theories of the knowledge economy and of situated cluster-based innovative capabilities and learning, which were applied to understand technical change initiated by weaving labour as well as maintenance engineers and owners in home-based and workshop craft silk production (Roman 2015). Srinivasan (2015) explored livelihoods in an exhaustive study of urban and suburban labour arrangements, using theories of labour mobility and labour market segmentation.

Whereas previous rounds had censused all 11 randomly selected villages, in Round Four of the VLS, a census was taken only of the three villages that had been studied in detail in Round Three (Arivukkarasi 2015). While institutions were researched in detail, the complex dynamics of urban–rural credit relations alone showed how both old and new institutional economics were deficient (Polzin 2015). While the agrarian crisis and agricultural poverty had hitherto been approached with a primary concern for production, in this round, for the first time and drawing on theories of mass consumption, the way people who were financially distressed – and whose food expenses exceeded their stated income – spent what money they had was researched (Cavalcante 2015).

As in Round Three, policy discourse and practice were theorised as stylised, conflictual, and implemented not simply by the state but also through the processes of micro-politics of caste associations, trade unions, and business associations (Basile and Harriss-White 1999; Basile 2015). Their detail and the impact of changes in formal regulative rules on the local rural–urban informal economy were mapped for the cases of weaving, rice processing, and gold craft objects (Roman 2008; Harriss-White 2015; Stanley 2015).

[54] This was the most explicitly urban round of research, but from the start in 1973–4 the economic base of the local market-town has also been studied alongside the villages. Like the rural project, it has been used to scrutinise and criticise theory – first as a growth centre (Harriss 1976), then it terms of parasitic and generative urbanism (Harriss and Harriss 1984), then as a manifestation of the informal institutions of capitalism (Harriss-White 2015).

[55] In development economics and political economy, structural transformation is the reallocation of economic activity across the sectors of agriculture, manufacturing industry, and services. Economic sectors are thus structures.

Despite this piecemeal approach to research, the field methods remained the same: a combination of research on entire populations (urban business associations and silk weaving), samples (random quota samples of agricultural households; stakeholder samples for credit; stratified random samples of urban labour, of urban businesses, and of rice mills), case studies (of gold craft, innovation, and labour), and ethnographic research (on silk and on credit). Focus groups and participatory rural appraisal were used for the first time in the three villages since Chambers had championed them four decades earlier (Cavalcante 2015). Parts of Round Four were thus sited in villages, but not on villages, though it might be argued that, since the research aspired to analyse an entire region, it was thus both 'in' and 'on' the villages that formed a part of it.

Some well-established conceptual categories were interrogated. Town and country, for example, were confirmed as terms indicating entities that were 'porous', given the constant, two-way flows of people, commodities, money, and investment (detailed in Basile 2013). Labour market transformation was found to start in villages and to develop in the town to which labour commutes and migrates. Investments and money flowed from urban to intensely localised rural sites and back. The 'urban settlement' emerged as a set of overlapping territorial containers of people, money and materials, with significant implications for public infrastructure. A peripheral ring of villages engulfed by the expansion of the town, but not incorporated into its municipal government or into its five-year plan, placed demands on urban infrastructure that the prevailing culture of fiscal non-compliance and revenue famine could not meet.[56] Over the 'rurban' region, regulative failure did not simply result from lack of resources; it was shown to be at the deliberate political behest of local elites – a pollution control board with but one officer without a vehicle benefits no interest save that of the polluters. The same applied to inspectors of labour or of schools and the interests of factory owners or headmasters.

5.3 Results relevant to rural poverty

In agriculture, changes to cropping patterns were not so much income-elastic as increasingly sparing of water and labour. A new generation of HYVs of rice bred to be labour-sparing, together with labour displacement due to mechanisation in production and processing, threatened the livelihoods of landless labouring households as never before. At the same time, water table depletion and a chronic cost–price scissors reduced returns to agriculture. The labour demands of weaving were incompatible with those of smallholder agriculture and many weavers sold plots. In the three villages, the proportion of landless households doubled in the 15-year period to 2009 (Arivukkarasi 2015).[57]

The commonest response was distress-induced migration to the local town and far beyond, where workers then encountered the social barriers in the labour markets described by Srinivasan (2015). Their *remittances* proved exiguous (Cavalcante 2015).[58] Despite incomes being low enough to threaten food security, Cavalcante's case material shows that positional or status goods such as televisions and mobile phones (sold in the local town) were nonetheless being preferred to food. The real costs of marriages were reported as being on the increase, as were those of (private) education. Pressured by fashion, by media coverage, and by social imitation, households below the poverty line dug into savings, contracted debt, or omitted meals in order to maintain the visible elements of a socially decent standard of living (Cavalcante 2015).

[56] See Jairaj and Harriss-White (2006), Harriss-White (2015c), Kar (2010), and Kumar (2002) for the developmental effects of pervasive fiscal non-compliance, tax evasion, and capital flight.

[57] Arivukkarasi (2015) reports intensified rates of landlessness, outmigration, and land sales by weaving households (for whom agricultural work was incompatible) who subsequently had nothing to fall back on when displaced in one of the cyclical downturns of the silk economy.

[58] For an analysis of the role of remittances in India's rural economy using NSSO data for 2007–8, see Tumbe (2011).

Rural credit institutions witnessed dramatic changes in the first decade of the twentyfirst century. Some formerly dominant local institutions disappeared (a moneylending dynasty; chit funds; grain *mundi* credit) and entirely new ones appeared (self-help groups; instalment credit from mobile traders from town), while a few persisted (pawn-broking; informal lending; formal banking). Processes of destruction, creation, reworking, and persistence were at work. Persistence may not indicate absence of change in an institution; it may result from evenly balanced but opposed forces.

Round Four also generated examples of sticky gender division of tasks in agriculture resulting from challenges by women and rebuffs by men. Many households had no reserves and if sickness struck an earning family member, they could not avoid withdrawing children from school to replace the incapacitated worker, despite their educational aspirations for the next generation.[59]

Apart from Polzin's analysis of credit, Arivukkarasi (2015) explored the 'rural non-farm economy' through surveys and case studies of the dynamic centralisation and decentralisation, concentration, and dispersion of craft production in silk handloom weaving.[60] She found landed silk weavers poorer than those without land. In recent decades, a first wave of technological innovation (from *dharmavaram*[61] to *korvai*[62] loom configurations) meant an increased need for several shuttles and assistance with three or four yarn threads – and thus a retrogression in the labour process with a rise in *child labour*. A subsequent wave of technical change back to *dharmavaram* was driven, not by demand or the structure of material incentives, but by the *aspirations of weavers* – by the preference of wage-earning weavers to send their children to school – to which traders were forced to accede. The latest technological change recorded by Aravukkarasi involved the entry of power looms using Chinese yarn into the town, displacing handlooms from villages. This process of labour displacement was highly socially structured. With a few exception from the suburban village of Nesal, *Dalit* and/or female weavers are most dispensable and the weaving labour force reverted to being male-dominated. Participation in weaving was both socially and economically differentiated and differentiating. Aravukkarasi concluded that weaving had not been a route out of poverty, especially for *Dalits*.

Round Four found that oppressive exploitative and gendered labour arrangements, as well as the displacement of labour through technological change, were widespread in both agriculture and craft production. Labour displacement was being offset or 'compensated' for by the employment multipliers generated by commodification and the adoption and diffusion of new goods and services.[63] Of course such compensation was not direct but structural, and uncompensated displaced labour would be pauperised.

Meanwhile, field research on local urban and rural labour markets found them durably segmented by occupation, sector, social identity (patriarchy, caste, and gender), and economic institutions (e.g. the family and collective preconditions for competition, such as business associations) (Srinivasan 2015).

[59] Using the labouring class, this case exemplifies the relations or skein of Latourian 'ties', alterations to which may generate a fluid 'translation' (Latour 1999).

[60] Other than in relation to silk, the rural non-farm economy was not studied in as much detail as in Round Three or in Wanmali's (1991) work in Round Two. In describing the redeployment of displaced weavers, Arivukkarasi (2015) outlines non-farm livelihoods available in villages as bunding, loading, brick-kiln work, painting and roofing, bore well labour, electrical work, parboiling and drying rice, cleaning and driving lorries, cooking and waiting in local meals hotels, and serving in shops. The region continues to generate recruits for military service.

[61] *Dharmavaram* is a handloom configuration requiring only one shuttle and permitting a seamlessly textured sari border (Roman 2015).

[62] *Korvai* is a loom configuration requiring three shuttles and enabling the development and connection of contrasting borders to the main body of a sari (Roman 2015).

[63] See Huws (2003) for her theory of commodification and Harriss-White (2005) for gendered petty commodification in India.

Although self-employment/petty production[64] is conflated with wage labour both in economic theory and in Indian labour law, it is distinguished by local people from wage labour in both agriculture and the non-farm economy. Petty production has been subject to debated interpretations: as disguised wage labour, as blockages to capitalist development, or as a more or less autonomous form of production grounded in the family. Certainly, it expands and thrives through the multiplication of small firms and not in the form of concentrated and centralised capital (Harriss-White 2018). Social discrimination has structured petty production quite durably over the decades (through access to apprenticeships, occupational choices, sites, contacts, credit, etc.). Segmented markets restrict sectoral mobility.

Since technological change requires access to capital, it is deeply embedded in the process of class formation. Since class and caste are still considerably congruent institutions and women are durably subordinated in this region, technological change is rarely unembedded in relations of social identity. Field evidence suggests the hypothesis that innovation in the non-farm economy is most commonly incremental as opposed to radical or disruptive; it is slowly and unevenly being dis-embedded from local knowledge resources, themselves structured by caste and class (Harriss-White 2017).

The caste–corporatist regulation by some 60 business associations of the local urban commodity economy has been able to control the market entry of firms, the labour force, and other means of stabilising the accumulation prospects of those who already have some capital (Basile 2013). Poor owners of small firms are admitted to these associations, but once admitted their interests are not politically represented. Collective action is not to be understood as harmonious, unless and until the likelihood of exclusivist and internally conflictual practices has been empirically eliminated.

These are ways in which the local institutions of capitalism – some new (informal accreditations for competence; access to urban bank loans), some persisting (gendered property relations), and some changing (male control of men in family businesses), while some are destroyed (craft production) – create poverty alongside wealth in a rural–urban economic complex where much activity is unregistered and unregulated by the state.

However, the twentyfirst century research further enriched conceptions of poverty. While the 1990s VLS – Round Three – developed the concept of rural poverty as *multi-dimensional*, in the twentyfirst century Cavalcante theorised rural poverty as *relational and relative* rather than absolute. Against a corpus of scholarship quantifying poverty in relation to heavily disputed 'poverty lines', Cavalcante, developing a consumptionist approach to poverty, revealing it as a *lack of capacity and resources to emulate.* In the three villages, he found poor people intensifying pauperising debt to acquire visible status goods in preference to food (Cavalcante 2015). Yet, set against evidence of the pauperising role of debt, Polzin's study of Vinayagapuram revealed cases of *indebtedness* enabling upward mobility and exit from poverty for women taking loans without individual, or third-party, collaterals through self-help groups established from 2000 (Polzin 2015). Against arguments about the transformation of caste relations, being *Dalit* in these villages was confirmed to mean a kind of *status poverty* that could – with few exceptions involving education – be escaped and transcended only by migration, by being relabelled in anonymous and cosmopolitan social contexts, and by working in new caste-neutral occupations – i.e. outside the frame of the agrarian.

'Agency', understood as purposeful economic action, was not directly analysed at the individual level but was reflected through its outcomes and implications in the context of the theories of institutional change, innovation, and consumer behaviour employed in Round Four.

[64] 'Petty commodity production' is an umbrella term in political economy that also covers trade, small-scale finance, and services.

6 ROUND FIVE: 2012–4

6.1 Organisation

The fifth round was coordinated from Oxford with a network of Indian (agricultural) economists, engineers, and political scientists, each from a different Indian institution (D.N. Reddy and M. Venkatanarayana, National Institute of Rural Development, Hyderabad; Deepak Mishra, JNU; Aseem Prakash, Institute of Human Development, New Delhi and Tata Institute of Social Sciences, Hyderabad; Gautam Mody, New Trade Union Initiative [New Delhi]; and Mohan Mani and Meghna Sukumar from the Centre for Workers' Management in Bangalore and Chennai). From Oxford, Alfred Gathorne-Hardy, an environmental scientist, joined forces with Harriss-White, a political economist. Energy technologist Sanjeev Ghotge from the World Institute for Sustainable Energy, Pune, was also closely consulted. Field investigators, a team of experienced non-governmental organisation workers from the Gandhian Unit for Integrated Development Education, Pazhaveli Village, and a range of expert stakeholders and advisers completed our base of intellectual resources.[65]

6.2 Objectives and context

As the ecological crisis deepened in NTN, in India, and globally, the fifth round of VLS set out to remedy the selective and unsystematic examination of nature in the earlier VLS rounds. Eight historical processes and arguments made this approach inevitable, as follows:

> i) the uniquely large and still growing informal economy, which is not registered or regulated by the state but which constitutes an important element in India's global competitive advantage and is vital to the electoral debate about jobs, while statistics about it are a matter of refined guess-work and extrapolation (Sinha *et al.* 2007, Ghosh and Chandrasekhar 2013, ILO 2018);
>
> ii) the fact that all activity creates waste, while economics externalises and generally ignores it or at most admits it as a low status field of research and policy, meaning it is in urgent need of rehabilitation;
>
> iii) the fact that nature not only generates resources but also processes waste (the atmosphere being merely the most politically acknowledged and accepted 'sink' of waste);
> iv) the fact that the waste-generating activities of agriculture have been exceptionally overlooked until very recently, being treated as a 'floor of waste' that cannot be reduced because of the primacy of food supply for a rapidly urbanising society (Anderson and Bows 2011);
>
> v) the fact that, while it is to a degree unscientific to reduce the ecological crisis to climate change (Rockstrom *et al.* 2009), GHGs are nonetheless critical for climate change, making it vitally important to develop methods to measure GHGs where regular official statistics are lacking (and where better to do this in the informal economy than in agriculture?);
>
> vi) the need to recognise that GHG hotspots in agriculture should not be regarded as sacrosanct and that ways to mitigate them should be sought;
>
> vii) the need to recognise that such means would need to be subject to the conditions of a) being practicable at market prices and b) not displacing labour without compensation – a process that would need costing too;

[65] The project can be found at www.southasia.ox.ac.uk/research-projects/resources-greenhouse-gases-technology-and-jobs-in-indias-informal-economy-the-case-of-rice.

viii) finally, the need for awareness that, while the quality and quantity of informal jobs and livelihoods in rice production and distribution were seen both as powerful indicators of poverty and as suggestive of anti-poverty trajectories through work, their effects on pollution are as yet unknown.

While all three villages were revisited, only one of the original 11 villages, Vinayagapuram, was taken for intensive study, because the objective was to find comparable sites in which to gather evidence for the waste created in a range of production methods and post-harvest market systems/supply chains.[66] In NTN, we studied two production technologies: HYV/intensive/chemicals-based rice production and organic rice production. To achieve robust estimates and comparisons, we studied Systems of Rice Intensification (SRI) and HYV technology in Warangal district, Andhra Pradesh, as well as rainfed rice ('organic', due to poverty) in Koraput and Nuapara (part of the undivided Kalahandi district) in Orissa/Odisha.[67]

The project focused intensively and exclusively on rice. By now, almost all the producers in these villages were small and marginal landowners. As in Round Four, this new use for VLS involved research in villages but not on villages. The economics and pollution of the post-harvest supply chain in NTN 'downstream' of production were researched to their retail points in supermarkets and small family stores. And the villages were re-visited for public engagements about less polluting technological options. This involved male and female small and marginal farmers and landless agricultural labourers in a truncated sample, which also involved highly educated (urban-based) experts. In many respects, this fifth round was unlike the earlier rounds.

Methodologically and analytically, the fifth round also involved familiarity with nearly a score of distinct thematic or disciplinary subfields of development:[68] climate change, life cycle assessment, ecological economics, agriculture, rice, agricultural economics, value chains, supply chains, systems of provisioning, food systems, innovation systems, labour studies, policy studies, science and technology studies, informal economy, and multi-criteria analysis and mapping. To a considerable extent, though not completely, the social science with which Round Five engaged was governed by the need for it to be compatible with life-cycle assessment, a method from environmental science that was treated as authoritative. The team also invented and applied a process of collective learning to bond trans-disciplinary specialists.[69]

6.3 Results relevant to poverty

How was poverty measured? In Round Five, it was first measured through the *a priori* category of land ownership below the state mean of two hectares, where plenty of existing research supports the assumption that such households are income-poor (reviewed in Dhas 2012).[70] Second, agricultural labour households are also poor: the poverty of labour was measured, not through household income but instead through work effort (human calorie expenditure) and wages in the minutely detailed tasks of the production–distribution system. Costs and prices were measured for farms and firms, exposed as crude analytical units when compared with the minutiae of the task-level detail required for life-cycle assessment of GHG emissions (Gathorne-Hardy 2015). Costs were collected for analysis in three ways:

[66] We also needed villages that were not already complaining about survey fatigue.

[67] Resource constraints of resources prevented our studying the GHGs embodied in research and development systems, but the embedded GHGs of inputs production were computed (Gathorne-Hardy 2013).

[68] A subfield is recognised by vocabulary and discourse, specialist journals, and epistemic communities of scholars.

[69] See Learning Workshops here: www.southasia.ox.ac.uk/research-projects/resources-greenhouse-gases-technology-and-jobs-in-indias-informal-economy-the-case-of-rice#tab-707936.

[70] In theory, with income streams from labour in the non-farm economy, this relation could be weaker over time. In practice, the relation between landholding and rural poverty is strong.

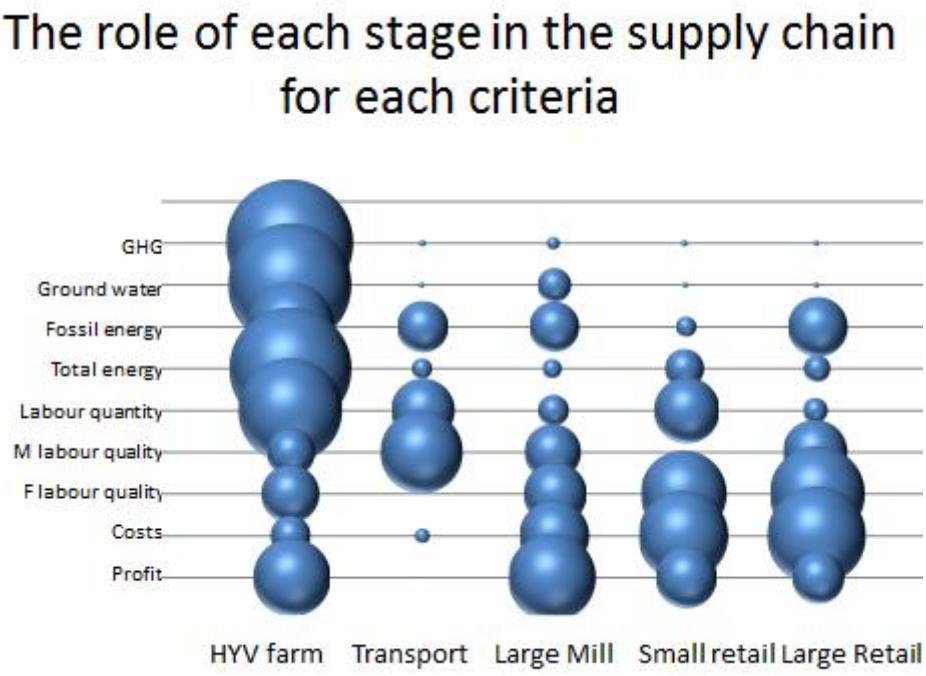
in terms of market prices, in social terms (market prices corrected for subsidies), and in environmental terms (with costs imputed for 'negative externalities').

Round Five's research results were replete with inconvenient findings and some paradoxes.

1. While pollution has poverty-creating impacts (pesticides and polluted water, chemical poisoning, and other pauperising diseases of field labour), the escape from income poverty increases pollution both immediately where people live and work (with greater use of agro-chemicals which pollute water, pollution from saline incursions and salination etc) and pervasively in GHG generation (from class differences in GHG emissions) (Chancel and Piketty 2015). Polluting pathways out of poverty need much more research, as do mitigation pathways of non-poor people.

2. Irrigation water and agricultural electricity are – for different reasons – free of private costs, but they constitute the most important single GHG pollutants in the entire agricultural production–distribution system due to the fossil fuel content of water-lifting technology for irrigation (see Diagram 1).

DIAGRAM 1: STAGES IN HYV RICE PRODUCTION: ENVIRONMENTAL, ECONOMIC, AND SOCIAL CHARACTERISTICS



Source: Harriss-White, Gathorne-Hardy, and Rodrigo (2019)

3. Agricultural labour was measured by task and aggregated in a new concept unfamiliar to social scientists: minutes of work per kilogramme of paddy. On average, HYV rice in Tamil Nadu and Andhra Pradesh requires 7.5 minutes per kilogramme,[71] while rainfed rice in Odisha requires 50 minutes per kilogramme.[72] Demand for labour in rice production is generally for low-skill, effortful, low-wage work, mainly at the stages of transplanting and weeding. One labour paradox, therefore, is that rainfed production technology to lower GHGs increases demand for low-quality work at poverty wages. Another related paradox concerns GHG

[71] 450 labour-days per hectare (Harriss-White and Janakarajan 2004: 35).
[72] See Gathorne-Hardy (2013) for details.

reduction using technology that increases demand for women's work (weeding), involving rates of pay for them that are up to 60 per cent below those for male labour and far below official minimum wages (Gathorne-Hardy 2015).

4. A further perverse outcome relates to innovation and the failure to adopt new technology or the decision to de-adopt. The question of innovation was revisited for the first time since 1973–4 due to its implications for climate change, agriculture, and jobs. Members of local 'small business' associations, small farmers, and labour were once again found to be innovative in all senses of the term: invention (electricians invented modified technology for electricity storage); adaptive innovation (Computer-aided Design (CAD) training in Tamil for poorly educated rural boys; improvements to weeders); and adoptive innovation (sprinklers; bore-wells) (Harriss-White 2017). However, comparatively new, less environmentally damaging (GHG-reducing) agricultural technology such as SRI, organic rice, rainfed rice, solar pumps, and reductions in transmission and distribution losses were known to small and marginal farmers but not adopted. Explaining this paradox is work in progress.[73] It requires – *inter alia* – the analysis of the cost structures and front-end loading of capital costs that typify much low-GHG technology. The capital costs of solar pumps, for instance, were 90 per cent of total costs and unaffordable to any of our sample. Available subsidies were not available to small farmers; and solar energy technologies were geared to pump-set sizes requiring collective action to operate, which was not (yet) operationally feasible.

7 GENERAL COMMENTS ON THE FIVE ROUNDS

Taking the five rounds of VLS as a whole, if – as is posited by Callon (1998) – the economy is 'performed through economics' rather than embedded in society and nature, then at least this critical *tour d'horizon* of the varied economics of the GR and of the effects of streams of new agricultural technology on poverty, on nature, and on the multipliers from agriculture in the diversifying rural economy would indeed suggest Callon's 'multiple performances' and 'many worlds'.

Here, we recognise some of the 'performances' and 'worlds' emerging from this reinterpretation of a body of work lasting nearly five decades: transdisciplinary pluralism, reductionist concepts, limits to comparative analysis, expanding yet selective treatments of agrarian poverty, the neglect of agency, and the roles of uncertainty and of disturbance.

Over the decades, the interaction between empirical findings and epistemological developments mean that theoretical and discursive/terminological pluralism is embedded in this longitudinal research. Theoretical pluralist approaches and constant re-framing[74] have required a wide range of multi-sited and multi-scaled practical research methods around a common core involving village censuses, stratified random sample surveys, case studies, and ethnography.

The project has deployed unstable analytical categories, toolkits, and measurements in its attempt to be critical and honest about the difficulties of reconciling analytical reductionism with empirical detail. The narrative is shot through with binaries (agriculture and non-farm economy/rural and urban/informal and formal/ capital and labour/big and small/adopters and non-adopters or de-adopters/poor and non-poor/undernourished or malnourished and nourished/dominant castes and SCs; etc.). The measurement conventions of disciplines vary a great deal. Just as is the case with the household, the farm and the firm are all fluid, contested, and reclassified socio-spatial categories; so

[73] This has now been thoroughly researched for SRI: see Taylor and Bhasme (2018).
[74] Common in VLS (Himanshu *et al.* 2015).

too is the village. The village as a residential unit or as a unit for water management (Farmer 1977: 132) is not a unit for work, let alone for stocks and flows of commodities, money, and investment – let alone a unit for revenue administration. All this has hampered rigorous comparisons over time (Srinivasan 2004).

Rigorously replicated re-surveys of whole villages were not undertaken. They do not seem to be possible. Panel research was jettisoned as impractical (not the least due to the out-migrations of many poorer households) and sample surveys used differently justified sampling methods. Both researchers and the researched change, and – through contact and reflection – they also change each other (Harriss-White and Harriss 2007). Each round provoked novel sets of questions emerging directly from contemporary historical developments, some predicted from earlier rounds but others not.

Poverty in these villages has not evolved in a way that is consistent with any general principle of development. Neither has its study. While All-Indian VLS may reveal many more approaches to mobility and poverty than in the NTN villages, for the moment these villages form our universe.[75] Although the long-term VLS project was dominated by economics, it did not make poverty central despite being concerned about it – poverty was an input to relations of production, distribution, and consumption; an outcome of a set of technologies, social relations, and contingencies; a cultural process; and an indicator of the failure of (anti-poverty) policies and processes. The appendix, which is undoubtedly incomplete, shows the myriad ways in which the concepts and conditions, causes and effects, processes, and relations of poverty have entered the long-term VLS project in NTN.

Despite working at multiple scales, the project has been *selective* in its handling of poverty. This is due to the fact that – as Da Corta and Venkateshwarlu argued (1999) – theory drives methods, which drive results. With respect to poverty, theory has not always been appropriate to the village and household scale of analysis. VLS are an assertion of the uniqueness of space, time, and society, and are not suitable for testing theories based on assumptions that deny such uniqueness and/or are based on universalist assumptions about motivation. While the categories of theory and history have both changed over time, methods – such as ethnography – that are inappropriate for hypothetico-deductive theory have led to the development of inductive theory (as in the case of IVV: Chambers and Harriss 1977; Harriss, J. 1991; Srinivasan 2004).

Setting poverty centre-stage has required a synthesising comparativist reinterpretation.[76] For poverty, the statics are comparative only to a very limited extent, confined to the agrarian part of the economy through crude categories of land ownership.[77] Even then, even though lack of land is consistently associated with poverty throughout the decades, more rigorous comparisons are not possible because research methods are individualist. The most robust comparative possibilities have emerged through political economy: there is something 'out there' which is not an ethno-particularistic construct or a product of an individualised and relativistic interpretation, and our evidence has generated robust debates in political economy.[78]

[75] For elaboration, see Bardhan (1989), Breman *et al.* (1997), and Himanshu *et al.* (2015, 2018).
[76] Arora *et al.* (forthcoming).
[77] Generalised in Harriss (1992), where a review of village-level evidence for poverty in India involved the review, comparison, and conceptual aggregation of hundreds of unique studies of aspects of poverty. The study of the small village of Palanpur in Uttar Pradesh has been more consistent, perhaps because it has been organised by the same team with questions about structural transformation, growth, and village inequality throughout as appropriate for analysis using techniques of development economics (Himanshu *et al.* 2018).
[78] Among others, the VLS reported here have engaged with debates about the attributes and theoretical status of capitalist agriculture, petty production and disguised wage labour, the process of differentiation, debt bondage and freedom in wage labour, non-farm economy and de-agrarianisation.

Throughout these VLS, agency has only occasionally been represented through case studies of individual actions and effects (Harriss, J. 1982). More often, it has been handled inductively through the outcomes of institutional change, or agency has been inferred from the results of a regression approach to cause–effect relationships. The units used in regression approaches will be the units to which agency is attributed – they are rarely individual. While we know the child sex ratio has been growing increasingly adverse to girls, while the ratio is correlated negatively with rural property ownership and while marriage costs for bride-givers are increasing, there is no record of the forces driving a 'non-poor' mother to end the life of her daughter.

Uncertainty and surprise have been routine in fieldwork-based reconsiderations of what *is* relevant and what *ought to be* relevant. For example, in the first round of the VLS, the research revealed unexpected results on water management, water table decline, seasonality, and IVV. It triggered a decade-long investigation into the introduction of inappropriately capital-biased rice milling technology. In the second round, work on local-level revenue and expenditure revealing a net drain from agriculture and work on alcohol consumption as a nutrition and poverty-related problem were unplanned. The question of how a severe drought should be addressed in research methods became unavoidable. In the third round, the field research discovered pauperising disability and incapacity, newly emerging excess female child mortality together with gender bias in nutrition, the development of water markets and complex pauperising interlocked agrarian contracts, sanitation as a development problem, and the increasingly caste–corporatist regulation of the local economy. The fourth round, developing the idea of the rural-urban complex, found that the local non-farm economy was not a pathway out of poverty for scheduled caste workers and women. The fifth round results return research to the first round questions of non-adoption and de-adoption, not of HYVs but, this time, of low carbon technology.

The certainty of all this indeterminacy has sat uncomfortably with mechanical resourcing procedures embodied in standard research proposal templates – and often with the resourcing itself. Yet, as when Chambers first argued for rural development to put 'the last first' (1983), empirical surprises from this set of VLS and the constant and necessary reappraisals of the idea and scope of relevance have frequently led to the energising of rural development discourse, research, and practice. Meanwhile poverty endures.

Appendix: Poverty, its characteristics, and processes in village-level studies in Northern Tamil Nadu, 1973–2014

Characteristics	Concepts and keywords		Rounds
District	As administrative unit – 'underdeveloped' – 'poor'		1, 3
Villages	Remoteness, land inequality, seasonal demand of agriculture for labour, persistence of poverty		1, 2, 3
	Aggregates of three, ten, or 11 villages; IVV and socioeconomic vectors of poverty		1–4
Agro-ecology	Biosphere	Crop varieties and bye-products, intercropping, diversification Soil fertility, organic manure Pests, weeds Human communicable disease vectors	All 1, 2, 5 1, 2, 3, 5 3
	Energy	Human, animal Diesel, electrical energy, subsidies, energy poverty	1, 2, 5 1, 2, 3, 5
	Water	Tanks, wells, water tables and decline, access, rental markets, over-extraction, pollution, drought, subsidies, water-poverty, hydrological crisis	1, 3, 5
Relations to the means of production	Class formation	Differentiation, capitalists, assets portfolios, accumulation, rich middle, small and marginal peasants, subsistence, intermediate classes, accumulation, petty commodity production, expansion by multiplication, rural working-class, contracts, terms and conditions of labour, destitute-outcasts	1, 3, 4
	Land	Farm size distribution, tenure, irrigation status, values Upwards and downwards mobility	All
	Labour	Landless labour, wage workers, landless peasants, proletariat, direct producers, casual female labour (male and female wage rates and (seasonal) earnings) – relation to land); jobs; informality, surplus labour, migration, remittances; 'poverty' labour (firewood, cow dung work, gleaning, shitwork, begging)	All
Technology	Agricultural technology for production	Adoption, de-adoption, non-adoption inventive, adaptive, adoptive, incremental, disruptive innovation Mechanisation By crop – notably rice and groundnut, but later many other crops By landholding, by socioeconomic class, by income/expenditure group Labour requirement: tools, mechanisation (-)/irrigation(+), labour displacement	All
	Post-harvest technologies	Huller, disc sheller, rubber-roll sheller	All
	Weaving	Dharmavaram and Korvai handloom configurations, costs and labour, power looms	4
Commodity exchange	Markets, marketing systems; informality, commercialisation, commodification, interlocked contracts; kind exchange, value chains, supply chains, food systems		All
Money	Costs and returns to agriculture and to non-agricultural activity By landholding, occupation group, income deciles, and socioeconomic class,		All

	(Informal) market institutions and terms and conditions, state controlled organisations (banks cooperatives and subsidies); savings and deposits, loans, debt and credit, collateral, land loans for landless, gendered savings and divestment, capture	1, 2, 3, 4
Poverty dynamics	Transient (short-term) and chronic (long-term) poverty processes	3
	Environmental, economic, political variability and shocks, risk and uncertainty, accidents, coping and survival mechanisms and practices	1, 3, 5
	Investment, innovation	1, 3, 4, 5
(Rural) non-farm economy	Growth linkages from agriculture; forward and backward, production and consumption linkages, growth centres, diversification, craft, service, trade, moneylending, transport, construction, leather, agro-processing, textiles, metal working, firms, workshops, petty production, self-employment, livelihoods	2, 3, 4, 5
	Migration of capital, rural–urban 'share' households	3, 4
	Technical or technological change applied to all these categories, innovation	
	Migration of labour, commuting, seasonal/long-term migration, earnings, remittances	3, 4, 5
	Distress as driver of entry to the non-farm economy, social and economic entry barriers to the non—farm economy (NFE)	2, 3, 4 3, 4
Income/expenditure	Profit/rates of return; earnings from all sources	All
	Consumption	All
	By income/expenditure groups/deciles/socioeconomic classes	All
	By household	All
	By occupation	1, 3
	In Kcal equivalents	2, 3
Household i) farm (small-scale producers, peasants, cultivators, farmers, petty producers)/ii) firm – in non-farm economy /iii) family – as demographic unit	Household-level assets portfolios	3
	Intra-household (gendered and generational) control over assets, income, decisions and expenditure (especially food expenditure)	3
	Household composition: dependents, female-headed, all female, individuated (M/F), female individuated (widows), collapsed	3
Social-cultural dimensions of poverty/ identity	Socially relative poverty: (lack of) capacity to emulate, (lack of) aspiration to consume, neglect of needs in consumption of poor	4
	Ideological reinforcement, punitive expectations, cognitive and verbal constraints	1, 2, 5
	Ascribed social status	
	Caste (ethnicity, religion), dominant caste, deference, *Dalit*s, SCs, backward castes, caste and entry barriers, social discrimination, humiliation, occupational segmentation, lack of options for mobility	2, 3, 4, 5
	Gender subordination, female households, gendered wages and occupations, gendered lack of education, gendered experience of disability, lack of opportunity in non-farm economy, loss of dependent status	2, 3, 4, 5
Multidimensional poverty	'Simultaneous deprivations'	3
	Simultaneous exclusion from multiple interventions	3
Human development poverty/capabilities (lack)	Life chances (gendered), nutritional poverty, alcohol expenditure, health, disability and poverty/incapacitation from work/sickness, mental ill health, educational poverty; constraints on freedom; feedback relations	2, 3 3

	Deprivations/absence of right to be dependent/social expulsion (cross-caste elopement, disease, mental illness, addiction, crime, abandonment/desertion etc.), eligibility for qualifications for social security programmes (maternity, unemployment, sickness, accident, delay to marriage age, breadwinner death, disability, old age), ineligible inclusion, eligible exclusion, quality of adult care	3, 4
State/policy	Government, corruption, fiscal non-compliance, tax evasion, cost of fines, bribes, delays	3, 4
	Bureaucratic politics, conditions of work and motivation of officials; politics of agenda–procedure–resource mobilisation–allocation and access, pauperising access to the state (delays, bribes, transactions costs, party politicisation)	3
	Growth and stagnation of agricultural research and development Infrastructural expenditure and subsidies, agricultural inputs subsidies	All
	Subsidised credit, agricultural production credit, land loans (lack of) for SC landless	All
	Public services affecting private poverty (sanitation, waste, drinking water, electricity, roads, education, health, food and nutrition)	3
	Social protection, allowances for maternity, unemployment, sickness, accident, delay to marriage age, breadwinner death, disability, old age	3
	Countering sex bias – delayed marriage age incentives, orphanages for abandoned girls	3
	Pauperising capture/pauperising anti-poverty policy, simultaneous exclusion from multiple interventions	3
	Public engagement with policy (lack of)	3
Disappearance	Lack of panel studies prevent research on migration and exit of poor out of region and of pauperising relations which result from migration	2
Neglect	Pastoral/livestock economy, fish economy, organisation and use of common property (other than water), system-wide energy, system-wide materials and biomass organisation, system-wide tech development from research and development to scaled applications, village-level party politics and Dravidian populism, army – remittances, skilling and post-service enterprise	

Note: concepts and keywords are drawn from the text and its sources and may not be exhaustive. Numbers from 1 to 5 indicate the round of village studies: 1 = 1973–4; 2 = 1982–4; 3 = 1993–5; 4 = early twentyfirst century; 5 = 2012–4+.

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The Green Revolution and Poverty in Northern Tamil Nadu: a Brief Synthesis of Village-Level Research in the Last Half-Century

STEPS Working Paper 115

Between 1972 and 2014, in Northern Tamil Nadu, India, the Green Revolution in agriculture was studied through five rounds of village-level studies. Over the decades, the number of villages dwindled; from 11, rigorously and randomly selected (together with a 'Slater' village first studied in 1916), through to a set of three villages in a rural–urban complex around a market town, to one of the original eleven, in the fifth round. During the reorganisation of districts in 1989, the villages sited on the Coromandel plain shifted administratively from North Arcot, a vanguard Green Revolution district, to Tiruvannamalai, described then as relatively backward. A wide range of concepts, disciplines, scales, field methods and analytical approaches were deployed to address i) a common core of questions about the economic and social implications of technological change in agriculture and ii) sets of other timely questions about rural development, which changed as the project lengthened. Among the latter was poverty.

In this paper, this corpus of research is revisited to reinterpret how poverty was theorised and analysed, and to synthesise and compare the findings. The extensive scope of poverty concepts and processes studied over the decades constitutes the appendix.