Why is the Subsidy on Fertilizers for Rice in Sri Lanka Continued?

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Abstract

This dissertation attempted an answer to the question ‘why the subsidy on fertilizers for rice in Sri Lanka is continued amidst a number of sustainability concerns?’ There is ample evidence to point out why the long-running subsidy schemes should end; but they continue. This study locates the problem beyond its current definition that largely focuses on the gains and losses of subsidies, to incorporate the roles of stakeholders and their environment in deciding the important causes of subsidies. Using the current rice fertilizer subsidy scheme that started in late 2005 as the case, this study examined the roles of two key stakeholder groups - rice farmers and agricultural bureaucrats and researchers – set in the complex interplay of history, institutions, ideas, leadership, different actors, and external influences in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka.

Guided by the foundations of post-positivism, critical realism, and systems thinking, the study used a mixed method approach consisting of both quantitative and qualitative methods. Data was collected from 22 semi-structured interviews with agriculture bureaucrats and researchers, 189 survey responses from rice farmers, and three focus groups involving 24 agriculture bureaucrats and researchers. The data analysis was followed by a critique of the roles of stakeholders and their environment.

The key findings of this study suggest that the persistence of the rice fertilizer subsidy in Sri Lanka is best explained by a model of shared food preference. The social, political, and economic conditions in Sri Lanka engendered and accommodated ideals that elaborated the role of rice unparalleled to its economic value. Nurtured by this environment, both farmers and agriculture bureaucrats and researchers have, for different reasons, constituted a support for subsidized fertilizers. At the operational scale, the rice fertilizer subsidy of Sri Lanka has been an experience very similar to those subsidy schemes in other developing countries generating benefits in fertilizer usage and rice production, but falling below its full potential due to limitations in its own operational mechanism and deficiencies in its enabling environment. Constrained by the diminishing soil conditions – perceived to be the most critical among all variables deciding rice yields – farmers found the perceived benefits of the subsidy to be beyond material measure, mediating a strong support for its continuation. The agriculture bureaucrats and researchers’ support for the fertilizer subsidy was largely driven by ideals of nationalism, development, and nutrition. To these ideals achieving self-sufficiency in rice was of the highest priority. Science’s contribution to policy was severely constrained by this cultural construct of rice and hence the policy choices. Therefore, the study concludes that the reason for continuing the rice fertilizer subsidy scheme in Sri Lanka is its people’s intimate preference for rice that is shared across the social spectrum. Being
a shared preference, rice evaded scrutiny and debate over any topic that questioned its suitability or potential, making it taboo. The rice fertilizer subsidy is only a symptom of this unconditional association Sri Lankans have with rice, limiting much of its potential for development. This not only explains why the subsidy persists but also why an exit is difficult.

A key recommendation of this study is the need for the agriculture sector to understand its context. It has to adapt to the changing dynamics of the rural sector and the real risks that involve not only food markets but beyond, both at the local and international scales. For effective policy reforms, including a solution to the subsidy problem, three sensitive topics require an open dialogue. These topics include the role of rice in science, the role of science in Sri Lankan agriculture, and the role of agriculture in the Sri Lankan economy. These constitute an enormous challenge in the current context.
Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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No contributions by others.

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agriculture policy, fertilizer subsidy, food politics, cultural political economy, rice culture, stakeholder perceptions, mixed methods research

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ANZSRC code: 070108 Sustainable Agricultural Development 20%

Fields of Research (FoR) Classification
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FoR code: 0701 Agriculture, Land and Farm Management 20%
FoR code: 1608 Sociology 20%
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## Abbreviations

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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AMS</td>
<td>Aggregate Measurement of Support</td>
</tr>
<tr>
<td>FGD</td>
<td>The identifier for focus group discussion participants</td>
</tr>
<tr>
<td>FS</td>
<td>The identifier for farmers in the questionnaire survey</td>
</tr>
<tr>
<td>HYV</td>
<td>High Yielding Varieties</td>
</tr>
<tr>
<td>c.i.f</td>
<td>cost, insurance and freight</td>
</tr>
<tr>
<td>MOP</td>
<td>Muriate of Potash</td>
</tr>
<tr>
<td>RQ (1 through 5)</td>
<td>Research Question</td>
</tr>
<tr>
<td>RRDI</td>
<td>Rice Research and Development Institute</td>
</tr>
<tr>
<td>SOP</td>
<td>Sulphate of Ammonia</td>
</tr>
<tr>
<td>SSI</td>
<td>The identifier for semi structured interviews participants</td>
</tr>
<tr>
<td>TDM</td>
<td>Top Dressing Mixture</td>
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<tr>
<td>TSP</td>
<td>Triple Super Phosphate</td>
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Chapter 1 Introduction

If we ignore how problems are framed we will be imprisoned by those frames
Jim Dalton

1.1 Introduction

In the preface to the textbook ‘Community Psychology’, reflecting upon his frustration at failing repeated attempts of the nine dot problem (Figure 1.1), Jim Dalton writes the following.

I was surprised how simple the answer was [Figure 1.2]! I had committed the error that most people commit when they encounter this problem. I made an assumption not given in the instructions or the diagram. The three by three array of nine dots seemed to me to create a square box. Not only was that assumption unnecessary, it actually made the problem impossible to solve. (Dalton et al. 2007)

What is intriguing here is neither the problem nor the solution, but Dalton’s reflection on why we so often fail at attempting to solve this problem. Sometimes, an easy solution it may be, but those assumptions with which we approach the problem, limit our options from finding it. So is it for the same mistake that we fail over and over again in addressing common but pressing resource management problems that have been the subject of deliberation for decades? It is this thought that guides this study in addressing the fertilizer subsidy problem in Sri Lanka.

The problem of subsidies is a worldwide phenomenon and so has been studied extensively. It has also been a dedicated topic of deliberation of many conferences and workshops. The knowledge on the theory of subsidies is therefore, vast. The various implications of subsidies including economic, social, and environmental aspects are well understood. Yet the problem of subsidies continues. Essentially, not everything about subsidies is bad. A subsidy could prove helpful in overcoming imperfections in resource capacities and distribution—be it by alleviating poverty or by withstanding risk. It could stimulate production, encourage innovation, promote investment, create employment opportunities, protect low income and other socially vulnerable groups, attain environmental goals, or manage trade (Gulati and Sharma 1995; de Moor and Calamai 1997; Bach et al. 2000; Van
Beers and Van` den Bergh 2001; Crawford et al. 2006; Morris et al. 2007). But the benefits would prove most efficient only when a subsidy is employed over the short-term (Hedley and Tabor 1989; de Moor and Calamai 1997; Cummings Jr et al. 2006; Fan et al. 2008). In the long-term, large-scale investments in subsidies have often resulted in economic inefficiencies, imposing a burden on government budgets and taxpayers (Gulati and Sharma 1995; Kleijn et al. 2001; Govereh et al. 2002; Dorward et al. 2004; Fan et al. 2008; Anderson and Martin 2009a; Dorward 2009). Adding to this issue of sustainability, are the environmental and social damages of subsidies that often cross geographical and generational boundaries (de Moor and Calamai 1997; Van Beers and Van den Bergh 2001; OECD 2005, 2007; van Beers et al. 2007).

Despite such continuing concerns, there has been a strong political resistance to exit long-running subsidy programs. Driven by their vested interests, various stakeholders extend an unwavering support to the existing institutions and policies. Long-run strategic investments and geopolitical tensions come into play, complicating any attempt of reform (de Moor and Calamai 1997; Van Beers and Van den Bergh 2001; Potter and Tilzey 2005; Dorward and Chirwa 2011). Such tensions are apparently indicative of divergent perceptions, assumptions, and opinions - some giving weight to the short-term gains and ruling in favour of subsidies, while others giving weight to the long-term detriment and ruling out the option of subsidies. Resonating with this global phenomenon, the rice fertilizer subsidy in Sri Lanka, which has existed in various forms for over 50 years, continues to remain a topic of dispute.

In 2005, keeping his election promise, the incumbent president of Sri Lanka renewed the subsidy policy by providing all three fertilizer nutrients to smallholder rice farmers at a fixed price. Sri Lanka imports all of its fertilizer demand and consequently, the size of the subsidy component is determined by the price of fertilizers in the world market. In 2008, when the fertilizer prices in the world market peaked to an all-time high, the subsidy reached to over 95% of the market price of fertilizers. While the government incurs a huge cost for the fertilizer subsidy, the rural economy which it benefits, continues to stagnate (Yamaguchi and Sanker 2007; Bandara and Jayasuriya 2009; The World Bank 2009a). However, since the 1950s, rice production in Sri Lanka has increased by about six folds (Department of Census and Statistics 2012) and some studies consider the subsidy’s contributions to have been important in this (Yahanpath and Agrawal 1985; Yamaguchi and Sanker 2007; Rajapaksa and Karunagoda 2009) while, others suggest otherwise (Bogahawatte 1982; Thusiman et al. 1987; Ekanayake 2006). Similarly, the public opinion over the
Continuation of the rice fertilizer subsidy in Sri Lanka against such sustainability concerns therefore, begs an answer to the question ‘why”? The issues that make the subsidy a problem suggests that an answer to the question ‘why the subsidy on fertilizers for rice in Sri Lanka is continued?’ may lie beyond the traditional concerns over the implications of subsidies. As Dalton reflects, it could be the problem frame in which we are imprisoned that makes the problem impossible to solve. Therefore, this study makes an attempt to rediscover the problem in a broader socio-political backdrop and thereby eliminate any assumptions that may have constrained its solving.

This introductory chapter sets the scene for undertaking a research task to address the problem outlined above. In the following sections, the chapter builds up the research problem, formulates the research questions, and delineates the scope for its addressing. Section 1.2 locates the beginnings of the study and explains how and why the particular research problem was chosen for the study. Section 1.3 locates why this research topic is of particular interest by tracing the knowledge gaps in the subsidy discourse and thereby makes a case for the originality and the importance of this study. Section 1.4 establishes the context of the rice fertilizer subsidy scheme and details its particulars. It then identifies the various elements that make the rice fertilizer subsidy a problem. Section 1.5 recapitulates the research problem leading to the formulation of the research questions in section 1.6. The organisation of the chapters and its relevance to addressing the research task is outlined in section 1.7. Finally, the chapter concludes in section 1.8.

1.2 The Origins of the Current Study

At commencement, the study set off to investigate a different topic –“The impacts of climate change policies on rice based food systems in Sri Lanka”. The topic was proposed as the next logical step to advancing the minor dissertation undertaken for the master’s degree in Environmental Management - “An evaluation of the impacts of climate change policy response on
developing world food security”. Contact with the informants in the preliminary field visit, revealed that the original problem was distant and its possibility of benefitting those who were thought to be affected by it was small. The local disconnection with the problem was rooted in the interpretations the local agricultural bureaucracy and research and development bodies had on the differential roles of nations within the climate change regime and the relative scale of agricultural emissions between the developed and the developing nations.

According to some informants, the policy response to climate change has essentially been a developed world response. For them this biased policy response carried a hidden agenda, to which action was thought of being gratuitous. The following comments by the bureaucrats constituted such thinking.

We in the agriculture department see it differently. . . . People in Asia - we eat rice. . . .This is all international politics. Earlier it came as methane emissions and now it comes as water productivity. (SSI41)

When you look for evidence on the internet or in the literature, they always try to emphasise on methane emissions from paddy lands. Even with the shortcomings in using a common emissions factor – for example, in Sri Lanka municipal solid waste emits much more methane than paddy lands. . . . I do not know the hidden agenda behind this. . . . They [the developed nations] also have municipal solid waste. But they do not have paddy lands. (SSI34)

The underlying science also seemed to rationalise the inaction resulting from this scepticism. As one bureaucrat explained, the condition of the rice paddy soils in Sri Lanka was such that, they did not emit significant amounts of methane.

What we have been asked to do is to multiply the correction factor by the extent, assuming that it is the same as the world situation. . . . To emit methane from paddy lands, . . . two conditions need to be satisfied. One is that the organic matter content of the soils should be very, very high, and second the redox potential . . . should be less than -240mV. That means the soils should be highly reduced. . . . Most of our paddy lands do not come under this category. Ampara, Kurunegala, Polonnaruwa, Hambantota, Anuradhapura – these are the granary areas of Sri Lanka - 75 % of our paddy requirement is produced by those districts. But these districts do not have such soil conditions. (SSI34)

Notwithstanding this view, Sirisena et al. (2004) found rice paddies in Sri Lanka kept inundated during the period from maximum tillering up until flowering to be emitting significant amounts of
methane, even in the total absence of fertilizers. But with intermittent drying of the paddy land, the authors found a significant reduction in the methane emissions. Other studies from elsewhere have also found water management in rice paddies to be an important determinant in managing methane emissions (Cai et al. 1997; Qin et al. 2010). In Sri Lanka, intermittent drying of rice paddies is standard practice. Relying on such evidence a researcher explained that action for methane mitigation in rice paddies in Sri Lanka has no priority.

Methane emission is there. But with our traditional [farming] practices we can reduce this. Because of our water limitations we do not keep paddy lands inundated throughout the cycle. . . . Our farmers do not apply large quantities of organic matter. So we don’t have a need to worry about this. (SSI24)

The division between the developed world and the developing world in pinning liabilities and sanctions to climate change so far have only resulted in the evading of effective management responses. The stand of the Sri Lankan agricultural bureaucracy and research and development bodies resonated with this reality. Furthermore, despite intense discussions about agricultures’ role in greenhouse gas mitigation in the lead up to Copenhagen, even the developed world’s response to mitigating agricultural emissions has been limited. Such noncommittal responses have little potential for making a difference to the sustainability of agriculture. The views and perceptions of the Sri Lankan agricultural bureaucracy and research and development bodies noted above make the local scale impacts of the global policy response to climate change an interesting topic worthy of further discussion. But considering the ambiguity of the policy response and the disconnect of the Sri Lankan agriculture sector with climate change, a critical decision was made to change the topic to a new research problem that the informants themselves identified as immediate and consequential – the rice fertilizer subsidy.

The easiest to practise is the application of chemical fertilizers [giggles]. With the [presidential] elections ahead - it is in keeping with the pledge made by the [incumbent] president last time [at the elections], that the fertilizer is given at Rs.350/-. Now there is a great debate about this between the two sides [major political parties]. Do not know to which side it will go. If it goes to the other side the fertilizer price might rise to Rs.2500/-. (SSI8)

This was a farmer’s response to the question -‘Among those farming practices promoted by the agriculture extension officer, which practices do you find easier than others’? The response summed up the complexity of the rice fertilizer subsidy program in Sri Lanka. The subsidy not only seemed to promote recommended fertilizer usage as intended but it also seemed to determine the rural vote.
Another farmer detailed the structure of the subsidy scheme highlighting a number of weaknesses he perceived to be affecting the program at operational scale.

The amount of fertilizer we get from the government under the subsidy is not adequate, the government recommends that we add 1.5 bags of fertilizer per acre to the mud. But we can’t apply that amount, because the amount we get from the government is not enough. To the mud, we only apply about a hundred weight\(^1\) of fertilizer. To date we have never received fertilizer on time. We always get fertilizers 2-3 weeks after we finish sowing - because of all the corruptions and things. The fertilizer is distributed by the Agrarian Service Centres. There are weaknesses in distribution. We get the fertilizers needed at the beginning, only when we are about midway through the season. So we use the fertilizer we receive for this season in the next season. But it is not even enough, we don’t get enough TSP (Triple Super Phosphate). (SSI11)

Bringing the whole system into perspective at the policy scale, a bureaucrat raised his concern - “trying to achieve self-sufficiency at what cost?” (SSI42). According to his perspective ad hoc policies in agriculture, including the rice fertilizer subsidy policy have had detrimental effects on the environment.

We do not recommend the fertilizer subsidy at all. The subsidy aggravates the existing situation. It increases the rate of soil degradation. . . There may be short term gains, but not in the long term. Excess accumulation of nutrients. . . is one thing. Another is water pollution. . . Under such circumstances giving a fertilizer subsidy is not desirable. . . . They give it for economic and political reasons. There are 600,000 rice farmers in Sri Lanka. That is a huge vote base. So both political parties give out the subsidy. (SSI42)

The participants’ perceptions over the rice fertilizer subsidy highlighted both causes and symptoms of a problem at different scales – virtually free fertilizers, the wrong amounts at the wrong time, soil degradation, water pollution, political bets, and corruption. According to these concerns of study participants, the rice fertilizer subsidy seemingly posed greater risks to sustainability. The problem seemed imminent and more enduring than the original problem and suggested that there is much greater potential for adaptive improvements. Therefore, the study redirected its focus on to the rice fertilizer subsidy problem.

\[^1\] 1 hundred weight (cwt) is equal to 50.802 kg
1.3 Locating the Study in the Knowledge Web of Subsidies

As noted earlier, there is a large body of literature on subsidies and a majority of this is on agricultural subsidies. The focus of most of these works has been on the costs and benefits and the inefficiencies (Barker and Hayami 1976; Thomson 1987; Hedley and Tabor 1989; Gulati and Sharma 1995; Elliot 2006; Esposti 2007; Dorward et al. 2008; Fan et al. 2008; Chand and Pandey 2009; Denning et al. 2009; Rajapaksa and Karunagoda 2009; Xu et al. 2009; Ricker-Gilbert et al. 2011). The various implications of subsidies on society (Gladwin 1992; Shortall 2002; Lasanta and Marin-Yaseli 2007; Tambulasi 2009) and environment (Kleijn et al. 2001; Kleijn and Sutherland 2003; Primdahl et al. 2003; Gottschalk et al. 2007; Mhango and Dick 2011) have also received some attention. Amongst these works the same topic has been visited and revisited from different angles and contexts. But often, these topics, whether addressing the economics of subsidising agriculture or its implications, have largely been addressed through econometric modelling.

Certain subsidy schemes have received more attention in the scholarly work. The Common Agricultural Policy (CAP) of the European Union is likely to claim the title for the single most studied subsidy scheme in the world. For over five decades from its start in 1962 the program has been the focus of many reviews, evaluations, and econometric models (Swinnen and Van Der Zee 1993; Kleijn et al. 2001; Shortall 2002; Potter and Tilzey 2005; Strijker 2005; Lasanta and Marin-Yaseli 2007; Swinbank 2009). The US Farm Bill is another example that has contributed largely to the knowledge base of agricultural subsidies (Harvey 1998; Marshall 2000; Sumner 2003; Lehrer and Becker 2010; Serra et al. 2011). The enormity of these subsidies and the resulting distortions in the local and international agricultural commodity markets, for which both subsidy schemes are blamed, attracts much of this world-wide interest (Pearce 2003; Vandermeer 2003; Sharma 2004; Elliot 2006; Abboushi 2007; Ormachea 2007). Many developing countries across Africa and Asia also run subsidy schemes to support their agriculture. Among these, the fertilizer subsidy schemes in Africa, South Asia and Southeast Asia have received much of the scholarly attention (Barker and Hayami 1976; Bayes et al. 1985; Ahmed 1987; Hedley and Tabor 1989; Gulati and Sharma 1995; Jayne et al. 2003; Ekanayake 2006; Dorward et al. 2008; Rajapaksa and Karunagoda 2009; Xu et al. 2009).

Despite differences in scale, heavy agricultural subsidies are common in both developed and developing countries. But there is an interesting dichotomy in the focus of the studies on these subsidies. In the developing world the focus of agricultural subsidy studies remains with economic efficiency (Barker and Hayami 1976; Ahmed 1978; Bayes et al. 1985; Thusiman et al. 1987; Ekanayake 2006; Yamaguchi and Sanker 2007; Dorward et al. 2008; Fan et al. 2008; Rajapaksa and
Karunagoda 2009; Dorward and Chirwa 2011). Much of this discussion has often been trapped in the normative premise of an optimal economic policy, which expects failure only in the lack of knowledge or poor management. The role of the government is presumed to be “an omniscient, benevolent dictator” which would rectify the failures in allocating and distributing resources in a market economy (Swinnen and Van Der Zee 1993). On the other hand, in the developed world the focus of the studies on agricultural subsidies has shifted much into questioning its effectiveness. Much of the concern there revolves around distortions to international commodity trade (Clunies-Ross 1990; Rayner et al. 1995; Sharma 2004; Elliot 2006; Abboushi 2007; Yusuf 2009), environmental impacts (Bradshaw and Smit 1997; Santos et al. 2006; Gottschalk et al. 2007; van Beers et al. 2007), and the effectiveness of agri-environmental payments (Kleijn et al. 2001; Kleijn and Sutherland 2003; Primdahl et al. 2003). But market failures and Marxist economics embodying “excessive economism” and “top down structuralist assumptions” continue to dominate the discussion.

Trapped in the traditional theoretical frameworks, these discussions could not explain the nature and the cause of agricultural subsidies (Marsden et al. 1993). Empirical works on subsidies ignored the behaviours of actors and institutions and relied on the structural features of the economy. The effects of politics including the role of actors and institutions were modelled as endogenous. Even when acknowledged the effects of political activity was assumed to be determined by the underlying structural features of the economy (Thies and Porche 2007). In addressing the unresolved issues of the nature and cause of agricultural protection in Europe, scholars found interest in the political economy of the problem (Swinnen and Van Der Zee 1993; Clark et al. 1997; Wen and Chang 1999; Lopez 2001; Swinnen et al. 2001; Henning and Latacz-Lohmann 2004; Potter and Tiltzey 2005; Pokrivcak et al. 2006; Swinbank 2009). In contrast to neoclassical economics the political economy approach started questioning the ability of a government to correct market failures in a prefect and costless manner. It recognised that the allocating of public resources in the political market is subject to the influence of the self-interests of politicians, bureaucrats, voters, and lobbying groups (Swinnen and Van Der Zee 1993; Murdoch et al. 2003; Potter and

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2 Political economy can mean different things. In the 18th and 19th centuries and into the 20th century political economy was a mere synonym for what economics connotes today. This usage was indicative of the mainstream economic thought of the time that placed emphasis on the interconnectedness of economics and politics. It was with the emergence of neoclassical economics in the 20th century that a distinction in usage between economics and political economy became apparent. Neoclassical economics marked a push for rigorous scientific analysis featuring agent optimization models. The more abstract political and sociological factors that appeared less amenable to such econometric modelling became the subject of other social science disciplines. The modern adoption of political economy was largely a response to apparently perverse policy outcomes experienced by many countries in the 1980s. The complexity and the variety of these economic events could not be explained by neoclassical economic theory and analysis. Looking for answers, some economists began exploring political forces that affected policy choices paying much attention to distributive conflicts and political institutions. Thus political economy regained its identity, distinct from mainstream economics with a less abstract and more positive focus. The current use of political economy could either refer to an area of study largely focusing on political behaviour of actors and institutions or a methodological approach presenting frameworks for analysing government policies (Lee 1989; Sayer 2000; Alesina 2007; Weingast and Wittman 2009).
Tilzey 2005). Economic policy making was no longer viewed as a black box and policy makers were no longer treated as benevolent agents committed to maximizing social welfare (Anderson 1995; Thies and Porche 2007). Thus the political economy approach introduced a socio-political dimension that was largely missing from the discourse of subsidies.

In explaining agricultural policy choices the political economy approach presents a number of models. Among, the collective action and politician-voter interaction models are the two most widely adopted. The collective action model was first developed by Olson (2002). He argued that despite variability in size and homogeneity of interests, all agricultural producer groups have an interest in greater protection at the expense of consumers and taxpayers. The differences among groups in their ability and incentive to engage in collective action to exercise political pressure would decide which groups will win over the others in rent-seeking behaviours. Using this model Olson (2002) explained the differences in agricultural protection between the developed and the developing worlds, between the large and small farms, and between the urban and rural. For example, according to the author small-scale rural farmers in the developed world face many obstacles with very little incentive to engage in collective action to stir political interest and so receive little or no protection compared to the large-scale elite farmers. On the contrary, the social mobilization approach models behaviours the collective action groups model could not explain, suggesting that the many obstacles faced by the underprivileged can be overcome through social mobilization (Birner and Resnick 2010).

Politician-voter interaction is another model that explains ineffective policy choices (Anderson 1995; De Gorter and Swinnen 2002; Thies and Porche 2007; Birner and Resnick 2010). Building upon the positive economic theory of regulation developed by G. S. Stigler and S. Peltzman, the model assumes that whether elected democratically or not, the political leadership is contestable and therefore, its interest is in maximizing the chances of remaining in office. Policies that assist particular groups such as agricultural protection, is one way of safeguarding political support. In such systems, social welfare has proven to be just one argument among the many possible objective functions pursued by the self-interested agents and often these do not favour the interests of the society as a whole (De Gorter and Swinnen 2002; Thies and Porche 2007; Birner and Resnick 2010). However, the validity of such models is subject to the type of political regime in power. Certain political regimes do not accommodate or facilitate the society-centred political forces described above. For example, van de Walle (2001) argues that most African countries enjoy an autonomy that makes them immune to societal pressures. The author suggests that for many African governments modern rational-legal administration is only an external façade for the underlying patrimonial forms of governance. Other authors have associated pluralistic systems and higher
levels of democracy with higher levels of agricultural protection (Beghin and Kherallah 1994; Olper 2001; Swinnen et al. 2001; Thies and Porche 2007).

Ideas and ideologies offer another explanation. Often treated as endogenous factors in econometric modelling with a limited utility of defending economic decisions and political interests, ideas and ideologies have been used by a few qualitative studies to explain particular orientations and shifts in economic policy making including the level of agricultural protection in certain countries. For example policies that taxed agriculture in the pre-structural adjustment period in Africa, were influenced by African socialism, dependency theory (Krueger et al. 1991), and mainstream economic thinking at the time (Bates 1981). The withdrawal of public sector intervention across many countries in the late 1970s and in to the 1980s was influenced by a paradigm shift in international developmental thinking and public sector administration (Paarlberg and Grindle 1991). The current global drive to support small-holder agriculture has been influenced by the post-Washington Consensus. The protection in food crop sectors in Africa and Asia is another such example influenced by the ideals of self-sufficiency (Birner and Resnick 2010).

Other models have also been proposed. Having to bear the burden of most of the adjustment costs during cyclical downturns in prices, make agricultural producers vulnerable to market fluctuations than their industrial counterparts. This vulnerability of agriculture sector caused by the relatively inelastic supply of agricultural products has been used to explain instances of agricultural bias in protection (Thies and Porche 2007). Certain types of external shocks further complicate these vulnerabilities and induce changes in agricultural protection. International terms of trade as well as government fiscal condition are highly vulnerable to a number of economic, political, and environmental shocks that directly channel these effects to agricultural commodity markets, both local and international (Anderson et al. 1986; Thies and Porche 2007). For example according to Milner (2002) improving terms of trade and fiscal crises enable reductions in the level of agricultural producer support.

In explaining the persistence of agricultural protection, some authors have proposed a ratchet effect. According to the ratchet effects model, once entrenched, lags in institutional support make agricultural protection inherently difficult to dislodge. It argues that when legislative or executive processes of reform entail the agreement of many political actors, long-running policies have very little chance, if at all of undergoing any change (Tsebelis 2002). The changing dynamics of supply and demand for agricultural protection during the different stages of a nation’s economic development is another model that has often been used to explain the differences in inter-sectoral protection. The model assumes that the demand for food becomes less price elastic as an economy
develops so that while agriculture is taxed during the initial stages of development an increase in demand for protection follows in the latter stages (Anderson et al. 1986).

These models are indicative of two things. First is that there is no single, holistic, universally applicable model to explain agricultural protection. Lee (1989) attributes this diversity of explanations to the multiplicity of actors that have widely divergent objective functions, face very different constraints, and access the policy-making process at unique points. Second, a common thread that runs through these models still is the assumption that the politics of protection is rational and is determined by underlying economic factors. As Jessop and Oosterlynck (2008) argue these models always assume “a universal privilege and decontextualized singularity of the economy over politics and culture”. But economic choices are influenced by cultural traits that are different across nationalities (Tabellini 2005; Alesina 2007). Often the press and the media profoundly engage in influencing and engendering beliefs, discursively. The political economy models noted so far, “naturalizes and fetishizes economic categories without regard to their discursively mediated and socially constructed characters” (Sayer 2000; Grossberg 2006). Therefore, there is an evident tension in the literature, between the analytical parsimony of econometric modelling and the complex interplay of history, institutions, ideas, leadership, different actors, and external influences in agricultural protection (Hill 2013).

Taking such thinking onboard, the cultural political economy approach insists an understanding of the socio-cultural constructions of the embedding economic actions and activities (Sayer 2000; Jones 2008). It recognizes a major gap in the understanding of complex relations between meanings and processes, especially those forces and how they select, retain, and reinforce specific meanings in shaping the “concrete, contextualized, and contingent dynamics” of political economy. In responding to such gaps, the cultural political economy scholars point to the importance of engaging with cultural studies and working across disciplines without retreating into own disciplinary boundaries or favoring particular forms of knowledge or means of knowledge production. It highlights the importance of understanding the common sense economic imaginaries and the existing struggles over their selection and retention by exploring the complexities of discursive and material mechanisms that shape economic phenomena (Jessop and Oosterlynck 2008).

But such studies focusing on the culturally influenced political economy of agricultural subsidies do not exist. Political economy, let alone adoptions of its cultural turn have often proved a difficult topic. As the Chair of the OECD workshop on reforming environmentally harmful subsidies, revealed in his summary, discussing the political economy of subsidies has been a too sensitive issue.
On the whole it was difficult, in some cases, for workshop participants to stay focused on political economy issues [original emphasis]. It is a difficult debate and raises difficult and sensitive issues. It seemed often that it was easier for participants to return to traditional discussion of the harmful effects of subsidies - the normative aspect of reform–than to debate the practicalities of it. (OECD 2006)

Therefore, the purpose of this study is to address this gap in knowledge, particularly the complex interplay of history, institutions, ideas, leadership, different actors, and external influences of agriculture protection in Sri Lanka focusing on the rice fertilizer subsidy policy.

1.4 The Construction of the Research Problem

To varying degrees, the rice fertilizer subsidy in Sri Lanka reflects complexity, uncertainty, divergence, and societal constraint, the very characteristics of a wicked problem (Rittel and Webber 1973; Head 2008). When addressing wicked problems, locating the problem could be as challenging as finding a solution (Allen and Gould Jr. 1986). It is the very problem addressed in this study-locating the problem. Addressing this challenge begins here in this section by locating the problem in its current manifestation. Through much more information and dialogue, the following chapters will continue to amend this problem definition. The task is begun here first by delimiting the current problem space. The demographic, economic, and physiographic context of Sri Lanka that determines the capacity, the potential, and the purpose of its agriculture defines the problem space of the rice fertilizer subsidy scheme, at large. The structure of the current rice fertilizer subsidy scheme, the subject of the problem is pinned down next .It then locates the elements within this problem space that makes the problem a problem.

1.4.1 A Brief Overview of the Problem Space of the Rice Fertilizer Subsidy Scheme in Sri Lanka

The rice fertilizer subsidy of Sri Lanka was first introduced in 1962, in parallel with the unfolding of the Green Revolution. It has been among the longest standing policies adopted by successive governments. From the time of its inception the fertilizer subsidy scheme has undergone a number of revisions, including a total withdrawal in 1990, which continued up until 1994. The revisions included changes in the selection of granted crops and fertilizers and the manner in which the subsidy component was decided, whether by fixing the price or the subsidy (Ekanayake 2006). Despite all the revisions, rice is the one crop that was subsidised over the entire course, receiving
nitrogenous fertilizers at all times (except when the subsidy was totally withdrawn in 1990), supplemented with phosphorous and potassium fertilizers at times (Ekanayake 2006; Weerahewa et al. 2010). At the time of its introduction, the objective of the subsidy was to encourage chemical fertilizer usage with a long-term vision of increasing agricultural productivity, mainly rice (Ekanayake 2006; Bandara and Jayasuriya 2009; Weerahewa et al. 2010). This stemmed from a food self-sufficiency goal; although, articulated as food self-sufficiency, a policy practised as rice self-sufficiency, which every post-independence government advocated (Ministry of Agricultural Development and Agrarian Services 2007; Yamaguchi and Sanker 2007; Bandara and Jayasuriya 2009). To understand how the subsequent developments of this sequence formulate the current construct of the problem, one needs to understand the problem space within which the problem unfolds and evolves. Below is a brief overview of the problem space of the rice fertilizer subsidy problem in Sri Lanka.

**Demography and geography**

Sri Lanka is a densely populated small island. It stretches over an area of only 65,610 square kilometres and is home to over 20 million people. It is located in the Indian Ocean, a few degrees above the equator off the southern tip of India, confined to the tropical belt (between North Latitudes 5° 55´-9° 50´ and East Longitudes 79° 42´-81° 53´). The island stretches 432km from North to the South at its longest and 224km from West to the East at its widest. Pork straight, which is only 50 kilometres wide, separates the island from mainland India and the rest of the subcontinent (Central Bank of Sri Lanka 2012b, 2012a). Sri Lanka is home to four main ethnic groups, the Sinhalese (73.9%), Sri Lankan Tamils (12.7%), Moors (7.1%), and Indian Tamils (5.5%). Other ethnicities (0.8%) only make up a very small minority. In religious composition, a majority are Buddhists (69.3%). Hindus (15.5%), Muslims (7.6%), and Christians (7.6%) make up the remainder (Central Bank of Sri Lanka 2012a, 2012b). A great majority of the population, of over 70% are rural.

**Recent socio-economic developments**

Over the decades Sri Lanka’s economy suffered heavily from the veering between left and right wing economic policies and continued political turmoil (Bandara and Jayasuriya 2009). The civil war against the Liberation Tigers of Tamil Eelam (LTTE) lasted for three decades (1983-2009) and an armed insurgency of the Sinhalese youth rebellion of the People's Liberation Front (JVP) in the south erupted twice in 1971 and 1987-1989. However, amidst all unrest, the country managed to maintain a relatively strong growth of about 5% per year (Figure 1.3). Compared to the previous,
last decade marked a strong growth momentum across all key sectors in the economy, resulting in higher growth and lower inflation rates. For example, in 2007, the Central Bank of Sri Lanka reported a 6.8% growth, marking a growth of over 6% for the third consecutive year (Central Bank of Sri Lanka 2008; Department of Census and Statistics 2009). This growth dropped to a 3.5% during the final military campaign against the LTTE in 2009, which also coincided with the global financial crisis (Central Bank of Sri Lanka 2010). Since then the economy has rebounded strongly (Central Bank of Sri Lanka 2011; The World Bank 2011b; Central Bank of Sri Lanka 2012a) and in 2010, the International Monetary Fund upgraded Sri Lanka from its lower income category to the lower middle-income economy category (Central Bank of Sri Lanka 2011; The World Bank 2011b).

According to recent statistics, Sri Lankan economy is worth Rs.6542.7 billion and the services sector makes the largest contribution to accounting for two thirds of the GDP (Table 1.1). With more employment opportunities in the services sector, unemployment has dropped. There has been an impressive expansion in the exports trade. The major exports included apparel, tea, and rubber products. Foreign worker remittances and tourism were the other major sources of foreign income. But a sharp increase in import expenditure due to the high demand for all major categories of imports and increased international commodity prices have resulted in record high trade deficits (Department of Census and Statistics 2009; Central Bank of Sri Lanka 2012a, 2012b).

![Figure 1.3 Annual percentage GDP growth in Sri Lanka](image)

**Figure 1.3** Annual percentage GDP growth in Sri Lanka

*Source: The World Bank 2011a*
### Table 1.1  The key economic statistics of Sri Lanka for the year 2011

<table>
<thead>
<tr>
<th>Income level</th>
<th>Lower middle income</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP at market prices</td>
<td></td>
</tr>
<tr>
<td>Rs. billion</td>
<td>6,542.7</td>
</tr>
<tr>
<td>USD. billion</td>
<td>59.2</td>
</tr>
<tr>
<td>Sectoral composition of GDP (%)</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>11.2</td>
</tr>
<tr>
<td>Industry</td>
<td>29.3</td>
</tr>
<tr>
<td>Services</td>
<td>59.5</td>
</tr>
<tr>
<td>Real GDP growth (%)</td>
<td>8.3</td>
</tr>
<tr>
<td>Export earnings</td>
<td></td>
</tr>
<tr>
<td>Rs. million</td>
<td>1,167,588</td>
</tr>
<tr>
<td>USD. million</td>
<td>10,559</td>
</tr>
<tr>
<td>Foreign worker remittances</td>
<td></td>
</tr>
<tr>
<td>Rs. million</td>
<td>569,103</td>
</tr>
<tr>
<td>USD. million</td>
<td>5,145</td>
</tr>
<tr>
<td>Tourism earnings</td>
<td></td>
</tr>
<tr>
<td>Rs. million</td>
<td>91,735</td>
</tr>
<tr>
<td>USD. million</td>
<td>830</td>
</tr>
<tr>
<td>Labour force participation rate (%)</td>
<td>48.2</td>
</tr>
<tr>
<td>Employment in agriculture (% of total)</td>
<td>32.9</td>
</tr>
<tr>
<td>Unemployment (% of labour force)</td>
<td>4.2</td>
</tr>
<tr>
<td>Poverty headcount ratio at national poverty line (% of total population)</td>
<td>8.9</td>
</tr>
</tbody>
</table>


With regard to social indicators, Sri Lanka has always been an outlier amongst other developing countries (Figure 1.4). Table 1.2 shows high literacy rates, low mortality rates and a steady decline in population growth over the years indicate social conditions that lie well above the average for a developing country (Department of Census and Statistics 2009; The World Bank 2011b; Central Bank of Sri Lanka 2012a; Ministry of Finance and Planning 2012). The striking progress in the social conditions in Sri Lanka is attributed to the massive state funding made in the public welfare programmes in health and education (Isenman 1980; Morrison and Waxler 1986; Anand and Ravallion 1993; Yapa 1998; Jayasuriya 2001).
Figure 1.4 The progression of social development indicators relating to education and health of Sri Lanka in comparison to South Asia and lower middle income counties from 1980 to the present

Source: The World Bank 2011a

Table 1.2 The key social and demographic statistics of Sri Lanka for the year 2011

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Population</td>
<td>20.9 million</td>
</tr>
<tr>
<td>Rural population (percentage of total population)</td>
<td>72.2</td>
</tr>
<tr>
<td>Life expectancy at birth (years)</td>
<td>74.9</td>
</tr>
<tr>
<td>Literacy rate, male (percentage of population aged 15 and)</td>
<td>93.2%</td>
</tr>
<tr>
<td>Literacy rate, female (percentage of population aged 15 and)</td>
<td>90.8</td>
</tr>
<tr>
<td>Human development index</td>
<td>0.691</td>
</tr>
<tr>
<td>Crude birth rate (per 1000)</td>
<td>17.6</td>
</tr>
<tr>
<td>Crude death rate (per 1000)</td>
<td>6.2</td>
</tr>
<tr>
<td>Infant mortality rate (per 1000 live births)</td>
<td>8.5</td>
</tr>
</tbody>
</table>

The agricultural economy

More than three quarters of the total agricultural output in Sri Lanka derives from crop agriculture. Livestock, fisheries and forestry make up the remainder (Central Bank of Sri Lanka 2011, 2012a). Crop agriculture is further identified into two categories, import-competing food crops and export crops. Distinction between these two sectors is crucial in understanding the government’s agricultural policy. Rice has always dominated the import-competing food crop sector. Other main import competing food crops includes a range of subsidiary food crops such as cassava, finger millet, maize, potatoes, cowpea, green gram, red onions, and chillies. The sector also includes fruits, vegetables, livestock and dairy, although small quantities of these commodities are exported, (Gunawardana and Somaratne 2000; Bandara and Jayasuriya 2009). Tea is the major export crop (Table 1.3). Tea was traditionally the leading export, until overtaken by the apparel industry in the 1990s and is still the second highest export earning industry (Bandara and Jayasuriya 2009; Central Bank of Sri Lanka 2012a; FAO 2012). Rubber, coconuts, cinnamon and spices are the other main export crops and account for 22.3% of the agricultural GDP (Central Bank of Sri Lanka 2012a; Ministry of Finance and Planning 2012).

<table>
<thead>
<tr>
<th>Agriculture exports (Rs. billion)</th>
<th></th>
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<tbody>
<tr>
<td>Tea</td>
<td>164.9</td>
</tr>
<tr>
<td>Rubber</td>
<td>22.8</td>
</tr>
<tr>
<td>Coconut</td>
<td>29.4</td>
</tr>
<tr>
<td>Other agricultural crops</td>
<td>62.4</td>
</tr>
</tbody>
</table>

Source: Central Bank of Sri Lanka 2012a
In 2011, agriculture sector at current prices recorded a share of 12.1% in the GDP, amounting to Rs. 791.2 billion (Figure 1.5) (Central Bank of Sri Lanka 2011; Ministry of Finance and Planning 2011; Central Bank of Sri Lanka 2012a; Ministry of Finance and Planning 2012). Over the years the share of agriculture in the GDP and labour force has declined (Figure 1.6). In early 1950s the sector employed 53% of the workforce. By 1995 this figure dropped to a 37% and by 2005 to a 31% and has remained around that, since (The World Bank 2009b; Central Bank of Sri Lanka 2010) (Central Bank of Sri Lanka 2008, 2009, 2010, 2011, 2012a). In parallel, the share of agriculture in the GDP dropped from contributing to almost a half of the GDP in early 1950s to less than a 15% in 2011 (Bandara and Jayasuriya 2009; Central Bank of Sri Lanka 2012a). Yet according to many scholars a great potential for improvement still lies within the sector (Abegunawardana and Pope III 1986; Wijerathne and Karunagoda 2007; Weerahewa et al. 2010) and the government is continuing its efforts in expanding sector with major investments (Ministry of Agricultural Development and Agrarian Services 2007; Ministry of Livestock Development 2007a, 2007b; Central Bank of Sri Lanka 2012a; Ministry of Finance and Planning 2012).
The climate

Two main features dominate the Sri Lanka’s climate, its size and physical structure. Because of its small size, the ocean winds pervade the country from all directions and keep it cooler than the steaming climate that is typical of mainland India. The coastal belt is almost level and rises inland, at first gradually and then sharply forming a central hill massif reaching over 2500m. The seasonal variation in the weather is marked by wet and dry seasons consistent with the two main monsoonal winds, the southwest and the northeast. Intermittently, the inter-monsoons, cyclones, and depressions bring more rains. The central hill massif acts as a barrier to the incoming monsoonal winds affecting the spatial distribution of the rains. The southwest monsoon brings the highest rainfall. It concentrates in the south, west, and the southwest parts of the central hills. The northeast monsoon brings rains to the north, northeast, southeast and parts of the central hills (Table 1.4). The spatial distribution of rainfall has been the key determinant in delineating agro-climatic zones in the country (Figure 1.7). The temporal distribution of rainfall corresponds with the seasons of cultivation, the Maha season (the prime season) coincides the southwest monsoon rains and the Yala season (lean season) coincides the northeast monsoon rains (Farmer 1950; Domroes 1974, 1979; Punyawardena et al. 2003).
Figure 1.7 The three major climatic zones of Sri Lanka
Source: The Climate Change Secretariat of Sri Lanka 2012

Table 1.4 The climate data of Sri Lanka

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Lowland temp</td>
<td>24.40C-31.70C</td>
</tr>
<tr>
<td>Highland temp</td>
<td>17.10C-26.30C</td>
</tr>
<tr>
<td>Wet zone rainfall</td>
<td>Over 2500 mm</td>
</tr>
<tr>
<td>Dry zone rainfall</td>
<td>Less than 1250 mm</td>
</tr>
<tr>
<td>Intermediate zone rainfall</td>
<td>In between 1250-2500 mm</td>
</tr>
<tr>
<td>Months of the southwest monsoon</td>
<td>May to September</td>
</tr>
<tr>
<td>Months of the northeast monsoon</td>
<td>December to February</td>
</tr>
</tbody>
</table>

Source: Central Bank of Sri Lanka 2007; Department of Census and Statistics 2009
The soils

The island is almost entirely underlain by Proterozoic high-grade metamorphic rocks extending over about 90% of the terrain. The only exceptions are the Miocene limestones of the Jaffna Peninsula and the narrow belt down the west coast to Puttalam, the sands of the eastern and western littorals, and a few deposits of alluvium (Farmer 1950; Mathavan et al. 1999; Yoshida 2003). Volcanic material is altogether absent and the alluvial is limited to minor Jurassic and recent deposits along the limestone belt and river valleys (Farmer 1950; Mathavan et al. 1999). The two major soil types found in the island are ultisols and alfisols. Ultisols are major soil type in the wet zone. These are deep, well-drained, red or yellow soils, with relatively higher weatherable minerals (Panabokke 1968; De Alwis and Panabokke 1972). Other soil types found in the wet zone are the inceptisols and entisols. Alfisols are the major soil type found in the dry zone. Other dry zone soils are oxisols, entisols, inceptisols, vertisols and aridisols (Panabokke 1968; De Alwis and Panabokke 1972; Punyawardena et al. 2003).

Most alfisols and ultisols in the tropics share common properties. Both soil types contain clays, predominantly kaolinites often mixed with small amounts of silicate clays. Ultisols undergo extensive leaching resulting in low base saturation, while alfisols undergo moderate leaching resulting in moderate to high base status soils (Sanchez 1976; Maglinao et al. 1986). Seasonal heavy rainfall, long periods of drought, and high ambient temperatures in the tropics cause very strong fractionation in chemical elements causing intense variations in element availability, leading to deficiencies or toxicities. Continuous cropping and chemical fertilization can also lead to severe compaction and acidification of poorly buffered kaolinitic soils, which after only few years can reach levels that are detrimental to plant growth (Lal and Sanchez 1992). These soils are also low in organic matter and soluble phosphorous. The physical properties of ultisols are less desirable for crop growth and the native fertility is relatively low. Relative to ultisols the native fertility of alfisols is considerably high (Sanchez 1976). Therefore, in general, the agricultural productivity of these soils is inherently low (Sanchez 1976; Fyfe et al. 1983; Abeywickrama et al. 1991; Lal and Sanchez 1992; Punyawardena et al. 2003).

Irrigation

In Sri Lanka crops are grown under both irrigated and rain-fed conditions. In the dry zone, which spans over two-thirds of the total land area, irrigation is a must (Aluwihare and Kikuchi 1991). In the wet zone, and parts of the intermediate zone crops are grown under rain-fed conditions. There is an extensive gravity-irrigation network in Sri Lanka, concentrated in the dry zone. These well-
developed irrigation infrastructures left from the ancient kingdoms of Sri Lanka, still continue to irrigate most of the cultivated land. In total there are more than 18,000 irrigation schemes irrigating about 600,000 hectares of land at full capacity (International Irrigation Management Institute 1997).

Determined by the level of production and the reliability of water supply, for various administrative purposes, the Department of Agriculture identifies two types of gravity irrigation regimes. These vary by the area of cultivation under their command. A major scheme has a command area greater than 80 ha (200 acres) and a minor scheme has a command area of 80 ha or less (Merry et al. 1988; Kemah and Thiruchelvam 2008). Administration of the two regimes is also different. Major irrigation regimes are managed and maintained by the Department of Irrigation while the minor irrigation regimes are managed and maintained by the Department of Agrarian Development. Rain-fed regime cultivates using rain water including irrigation by aquifers. In 2010-11 Maha season major, minor, and rain-fed regimes covered 46.4%, 25.7%, and 27.9 % of irrigated land respectively. In 2010 Yala season, major, minor, and rain-fed regimes respectively covered 61.2%, 20.7%, and 18.1% of the total cultivated land area (Department of Census and Statistics 2012).

**The composition of agriculture**

Area wise, 41.6% of land in Sri Lanka is used for agriculture (Table 1.5). Rice covers a majority of the extent occupying an average extent of 977,000 hectares. This is equivalent to 15.6% of the land area and 37.5% of the agricultural land (author calculations based on data from De Silva et al. 2007; The World Bank 2011b; Department of Census and Statistics 2012). Other crops that extensively, occupy the cultivated land area are coconut (20.32%), tea (10.94%), and rubber (5.99%). Smallholdings constitute almost 75% of the total cultivate land. There are 1.8 million smallholdings and 90% of that is less than 2 hectares (0.02 sq km). Around 70% of the smallholdings are dedicated solely for crop production and the rest comprise mainly of a mixture of crops and livestock. Holdings solely dedicated for livestock production are very few (Ministry of Livestock Development 2007a). Besides, semi-permanent shifting cultivation referred to as ‘chena’ cultivation occurs largely in the dry zone and in the margins of the wet zone (Baker 1968; Domroes 1979; Kingwell-Banham and Fuller 2012).
Table 1.5  The type and the extent of land use in Sri Lanka

<table>
<thead>
<tr>
<th>Total land area (sq.km)</th>
<th>65610</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land area (sq.km)</td>
<td>62710</td>
</tr>
<tr>
<td>Inland waters (sq.km)</td>
<td>2905</td>
</tr>
<tr>
<td>Forest area (%)</td>
<td>29.7</td>
</tr>
<tr>
<td>Agricultural land (%)</td>
<td>41.6</td>
</tr>
<tr>
<td>Permanent cropland (%)</td>
<td>15.5</td>
</tr>
</tbody>
</table>

Source: The World Bank 2011a; Central Bank of Sri Lanka 2012a

The regional distribution and the intensity of agriculture in Sri Lanka show a distinct geographically horizontal and vertical differentiation. The horizontal differentiation of crops largely coincides with the agroclimatic divisions of the wet and dry zones. The southwest quarter of the country, which is basically the wet zone, is cultivated with high intensity and is largely used for perennial crops. Agriculture is less intense in the rest of the country and comprises of annual crops, predominantly rice. In the drier zones cultivation commences with the onset of the inter-monsoonal and monsoon rains. This allows for the maximum utilisation of rainfall and minimal utilisation of irrigation water (Department of Agriculture 2005; Department of Census and Statistics 2012). The vertical zonation on the other hand corresponds with the differentiation of temperatures marked by the altitudinal belts. This zonation is clear-cut with the coconut cultivations lying in the coastal lowlands, rubber in the lower highlands and tea in the mid to upper highlands (Farmer 1950; Domroes 1974, 1979; Punyawardena et al. 2003).

**Rice sector**

Rice is the staple food of Sri Lankans and contributes to 37% of the daily per capita caloric intake (Department of Agriculture 2006; FAO 2012). Rice also makes the highest contribution to the national GDP and rural livelihoods. In 2011, it made a contribution of 1.5% to the GDP, amounting to Rs. 95,807 million. Sri Lanka currently produces about 4.0 million tons of rice-paddy per annum. This is equivalent to 2.5 million tons of rough rice, and exceeds the domestic rice demand. Since around 2005, the domestic rice production has remained well above self-sufficiency, despite a minor shortfall in 2007 (Department of Census and Statistics 2012). At the time of the 2000 agriculture census, there were over 897,000 farmers, operating a rice farm of their own or by tenancy (Department of Census and Statistics 2007). Recent figures by the department of agriculture account for 1.8 million families engaged in rice farming (Department of Agriculture 2006). Based on these figures, it is estimated that over 30% of the total labour force is involved in
rice farming directly or indirectly (Weerahewa et al. 2010; Weerakoon et al. 2011), making it the single largest provider of employment in the country (Thilakarathne et al. 1997).

According to the 2002 agriculture census, there were more than 897,076 paddy holdings in the island. Holdings less than one acre, accounted for 45.7% of the total holdings and those less than five acres (roughly equivalent to one hectare) accounted for 97.3% of the total holdings. In terms of extent, paddy holdings less than five acres occupied 85.2% of the total paddy extent (Table 1.6). About 240,415 farmers were tenant cultivators and nearly 50% of them had holdings smaller than half an acre. About 70% of the rice yield was produced in small paddy holdings of less than five acres (Department of Census and Statistics 2007). The two drier zones (Figure 1.7) that extends over two thirds of the country, account for approximately 72% of the paddy production (Department of Agriculture 2005; Department of Census and Statistics 2012).

Table 1.6  The number and the extent of paddy holdings by the size of the holdings

<table>
<thead>
<tr>
<th>Area of holding (Acres)</th>
<th>Percentage of number of holdings (%)</th>
<th>Percentage of extent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1/2</td>
<td>18.8</td>
<td>3.5</td>
</tr>
<tr>
<td>1/2&lt;1</td>
<td>26.9</td>
<td>11.5</td>
</tr>
<tr>
<td>1&lt;2</td>
<td>26.4</td>
<td>22.8</td>
</tr>
<tr>
<td>2&lt;5</td>
<td>25.2</td>
<td>47.4</td>
</tr>
<tr>
<td>5 and above</td>
<td>2.7</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Source: Department of Census and Statistics 2007

Rice is also the most widely grown crop in Sri Lanka and covers 28.0% of the total cultivated land area (Department of Census and Statistics 2009). From the early 1950s to 2009, the area sown with rice has increased by over 107%. Currently around 870,000 ha of land is brought under rice cultivation each year. Due to restrictions in irrigation supply, the area brought under cultivation in a given growing season remains well below the total extent dedicated for cultivation. On average, only 76.7% of this area is cultivated in the Maha season and 42.4% of the area in the Yala season (Figure 1.8). Therefore, the annual cropping intensity is as low as 119% (Department of Agriculture 2005; Department of Census and Statistics 2012).

3 1 acre is equivalent to 0.405 ha
Figure 1.8  The average extent sown with rice in Maha and Yala seasons, in Sri Lanka from 1952 to 2009
Source: Department of Census and Statistics 2012

Under major irrigation, both Maha and Yala cropping seasons have reported consistently high yields - Maha on average register 4.26 t/ha and Yala on average register 4.1 t/ha. However, the yields under minor irrigation and rain fed cultivation have been low in both seasons. Under minor irrigation, on average Maha registered a yield of 3.5 t/ha, and Yala registered a yield of 3.1 t/ha. On average the rain fed cultivations only yielded 2.9 t/ha in Maha and 2.7 t/ha in Yala.

Since the 1950s rice production in Sri Lanka has increased by about six fold (Figure 1.9). Over the same period the yield output tripled (Department of Census and Statistics 2012). As a result, by the first decade of the 21st century Sri Lanka reached its self-sufficiency goal in rice (Figure 1.10). The massive investments in irrigation and the introduction of high yielding rice varieties and chemical fertilizers were the key reason for the huge increases in rice production (Yahanpath and Agrawal 1985; Thusiman et al. 1987; Aluwihare and Kikuchi 1991; Kikuchi et al. 2002). The rice fertilizer subsidy scheme has been regarded as an important determinant in promoting the adoption of high yielding seed and chemical fertilizer technology among farmers (Yahanpath and Agrawal 1985; Weerahewa et al. 2010).

According to the fertilizer statistics published by the government, fertilizer usage in rice, from the early days has shown an increasing trend. From the late 1990s fertilizer usage has shown an exponential growth. However, from 2005 to 2008, there has been an atypical upswing in fertilizer usage (Figure 1.11). This atypical growth in fertilizer usage dropped after 2008, and realigned with the long-running growth rate.
Figure 1.9 Average yield and production of rice in Sri Lanka from 1952 to 2009
Source: Department of Census and Statistics 2012

Figure 1.10 The percentage rate of self-sufficiency in rice in Sri Lanka from 1949 to 2009
Sources: Aluwihare and Kikuchi; Kikuchi et al. 2002; Wickramasinghe et al. 2009; Department of Census and Statistics 2012
1.4.2 The Problem Subject - The Current Rice Fertilizer Subsidy Scheme in Sri Lanka

Listed as a promise to ‘Ease the Family Burden’ in the election mandate of then presidential candidate of the Sri Lanka Freedom Alliance, Mahinda Rajapaksa, the ninth and the final target reads as follows.

9. The price of a 50kg bag of fertilizers of all type will be reduced to Rs. 350 [original emphasis]. Through the reduction of the cost of production and increase in output of rice, vegetables, fruits and other local products, consumers could obtain them at affordable prices. (Mahinda Chinthana 2005)

The current fertilizer subsidy scheme for rice sprang from this statement. In late 2005, when elected, the Sri Lanka Freedom Alliance government led by the president, keeping its election promise launched the current subsidy scheme. At the beginning the subsidy was targeted at rice farmers. All nitrogen, phosphorous, and potassium fertilizers were made available to smallholder rice farmers cultivating 2 hectares or less. The government adopted a variable subsidy scheme with a fixed selling price. A bag of 50kg fertilizer is issued at 350 rupees with a uniform selling rate across all three fertilizer types. The total amount of each type of fertilizer allotted per unit area was
capped by the type of irrigation. Both owner and tenant farmers were eligible to receive the subsidy upon producing documentary evidence of the right to cultivate (Secretary to the Ministry of Agriculture Development and Agrarian Services 2008).

1.4.3 Framing the Problem – What Makes the Rice Fertilizer Subsidy Scheme in Sri Lanka a Problem?

There are a number of issues that question the continuation of the rice fertilizer subsidy scheme. These include the high budgetary outlay, total dependency on international fertilizer markets subject to high price volatilities that further aggravate the budgetary burdens, a stagnating rural economy that fails to justify the role of the subsidy in the rural economy, and looming concerns over possible environmental contaminations. On top of these concerns there is ample evidence in the literature, both local and international to suggest that a scaling down or even a termination is advisable. Some issues make the ‘problem’ a problem, while others complicate its context. Some of these work in isolation while others result in various interdependencies adding further complications. Some involve uncertainty in terms of cause, risk, and consequences. Others relate to divergence in attitudes, values, interests, and priorities. Some reflect the societal constraints, such as social, political, organisational, and technological restraints. How each of these issues express the rice fertilizer subsidy problem in Sri Lanka is now explored.

Dependency on international fertilizer markets

Sri Lanka imports all of its nitrogen and potash demands and 82% of its phosphate demands (IFA 2009). Table 1.7 lists the production, imports, and consumption figures of fertilizers in Sri Lanka for the year 2009. The situation of fertilizer markets is largely influenced by the trends and developments in a number of economic, social, and political institutions. Population growth, economic development, agricultural productivity and output prices, fluctuations in money and energy markets, and changing policies, all decide the price of fertilizers internationally. If agricultural commodity prices are more stable investments in fertilizer markets become less risky. But turbulence in financial markets, low food stocks, and policy decisions in food, agriculture, and environment affecting supply, stocks, and demand lead to speculations in agriculture commodity markets making investments in fertilizer markets risky (Mitchell 2008; Piesse and Thirtle 2009; Heffer and Prud'homme 2010). High oil prices on one hand contribute to high agricultural commodity prices by raising input costs and freight costs and on the other hand by boosting the demand for agricultural crops for biofuel production (FAO 2008; von Braun 2008; FAO 2009;
Heffer and Prud'homme 2010). These linkages between fertilizer markets and other commodity and money markets are becoming stronger than ever before, resulting in persistent market uncertainties. As a result, in parallel to the recent financial and food crises, the fertilizer prices have risen even more than cereal, oil, and metal ore prices. Since 2007 the price of nitrogenous fertilizer has quadrupled. By late 2008, the price of phosphate increased to over five times the 2007 base level and potash to three times (Mitchell 2008; Piesse and Thirtle 2009).

Table 1.7 Production, imports and consumption of fertilizers in Sri Lanka in 2009

<table>
<thead>
<tr>
<th>Fertilizer type</th>
<th>000 tonnes nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>nil</td>
</tr>
<tr>
<td>Phosphate</td>
<td>8.0</td>
</tr>
<tr>
<td>Potash</td>
<td>nil</td>
</tr>
</tbody>
</table>

Source: International Fertilizer Industry Association 2011

**The cost of the rice fertilizer subsidy to the economy**

In 2011, Sri Lanka’s GDP was Rs. 6543 billion. The government’s outlay for the fertiliser subsidy for the year was Rs.29.8 billion. The respective budgetary allocations for education, energy and health were Rs.99 billion, Rs.3.5 billion and Rs.74.4 billion (Central Bank of Sri Lanka 2012a). These figures bring the enormity of the subsidy into perspective. At the start of the current subsidy scheme in 2006, the spending on fertilizers recorded a 73.4% jump from the previous year (Central Bank of Sri Lanka 2007). With rising fertilizer prices in the world market the outlay for the subsidy has been rising (Figure 1.12). In the 2008 fiscal budget the government allocated 15 billion for the fertilizer subsidy (Central Bank of Sri Lanka 2009). Owing to a surge in fertilizer prices in the world market, by the end of the first five months allocations for the entire year was exhausted, prompting the government to make extra funding available through a supplementary budget (Weerahewa et al. 2010). In comparison to 2010, the budgetary outlay on the subsidy in 2011 saw an increase of 14.5%. (Rajapaksa and Karunagoda 2009; Weerahewa et al. 2010; Central Bank of Sri Lanka 2012a).
A stagnating rural rice economy

Despite continuing increases in production and on-farm productivity, rice farming in Sri Lanka, over the years has been a barely profitable enterprise. High variability in yields and stagnating profitability have been the major challenges faced by the sector (Department of Agriculture 2005). According to the National Agricultural Policy, poverty has continued to affect 25-30% of the population and is largely concentrated in the rural areas (Ministry of Agricultural Development and Agrarian Services 2007).

Due to the low profitability of rice farming, farmers rely on other economic activities such as other cultivations, wage labour, small businesses, foreign employment, and other salaried employment for income generation (Silva et al. 1999). Ministry of Agricultural Development and Agrarian Services (2007) estimates, a rice farmers income derived from rice farming to be as low as 23% of the total income. The Other studies locate this figure to range between 40-60% (Bandaragoda 1989; Silva et al. 1999). According to The World Bank (1996), the aggregate effect of the low productivity in rice farming and the relying on off farm employment for income generation has enabled marginal farmers working uneconomic holdings to survive at a suboptimal level.
**Possible environmental impacts**

Recently, there have been concerns over health risks with possible links to environmental pollution caused by fertilizers contaminated with various toxic elements. In 2008 more than 7500 patients with chronic renal disease were recorded from the North-central province. A great majority of the patients were male rice farmers aged between 30-60 years (National Health Development Fund 2008; WHO 2008). Some studies have associated the disease with cadmium and uranium contaminated fertilizers (Bandara et al. 2008; Bandara et al. 2010a; Bandara et al. 2010b). In the Anuradhapura district waters in some reservoirs have been found to exceed the maximum cadmium contamination levels for drinking water. Similarly the cadmium content in Lotus rhizomes has been found to exceed the recommended daily dietary intake levels. There has also been evidence on TSP samples contaminated with cadmium (Chandrajith et al. 2010). The multiplicity of risk factors associated with the disease has however complicated the identification of the exact cause. Although it is unwise to draw firm conclusions in the absence of empirical evidence to establish cause and effect between the chronic renal disease and heavy metal contaminated fertilizers, some authors point to this evidence as a possible explanation for the disease (Wanigasuriya et al. 2011).

**Mixed scholarly evidence**

The rice fertilizer subsidy of Sri Lanka has been the subject of a number of economic reviews and analyses. But the findings have not been consistent. Some studies have found the fertilizer subsidy to be an important determinant in stimulating production and fertilizer use. Others suggest the contrary. However, in making recommendations for the future, most agree on a scaling down or a termination as the appropriate solution.

Taking into account the fertilizer demand from 1965 to 1982 Yahanpath and Agrawal (1985), among others found the price of fertilizer to be an important factor determining fertilizer demand. Yamaguchi and Sanker (2007) studied the impacts of the structural adjustments implemented during the period from 1977 to 1994, on the agriculture sector. The study found the structural adjustments during this period to be favourable for overall agricultural development but negative on the domestic food sector. According to the authors, raises in fertilizer price had the most negative impact on the domestic food prices while. Rajapaksa and Karunagoda (2009) assessed the current fertilizer subsidy scheme and concluded its effect on paddy production to be significant. According to the findings, the rice supply and fertilizer demand in non-commercial farming areas was more responsive to fertilizer price than in the commercial farming areas. Wickramasinghe et al. (2009), did a detailed study on the current rice fertilizer subsidy scheme and found a number of positive
implications. According to the authors the subsidy contributed to a 4% increase in rice yields in 2006 and an 11% increase in 2007. The study also found a decrease in input cost from 15% to 6% following the introduction of the subsidy and a drop in farmers’ dependency on credit for purchasing fertilizer. Studying the impact of the fertilizer subsidy scheme on rice production during the period from 2005 to 2007 in a land consolidation scheme in Anuradhapura District, Wijetunga et al. (2008) found a 32% increase in fertilizer use, a 17% increase in rice yields, and a 10% increase in extent. The authors attributed these to the rice fertilizer subsidy scheme. Karunagoda (2009) also found the subsidy to be providing an incentive for farmers under all irrigation regimes to engage in commercial rice cultivation.

Other studies contradict these findings - but it is important to note that the particulars of subsidy schemes under focus, especially their timeframes are different. Ekanayake (2006) assessed the impact of fertilizer prices on fertilizer demand for the period from 1962 to 2005. The results showed an inelastic fertilizer demand response to fertilizer price. Bogahawatte (1982), Thusiman et al. (1987), and Weerahewa (2004) have reported similar results, concluding that the price of fertilizer has no significant effect on the use of fertilizers in rice cultivation. Bogahawatte (1982), studied the factors determining the aggregate production and consumption decisions of rice during the period from 1955 to 1979 and Thusiman et al. (1987) assessed the fertilizer subsidy scheme that was in operation in the early 1980s. Ekanayake (2006) in his paper explained the result, suggesting that farmers in Sri Lanka apply fertilizers regardless of financial difficulties, because substitutes are absent. Thusiman et al. (1987) argued in similar lines, suggesting that a small shift in fertilizer use may not be critical as Sri Lankan farmers already use high levels of fertilizers.

Regarding the relative importance of price support and fertilizer subsidising, there was much more agreement. Bogahawatte (1982), Thusiman et al. (1987), Weerahewa (2004), Ekanayake (2006), and Rajapaksa and Karunagoda (2009) all found rice price control to be more effective than fertilizer subsidization in promoting fertilizer use and rice productivity, even when the responses were inelastic to rice price.

Regardless of the differences in the findings, the recommendation made by these studies was common - a scaling down or a termination of the subsidy. According to Wickramasinghe et al. (2009) the current fertilizer subsidy program has been effective and efficient in terms of achieving national objectives in economic, food security, and rural welfare policies. But the authors recommended a scaling down over the long-term. According to Karunagoda (2009) at current farm-gate prices a 50% decrease in the subsidy component in the major irrigation regime, would not affect the incentive for rice farming. But to avoid the unfavourable effects of such a scaling down the author recommends adequate adjustments in the farm-gate price for rice in other irrigation
regimes. Wijetunga et al. (2008), Rajapaksa and Karunagoda (2009) and Wickramasinghe et al. (2009) have also recommended a gradual scaling down of the subsidy. Undertaking policy reviews, Bandara and Jayasuriya (2009) and Weerahewa et al. (2010) have recommended a withdrawal of the subsidy. Amongst these studies only Yamaguchi and Sanker (2007) have highlighted the importance of continuing the fertilizer subsidy. What is noteworthy is that a number of studies that found the current subsidy to have positive implications on fertilizer use and rice production went on to recommend a scaling down of the subsidy. But the findings of these studies do not suggest the necessity of a scaling down. So the recommendation must have come from a best guess considering the heavy budgetary outlay of the subsidy. On the whole, the findings remained mixed but evidence to justify the continuation of the subsidy scheme was small.

1.5 The Research Problem

The rice fertilizer subsidy in Sri Lanka that has been continuing for over five decades with alternating amendments, saw a marked increase in recent times due to price escalations in the world fertilizer markets, further aggravating its budgetary burden on the economy. Despite scholarly evidence that favours a termination or scaling down of the rice fertilizer subsidy, vested political interests make this impossible. In the meantime the rural rice economy continues to stagnate, the environmental concerns loom large, and the Sri Lankan government continues to subsidise fertilizer.

1.6 The Research Questions

As formulated in section 1.4 and outlined in section 1.5, the question that remains unanswered is ‘why is the subsidy on fertilizers for rice in Sri Lanka continued, amidst a number of sustainability concerns?’ The problem could be that as Sayer (2000) notes we have been searching for a solution in all the wrong places, possibly where the light is brightest and hackneyed theories are cramped in rather than where the important causes, phenomena, and activities are to be found. The ‘theoretical’ inspiration for this study comes from cultural political economy. Therefore, the study learned from the existing political economy models outlined in Section 1.3, but did not restrict its search to explanations offered by these models. Without asserting economic theory as an adequate explanation, the study expanded its search across disciplinary boundaries exploring various discursive and material mechanisms that characterize the complex interplay of history, institutions, ideas, leadership, different actors, and external influences of the rice fertilizer subsidy problem. In
doing so the study placed its concern primarily with people, assuming that economic phenomena are a consequence of people acting individually and collectively, in a material, historical, and power ridden world (Lipschutz 2001). These interactions over time select, retain, and reinforce specific meanings constituting the stakeholders response to the subsidy. On this premise this study sets out to explore the role of stakeholders in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka using an incremental approach as suggested by (Lee 1989).

Two key stakeholder groups were identified. At the village level were the farmers who received the subsidy. At the policy level was the agricultural bureaucracy and the research and development bodies, who contributed to formulating and managing the subsidy and the relevant knowledge. Two key questions were targeted at collecting information to understand the role of these two stakeholder groups in constituting and mediating the rice fertilizer subsidy policy. The roles of the two stakeholder groups were reconstructed by discovering the perceptions\(^4\) of the stakeholders about the various aspects of the problem. Exploring the roles of these stakeholders required an understanding on the background in which they operated complete picture of attempted locating the various. This suggested an antecedent question, probing the social, political, and economic setting of the rice fertilizer subsidy policy. The knowledge gained from addressing these questions would inform how to improve decision-making, providing the final outcome of this study. This was achieved in two steps, first by synthesising the new knowledge to formulate a new problem definition and second by tracing the policy implications for a possible exiting or continuation of the rice fertilizer subsidy. The last two research questions were aimed at this and the five research questions delineated the scope of the study (Figure 1.13).

The research questions guiding this dissertation were as follows:

RQ1. What are the social, political, and economic dynamics that constitute the rice fertilizer subsidy policy in Sri Lanka?
RQ2. What is the role of rice farmers in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka?
RQ3. What is the role of the agricultural bureaucracy and research and development in constituting and mediating the rice fertilizer subsidy policy?
RQ4. What is a new problem definition for the rice fertilizer subsidy problem in Sri Lanka?
RQ5. What are the implications of this new problem definition for exiting or continuing the rice fertilizer subsidy scheme?

\(^4\) Adopting an Oxford Dictionary definition, a perception is used here to denote ‘a way of regarding, understanding, or interpreting something’, which may involve insight, opinion or beliefs
Figure 1.13 The scope of the study defined by its research questions
1.7 Dissertation Structure

As shown in Figure 1.14, the dissertation is organised into eight chapters. This introductory chapter sketches an outline of the research, by introducing the research problem and research questions and establishing the significance and the scope of the study. Thereby this chapter defines the course of the methodology and as well as the structure of the dissertation. Chapter 2 reviews the literature and synthesises the knowledge already available. It probes into the details of the problem setting and thereby answers RQ1. Chapter 3 presents the methodology. It details the methods and the underpinning rationale of the inquiry approach. Chapter 4, 5, and 6 are the results chapters. Chapter 4 and 5 are dedicated for answering RQ2. Chapter 6 answers RQ3. Chapter 7 is the discussion chapter. It synthesises the knowledge built up through Chapters 1 to 6, bridging the results with conclusions and making connections and filling in any gaps to answer RQ4 and RQ5. Chapter 8 revisits the findings for each RQ to arrive at conclusions.
Chapter 1
Introduction
Introduces the research problem and delineates the scope of the study

Chapter 3
Methodology
Defines how the research problem is addressed

Chapter 2
Literature Review
Locates the study in the available knowledge base

Chapter 4
Results
Reports results from farmer survey

Chapter 5
Results
Reports results from farmer survey

Chapter 6
Results
Reports results from interviews and focus groups

Chapter 7
Discussion
Synthesises the knowledge

Chapter 8
Conclusion
Summarises the resolutions for each RQ

Resolves RQ1
What are the social, political, and economic dynamics that constitute the rice fertilizer subsidy policy in Sri Lanka?

Resolves RQ2
What is the role of rice farmers in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka?

Resolves RQ3
What is the role of the agricultural bureaucracy and research and development in constituting and mediating the rice fertilizer subsidy policy?

Resolves RQ4
What is a new problem definition for the rice fertilizer subsidy problem in Sri Lanka?

Resolves RQ5
What are the implications of this new problem definition for exiting or continuing the rice fertilizer subsidy scheme?

Figure 1.14 The objective and the flow of chapters
1.8 Conclusions

Some problems have remained a problem for over too long without answers and the rice fertilizer subsidy problem in Sri Lanka is one of those. Stale discussions, equivocal reform responses, and the abundance of knowledge suggest that a solution to the subsidy problem may lie beyond its current problem definitions. Although a too sensitive topic often overlooked, the nature of interests and the interactions of different stakeholders that mediate and constitute subsidies in the political market may hold an answer to this continuing problem. Building on this premise, this study sets off to explore an answer to the question ‘why the subsidy on fertilizers for rice in Sri Lanka is continued amidst a number of sustainability concerns?’ This study attempts to answer this question, by seeking a broader definition for the problem in a socio-political backdrop that may explain why a solution has been difficult, the study navigates through five research questions. These research questions are designed to discover the social, political, and economic context of the rice fertilizer subsidy in Sri Lanka, the role of key stakeholders in its mediating and constituting, a renewed socio-political interpretation that broadens its current framing, and the implications of this new interpretation for its future. Chapter by chapter this dissertation would attempt at resolving these. This chapter made a start to the process in Section 1.4 by contributing toward resolving RQ1. It established parts of the current social, political, and economic space of the rice fertilizer subsidy, upon which Chapter 2 would build up, to complete an answer to RQ1. The subsequent chapters would continue to add on to this knowledge to resolve the rest of the research questions.
Chapter 2 Rice and a Subsidy

Most of the change we think we see in life is due to truths being in and out of favour.
Robert Frost

2.1 Introduction

As noted in Chapter 1, the vast knowledge base on subsidies has not yielded any effective solution to the problem. This study sets off to seek an answer to why this has been the case in a space that extends beyond current concerns over the problem. To know what knowledge is missing in the current space of the problem definition, it is imperative to learn what knowledge is already available and most importantly how this knowledge is used and interpreted. Where the new knowledge or the new interpretations of the existing knowledge would sit and what role these would play in achieving what has long been impossible, would be largely decided by the existing knowledge and its interpretations. The purpose of this chapter is to establish this connection between what is already known and what can be explored by this research. In doing so the chapter achieves two goals. First, it builds up the logic for and the relevance of the research questions to addressing the problem. Second, it completes an answer to RQ1, ‘what are the social, political, and economic dynamics that constitute the rice fertilizer subsidy policy in Sri Lanka?’

The chapter is organised into five sections. Section 2.2, commences with a concise introduction to agricultural subsidies and their impacts. Section 2.3 details the background to fertilizer subsidies in the developing world, by locating the links between fertilizer use, fertilizer subsidies, grain production, and food. Section 2.4 brings the international focus in the previous sections to the local, to locate the developments throughout the Sri Lankan history that shaped its agriculture and its societal interpretation. This includes a discussion on the policy and administration of the agriculture sector in Sri Lanka which navigates through the evolution of the agricultural policy, including the fertilizer subsidy policy to the present day. Section 2.5 introduces another concept that is central to the understanding of rice fertilizer subsidy - the cultural significance of the rice crop. Section 2.6 concludes the chapter with a synthesis of this knowledge by summarising the answer to RQ1.
2.2 The Concept of Subsidisation: A Global Perspective

As noted in Chapter 1, subsidy reform has been a contentious issue since the earliest concerns over sustainability. Repeated policy and institutional failures have resulted in a ‘lock in’ of the existing inefficiencies in the economy and the administration of subsidies. The proposals for reform have not only been incomplete or too lax, but progress toward desired outcomes has often been overplayed (de Moor and Calamai 1997; Van Beers and Van den Bergh 2001; Potter and Tilzey 2005). As this dissertation seeks to address the issue of why the subsidy on fertilizer for rice is continued in Sri Lanka, this section briefly discusses the complexity and the extent of the subsidy problem at a global scale.

2.2.1 Defining a Subsidy

Subsidies are not always easy to identify and therefore creates problems in defining a common appropriate baseline (Pearce 2003; Steenblik 2003). In lexicography, the origin of the word ‘subsidy’ is traced back to the Middle Ages. At the time the word was used in making references to the English parliamentary funds granted to the sovereign to meet the state needs which supplemented or replaced customs duties and other taxes collected by the royal prerogative (Steenblik 2003). Since then, the term has evolved to refer to any capital or current-account expenditure incurred by the government that is not recovered from the beneficiaries (United Nations 1968; WTO 1999). Fiscal subsidies often take the form of direct income transfers from the exchequer-often tied to a material good, to certain predetermined sections of the population. However, there are subsidies that do not involve such cash transfers. For example, the absence of a tax constitutes an indirect subsidy, if zero taxation is not practised on other competing industries (Pearce 2003; Norton 2004). The provision of agro-inputs below market prices, purchase of harvests above market prices, resale of harvests below market prices, provision of research and extension services free or below the cost, discounted or written off credit, free or below the cost irrigation and below the cost sales or free grant of state-owned land are the most common among explicit agricultural subsidies. An import tariff on the other hand, shields domestic producers from international competition to a degree, and therefore implicitly subsidizes higher costs of production. Price controls confer similar implicit subsidies. When a farmer does not pay the full damage caused by the usage or operation of some natural resource, the lack of such payments can also be regarded as a subsidy (Steenblik 2003; Norton 2004). Therefore, a subsidy can be defined as “any measure that keeps prices for consumers below the market level or keeps prices for producers above the
market level, or that reduces costs from consumers and producers by giving direct or indirect support” (de Moor and Calamai 1997).

**2.2.2 The Role of a Subsidy in an Economy**

As noted in Chapter 1 a subsidy could help achieve a number of development goals in a number of ways. Alleviating poverty, achieving economies of scale, developing research, and supporting critical industries encompass the key objectives of subsidizing (Abboushi 2007). In achieving these a subsidy may intervene to improve the distribution of income or to reduce the cost of production or price (Mutti 1982; Gupta 2002). Agricultural subsidies are justified on many grounds. These include the need to maintain and improve the standard of living among farmers, enhance agriculture production efficiency and innovation, provide adequate and reliable sources of food in the country, protect food safety and quality, protect the environment, and to ensure food security. In the developing world agricultural subsidies further target poverty alleviation, rural development and expansion of agricultural revenues (de Moor and Calamai 1997; Abboushi 2007).

However, there have been both positive and negative outcomes. The first wave of ‘industrialisers’ in Asia present a good example for the successes achieved through agricultural protection. Japan, Korea, and Taiwan managed continuing investments in agricultural protection while achieving advancement in the industrial sector (Anderson and Martin 2009b; Honma and Hayami 2009). Even in Sub Saharan Africa and most of Asia, where poverty continues to remain a problem, agricultural subsidy schemes introduced in the 1960s and 70s have helped boosting agricultural production and maintaining low food prices (Hall et al. 1983; Hedley and Tabor 1989; Govereh et al. 2002; Yamaguchi and Sanker 2007; Dorward et al. 2008; Fan et al. 2008; Wickramasinghe et al. 2009). Yet these same subsidy schemes, especially in Sub Saharan Africa and South Asia have been plagued with corruption and resource misallocation, raising serious concerns over their efficiency (Govereh et al. 2002; Lundberg 2005; Morris et al. 2007; Dorward et al. 2008; Fan et al. 2008; Bandara and Jayasuriya 2009; Dorward 2009). Therefore, for decades, despite continued support, the rural agrarian economies in these regions have remained stagnant. However, there are scholars who maintain the view that much of the advancements achieved in agriculture in Asia and Sub Saharan Africa would not have been possible if not for the active state interventions in agricultural input and output markets that accompanied Green Revolution (Timmer 1993; Dorward et al. 2004).
2.2.3 The Extent of Subsidies

Between 1998 and 2002 on average, 6.6% of government expenditures globally, comprised subsidies (Abboushi 2007). Every year, the OECD countries alone transfer USD 400 billion as a minimum, to different economic sectors in subsidies (OECD 2005). Among all sectors, agricultural subsidies receive the largest portion of government allocations on subsidies (OECD 2005). The level of protection in agriculture is even greater than that received by manufacturing (Elliot 2006). For example, in OECD countries, agricultural subsidies are estimated to account for over 30% of the total subsidy allocations. Under WTO (World Trade Organisation) rules, agriculture is the only sector, in which both quantitative restrictions of tariff-rate quotas and export subsidies are still permitted. Following the WTO’s decision to end the global quota system restricting trade in textiles and apparel in January 2005, agriculture became the most distorted of all sectors in the global economy (Elliot 2006; Abboushi 2007).

There is a wide gap in the scale of subsidies between the developed and the developing worlds. In advanced economies, subsidies account for about 8.2% of total government expenditures, while in the developing world, they account for about 4.4% (Abboushi 2007). Between the subsidies in these economies, there is a distinction in purpose as well. According to Anderson et al. (1986), De Gorter and Swinnen (2002), and Gawande and Hoekman (2010) in the developed world, subsidy policies are a response to private incentives and lobbies, while in the developing world, it is a response to the need for raising revenue and promoting industrialization, and the demand for supplying cheap food. As an economy develops, the capacity of its non-agriculture sector, to contribute toward the protection of its agriculture sector, increases. On the one hand, it creates a greater demand for more protection by the farmers and on the other hand raises the non-agricultural sectors tolerance for agricultural protection Anderson and Martin (2009b). As an economy moves up the income ladder, despite agriculture’s declining comparative advantage, a rise in agricultural protection becomes common (Pearce 2003; Anderson and Martin 2009b; Honma and Hayami 2009). Consequently, the magnitude of agricultural protection as a proportion to the economy is far greater in the developed world than in the developing world, although there is far less justification for using subsidies to protect its vulnerable agricultural sector (Elliot 2006; Abboushi 2007; Yusuf 2009).

2.2.4 The Criticism over Subsidies

Subsidies are criticised for a number of reasons. A major criticism is the enormity of subsidies, especially in the developed world. For example, in the EU over 40% of the budget is allocated for subsidies under the Common Agricultural Policy, Common Fisheries Policy, and Rural
Development and Environmental Measures Policy. In 2010, the amount spent by the EU on direct agricultural subsidies alone equalled €39 billion (EUROPA 2010; European Commission 2010). The US also spends between $10 billion to $30 billion annually, in direct cash subsidies to farms under the US farm bill. The exact amount depends mainly on market prices of crops and disaster payments (Edwards 2009; USDA 2010). One problem with heavy subsidies is that it yields a surplus in agricultural produce that help maintain low commodity prices in the world markets. Unable to compete against market prices below cost, small scale agricultural producers get forced out of business (Vandermeer 2003; Elliot 2006; Abboushi 2007; Yusuf 2009).

Another contention over subsidies revolves around the recipients of subsidies. A great proportion of these subsidy payments in the developed world target only a small proportion of farmers. For example in the EU and the US, around 5% of the farmers receive more than half of the total subsidy payments and around 80% of the farmers receive between 12-18% of the total subsidy payments (Abboushi 2007). Due to the disproportionate distribution of subsidy payments not only the farmers in the developing world but the small scale farmers in the developed world also get affected by heavy subsidies (Vandermeer 2003; Elliot 2006; Abboushi 2007; Yusuf 2009).

Many subsidies that promote production or consumption also have negative environmental externalities (de Moor and Calamai 1997; Sizer 2000; Van Beers and Van den Bergh 2001; Pearce 2003; Steenblik 2003; Booth and Campbell 2007). The impact of agricultural subsidies on the environment depends mainly on farm-level decision making concerning the choice and the intensity of input usage and the extent of land usage (de Moor and Calamai 1997; van Beers et al. 2007). Therefore, subsidies when coupled with production, distort the main controls of price and incentives that otherwise maintain the balance between the environmental and economic trade-offs of on-farm decision making (de Moor and Calamai 1997; OECD 2003, 2006). The sensitivity of the landscape to these day-to-day decisions of farmers in managing land and input usage is wide-ranging. If mismanaged these decisions could lead to erosion, chemical run-off, leaching, water pollution, soil contamination, degradation and fragmentation of wildlife habitat, loss of biodiversity, enhanced greenhouse effect, and eutrophication (Robinson 1991; de Moor and Calamai 1997; Myers and Kent 2001; Van Beers and Van den Bergh 2001; van Beers et al. 2007). Market price support and payments based on output volume, input usage, area planted, or the number of animals reared increases the incentive for intensive farming, be it monoculture, higher input usage, exploitation of environmentally sensitive land or to bring additional land or animals in production leading to harmful environmental effects (OECD 2003). There are subsidies aimed at reversing the damage caused by intensive farming, the so called agri-environmental schemes. These have been praised for the contributions they have made toward encouraging environmental stewardship among farmers.
(Primdahl et al. 2003). Yet that again is contested with evidence suggesting that large scale spending on agri-environmental schemes have not delivered the expected outcomes in improving the ecological quality of the landscape (Kleijn et al. 2001; Kleijn and Sutherland 2003; Berendse et al. 2004; Kleijn et al. 2006).

### 2.2.5 Subsidies and World Trade

It was only after the Uruguay Round (1986-93) of GATT (General Agreement on Tariffs and Trade) that agriculture became a central topic in the multilateral trading negotiations. The focus of the post war trading system of GATT, signed in 1947, was on promoting free trade by reducing tariffs and other trade barriers and eliminating preferences. Left out of its mandate, the GATT did not oversee the trade distortions caused by agricultural subsidies (Abboushi 2007; Yusuf 2009; WTO 2010b). During the Uruguay Round, a broad framework for addressing distortions in agricultural trade was developed for the first time (Elliot 2006; Yusuf 2009; WTO 2010c). The Agreement on Agriculture, which was the result of these negotiations entered into force under the WTO, which replaced GATT in 1995. The Agreement on Agriculture contains disciplines on three areas identified as the ‘three pillars’. The three pillars represent domestic support, market access, and export subsidies. Subsidies supporting agriculture in the production process come under the domestic support pillar (WTO 2010a).

Depending on the effect brought on production and trade, the domestic pillar is further divided into three different categories. These categories are identifies as coloured boxes. The ‘amber box’ contains the most trade-distorting subsidies that directly link to production levels such as input subsidies, tax exemptions, and price support. These subsidies are calculated as an Aggregate Measurement of Support (AMS) and are subject to reduction under the agreement. A threshold allowance referred to as ‘de minimis’ at 5 percent of the production for developed countries and at 10 percent for developing countries is permitted and are exempt from the calculations of the AMS. The ‘green box’ subsidies sustain tolerable levels of trade distortions and include payments for environmental stewardship, domestic food aid, buffer stocks\(^5\) at current domestic market prices, decoupled income support, and disaster relief payments. The ‘blue box’ contains payments that are tied to programmes that limit production. Both green and blue boxes carry no limits and are exempt from AMS calculations (Elliot 2006; Abboushi 2007; Yusuf 2009; WTO 2010a).

\(^5\) Qualify food purchases for buffer stocks of for domestic food aid at current market prices at current domestic market prices. The conditions do not apply for developing countries.
Distortions in international trade have become controversial to the point that successful outcomes in WTO negotiations, now depend on how nations agree on agricultural subsidies. Disagreement over agriculture between the US, the EU and other agriculture exporting countries delayed the scheduled completion of the Uruguay Round Agriculture Agreement by three years. Agricultural trade thus emerged as the make or break factor in the Doha Round negotiations that started in 2001 (Elliot 2006; Yusuf 2009). Green Box subsidies and the decoupled income support are at the centre of this debate. Described as a scandalous cover for continuing direct payments to farmers, by the critics, the Green Box subsidies remains a contentious issue in the multilateral trade negotiations (Vandermeer 2003; Sharma 2004; Elliot 2006; Abboushi 2007; Sharma 2007; Yusuf 2009).

2.3 Fertilizer Subsidy Schemes in the Developing World

Given the multiplicity of variables that have been in operation, contributing to a massive growth in agriculture, over time, isolating the effects of subsidising fertilizer has remained a difficult task. Acknowledging this reality, this section first, draws upon food self-sufficiency policies in the developing world that often overlapped with fertilizer subsidy scheme, but suggests no cause and effect. The section next deals with available empirical evidence that detects an important aspect of this equation, the effect of fertilizer price on fertilizer usage and extends the discussion to understand how fertilizer subsidy schemes in other parts of the developing world have performed, in an attempt to trace parallels that may help explain the Sri Lankan experience.

2.3.1 Fertilizer Subsidies and Self-Sufficiency in Cereal Production

Many South and Southeast Asian nations that gained independence after World War II had adopted a goal of rice self-sufficiency (Barker and Hayami 1976; Bayes et al. 1985; Evenson and Gollin 2003). The economy of these countries during colonial rule was based on cash crop exports. After achieving independence, in an attempt to limit foreign currency expenditures on food imports and to minimise foreign power leverages, recourse to self-sufficiency was actively sought. It was during the same time that food deficits first began to appear in the region. In the subcontinent, food rationing was practised in the 1940s as a wartime measure. The rapid growth in population and the decline in agriculture that followed made food deficits grow. In the aftermath, food self-sufficiency again became the prime objective of agriculture and the parallel innovations of Green Revolution in crop genetics and fertilizer availability helped the region achieve much success in reaching this goal (Barker and Hayami 1976; Chaudhry 1994; Bandara and Jayasuriya 2009).
In the pursuit of self-sufficiency in cereal production which was complemented by the timely advances of Green Revolution, many governments in Asia introduced fertilizer subsidy schemes. By providing fertilizers at a cheaper price, the subsidy programs promoted the use of chemical fertilizers to augment cereal production. Bangladesh, India, Indonesia, Pakistan, the Philippines, and Sri Lanka were the frontrunners in adopting fertilizer subsidy policies in the region. The Philippines introduced its subsidy scheme as early as in the middle of the 1950s and Sri Lanka introduced its subsidy scheme in the early 1960s (Barker and Hayami 1976; Ekanayake 2006). Pakistan, Bangladesh, Indonesia, and India followed by introducing fertilizer subsidy programs in the 1970s (Bayes et al. 1985; Hedley and Tabor 1989; Chaudhry 1994).

In the 1960s when the high yielding cereal varieties were first adopted, fertilizer consumption in Southeast Asia, increased by about 14% and in South Asia by about 23% (calculations using FAO 2012 data). For example, in 1958 fertilizer usage in rice in Sri Lanka was 7kg per hectare. By the late 1960s this amount had increased to over a 30kg per hectare. Similar trends were reported from other countries. In India, there was a sudden rise in fertilizer use in the mid-1960s. Fertilizer consumption increased from 0.5 kg/ha in 1951-52 to 40 kg/ha by 1980-81 (Shukla 2010). In Bangladesh, in the early years fertilizer use increased at a rate of 10% per year (Renfro 1992). In Indonesia, from 1972 to 1986 total fertilizer consumption increased by 14% (Hedley and Tabor 1989). In the Philippines, from early 1960s to the late 1960s fertilizer consumption increased by over a 180% (FAO 2012). Such growth in fertilizer consumption was unparalleled to the growth seen in any other agricultural input.

During this time, India, Pakistan, Sri Lanka, the Philippines, and Indonesia maintained a high growth rate in cereal production. Every aspect of production showed growth. Croplands expanded, cropping intensities increased, and yields improved (Hedley and Tabor 1989; Chaudhry 1994; Kikuchi et al. 2003). In wheat, increases in production, was far greater than in rice (Farmer 1981; Evenson and Gollin 2003). In India, Pakistan, and Sri Lanka advancements achieved through the adoption of high yielding crop varieties and chemical fertilizers were augmented by major investments in surface irrigation (Aluwihare and Kikuchi 1991; Chaudhry 1994; Kikuchi et al. 2002; Kikuchi et al. 2003). During the same period, various advancements in agriculture occurred that helped the region get closer to their food self-sufficiency goal, although the degree of their relative contributions remains unclear.
2.3.2 The Effect of Fertilizer Price on Fertilizer Use and the Element of Risk

One of the important factors central to the debate about the agricultural growth that Asia experienced in the early 1960s was the degree to which it was influenced by subsidising fertilizers. Many studies have looked at the relationship in Africa and Asia, some have found fertilizer price to be a key determinant affecting fertilizer use. Abdoulaye and Sanders (2005), studied the determinants of fertilizer use, using farm household surveys, in Niger and found that the price of fertilizer relative to millet was among the significant determinants of fertilizer adoption. Participation in demonstration trials and income level were the other significant determinants that decided fertilizer adoption in Niger. According to Croppenstedt et al. (2003) the value-to-cost ratio of fertilizers was a major determinant of fertilizer adoption in Ethiopia. The study also found the formal education of the farmers to be another key determinant. In Sri Lanka, Chandrapala and De Silva (1988), found the price of fertilizers to have a significant effect on fertilizer use in tea, rubber, coconut, and rice. Yahanpath and Agrawal (1985), undertook a similar study for rice in Sri Lanka. According to the authors, the demand for nitrogen was price elastic. Demand for phosphoric acid and potash relied on the extent of cultivation under major irrigation. Price of rice and price of nutrients accounted for more than 85% of the aggregate demand of fertilizers. As the study by Rajapaksa and Karunagoda (2009) revealed both rice and fertilizer prices influence the fertilizer demand in Sri Lanka, but the effect of rice price is greater than that of fertilizer price.

Notwithstanding the above, there are other studies that did not find fertilizer price to be a key determinant. Green and Ng'ong'ola (1993), studied the factors affecting fertilizer adoption in Malawi. The authors identified, tobacco farming, use of improved varieties, access to credit, participation in off-farm activities, and regular employment to be the main activities influencing fertilizer adoption. A recent study carried out in Malawi attributed fertilizer adoption to be positively associated with higher level of education, larger plot sizes, and higher non-farm incomes. Households headed by women and distance from input markets on the other hand showed a negative association with fertilizer use (Chirwa 2005). Sanders and Ahmed (1998) found a lack of information to be the key determinant withholding farmers in Sub-Saharan Africa from buying fertilizers. In Pakistan, Coady (1995) found farm size to be a major determinant influencing access to fertilizers. According to the study, capacity to secure credit, irrigation, and access to knowledge were the main problems faced by small landholders, limiting their access to fertilizers. Several Sri Lankan scholars, studying just the question of the effect of fertilizer price on fertilizer use, found the effect to be inelastic (Thusiman et al. 1987; Ekanayake 2006).
Studies on fertilizer adoption by Pilipino farmers (Hiebert 1974) and Thai and Korean farmers (Jamison and Lau 1982) report similar findings. In the Philippines, the expertise manifested by farmers with intensive contact with extension was consistently higher (Hiebert 1974). In Thailand the decision of fertilizer adoption was significantly influenced by farm size, availability of extension, and the level of the formal education of the house-hold head (Jamison and Lau 1982). In a study carried out in Ethiopia (Negatu and Parikh 1999) examined the significance of the impact of farmers perceptions regarding new technology towards adoption, and how adoption in turn affects perception. A farmer’s perceptions about grain yield and market ability of product were the two most influential factors guiding the adoption of new technology.

However, Coady’s (1995) study takes this understanding on the determinants of fertilizer use one step further. He qualified the trends in input use decisions by factoring in the effect of uncertainty. Assessing the variation in the level of nitrogenous fertilizer application in high-yielding wheat, the study makes a distinction between the households that do not have access to fertilizer and those that make the choice to not apply fertilizers. The results showed that access to fertilizer was positively correlated with the size of the farm. But the presence of uncertainty tended to reverse this effect. In contrast to the common trend, among those farmers who used fertilizers, per acre usage of fertilizers decreased with farm size showing a negative relationship between farm size and fertilizer intensity. Based on these findings Coady (1995) argued for the importance of minimising risk in promoting input adoption. Apart from the importance of understanding the different dimensions of the interpretations of risk, what is most noteworthy here is that fertilizer use decisions by farmers are multifactorial.

On the whole, this evidence suggests that fertilizer use decisions by farmers are determined by their perception of risk. From one context to another, the risk factors or more precisely, the perception of risk factors, have varied. In certain contexts high fertilizer price was perceived as a risk, but not in others. So the price elasticity of fertilizer and its demand varies, and so does the effect of fertilizer subsidies. Overall, it is the farmers’ interpretation of the context. However, it is also important to note that there is an element of judgement made by the researcher who ‘interprets’ the farmers’ ‘interpretation’. The relative importance of the variables and the scale at which these variables have been considered, have also contributed to the differences in the interpretations noted above.

Therefore, comparisons across interpretations demand an answer to the questions, what variables were interpreted as important in a certain context, and why - questions that this study attempts to answer for Sri Lanka.
2.3.3  The Performance of Fertilizer Subsidy Schemes in Other Developing Regions

Some studies have attempted to establish cause and effect between the fertilizer subsidies and the developments in agriculture that followed. According to these studies, a number of subsidy schemes have been successful in achieving one of its targeted goals, an increase in production. In Malawi, according to a performance assessment of the fertilizer subsidy, the increase in smallholder maize productivity has been a result of the subsidy (Dorward et al. 2004). In India, the initial subsidies in fertilizer along with credit and irrigation were found to be crucial for small farmers to have adopted new technologies (Fan et al. 2008). Govereh et al. (2002) studied the developments and implications following the liberalisation of fertilizer markets in Zambia. The study found that a year after commencement, the farmers who received the subsidy were better off than those who did not receive subsidised fertilizer. In Sri Lanka, Wijetunga et al. (2008), Rajapaksa and Karunagoda (2009), and Wickramasinghe et al. (2009) found the effect of the fertilizer subsidy to have a significant effect on the rice supply.

Despite the positive impacts on productivity, many of these programs have been impaired by inefficiencies in operation. In addition, many of these programmes are also blamed for undermining the demand for commercially distributed fertilizer and disturbing the markets. For example, in Malawi, variations in production and productivity were noted in response to the degree of displacement of commercial sales of fertilizers by subsidized fertilizers. Furthermore, at the operational scale timelines of fertilizer delivery and the effectiveness of fertilizer application, contributed to this variability. The cost-benefit analysis of the subsidy was sensitive to maize prices and when the regional maize prices were low the benefit-to-cost ratio was low (Dorward et al. 2008). In Zambia, the distribution of fertilizers by the government under its subsidy scheme has not been cost-effective. The programme contributed to a number of market failures. due to varying response rates and market conditions, fertilizer application in some areas became unprofitable. Mutual mistrust between private and public sectors created uneven business opportunities, and further augmented the risks in fertilizer markets. The programme also suffered from failures in meeting soil specific agronomic demands Govereh et al. (2002). Another study found the impact of the Zambian fertilizer subsidy on overall fertilizer use to depend on the relative affluence and the activity of private sector in the area. In the poorer areas where the private sector was relatively inactive, subsidies helped generating a fertilizer demand and attracted the private sector retailers. However, in areas where average wealth was higher and the private sector was relatively active the subsidies have substantially displaced the private sector (Xu et al. 2009). A major repercussion was a false sense of market failure, mistaken for the disincentives of the ‘crowding out’ effect. This in
turn justified continued government support. Although, intended for correcting market failures, the policy in reality impeded its efficient operation (Jayne et al. 2003; Xu et al. 2009).

2.4 Locating Sri Lankan Agriculture in Context

Before narrowing down this focus to explore the details of the rice fertilizer subsidy scheme in Sri Lanka, it is necessary to understand the agricultural system within which the subsidy originated, evolved, and continues to operate. As noted in previous sections, the introduction of the rice fertilizer subsidy in the 1960s was aimed at achieving self-sufficiency (Sections 1.4 and 2.3) and its recent amendments in 2006 were aimed at benefiting both farmers and consumers (Section 1.4.2). These objectives connect three themes in agriculture, food, a livelihood, and a development orientation. Therefore, any attempt to understand the context of the rice fertilizer subsidy must locate the various links among these themes. In search of those links, section 1.4.1 established an overview of the current demographic, economic, and physiographic context of Sri Lankan agriculture. This section extends this effort to examine the social, political, and economic context of Sri Lankan agriculture in detail, tracing its purpose, capacities, limitations, patronage, the changing trends, and the forces that have contributed and continues to influence those trends.

2.4.1 A Short History of Agricultural Development in Sri Lanka

Sri Lankan history, as told in Mahavamsa, begins in the fifth century BC, with the advent of the Aryan Prince Vijaya in the island, which is contrived to synchronise with the parinibbana (the passing away) of Buddha (Knighton 1845; Ludowyk 1967; De Silva 1981). This brings the perfect beginnings to ‘a’ history of Sri Lanka, celebrating the succession of both religious and secular heroes (De Silva 1981). This national story continues to date and has many implications for the way of life in Sri Lanka and its political and economic passage.

2.4.1.1 Agricultural Development in the Pre-Colonial Era

According to Mahavamsa, the Aryans established settlements in several parts of the island, confined to the river basins in the dry zone. Rice was their staple crop. The earliest colonisers relied on the Northeast monsoon and cultivated a single annual crop. The climate was harsh and the rains

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6 ‘Mahavamsa’, literally, the ‘great genealogy’ is the oldest literary record of the history of Sri Lanka. Mahavamsa and its subsequent supplementary Chulavamsa, were the works of Buddhist monks. As noted by De Silva (1981) throughout these works, miracle, invention, and religious bias are apparent. Depicting the island’s historic role as a bulwark of Buddhist civilisation runs a central theme. The chronicle opens with Buddha’s conquest of the island (563-483 BC).
although seasonal were not reliable. Given the low capacity of soils in the dry zone to hold water (Vann 1987), a regular provision of water became a necessity. Two solutions were sought. One was to excavate channels from rivers and the second was to construct tanks or reservoirs. Embarking on the challenge the first Aryan settlers achieved major developments in irrigation over the next two centuries. By the early stages of the Anuradhapura Kingdom (377 BC to 1017) irrigation technology in the country reached its excellence. These developments in irrigation helped sustain a booming agriculture and over the centuries the kingdom acquired great progress in the economy, arts, and architecture (Zeylanicus 1970; De Silva 1981; Seneviratna 1994). The hydraulic, agricultural, and aesthetic prosperity of the Anuradhapura era continued into the successive Polonnaruwa Kingdom (AD 1056-1236) (De Silva 1981; Parker 1981; Seneviratna 1998; Sattar et al. 2010).

The irrigation works of the Anuradhapura and Polonnaruwa Kingdoms (jointly known as Raja-Rata - the land of kings) were numerous and extensive. Between the fourth century BC and the thirteenth century AD, 44 large-scale reservoirs were built in Raja-Rata. By the end of the thirteenth century there were about 10,000 small village tanks and by the end of the fifteenth century this number increased to about 20,000 (Leach 1959; Zubair 2005). Noting this, an administrator of the British colonial government, wrote the following.

In Egypt, Syria, Persia, and in India, there are remnants of far greater works, and in these countries, works of far greater antiquity, as well as magnitude, but probably no other country can exhibit works so numerous, and at the same time so ancient and extensive, within the same limited area, as this Island. (Bailey 1859, as cited in De Silva 1981)

Not only were these works extensive, but were elaborate in both structure and function. They consisted of canals, channels, water storage tanks, and reservoirs which were regulated through barrages, weirs, anicuts, and valve pits (Parker 1981). Admiring this mastery in hydraulic engineering another British administrator wrote;

No people in any age or country had so great practice and experience in the construction of works for irrigation; and so far had the renown of their excellence in this branch reached, that in the eighth century, the king of Kashmir, Djaya-pida, sent to Ceylon for engineers to form a lake. (Tennent 1860)

At its greatest complexity, the hydraulic system was robust and efficient, and its controlling mechanism was sophisticated, but delicate with little margin for error. The maintenance of this system required high level of organisation and efficiency in administration (De Silva 1981; Sattar et al. 2010).
2.4.1.2 The Hydraulic Civilization and Leadership

Throughout its history in Sri Lanka, rulers who constructed and maintained irrigation works and services for agricultural development, were regarded with virtue and reverence (Zubair 2005). Among, the most admired is King Parakrama Bahu (1153–1186 AD). It is believed that the zenith of the ancient hydraulic civilisation was reached during his rule (Parker 1981). Although it is contested by the present-day historians, according to *Chulavamsa*, during King Parakrama Bahu’s time, Sri Lanka was exporting rice to other parts of Asia and had become known as the granary of the east. The following statement by King Parakrama Bahu proclaimed in one of his inscriptions, is taught to and learnt by every school child in Sri Lanka to this day, and is idealised as the pathway to development.

In a country like this not even the least quantity of rainwater should be allowed to flow into the ocean without profiting man. Remember that it is not meet that men like us should live and enjoy what has come into our hands and care not for the people. Let there not be left anywhere in my kingdom a piece of land, though it be of the smallest dimensions, that does not yield some benefit to the man. (King Parakrama Bahu quoted in Zeylanicus 1970)

Despite such recognition, some scholars argue that the large reservoirs built by the powerful rulers were essentially ornamental, that aesthetics and egotism were the mere motives behind such works (Leach 1959; Zubair 2005). This public acceptance and admiration received by the rulers for the construction of large scale irrigation works, seems a too important potency for their image, that it urged others to claim credit for irrigation works that they did not undertake (Seneviratna 1998).

2.4.1.3 Fall of the Ancient Hydraulic Civilization of Sri Lanka

What is baffling is how the Raja-Rata kingdoms sustained large populations, over a millennium, while flourishing in irrigation, architecture, and agriculture, amidst the political disorder it experienced. During the time political instability in the country was the norm rather than the exception. Dynastic rivalries, succession disputes, over-centralisation of administration, the incapacity of administrative and political structures to keep pace with the expanding economy, ethnic and religious antagonism, invasions, and civil wars caused frequent political turmoil. Despite the holding over for a long time against these frequent interruptions, the ancient hydraulic

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7 An addendum to *Mahawamsa*

8 According to Leach (1959) and Zubair (2005) the highly decentralised villages rarely relied on large-scale reservoirs. Each village had its own supply of small-scale irrigation within the village and the system was managed by the villagers locally. While there is evidence that some village tanks were fed by the larger reservoirs, most village tanks were fed by rainwater and streams.
civilisation of the dry zone collapsed in the thirteenth century (Knighton 1845; Zeylanicus 1970; De Silva 1981).

Following the breakdown in administrative and social order, the maintenance and management of the complex irrigation works ceased. Some irrigation works were deliberately destroyed by the invading armies. In addition to all the ills, in the mid thirteenth century the dry zone became plagued by a malaria epidemic - the abandoned tanks and channels providing ideal breeding grounds for the malaria mosquito (De Silva 1981; Sattar et al. 2010). While malaria was not the cause of abandonment, it was a major problem, which foiled all attempts of resettlement in the dry zone until the 1930s. A majority of the population drifted to the southwest into the wet zone. It is at the same era that the advanced hydraulic civilisations in Cambodia, Northern Thailand, and the Pagan region of Burma experienced an irrevocable decline, which also coincided with the Little Ice Age (Appleby 1980; Folland and Karl 2001). It is argued that the fall of all these civilisations at about the same time was the result of the disintegration of the institutional mechanism subject to age, which is inherent of such complex systems (De Silva 1981). Whether it was time tested chance or not, in the case of Sri Lanka, there is ample evidence to imply that both deliberate and imprudent actions and endeavours of the rulers, probably aggravated by climate change, given the coincidental collapses globally, led to the end of the Raja-Rata kingdoms.

Following the decline of Polonnaruwa, political turmoil and South Indian invasions continued. In search of security, the Sinhalese capital repeatedly shifted south-westwards. In the wet zone there was no scarcity of water. Instead, drainage and the rugged terrain were the problems to overcome. The custom duties on spices were an easier income for the kings than land revenues and agricultural taxes. As a result, the kings of the time paid less and less attention to agriculture and its improvement. With little Royal support, agriculture protracted to a mere subsistence (Sattar et al. 2010).

### 2.4.1.4 Pre-Colonial Land Tenure System

The land tenure system in pre-colonial Sri Lanka was primarily built around the main economic unit of rice fields (Roberts 1968). Its management, the irrigated rice lands used exclusively for wet rice cultivation, was essentially feudal in nature (Roberts 1968; Shanmugaratnam 1981; Bandarage 1983). The dry lands and chena on the other hand remained under a communal mode of production (Bandarage 1983). The king was the ultimate possessor of all lands. Observing this, Knox (1681) in his account on Sri Lanka wrote, “the country being wholly his, the King farms out his land, not for money, but service”. The peasants who cultivated lands granted directly by the state, occupying
The king’s villages, called ‘gabadagam’ (royal villages) were called upon to perform the services. These services rendered to the state in exchange for the use of land were called ‘rajakariya’ (services to the state). In the royal villages, the peasants held land on hereditary basis. The service was attached to the land and was obligatory. There were two kinds of services - one was by provisioning labour in public works, including the maintenance of irrigation, and the other was by performing specified tasks assigned to their respective casts, for the king and other people, usually of higher cast. The king also had a right to a share of agricultural income and it was generally paid in kind (Roberts 1968; Shanmugaratnam 1981).

The king rewarded the higher officials with land for their services. The king also liberally granted land to Buddhist and Hindu temples. These feudal villages that became to be known as ‘nindagam’ (aristocratic villages), ‘viharagam’ (temple villages), and ‘devalagam’ (deity villages), resulted in different forms of landlordism (Roberts 1968; Shanmugaratnam 1981; Bandarage 1983). However, the authority was political and the recipient’s right to the land was similar to that of a feudal overlord. No freehold ownership over land existed (Roberts 1968). The overlords in turn granted their lands in smaller plots to peasants. The peasants performed various services for the feudal overlords ranging from formal homage to daily labour in household functions. Alongside, another form of tenancy operated in the feudal villages was share cropping called the ‘ande’. In sharecropping, the tenant was obliged to surrender a share of the harvest ranging between 30-50 % to the overlord (Roberts 1968; Shanmugaratnam 1981).

Between different rulers and kingdoms in pre-colonial Sri Lanka, the land tenancy practices varied, but only within this broader framework (Shanmugaratnam 1981). The feudal society of the time sustained rigid divisions in the social structure and the relations between people. Caste, the key determinant of this stratification, was a division of profession among family lineage, across which social mobility was restricted. However, there were no landless. Except for the king, the aristocrats, and the priests, everyone practised subsistence (Bandarage 1983; Wickramasinghe and Cameron 2005; Alawattage and Wickramasinghe 2009). There was a surplus of labour and produce that was larger than what subsistence demanded. The social hierarchy and the land tenure system created an opening for extorting this surplus of labour and produce, as tax and rent. For over a millennium the modes of production and the social constituency established a normative order fixated into custom and tradition. This enhanced social solidity and further fostered a resistance for dissolution. As such the agrarian social order that prevailed in pre-colonial Sri Lanka demanded no change (Shanmugaratnam 1981).
2.4.1.5 Post-colonial Agricultural Developments

Early in the sixteenth century the politics in the country had become highly unstable (Knighton 1845). Over the next four and a half centuries, Sri Lanka came under the rule of three European colonial powers - the Portuguese (1505-1658), the Dutch (1656-1796), and the British (1815-1948). During Portuguese and Dutch colonial periods the land tenure system in Sri Lanka did not change drastically (Shanmugaratnam 1981; Wickramasinghe and Cameron 2005). The Portuguese were interested mainly in the trade of spices and had very little impact on the native modes of production. The Dutch were keen in maximising trading surpluses, and provided state support to extend rice and coconut cultivation (Wickramasinghe and Cameron 2005). The colonisers continued enforcing the rajakariya system. They conscripted peasants into the military using rajakariya, but experienced breaches in recovering taxes and traditional services (Roberts 1968; Shanmugaratnam 1981). Both powers exacted economic profit from their coastal holdings, trading cinnamon and other spices, but lacked suitable lands to open large-scale cash crop plantations in higher altitudes.

In 1815, when the British unified Sri Lanka under one rule, for the first time after 600 years, they also gained access to the highlands, which then had the highest economic potential. Until overtaken by tea in the 1980s after succumbing to a leaf fungus, coffee was the main plantation crop (Shanmugaratnam 1981; Wickramasinghe and Cameron 2005; Roland 2007). Both crops shared three features that characterised the plantation sector of the time – they were grown exclusively for a foreign market, in extensive monocultures, using imported South Indian wage labour (Roland 2007).

The plantation system did not bring about a total dissolution of the feudal mode of production, instead, it introduced a bimodal dynamic (Shanmugaratnam 1981). By enacting land legislation, the colonial state acquired large tracts of undeveloped land throughout the country. The legislation included the following.

- The Crown lands (encroachment) Ordinance No12 (1840): The act declared "all forest, waste, unoccupied or uncultivated land" to be the property of the Crown until the contrary was proved

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9 Maritime trade in the Indian Ocean at the time had gained prominence and the European colonisers were becoming highly active in the region. At the time, the stranglehold on spice trade in the East was held by the Ottoman Turks (Zeylanicus 1970). The Portuguese were keen on breaking this dominion in the spice trade and spreading Roman Catholic Christianity in the East (Knighton 1845; De Silva 1981). Drawn by cinnamon and the islands strategic position, the Portuguese defeated the Kotte Kingdom and ruled the Maritime Provinces for 153 years. The rifts in internal politics in Sri Lanka at the time served to their advantage. The Dutch out-maneuvered the Portuguese and ruled the maritime provinces over the next 140 years. The British took over from the Dutch, and conquered the entire island, during when the last royal dynasty to the Sinhalese throne ended (Knighton 1845; De Silva 1981).
• Registration of Temple Lands Ordinance No10 (1856): Under this act the Crown gained further access to land under the control of temples
• The Waste Lands Ordinance No 1 (1897): Under this act, the Government Agent was given the power to compel any claimant to appear before him to prove his title in default of which the land would be declared the property of the Crown. (Shanmugaratnam 1981)

The new rules established freehold rights in land, and in effect gave rise to a land market. The cultivators in the royal villages were given freehold rights to the ancestral rice fields. The colonial administration expropriated large tracts of forest and periodically cultivated chena lands belonging to both royal and feudal villages. The peasant cultivators thereby lost communal user right to these lands, which offered an important safety net of peasant subsistence and political autonomy (Shanmugaratnam 1981; Bandarage 1983). The colonial administration also retained its right to exact compulsory service, which would be paid for, not only in services or in kind, but in money (Roberts 1968). The inability to pay the grain tax pushed many peasants to sell their land plots. By defaulting on the commuted paddy tax others were stripped of ownership and user rights. The state in turn sold these lands to headmen and planters and the land market became a monopoly of the wealthy foreigners and natives (Shanmugaratnam 1981; Bandarage 1983).

The colonial administration filled the labour demand in the plantations with imported South Indian labourers. The state imported its entire rice requirement for the estate labour from India and Burma. The customs duties on rice were also maintained low. The labour and food requirements of the plantations therefore, remained largely independent of the Sinhalese peasantry. Debt-bondages created by the payment of large cash advances and the partial payment of wages in rice, effectively made wage labour in the plantations, an obligation rather than a choice (Bandarage 1983; Wickramasinghe and Cameron 2005). The political and economic transition introduced elements of capitalism into a feudal framework, but did not bring about a complete capitalist transformation. It still retained the exploitative forms of feudalistic tenancy (Shanmugaratnam 1981; Wickramasinghe and Cameron 2005). Overall, the structural transformations in property relations, surplus appropriation, and class relations left strong impacts on the country, its agriculture, and its post-colonial developments (Shanmugaratnam 1981; Bandarage 1983; Wickramasinghe and Cameron 2005). These events also marked a beginning to deepening segregation of ethnic identities, distrust of the foreign, and a nostalgic sentiment toward the ancient glories of the Sinhalese. The present-day agriculture of Sri Lanka is influenced by this background.
2.4.2 A Background to the Present-Day Agriculture

As development proceeds, and per capita income rises, the share of agriculture in employment and economic output declines. This is considered a routine expression of structural transformation in an economy undergoing growth. The overwhelming evidence suggests that the industrially advanced countries have completed this process of structural transformation (Johnston and Mellor 1961; Kuznets 1966; Chenery and Syrquin 1975). Despite the observed decline in the relative importance of agriculture in economic output, overall growth often has a precondition of rapid agricultural growth. In many instances, food, raw material, and capital needs of a growing economy cannot be met by a stagnating agriculture. Therefore the structural transformation of economic growth is either considered to be accompanied or preceded by agricultural growth (Timmer 1988; Chaudhry 1994; Timmer 2002). As noted in Section 1.4.1, Sri Lanka exhibits evidence for having entered this transformative process.

2.4.2.1 The Policy and Administration of Agriculture in Sri Lanka since Independence

In 1912, in the latter part of their rule, the British established an agricultural department, to undertake research and development in the plantations sector in a manner, similar to the role of the botanical gardens across the British colonies. But there were two research areas ventured into by the department that became important in moulding the department’s outlook in the years to come. These key initial researches included the collection and selection of improved rice varieties and soil classification, which were significant in paving the way for subsequent research in varietal development and fertilizer recommendations in the food crop sector (Pain 1986). In the early years after independence the agriculture policy in Sri Lanka was focused on two objectives. The first was to reach food self-sufficiency, primarily in rice (Abegunawardana and Pope III 1986; Bandara and Jayasuriya 2009). At the beginning it was an attempt to satisfy the political demand of a free rice ration that originated from the welfare policies of the final stage of the colonial rule (Pain 1986). The second was to dismantle the dual agricultural economy of plantation and peasant subsectors (Abegunawardana and Pope III 1986). These two objectives in various expressions continue to determine the course of the agriculture policy in Sri Lanka, to this day.

2.4.2.2 Evolution of the Agriculture Policy in Sri Lanka since Independence

The agriculture policy of Sri Lanka has been an interplay between shifting ideologies of mainstream left and right wing of politics, and the conflicting interests of producers, consumers and the economy (Bandara and Jayasuriya 2009). Since regaining independence from the British in 1948,
14 governments alternating between the two main political rivalries, the United National Party (the right wing liberal conservatives) and the Sri Lanka Freedom Party Alliances (the left wing labour) have ruled the country. Each administration had its own development strategy, but three eras are noticeable for distinct fiscal policy orientation. Transitions between free market operations and total state control distinguished the three eras. The governments in between 1948-1959, adopted non-interventionist open-free market policies. During the period from 1960-1977, the economy was kept under total state control. Since 1978, the policy orientation took another turn switching to export oriented trade liberalisation (Gunawardana and Somaratne 2000; Dayaratna-Banda et al. 2008; Bandara and Jayasuriya 2009). Each era had an enduring effect on the country’s agricultural potential and its future.

The economic and trade policies adopted up until 1977 had adverse effects on the overall development of agriculture. Beginning in the 1950s, there was a shift towards inward oriented development strategies. Ownership and the management of the plantation sector at post-independence remained largely foreign. The resentment of the left-wing coalition governments of the time brought the plantation sector under the threat of nationalisation. A number of measures were employed to protect the import-substituting industries. These included foreign exchange controls and discriminatory dual exchange regimes. Later in the 1960s with the ideological shift to total state control over the economy, the import restrictions and the exchange controls were further strengthened (Bandara and Jayasuriya 2009). Many private businesses were taken under government management and new state owned industrial enterprises were established. In the mid-1970s, the large estates of tea, rubber, coconut, and paddy under private ownership were finally nationalised in an ambitious effort of land reform (Gunawardena 1981). The agriculture policy up to the 1980s taxed export agriculture while protecting import-competing food agriculture through various input subsidies for irrigation, fertilizer, research and development. Nevertheless, these measures inflicted spill over effects on the import-competing food agriculture sector. Overall, there was a bias against the agriculture sector during this period (Bhalla 1991; Bandara and Jayasuriya 2009).

Policy liberalisation in the 1980s helped relax the anti-agricultural bias in the development strategy. Reforms in the financial sector including financial deregulation opened up opportunities for the private sector. The newly elected United National Party government focused on export development. Attracting foreign investments was given high priority in an attempt to promote industrialisation. During this time massive public sector investment programs in irrigation, energy and housing were launched (Athukorala and Jayasuriya 1994; Gunawardana and Somaratne 2000). Beginning in the 1980s the government decreased the direct taxation of export crops; by the 1990s
the measures were totally eliminated. Trade liberalisation of the manufacturing sector massively contributed in lowering the indirect burdens of industrial protectionism on agriculture. The overall development strategy, far more liberal than any since the 1950s, was more favourable to agricultural development.

However, the import competing food agriculture underwent limited reform. The sector continued to enjoy direct assistance and protection from imports. Rice, sugar, potatoes and dairy in particular receive direct input subsidies and protection through the trade regime (Gunawardana and Somaratne 2000; Bandara and Jayasuriya 2009). Today the domestic rice production has increased substantially, achieving self-sufficiency, but the overall food production remains stagnant at levels of the 1970s. Agricultural exports have plummeted, tea being the only exception, while food imports have increased. Since 1980, per capita food production in Sri Lanka has dropped by over 12%. In parallel times per capita food production in other developing countries have risen by an average of 48% (Gunawardana and Somaratne 2000; Bandara and Jayasuriya 2009). As such the long-term average growth rate in agriculture has barely exceeded the rate of population growth, reducing the contributions of the sector to a continual drag on the efforts to alleviate poverty (IMF 2005). Among the many policy indicators outlined above, a number of key policy indicators, were decisive in characterizing the orientation of the agriculture sector. These are revisited below in detail in the following sections.

**Agricultural subsidies and support services**

Subsidies for import competing food agriculture have played a key role in every government’s policy agenda. The generosity of the subsidies was determined by the emphasis placed on food independence and self-sufficiency. A variety of subsidies were made available in irrigation, fertilizers, pesticides, machinery, planting material, guaranteed floor prices, agricultural credit, agriculture research and extension services; some direct and others hidden (Weerahewa 2006). Restoration of irrigation works accompanied by land settlement schemes in the dry zone began in the 1930s under the British rule. The immediate post-independent government continued with this irrigation development and land settlement efforts in the dry zone. A number of agricultural support services were established and introduced during this period. These included a comprehensive network of research and extension services, marketing and agrarian service institutions, a guaranteed minimum price for rice, subsidized institutional credit programs, and crop insurance schemes (Thorbecke and Svejnar 1987; Weerahewa 2006). Due to the import restrictions imposed by the government during 1960-1977 imported agriculture inputs were limited. However, the government continued to provide material inputs such as fertilizers, pesticides, tractors, and
improved seed and planting material at a subsidized price. 1978-89 government continued with the provision of research, extension services, and irrigation. The fertilizer subsidy was totally withdrawn in 1990 but was reinstated in 1994. During 1989-93 there were reductions in investments in new irrigation and land settlement projects. But the provision of research, extension and irrigation, was continued, while removing the controls on the importation of agricultural inputs and machinery. In 1997 a tariff reduction was made on the imports of agricultural inputs, especially tractors. Lowering interest rates on agricultural credit, and reducing turn over tax on agricultural inputs were the other key highlights of this period (Gunawardana and Somaratne 2000; Weerahewa 2006).

**Food subsidy scheme**

Food rice subsidies were first introduced in the 1940s. The post-independence governments continued to provide rice to consumers at subsidized prices. A non-targeted rationing scheme was deployed from the early 1950s until 1978. Under this scheme all persons above one year of age were provided with the ration. During 1970-77 income tax payers paid higher market prices for rationed rice. Rice purchases under the guaranteed price scheme and imports were the sources of supply for rice rationing scheme (Gunawardana and Somaratne 2000; Weerahewa 2006; Weerahewa and Thrikawala 2008). Major fiscal policy reforms in 1978-89 included the replacement of generic (non-targeted) food subsidies with a targeted food stamp scheme. Under the 1989-93 poverty alleviation programme, a welfare scheme of direct income transfers called *Janasaviya* (People’s Strength) was introduced. The program was targeted at 50% of the poor. Under this program the food stamp scheme was better targeted to include families entitled for *Janasaviya* and the cash value of the food stamps was doubled.

**Agriculture marketing and distribution**

In 1971, the Paddy Marketing Board, a public distribution system for procurement and marketing of paddy and subsidiary crops, was established. The purpose of this establishment was to make rice more affordable to the consumers. During 1973-75 private trade and transport of paddy and rice was made illegal. The Paddy Marketing Board became the sole purchaser of paddy from farmers. This however, created a parallel black market of paddy and rice trading (Gunawardana and Somaratne 2000). Between 1978-1989 the role of the Paddy Marketing Board was reduced to the ‘buyer of last resort. Paddy purchasing by the Paddy Marketing Board became effective, only at times when market prices were lower than the floor prices, during harvests in particular (Gunawardana and Quilkey 1993). In the late 1970s the board was responsible for purchasing 38% of the domestic
paddy output under the guaranteed price scheme. As a result of the deregulation rice marketing and the abolition of non-targeted rice rationing, by 1989, paddy purchasing under the guaranteed price scheme declined to a less than 5%. In 1999, all operations of the board were dismantled. This allowed the private sector to operate on a competitive basis in purchasing, milling, and distribution of rice. However, state intervention in rice market was still maintained via the co-operative wholesale establishment. In 1999 the government reintroduced the minimum purchase price scheme for ten of the import competing food crops. These include rice, potatoes, dried chillies, onions, cowpea, green gram, maize and ground nuts. The scheme was implemented exclusively by the co-operative wholesale establishment. In order to safeguard farmer interests, the floor prices were set on parity with world market prices (Gunawardana and Somaratne 2000).

**Export and import taxation**

The immediate post independent governments taxed export agriculture. In the 1950s taxes on tea, rubber and coconut products accounted for 30% of all government tax revenue. The structure of the taxes was highly disadvantageous for the producers. They were subjected to the burdens of cost increases due to domestic inflation and were also deprived of the gains from any exchange rate adjustments or price increases. In the late 1950s the structure of levies and incentives became even more hostile towards export agriculture. The import restrictions, exchange controls and the dual exchange rate scheme adopted by the government during 1968-77 led to a real exchange rate overvaluation. Under the dual exchange rate the government introduced a ‘foreign exchange entitlement certificate’. In 1968 the rate of the foreign exchange entitlement certificate was fixed at 44% higher (more depreciated) than the basic official rate. Later in 1969 the exchange entitlement rate was adjusted to 55% and in 1972 to 65%. The official rate was applied to the traditional export crops requiring the conversion of export earnings to a less favourable exchange rate. The foreign exchange entitlement certificate was applied to the non-traditional exports and imports of some of the major imports such as rice, wheat and sugar (Gunawardana and Somaratne 2000; Bandara and Jayasuriya 2009).

The 1977 reforms unified the exchange rate allowing it to be determined by the markets. The explicit export taxes and the exchange controls were removed. The rupee was substantially devalued as a result. The quantitative restrictions on imports imposed by the previous government were replaced with a six band duty system ranging from zero on essential consumer goods imports to 500% on luxury imports. Trade liberalisation was a key objective of in the reform package. However the liberalisation was not uniform. Crops cultivated in the north such as red onions, chillies, and grapes were subject to liberalization, while those cultivated in the other parts of the
country continued to enjoy protection. Therefore food crop agriculture was subject to some import competition.

2.4.2.3 The Current Agriculture Policy

The agriculture policy renewed in 2007 highlights seven objectives, each focusing on food security and sustainable growth. The policy covers all agriculture sectors including food crops, export agriculture crops, plantation crops and livestock. The objective statements of the agriculture policy read as follows (Ministry of Agricultural Development and Agrarian Services 2007).

- Increase domestic agricultural production to ensure food and nutrition security of the nation
- Enhance agricultural productivity and ensure sustainable growth
- Maximise benefits and minimize adverse effect of globalization on domestic and export agriculture
- Adopt productive farming systems and improved agro-technologies with a view to reduce the unit cost of production and increase profits
- Adoption of technologies in farming that are environmentally friendly and harmless to health
- Promote agro-based industries and increase employment opportunities
- Enhance the income and the living standard of farming community

To achieve these overarching objectives the policy lists a series of generic strategies covering the sectors of production, agro-inputs, resources, research, extension, processing, markets, industries, knowledge, investment, participation, and exports (Ministry of Agricultural Development and Agrarian Services 2007). In 2005, aligning with these key objectives, the Department of Agriculture, drafted a research and development plan for the mandated crops. The activity plan for rice lists two objectives. These objectives read as follows.

- Achieve 100% self-sufficiency (3.0 million t) mainly through increased productivity (5.4 t/ha) and ensure year-round availability by 2010.
- Process surplus rice into value added products and reduce per-capita wheat flour consumption by 20% from the present 40 kg level, by 2010 (Department of Agriculture 2005).

Emphasising the importance of rice self-sufficiency, the policy further reads that “self-sufficiency in rice for sustainable food security, increasing domestic production to reduce imports and thereby
save foreign exchange are the national priorities”. To meet this anticipated demand, raised by a decline in wheat consumption, an increase of rice yields from the then average of 4.1 t/ha to an average of 5.4 t/ha was needed. In achieving the objectives, a number of limitations relating to four key problem areas were recognised as constraints to be overcome - namely, technology development and adoption, natural resources, socio-economic policy, and marketing, and processing. Some of these limitations identified in the five year work plan, included, inadequate availability and low adoption of technologies, insufficient coverage in extension, problems inherent to soils and climate, un-assured water supply, inadequate attention to the variability in production potential of different environments, inconsistencies in government policy, less attractiveness of rice farming, tendency for increased consumption of wheat based products, high post-harvest losses, low popularity of rice based products, poor processing and milling technologies, inadequate storage facilities and inadequate supply of quality seeds (Department of Agriculture 2005).

2.4.2.4 Organisation of the Agriculture System

The power and authority in management and development of non-plantation crop agriculture is under the Ministry of Agricultural Development and Agrarian Services. The Ministry operates two departments that develop and manage the crop agriculture sector, the Department of Agriculture and the Department of Agrarian Development. The responsibility of improving the production and productivity of crop agriculture is entrusted with the Department of Agriculture. The key functions of the department include research, extension, seed and planting material production, and regulating plant quarantine, soil conservation, and pesticides. The department manages three research institutes, each dedicated for rice, field crops, and horticulture. The RRDI (Rice Research and Development Institute) is the leading institute responsible for research and development in the rice sector. There are five other research centres, managed also by the Agriculture Department undertaking research in rice. The Department of Agrarian Development is the responsible body for providing supply services for agriculture schemes. The services include agriculture loans and marketing, supply of agriculture inputs, minor improvement in irrigation, and price control. The department is also responsible for formulating and implementing agrarian law, strengthening and developing farmer institutions, agricultural land management, and water resources management, distributing of subsidized fertilizers to farmers.

Until the 1970s extension was primarily the responsibility of the Department of Agriculture. During the following decades the service experiment major shifts in administration between public

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10 Towards the end of the 19th century, the British recruited the first few agriculture instructors (AI), who worked directly under the government agents. In 1912, the Department of Agriculture was established, mainly to cater the plantation sector and in early 1920s the extension service was
administration and agricultural administration. With the establishment of dedicated departments to livestock and export crops in 1972, the responsibility of extension was delegated to the respective departments. During the same period, the Mahaweli Development Authority was established under the Mahaweli River Development Scheme. All agricultural development activities including extension in the Mahaweli Development Area were handed over to the jurisdiction of Mahaweli Development Authority. Under the 13th amendment to the constitution in 1987, the authority over agriculture with the exception of command areas under major irrigation schemes was devolved to the provincial councils. The extension service responsibilities left with the Department of Agriculture was further divided up between the administration of the agriculture department and the provincial councils. In 2005 and 2006 the Department of Agrarian Development admitted new recruits as Agricultural Production and Research Assistants, entrusting the role with some responsibility in extension. Therefore extension services provided for non-plantation crops at present come under the administrations of the Department of Agriculture, Provincial Councils, Mahaweli Authority and Department of Agrarian Development. Extension officers recruited by the Department of Agriculture, Provincial Councils and Mahaweli Authority either hold a diploma or a degree in agricultural science.\(^\text{11}\) (Mahaliyanaarachchi 2002; Hathurusinghe 2010).

### 2.4.2.5 Evolution of the fertilizer subsidy scheme in Sri Lanka

In 1962 the government led by Sri Lanka Freedom Party introduced a fertilizer subsidy scheme. The objective of the government was to increase rice productivity by encouraging the cultivation of high yielding varieties in place of the traditional rice varieties that were in use at the time. High yielding varieties were highly responsive to chemical fertilizers. The subsidy was intended for making fertilizer available at prices as cheaply as possible. Low fertilizer prices were expected to reduce cost of production. The rationale behind the subsidy was that reduced cost of production, depending on the elasticity of substitution, income effect and elasticity of supply of other inputs would trigger an increase in the demand for fertilizer and other inputs. Given adequate availability of inputs to meet the increased demand and the effective use of the inputs by farmers, the food production was bound to increase (Ekanayake 2006). Fertilizer subsidy scheme underwent various amendments and revisions under various governments (Table 2.1). The evolution of the Fertilizer Subsidy scheme can be identified into five distinct phases.

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\(^{11}\) Seven universities in Sri Lanka, all state-owned, offer agriculture as a subject stream, including three with designated agriculture schools that offer a four-year degree programme in agriculture.
1. Period I – Subsidy provided for three main fertilizers (1962–1989)

At instigation the subsidy rate was fixed and was limited to rice. All three N-P-K fertilizers, including urea, SOP (Sulphate of Ammonia), MOP (Muriate of Potash), TSP, and rock phosphate were subsidized (Ekanayake 2006; Wickramasinghe et al. 2009; Weerahewa et al. 2010). Until 1975, different fertilizer types were subsidized at different rates for different crops. This scheme allowed unauthorized leakages between different crop sub sectors and in response to this problem, the government introduced a uniform subsidy scheme for all crop sectors in 1975 (Ekanayake 2006). The Subsidy was subjected to revision over time. From 1971 until 1977 Ceylon Fertilizer Corporation owned the monopoly of fertilizer importation and the private sector was banned from any involvement.

During 1976-79 the subsidy was uniform across all fertilizer types. In 1978 the subsidy was maintained at 50% of the c.i.f (cost, insurance, and freight) price and in 1979 the subsidy was increased to 85% of the c.i.f price for urea and 75% of c.i.f price for MOP and TSP. In 1981 owing to an increase in prices in the world fertilizer markets and the depreciation of the rupee, the fertilizer prices were adjusted accordingly. Urea and MOP was fixed at 65% of c.i.f price and TSP was fixed at 40% of the c.i.f price. Following a sharp escalation of fertilizer prices in the international market prices of all three major fertilizers increased. In response the subsidy rates were reduced by around 30% in 1988. In addition the subsidy for SOP and rock phosphate was eliminated. Paddy prices continued to increase and the government increased the guaranteed price in order to cushion the farmers from the rising fertilizer prices. In 1977 the ban on the private sectors involvement in fertilizer importation was lifted and in the following year the National Fertilizer Secretariat was given the authority in administering the fertilizer subsidy program and determining the retail prices of fertilizers. These fertilizer prices were not revised until 1988 (Ekanayake 2006; Wickramasinghe et al. 2009).


During the late 80s the government faced extreme difficulties in maintaining fertilizer prices at the subsidized rates. Increasing prices in the international fertilizer markets, rising oil prices and depreciation of the exchange rate posed key obstacles in generating the necessary budgetary allocations. The loan agreement signed in 1989 with the World Bank and the IMF, compelled the newly elected UNP government to remove the subsidy (Ekanayake 2006). As a result with effect from 1 January 1990 the fertilizer subsidy scheme was completely withdrawn (Ekanayake 2006; Wickramasinghe et al. 2009; Weerahewa et al. 2010). Following the removal of fertilizer subsidy there was sharp escalation of fertilizer prices in the open market (Ekanayake 2006). The private
sector was permitted to carry out fertilizer marketing alongside government agencies. Fertilizer prices were aligned with the prices in the world fertilizer markets (Gunawardana and Somaratne 2000). But in order to moderate the impacts of the withdrawal of the subsidy, the government made an upward revision in the guaranteed price scheme price for paddy (Ekanayake 2006).


The fertilizer subsidy was immediately reinstated by the Sri Lanka Freedom party coalition government elected in 1994 (Ekanayake 2006; Weerahewa et al. 2010). Reinstatement of the subsidy constituted a crucial election pledge in the government’s mandate. The subsidy was granted for urea, SOP, MOP, and TSP covering all crops under a fixed rate. Later in 1996 the subsidy on SOP was eliminated (Weerahewa et al. 2010).

4. 3. Period IV – Subsidy provided only for Urea (1997–2005)

In an attempt to balance the fiscal burden on the economy and the welfare of the rice farmers, in 1997 the fertilizer subsidy was restricted to Urea. The purpose of the revision was to orientate the benefits of the subsidy towards rice farmers. This scheme was subjected to revision on a seasonal basis and the subsidy was determined by either fixing the selling price or by fixing the subsidy component. The former permitted a variation in the subsidy component subject to import prices whereas the latter permitted a variation in the selling price. The government continued switching between different fixing schemes to suit the existing political economy. For example in the late 1990s the selling price was fixed with the intension of protecting the farmers from price fluctuations. With a fixed pricing scheme there was no incentive for the importers for importing fertilizer at times when the prices in the world fertilizer markets were low. The government’s reaction was to fix the subsidy component allowing price for fluctuations determined by the markets. High prices in the world fertilizer markets resulted in an increase in production costs. In response the government to returned to fixing the retail price in 2004. This continued until December 2005.

5. Period V– Subsidy provided for three main fertilizers (2005–present)

In December 2005, the newly elected government extended the subsidy scheme covering all types of fertilizer, under a fixed selling price. However, this scheme was restricted for paddy farmers. In 2006 small holder farmers cultivating less than 1 hectare of land in tea, rubber and coconut were included in the subsidy scheme. In 2009 the fertilizer policy was coupled with a paddy procurement policy. The coupling of the two policies required the farmers to sell a fixed share of the harvest to the government under the guaranteed price scheme (National Fertilizer Secretariat 2011). The
current subsidy scheme is discussed below in detail. This study was conducted entirely in this period.

Table 2.1  The chronology of the fertilizer subsidy program in Sri Lanka

<table>
<thead>
<tr>
<th>Period</th>
<th>Fertilizer Type</th>
<th>Rice</th>
<th>N, P, K</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-1975</td>
<td>N, P, K</td>
<td>Rice</td>
<td>Different retail prizes for different fertilizer types</td>
<td></td>
</tr>
<tr>
<td>1976-1989</td>
<td>N, P, K</td>
<td>All crops</td>
<td>A uniform subsidy (at 33%)</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>N, P, K</td>
<td>Rice</td>
<td>85% for urea 75% for other fertilizers</td>
<td></td>
</tr>
<tr>
<td>1983-1987</td>
<td>N, P, K</td>
<td>Rice</td>
<td>(Variable subsidy policy; although not announced) Fixed fertilizer prices regardless of world market price fluctuations</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>N, P, K</td>
<td>Rice</td>
<td>World fertilizer market prices increased significantly. Therefore the subsidy rates were reduced</td>
<td></td>
</tr>
<tr>
<td>1990-1994</td>
<td>-</td>
<td>-</td>
<td>Fertilizer subsidy scheme was completely eliminated</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>N, P, K</td>
<td>Rice</td>
<td>Urea, SOP, MOP, and TSP came under the variable subsidy program leading to a fixed retail price levels</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>N, P, K</td>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997-2002</td>
<td>N</td>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>N</td>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>N</td>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>N, P, K</td>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006-2011</td>
<td>N, P, K</td>
<td>Rice</td>
<td>Fixed price. Targeted only to small paddy farmers (owners or tenants) who controls less than 5 acres of land.</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Ekanayake 2006; Wickramasinghe et al. 2009; Weerahewa et al. 2010

2.4.3  The Administration of the Current Rice Fertilizer Subsidy Scheme

The National Fertilizer Secretariat, which functions under the Ministry of Agriculture, is the authoritative body responsible for coordinating all activities relating to importation and distribution of subsidised fertilizers. The National Fertilizer Secretariat, through the Agrarian Department, collects estimates of the fertilizer requirements and invites tenders from registered suppliers of the government fertilizer companies. The sole responsibility of importing, wholesale marketing, and delivery of fertilizers to the village distribution centres, lies with the two government fertilizer companies, the Ceylon Fertilizer Cooperation and the Colombo Commercial Fertilizer Company. Before the introduction of the current subsidy scheme, both state and private sector were involved in importing and distributing subsidised fertilizers. By the 2007 Yala season, the private sector had fully withdrawn from its involvement in handling subsidised fertilizers. But the private sector still
continues to cater the other fertilizers needs in the country. This has created a dual market system where the state, runs the subsidized fertilizer market for smallholder rice farmers while in parallel the private sector runs the open market trade of other fertilizer needs (Wickramasinghe et al. 2009).

At the start of the new subsidy scheme, the responsibility of distributing of fertilizers to farmers was shared among the Department of Agrarian Development, Mahaweli Authority, Cooperative Societies, and private companies. Since the second cultivation season from the start of the current subsidy scheme, the Department of Agrarian Development assumed the responsibility of distribution fertilizers to the farmers. The Department of Agrarian Development delivers the routine services through its network of Agrarian Service Centres at the village level. These Agrarian Service Centres, through farmer organisations carry out the distribution of subsidised fertilizers to the farmers. The Agricultural Production and Research Assistants, attached to Agrarian Service Centres, act as the primary contact between the state and the farmers. These officers oversee the extension activities related to the distribution of fertilizers including the issuing of fertilizer subsidy applications and in deciding eligibility (Wickramasinghe et al. 2009; Weerahewa et al. 2010; National Fertilizer Secretariat 2011).

Based on the fertilizer recommendation adopted by Fertilizer Secretariat, each farmer receives a bundle of fertilizers proportional to the cultivated rice acreage. Fertilizer recommendation adopted by Fertilizer Secretariat derives from the Department of Agriculture’s 2001 fertilizer recommendation. In making the recommendation, department has taken three factors into account-the agro-climatic zone, yield potential, and the age of cultivars. Deriving from this, fertilizer issues under the current subsidy scheme provide fertilizers considering a maximum yield potential determined by the irrigation regime and agro-climatic zone.

6. Yield potential under different agro-climatic zones

For the purpose of making fertilizer recommendations for rice, The Department of Agriculture has identified four agro-climatic zones. Table 2.2 lists these agro-climatic zones and the maximum yield potential forecast for each zone (Amityagoda 2007).
Table 2.2  The guide of maximum yield potential forecast for each climatic zone used in making the fertilizer recommendation

<table>
<thead>
<tr>
<th>Climatic zone</th>
<th>Maximum yield potential forecast (bushels/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry and intermediate zone</td>
<td>140\textsuperscript{12}, 120\textsuperscript{13}, 100\textsuperscript{14}</td>
</tr>
<tr>
<td>Up country and mid-country wet and intermediate zones</td>
<td>80\textsuperscript{15} - 100</td>
</tr>
<tr>
<td>Low-country wet zone-mineral soil group I</td>
<td>80</td>
</tr>
<tr>
<td>Low-country wet zone-mineral soil group II (high)</td>
<td>80-100</td>
</tr>
</tbody>
</table>

Source: Amitiyagoda 2007

Within each agro-climatic zone, the maximum yield potential varies by the irrigation regime. Based on these factors Fertilizer Secretariat has adopted the fertilizer recommendation given in Table 2.3. The recommendation for cultivation under irrigated schemes in the dry and intermediate zone is based on a yield potential of 140 bushels per acre for the major regime and 120 bushels per acre for the minor regime. Under the rain-fed regime the yield forecast is 100 bushels per acre.

Table 2.3  Fertilizer provisioning under the subsidy scheme for cultivation zones identified by climate and irrigation regime

<table>
<thead>
<tr>
<th>Agro-climatic Zone</th>
<th>Irrigation regime</th>
<th>Fertilizer amounts in kg/hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry and intermediate zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Major</td>
<td>Urea</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>312.5</td>
</tr>
<tr>
<td></td>
<td>Rain-fed</td>
<td>265.0</td>
</tr>
<tr>
<td>Mid-country wet zone, up-country dry zone, low-country wet zone with high potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irrigated</td>
<td>312.5</td>
</tr>
<tr>
<td></td>
<td>Rain-fed</td>
<td>265.0</td>
</tr>
<tr>
<td>Up-country wet zone</td>
<td>All</td>
<td>175.0</td>
</tr>
<tr>
<td>Low-country wet zone</td>
<td>All</td>
<td>137.5</td>
</tr>
</tbody>
</table>

Source: Secretary to the Ministry of Agriculture Development and Agrarian Services 2008

In order to increase the use of organic matter in 2009 the government amended the subsidy scheme by making the use of compost compulsory. According to the circular, to obtain fertilizers under the subsidy scheme, a farmer must confirm the use of straw and organic fertilizer in rice cultivation. Under section 5 titled chemical fertilizer recommendation, organic fertilizer use, and correct fertilizer trading, the circular further states the following (National Fertilizer Secretariat 2011).

\textsuperscript{12} 7217 kg/ha  
\textsuperscript{13} 6186 kg/ha  
\textsuperscript{14} 5155 kg/ha  
\textsuperscript{15} 4124 kg/ha
5.1. In order to increase yields in an environmentally friendly manner, when distributing fertilizer under the subsidy scheme, it is essential for the Agricultural Production and Research Assistants to undertake actions, subject to the technical advice of Agriculture Inspectors, to encourage farmers to use straw and organic fertilizers. It further states

5.2 In order to encourage farmers to use straw and organic fertilizers for increasing yields, chemical fertilizers should be supplied to those farmers who are entitled to receive subsidised fertilizer, only after confirming that the farmers have made all arrangements to use straw and organic fertilizers.

5.3 This must be implemented by educating the farmer community accurately and clearly, that according to the national policy to encourage the use of straw and organic fertilizers to obtain higher yields in an environmentally friendly manner, it is only in the interest of farmers but no attempt to limit the chemical fertilizers provided under the subsidy. (National Fertilizer Secretariat 2011)

Apart from this, the circular does not state any other information about the use of straw and organic fertilizers. While the circular states “straw and organic fertilizers” it does not qualify organic fertilizers. Therefore, what qualifies as organic fertilizers, the amount of straw and organic fertilizers to be used and in what frequency, remains unclear.

2.5 The Importance of Rice

Internalised social values have profound implications for understanding the spread and the practice of agriculture, and in this case rice. Anthropologists, trace the impacts of food preference on the human–nature relationship back to the end of the Holocene, some 10,000 years ago, into the beginnings of plant domestication. Be it a stark revolution or a gradual transition (Smith 2006) the early agriculturists of the Neolithic learnt how to control plant reproduction. They chose which plants to harbour and propagate. During the early stages, these choices were based on the size of the edible portion, ease of harvests, resistance to pests and storability. Taste, bitterness, and the amount of toxins available in the plant also played an important role in this (Fuller 2011b). But further down the time line, social values became an important determinant in shaping up food preferences (Fuller 2007, 2011b). This section traces how such social values shaped up the rice preference in Sri Lanka. The chapter, throughout, noted a rice-bias in the agriculture policy of Sri Lanka and also elsewhere in Asia. So what internalised social values made rice special? This warrants an answer,
before moving on to any conclusions on, ‘the social, political, and economic dynamics that have shaped the rice fertilizer subsidy policy in Sri Lanka’.

### 2.5.1 Rice and Nutrition

As noted in Chapter 1, rice is the staple food of Sri Lankans. On an average, it contributes to about 1000 kilo calories of the daily food intake and satisfies 41.4% of the total calorie requirement (Figure 2.1) and 32.7% of the protein requirement (Figure 2.2) (FAO 2012). Like in many other Asian countries, Sri Lankans eat rice two-three times a day (De Silva and Yamao 2009). In 2009-2010, per capita rice consumption in Sri Lanka was 108.74 kilograms (Department of Census and Statistics 2011). According to the Director of the Agriculture Division of the Statistics Department, this figure can be even higher, totalling up to 114 kilograms per year (Mudugamuwa 2010). Fluctuations in per capita rice consumption mainly depend on price fluctuations of rice, bread and wheat flour, the According to FAO statistics (2012), which do not agree fully with the consumption figures reported locally, Sri Lanka is just behind the top ten per capita rice consumers in the world (Table 2.4). Annual per capita rice consumption of rice in Sri Lanka ranges between 108-114 kg (Mudugamuwa 2010; Department of Census and Statistics 2011; FAO 2012).

![Figure 2.1 Average daily caloric intake of a Sri Lankan in 2009](source: FAO 2012)
Figure 2.2  Average daily protein supply of a Sri Lankan in 2009
Source: FAO 2012

Table 2.4  Rice supply quantity in 2007

<table>
<thead>
<tr>
<th>Country ranking in per capita rice consumption</th>
<th>Rice supply (g/capita/day)</th>
<th>Percentage of daily caloric intake sustained by rice (%)</th>
<th>Total food supply (kcal/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Brunei Darussalam</td>
<td>671.06</td>
<td>26.58</td>
<td>3012</td>
</tr>
<tr>
<td>2 Viet Nam</td>
<td>453.57</td>
<td>57.85</td>
<td>2637</td>
</tr>
<tr>
<td>3 Lao People's Democratic Republic</td>
<td>445.49</td>
<td>64.23</td>
<td>2287</td>
</tr>
<tr>
<td>4 Bangladesh</td>
<td>437.60</td>
<td>69.76</td>
<td>2455</td>
</tr>
<tr>
<td>5 Myanmar</td>
<td>429.96</td>
<td>54.45</td>
<td>2435</td>
</tr>
<tr>
<td>6 Cambodia</td>
<td>417.03</td>
<td>64.07</td>
<td>2372</td>
</tr>
<tr>
<td>7 Philippines</td>
<td>354.22</td>
<td>49.56</td>
<td>2609</td>
</tr>
<tr>
<td>8 Indonesia</td>
<td>343.23</td>
<td>48.77</td>
<td>2546</td>
</tr>
<tr>
<td>9 Thailand</td>
<td>282.43</td>
<td>40.34</td>
<td>2877</td>
</tr>
<tr>
<td>10 Madagascar</td>
<td>279.60</td>
<td>48.06</td>
<td>2157</td>
</tr>
<tr>
<td>11 Sri Lanka</td>
<td>266.62</td>
<td>39.90</td>
<td>2399</td>
</tr>
</tbody>
</table>

Author calculations from FAO (2012) food supply data

Among all cereals, rice is a superior source of energy. Despite being low in riboflavin and thiamine, rice alone can meet the daily carbohydrate and protein needs of the labouring poor (Bray 1986; Chang 2000). The protein content of rice is relatively low, but in net protein utilization rice ranks higher. Among all grains, protein quality\(^{16}\) of rice (66%) is only second to that of oats (68%) and is

---
\(^{16}\) The level at which the nutritional amounts of essential amino acids needed for overall body health, maintenance and growth is provided
well above that of whole wheat (53%) and corn (49%). However, when milled, rice looses nearly 50% of its vitamin B complex and iron (Chang 2000). In Sri Lanka, all rice varieties sold in the markets are milled. But the red variety, known as ‘Kekulu’ is incorrectly, equated to brown rice by the government and as well by scholars (Atukorale 2003; De Silva and Yamao 2009). The alleged nutritional advantage of red ‘Kekulu’ rice over other varieties, is therefore ill found (Chang 2000; Breckenridge 2002).

Bread has always been considered inferior to rice both in status and nutrition. In the fast moving urban areas, bread is an easy alternative for rice. In the rural parts bread is still considered inferior to rice and is only the poor alternative when rice is unaffordable. Especially among farmers, consuming their own rice involves dignity and pride. There is symbolic pride in being able to feed the family with rice grown in your own field. The alternative staples such as hoppers, string hoppers, and pittu were originally made with rice four and later with the ready availability of wheat flour in the markets; rice flour was substituted with wheat flour as a cheap and easy alternative. In Sri Lanka, wheat accounts for 12.4% of the daily caloric intake. When considering some other South Asian counterparts, in India 21.2% of the daily caloric intake consists of wheat while in Pakistan it is high as 36.1% (calculated from 2009 food balance sheets, FAO (2012). Both India and Pakistan are also among the top ten wheat producers in the world (FAO 2012). However in recent times there is revived impetus for substituting wheat flour products with rice and rice flour.

2.5.2 Suitability of the Rice Crop

Rice is a self-supporting semi-aquatic plant that is extremely adaptable. The seeds have the ability to germinate under both aerobic and anaerobic conditions. The plant has an efficient system of air passage, a series of air-conducting aerenchymatous tissues which permits air supply through to the roots, under continuous flooding. These unique characteristics enable the plant to grow in a wide range of habitats, dry uplands, irrigated fields and flooded river beds (Bray 1986). Its water requirement through the growing cycle coincides with the monsoon rains. Even under adverse conditions, rice produces relatively high yields. If the water supply is adequate, without any mineral fertilizers, naturally occurring nitrogen fixing organisms can enable around two tonnes of paddy per hectare. For these reasons, rice is the only subsistence crop that grows in poorly drained soils without the external application of nitrogen fertilizers (Bray 1986; Greenland 1997; Khush 1997; Chang 2000).
2.5.3 Rice and Culture

Rice as food and crop in central to the identities of many Asian Societies, indeed most mainstream state cultures in East, Southeast, and South Asia, from Japanese to Sichuanese, to the Thai or Sri Lankan Sinhala, see rice as a core part of their cultural tradition. (Fuller 2011a)

The known histories of these traditions go as far back as the recorded history. For example, the South Asian literary record throughout its trajectory, starting from the tenth century BC, treats rice with remarkable significance. Rig Veda, later supplemented by Buddhist and Jainist texts, and the epic poems of Mahabharata and Ramayana, make many references to the ritual, medicinal, and social value of rice. According to these texts rice was the staple of both humans and deities. It was also the luxury food of feasts and various sacred offerings (Kumar 1988; Smith 1992). The production process of rice was similarly, consecrated with ritual and formality.

Every single step of the rice cropping cycle, be it ploughing, weeding, calling out for rains, inducing grain formation, harvesting, threshing, or storage, is consecrated with a ritual somewhere in Asia. Often, these rituals served two purposes - one was to bolster hard labour and two was to pray for supernatural protection for the crop. They consisted of traditional rites that often follow with festivities enabling opportunities for communal celebrations. In Sri Lanka rice is a symbol of prosperity, wealth, and fertility. The ploughing festival (vap magula) and the harvesting festival (aluth sahal mangallaya) are the most prominent occasions celebrated with ritual. The vap magula marks the beginning of the new farming season with clearing and breaking of the ground and ploughing. Therefore, as O’Connor (2011) notes, the slow and steady “rizification” of Asia, created cultures where “rice” meant “food” and growing rice became a total social phenomenon.

2.5.4 Rice as a Shared Food Preference

Food is special (Bourdieu 1998). It is an expression of identity, a social enterprise, an economic resource, a cultural symbol, and a religious and ritual influence (Curet and Pestle 2010). In these many roles, food bridges the constructed gap between culture and nature (Pearson 2003). But what sets food apart from those other everyday goods such as “houses, pots, masks, [and] clothing” (Appadurai 1981)? Appadurai (1981) traces this “semiotic virtuosity” of food in two sources: First, is in the “never-ending pressure to produce or acquire” food, reminded by the “daily pressure to cook” it - food is a perishable good that is in constant demand. Second, is in the capacity of food to “mobilize strong emotions”. These cultural expressions of food may hold some clues to
understanding agricultural subsidies on food crops, as in the case of the rice fertilizer subsidy in Sri Lanka.

Nevertheless, some foods are more special. They are the so called luxury foods or high-status foods. “These are not specific items of food, but rather those foods that in any particular place and time are regarded an indulgence and a status indicator”(van der Veen 2003). Labour intensive processing and the diversity of forms in which they are cooked or displayed elevated their status (Leach 2010). Even when abundant, these foods did not diminish in appeal (Hastorf 2003; Leach 2003; Curet and Pestle 2010). The food that assumed these roles for the Asians was rice (Bray 1986; Latham 1998) and they treated it with both moral and social value (Smith 2006).

When such food preferences are society-wide, they get expressed in the daily practices at every level in consumption, preparation, and production of that food. These involve decisions not only about who eats what and in what quantities but also about the household allocation of labour in growing and processing food. In a simple society these decisions would be made within the household. But in a complex society with hierarchical structures such decisions come under the influence of wider social authority. In result, food choice no longer remains a household choice but becomes a communal choice (Smith 2006). Concerning rice, whether the choice is a communal or a forced upon by the rulers, has remained a topic of debate among anthropologists for decades.

Earlier authors hypothesised that it was a choice forced upon the community by the rulers. Wittfogel (1957), was among the forerunners who held the view that “the hydraulic empire” in Asia was built upon despotic power regimes. According to his theory, the state was seen as an entity operating under a “monopoly of force”, having the sole control over military power and judicial mechanisms. Hence, in a despotic power regime, the political leadership summoned the services of the followers by force. However, the benefits were not mutual. Considering the addictive nature with which rice spread, the small-scale intricacies of wet rice cultivation, and the way rice re-organised everyday life of the Asians around itself, subsequent authors dismissed such dictatorship. Lasting production of the same food stuff, the process of cultivation and the building and maintaining of dedicated hydraulic networks required labour investments at multiple levels and over long periods of times. Unlike in warfare, where the pay-off for the commoners was uncertain, the benefits of these agricultural investments were perceived by many. Such long-running services carrying widespread utility entailed a level of consensus among the rulers and followers.

Anthropologists of more recent times therefore, argue that the rice centred hydraulic empire of Asia was a shared interest between the leadership and the followers, vested in increasing the production of a preferred food (Smith 2006; O’Connor 2011). While, considering the shared preference for rice as an imposed false consciousness, may deny the presence of individuals and households in the
value system, the possibility of active manipulation, a manifestation of any food system, cannot be ruled out (Nestle 2007).

2.6 Conclusions

As noted in the introduction to this chapter, its purpose was to establish a logic between the “already known” and the “to be known”. In attempting this, the chapter aimed at two goals. One of them was to explain the relevance of the research questions to addressing the problem.

This chapter extended the argument in Chapter 1 that the current definition of the problem is too focused on gains and losses so that the nature and cause of subsidising is often lost in the purpose of the subsidy itself and the vested interests of the rulers. The chapter identified a number of other elements that expanded the problem space of the rice fertilizer subsidy of Sri Lanka into new domains within history, culture, food, social norms, and national vitality. Among these elements were a history built upon irrigated rice cultivation, a food preference for rice, a way of life ingrained in rice—both as food and crop, a consideration of welfare as an entitlement, a striving for self-sufficiency as a means of limiting foreign power leverages, an antipathy toward the foreign, and a nostalgia for the lost prosperity of the ancient times. In these interactions, not only rulers who ‘give’, but followers who channel their interests to constitute and mediate what they receive were also present. These components welcomed a new interpretation of the problem that would assess the contributions of different stakeholders to the development of the problem and the context in which those developments would occur. This verified the need to address the problem as a socio-political project and gave credence to the relevance of the research questions.

A second goal of this chapter was to resolve RQ1. While locating the problem in Section 1.4, Chapter 1 made a start to this by establishing the current operational space of agriculture in Sri Lanka with a special emphasis on the rice sector. This chapter was built on that to complete an answer to the question. The socio-political drivers that have shaped the rice fertilizer subsidy in Sri Lanka are rooted in the importance of rice in Sri Lankan culture both as a food and a crop. The dietary significance of rice as well as the socio-cultural significance of its cultivating predated the recorded history and were common across most parts of Asia. Further, the ancient hydraulic civilisation of Sri Lanka, which is considered to have been among the best of the time and brought agricultural, economic, and aesthetic prosperity to the country was built upon the cultivation of rice. Sinhalese revere this history with pride. On the other hand, they resent the lasting effects on the country’s political, land, and social constituency claimed to have been brought about by the fall of this civilisation and the subsequent European invasions. These ideals have created nostalgia for
reviving the perceived economic prosperity of the time through similar advancements in irrigation
and agriculture and an antipathy toward the foreign. Therefore, rice has always been socially
sensitive and politically charged both as food and crop, that support for rice whether in the form of
fertilizer or any other form, has been socially acceptable, and politically rewarding.

The key economic dynamic that has shaped the rice fertilizer subsidy in Sri Lanka was the role of
rice in the Sri Lankan economy. Among other crops, rice makes the most contribution to the
agricultural GDP and the workforce and has always received state support that was unparalleled by
any other crop. Achieving self-sufficiency in rice has been a key priority of the agriculture policy
since independence and the economic policy has always complied. All Sri Lankan governments
have invested more in promoting rice than any other crop. These investments in rice included large
scale investments in irrigation, land consolidation projects, free provisioning of irrigation and
extension, subsidising fertilizer, protection from import competition, price support, and dedicated
state procuring and distribution systems. The fertilizer subsidy for rice was only one of the many
measures of state patronage given to the crop. In addition from time to time welfare food stamps
were given on rice and it has been a common denominator that has been the subject of state welfare
both as food and crop.

At large, these were the key social, political, and economic dynamics that constitute the rice
fertilizer subsidy policy in Sri Lanka. Having identified relevant spaces for its broader exploring,
the next task is to fill in the gaps in these new spaces. The following chapter explains the
methodology of this undertaking.
Chapter 3 Methodology

Would you measure by your rules something that is not governed by them? Forget your own guidelines; seek first for the appropriate rules.

Die Meistersinger: Act I

3.1 Introduction

There is more than one way to make sense of things. The way we make sense of things depends on the meanings we attach to what we observe. Depending on the frames of references used, in the process from observation to interpretation, the derived meanings may vary (Babbie 2007). In everyday life this is an unconscious effort. But in research it is a conscious effort directed toward in being able to track how and why the derived meanings were arrived at and will they stand scrutiny. The purpose of the chapter is to disclose how this was applied to my study.

The chapter is organised into five sections. In Section 3.2, I locate myself by briefly explaining my background and its connection to my approach to research. Section 3.3 locates the philosophical underpinnings of the models used in guiding and designing this study. Thereby it makes case for how the process of observation was designed to best answer the research questions stated in Section 1.6. The study design and methods are described next in Section 3.4. Section 3.5 concludes the chapter by summarising the study design and its rationale.

3.2 Personal Construct of Worldviews

Every researcher brings in a set of values and preferences to research (Lincoln and Guba 1985; Creswell 2007). Although it is ideal to avoid such predispositions, its influence cannot be totally removed. They guide and shape the methodology from the very beginning. The choice of research problem, its definition, the direction, and the context of the research questions are essentially influenced by the values and preferences that a researcher brings into the research (Strauss and Corbin 1990). These values and preferences reflect the interaction and interplay of disciplinary backgrounds, research training, and worldviews (Creswell 2009). Here I reveal mine, acknowledging that they may have influenced the study design in some way or another. It also provides a logical foundation to adopting the methodology pursued in this research.
My educational background, research training, and work experience all stem from experimental science. I received my research training in ecology and ornithology. I worked as a research coordinator in clinical medicine and epidemiology. Therefore, my earlier experiences of research and science in my undergraduate and working years were limited within the scopes of positivist science. It was only during my postgraduate training that I became more and more aware of the social complexities involved in natural resource management. In the challenge of understanding and solving resource management problems, the experimental design I was so familiar with until then, proved inadequate. I came to realise that there are different ways to asking questions and different ways to seeking solutions.

3.3 The Different Frames of References

Is knowledge a single reality or are there multiple realities? Is knowledge independent from knowing or is it always a mental construction or is sensory experience its primary source? Is there a unity between natural and social sciences? What is a reliable discovery, is it a confirming instance, or is it only an instance that has not been refuted yet? Is objectivity a property of an individual researcher or an emergent property of scientific practice? Are all observations equally good? For over centuries philosophers have debated these questions. The variety of answers to these questions has resulted in a variety of models about our understanding of knowledge - what constitute knowledge, how one can go about finding it, and what methods to be used.

On one end positivism, which has its roots in the natural sciences, seeks a single objective reality, which can be known through direct experience or observation. Positivism is empiricist in asserting that, experience itself is the primary source of all knowledge (Carey 2008). Its purpose is to identify and understand the causes that influence outcomes. Based on a priori theories, numeric measures of observation are used to collect value-free facts. Founded on facts, the empirical regularities establish the causal relations. In the positivist view science becomes credible and possible because every scientist who investigates the same phenomenon observes the same reality (Robson 2002; Creswell 2009). But it has long been accepted that the methods used to study “the social world of self-conscious agents” could not be as same as the methods used in the natural sciences. Positivism, despite being dismissed as a coherent philosophy, its elements are very much present in the anti-positivist analytical approaches such as the search for universal causal laws as in analytic induction, verification as in grounded theory, and strict empiricism as in conversation analysis. Moreover, the positivist rhetoric still prevail in many science disciplines (Madill 2008).
Post-positivism retains the idea of objective truth, but accepts that it can be “apprehended only imperfectly and probabilistically” (Madill 2008). Therefore, the ontological stance of post-positivism is similar to that of positivism, but the epistemological stance is less stringent. It accepts multiple perspectives and permits qualitative inquiry, but does so within the rigorous methods of data collection and analysis carried on from the reductionist approach of positivism (Corman 2009; Creswell 2009).

On the other extreme the constructivists refute the notion of absolute truth and maintain that there is no eternal reality independent of human consciousness. According to this stance, science is only a single cultural tradition among many. Constructivist ontology is characterised by socially constructed multiple realities, with subjective meanings negotiated and formed through historical and social interactions (Feyerabend 1978; Lincoln and Guba 1985; Denzin and Lincoln 2000b). These multiple realities, according to the theory are equally valid and equally real (Denzin and Lincoln 2000a; Mertens 2003; Creswell 2009). The purpose of the research in constructivist worldview is therefore, to understand these meanings and interpretations in the participants view through open, in-depth qualitative inquiry (Robson 2002; Creswell 2009).

To these debates or the so called ‘paradigm wars’, pragmatism offered some reconciliation (Robson 2002). It asserts that there can be no absolute proof of beliefs, but until justified, there is no reason to be sceptical about beliefs that hold up in experience. In pragmatism, meaning and truth of concepts, beliefs, and propositions are best clarified by looking into their practical importance arising from actions, situations, and consequences rather than antecedent conditions. Instead of strictly adhering to a definite model, pragmatism prescribes to adapt to ‘what-works’ (Patton 1990; Maxcy 2003; Creswell 2009; Liszka 2012). The research questions dictate the method of inquiry. The logic of inquiry includes induction, deduction, and abduction. Rather than constraining the choice of methods, as traditional dualism does, permission for multiple approaches in pragmatism offers the best chance for an inclusive and complementary answer (Johnson and Onwuegbuzie 2004).

The research design adopted in this study did not limit itself to a single model and adopted a pragmatic approach. Its ontological and epistemological orientation derived from post-positivism and critical realism. Also relevant to the study was systems thinking. Systems thinking is a conceptual framework, whose role in relation to the other frameworks considered can be integrated (Checkland 1981; Aplin 2002; Checkland and Poulter 2010). From an epistemological point, the study relied on systems thinking in delimiting its scope-considering larger conceptual spaces over longer timeframes, integrating social, political, and economic, factoring in uncertainty and change, and working beyond conventional institutional boundaries (Grumbine 1994; Christensen et al.
Both quantitative and qualitative inquiry methods were complemented in collecting data and the findings were integrated to facilitate interpretation.

In the first stage, the exploratory nature of qualitative inquiry facilitated the identification of most relevant variables that were later measured through quantitative inquiry. Knowledge and information gathered through relevant literature including other research studies were also important in identifying the most pertinent variables (Creswell 2007). This information minimised the artificiality of the survey phase (Fontana and Fray 2000; Babbie 2007). Because the questions and the predetermined responses were based on the insights gained from the participants themselves, the initial qualitative phase improved the relevance and the appeal of the questions and responses in the survey (Creswell 2007, 2009).

In the second stage, the qualitative approach enabled learning and discovering the meanings the informants ascribed to the problem and their orientations. It facilitated rich descriptions and interpretations and adequately captured the complexity of the individual’s point of view (Denzin and Lincoln 2000a; Creswell 2007) which nomothetic approaches could not capture (Denzin and Lincoln 2000a). The qualitative knowledge also provided a basis for explaining causal theories that involved quantitative probing (Creswell 2007).

The quantitative aspect of the study on the other hand allowed generalising the findings from the sample to the population. Therefore the data derived from the quantitative phase represented the perceptions and behaviours of the farmer population in the two districts as a whole. The two methods offered alternative but not mutually exclusive research approaches, to better address the research problem (Patton 1990). Using a bottom up approach, the study then articulated this knowledge into broader themes and conceptions (Creswell and Plano Clark 2007). Through inductive reasoning the study answered the research questions (Morgan 2007; Creswell 2009).

It is important to acknowledge that the inquiry was value-bound. My presence in the choice of the problem topic, manner in which the problem was defined and framed, methods adopted, and the manner in which the results were interpreted, is undeniable (Lincoln and Guba 1985; Denzin and Lincoln 2000b). However, caution was exercised when doing this. This study avoided the ‘anything goes’ approach over endorsed by the postmodern assertion that any attempt to develop knowledge is as valid as another.
3.4 The Study Design and Methods

There were five main cycles in the study. The first cycle was primarily a design phase. A comprehensive knowledge base was compiled in this cycle by collecting various forms of information including scholarly work, policy documents, government reports, and research. Based on this knowledge, a flexible mixed method inquiry approach was developed. The second cycle was a data collection phase. This data collection cycle was intended for gaining a better understanding of the problem. As described in Section 1.2, interaction with informants in this cycle led me to recognise a more substantive issue, which had more relevance locally than the original problem. Consequently, the third cycle again became a design phase, involving a new research problem. An additional knowledge base was compiled and the inquiry methods were adapted to accommodate the new problem. A fourth cycle of data collection, followed. It was divided into two concurrent field data collection phases (Figure 3.1). The fifth and the final cycle involved the final analyses and interpretation of results. Details of data collection and analyses are explained in detail below.

![Figure 3.1 Stages of field data collection and the participating informants](image)

QuaL denotes a qualitative, and QuaN denotes quantitative

3.4.1 The Sampling Frame and Methods

The study engaged four groups of informants, rice farmers, agriculture extension officers, agriculture researchers, and agriculture bureaucrats. Rice farmers were the key target group of informants and were involved in all three legs of data collection including both qualitative and quantitative phases of the study (Figure 3.1). Agriculture researchers, bureaucrats, and extension officers were involved only in the qualitative stages, while the participation of extension officers was limited to the initial qualitative stage.
3.4.2 First Stage of Field Data Collection (04 Jan-15 Feb 2010)

In the first stage of data collection, data was collected from all four groups of participants—rice farmers, agriculture extension officers, agriculture researchers, and agriculture bureaucrats. The participants were selected through purposive sampling using an informal sampling frame (Robson 2002; Babbie 2007; Teddlie and Yu 2007). This sample was extended through snowball sampling; a process of accumulating more subjects by locating them through the networks of the initial purposive sample (Babbie 2007). These non-probabilistic sampling methods are not representative of any meaningful population but serve the purpose of addressing specific needs related to the research questions and selecting participants from whom the most can be learnt (Robson 2002; Teddlie and Yu 2007). The objective here was to select individuals who were knowledgeable in different aspects of rice farming.

Data was collected through face-to-face interviews. The interviews were semi-structured in format with a predetermined set of topics leading to open-ended questions. This allowed for in-depth discussion. The topics were subject to modification depending on what seemed rich and vivid with a particular interviewee. The exact wording, sequence, and time and attention given to each question were therefore, different from one participant to another (Robson 2002; Babbie 2007). As such the interviews were conducted in the form of a conversation with an established direction but pursued along on the topics raised by the informant (Babbie 2007).

No stringent rules were adhered to in determining the size of an interview sample. In similar studies of this nature, the sample size usually ranged around 30 cases (Teddlie and Yu 2007). The large amount of data generated in a single interview, triviality of statistical generalization, and limitations in qualitative analysis are the key reasons for maintaining a small sample size. The actual number of interviews is usually guided by the point of information saturation, when no more new information is added or gained by conducting more interviews (Glaser and Strauss 1967; Strauss and Corbin 1990). Following these guidelines, 43 semi-structured interviews were conducted with all four categories of participants producing a total of 39:37 hours. Table 3.1 lists the number of participants from each category and the transcript hours.

The data presented how the respective informants perceived problems, risks, and limitations in rice farming and their relevance to the agriculture sector, overall. It was descriptive and exploratory (Babbie 2007; Creswell and Plano Clark 2007; Creswell 2009). Therefore, despite the change in topic, the data remained relevant, and served three purposes. First, it helped broaden my understanding of the rice farming system, its capacities and limitations, in Sri Lanka. Second, it compiled the information basis to guide and develop the subsequent phases of the study—it helped
develop the study instruments used in the next stages by identifying the relevant variables (Creswell and Plano Clark 2007). Third, the findings derived from this data supported resolving the third research question, ‘what is the role, of those contributing to the formulation and managing of the rice fertilizer subsidy policy, in constituting and mediating the policy?’

<table>
<thead>
<tr>
<th>Participant Category</th>
<th>Number of Participants</th>
<th>Transcript hours (hours:minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice farmers</td>
<td>13</td>
<td>8:32</td>
</tr>
<tr>
<td>Extension officers</td>
<td>9</td>
<td>09:45</td>
</tr>
<tr>
<td>Academics and researchers in agriculture</td>
<td>14</td>
<td>15:19</td>
</tr>
<tr>
<td>Bureaucrats</td>
<td>8</td>
<td>08:31</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>18:07</td>
</tr>
</tbody>
</table>

### Table 3.1 The composition of the semi-structured interviews sample

3.4.3 Second Phase Field Data Collection (01 January-20March 2011)

The second phase of field data collection consisted of two concurrent stages – one involving qualitative data collecting through focus groups and another involving primarily quantitative data collecting through a questionnaire survey.

#### 3.4.3.1 Focus Groups

The participants in this stage included agriculture researchers specialising in agro-economics, agribusiness management, agronomy, plant breeding, and physiology and agriculture bureaucrats from the Ministry of Agriculture. The method of data collection was in the form of a group interview, a focus group. This method is employed for eliciting an open ended group discussion on a specific topic, which becomes the focus of the discussion (Robson 2002). The objective here was to initiate an in depth discussion on “the rice fertilizer subsidy in Sri Lanka”. The discussion was guided to seek answers, which would explore and explain the current fertilizer subsidy scheme and its implications for Sri Lankan agriculture. The group dynamics elicited responses emerging from unforeseen and unlikely depths and dimensions which did not manifest in interviews with individuals (Babbie 2007). The findings reconstructed from the focus groups, along with the findings reconstructed from the interviews, contributed to resolving research question three, ‘what is the role, of those contributing to the formulation and managing of the rice fertilizer subsidy policy, in constituting and mediating the policy?’
A total of three focus groups were conducted. The number of focus groups was determined by taking into account the amount of qualitative data generated and information saturation (T Teddlie and Yu 2007). No hierarchical pressures apprehending communication existed among these participants (Robson 2002). Participants were selected through purposive and snowball sampling and did not represent any meaningful population. Some participants identified in the first stage of data collection were also included in the focus groups considering the richness of their inputs in the first stage (Babbie 2007). The discussions lasted for about 1.5 hours (Table 3.2). For the first of the three focus groups my principal supervisor\textsuperscript{17} assumed the role of the moderator in guiding the discussion by maintaining the standards and an efficient flow while keeping within the bounds of the topic (Robson 2002). I assumed the role of an observer as I had no previous experience in conducting focus groups. My principal supervisor is an experienced focus group moderator and his demonstration helped me in assuming the role in subsequent focus groups. The discussions were recorded using a voice recorder.

Table 3.2 The composition of the focus group sample

<table>
<thead>
<tr>
<th>Focus Group</th>
<th>Number of Participants</th>
<th>Transcript hours (hours:minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>5</td>
<td>1:41</td>
</tr>
<tr>
<td>Two</td>
<td>7</td>
<td>1:29</td>
</tr>
<tr>
<td>Three</td>
<td>12</td>
<td>1:27</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>4:37</td>
</tr>
</tbody>
</table>

3.4.3.2 Questionnaire Survey

In this stage a questionnaire survey was conducted using probability sampling. Initially, a sample size of 200 plus was targeted, with a confidence interval of 6.75. The calculation was based on the number of rice holdings in each district. A rice holding is defined as a land used wholly or partly for agricultural production and operated under one operational status and situated within one Divisional Secretariat (Department of Census and Statistics 2012). The sample size was calculated using formula 1. But given the time constraints following 2010 January-February floods that hit Polonnaruwa twice during the sampling period, the sample size was reduced to 189. The 95% confidence level for this sample size gave a confidence interval of 7.15.

\textsuperscript{17} Prof. R J S Beeton
Formula 3.1 Formula calculating the sample size, where \( N \) is population size and \( e \) is confidence interval

\[
n = \frac{N}{1 + N(e^2)}
\]

In selecting the samples, a stratified random cluster sampling method was employed. The target population was the paddy rice farmers in the intensively cultivated dry zone. The districts reporting the highest yields under each irrigation arrangement were considered. Polonnaruwa reported the highest yields under the command of major irrigation and Kuruneagala reported the highest yields under the command of both minor and rain-fed. Therefore the sampling frame was limited to the two districts of Polonnaruwa and Kuruneagala. This sampling frame was subject to stratification based on irrigation regime, major, minor and rain-fed. The sample population was divided proportionately across each stratum. Within each stratum clusters of rice farming households were selected on a random basis. A list of GN divisions in each District under each irrigation arrangement was obtained from the district secretariat office in each district. Each GN division was assigned with a unique number that was used in district administrative purposes. These numbers span from 1 to the number equivalent to the total number of GN divisions within the district. A random numbers list (generated by Microsoft Office Excel) was used in selecting a random sample of GN divisions. The selection of the first survey respondent was opportunistic. This depended mostly on the availability of the farmer and his or her ability to commit for the survey within the next 30-40 minutes. The sample was then extended using a cluster method by recruiting three or four more neighbouring farmers. Cluster sampling does not require an exhaustive list of the sampling frame. In addition it also has the advantage of efficiency in data collection (Robson 2002; Babbie 2007).

The questionnaire was designed to collect relevant demographic, behavioural, and attitudinal data. The questions covered three major domains. The first explored sociographic and demographic information about the farmers, their farm, and the household. The second probed the current status in and the trends since the launching of the present subsidy scheme, in fertilizer usage, rice yields, and wealth. The third sought for attitudes and perceptions associated with fertilizer usage, rice yields and wealth. The questionnaire contained a total of 69 questions (Appendix 1). It included a mix of modified open-ended numerical responses, selecting a single response from a list of

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18 Grama Niladhari Divisions (Appendix 1)
possibilities, selecting multiple responses - up to three - from a list of possibilities, Likert scale responses, and simplified ranking tasks. The objective of this stage was to gauge attitudes and perceptions of rice farmers towards fertilizer usage and the subsidy. The findings from the questionnaire survey answered research question two, ‘what is the role of rice farmers in constituting and mediating the rice fertilizer subsidy policy?’

The survey was administered by me in person. The farmers were welcome to add any new response that was not included among the statements originally defined in the survey. Any additional response was noted down and was later considered in post coding. These additions ensured that the findings of the survey best reflected the farmer’s views. The frequency of each new response in relation to the frequency of other statement categories under the same question was considered in deciding whether the new response was incorporated as a separate statement or merged into the other category. The farmers were also welcome to make explanations and comment on the matters surveyed. Any additional comments or remarks of interest were noted down in full. These additional comments and remarks were treated as qualitative data.

### 3.4.4 The Methods of Analyses

The qualitative data was organised into a database using the NVivo software, version 8 (QSR International Pty Ltd. Version 8, 2008). The audio files recorded during interview and focus group sessions were imported directly into NVivo and the audio files were played back, listened to, and transcribed where necessary, using the software. The analysis involved a transformation process of turning the raw expressions of the participants into elaborate conceptual framings (Emerson et al.). From the raw data to the elaborate conceptions, the transformation process advanced through open, axial and selective coding, as detailed in (Glaser and Strauss 1967; Charmaz 1983; Strauss and Corbin 1990; Lofland et al. 2006; Corbin and Strauss 2008). During the analytic process, generic and interesting comments in the dialogue were fully transcribed. Quotes from interviews and focus groups, conducted in Sinhala were translated verbatim. Priority was given to preserving the authenticity of the original statement. However, in order to improve readability, the statements were edited where necessary, without compromising the authenticity of the expression.

In open coding, data bits were sorted into broad categories. The first step of this was to become familiar with the data, by carefully listening to the interviews a several times. Similar to the concept of ‘focussing’ as a prelude to analysis, suggested in (Lofland et al. 2006), the audio files were listened to while contemplating for possible topics of data categories. The key idea of each section of the dialogue was then noted along with its properties\(^{19}\) and dimensions\(^{20}\). Any subsidiary and

\(^{19}\) Corbin and Strauss (2008), pp. 159, 164-165
peripheral ideas, and examples brought up in connection to the key idea were also noted. Each section of the dialogue was tagged with time markers to make it easier for subsequent revisits of the analysis.

The second step was to extract and develop basic themes from the already established broad categories of ideas. At this stage, both open and axial coding was carried out conjointly. By further advancing the open coding process the data categories were reviewed to provide insight into specific ideas. Through axial coding patterns and relationships between data categories were established. This involved the use of questioning and making constant comparisons between themes (Charmaz 1983; Strauss and Corbin 1990; Corbin and Strauss 2008).

The third step of the analysis involved selective coding. At this stage, the themes that emerged from the previous stage of the analysis were advanced into generic propositions by interrelating them. The process sought for emerging patterns and typologies through repeated sorting, coding and comparison (Charmaz 1983; Strauss and Corbin 1990; Lofland et al. 2006). The basic operations involved at this analytic stage were, asking questions about the themes, making constant comparisons between the themes, considering the opposite of what was said, probing the taboo, looking for exceptions, linking to possible causes and consequences and also relating to what is established in the literature (Lofland et al. 2006; Corbin and Strauss 2008). Displacing ventriloquism, these conceptions therefore reveals the researcher’s interpretation of the data (Fine 1992).

The survey data was analyzed using SPSS (SPSS, Inc., an IBM Company, USA) version 19.0, and R (The R Foundation for Statistical Computing), version 3.0.3 software. Simple descriptive statistics were reported for each variable. Associations between variables were tested using chi-square tests and Fisher’s Exact Tests, and the variation among different fertilizer usages was tested using a mixed-effects ANOVA model. The specific details of individual tests are reported in the results chapters with explanations on from which survey questions the data was derived.

3.5 Conclusions

The study addresses a wicked problem. The research questions attempt to model a constructed reality of the problem, and to review this reality against the best knowledge available. The study therefore adopts a pragmatic approach, drawing from post-positivist and constructivist paradigms that permits an appropriate set of tools to answer the research questions. Of the two core research

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20 Ibid.
questions that involved field inquiry, one aimed at exploring the perceived effects of the fertilizer subsidy, and the other aimed at exploring the perceived drivers of the fertilizer subsidy. The answer to the former remained with a large population of farmers, who carried out farming under three different scenarios, of the subsidy scheme. The information sought by this question was an approximation of the effects of the subsidy, gauging how in general the farmers perceived the performance of the subsidy. Therefore, the ability to quantify the perceived effects and to detect trends in these perceptions across the sampled districts was important. Therefore a quantitative probabilistic sampling strategy was employed. A survey proved the most efficient in terms of time and information. Representative samples of farmers stratified by the subsidy scenarios were chosen from two selected districts. The answer to the latter remained mainly with the bureaucrats and researchers who contributed to the knowledge and policy of the rice fertilizer subsidy. This targeted group consisted of a very small restricted population. The results sought were conceptual. Therefore a theoretical sampling strategy employing qualitative methods was adopted. The different dynamics of individual interviews and group interviews augmented the depth and scope of the qualitative data. Simple descriptive statistics were used in analysing the quantitative data, and qualitative data was analysed using standard coding procedures. To answer the research questions, through inductive reasoning, the interpretations of results were synthesised by drawing upon the existing knowledge base.
Chapter 4 Farmers’ Perceived Trends in Fertilizer Use

There are things known and there are things unknown, and in between are the doors of perception
Aldous Huxley

4.1 Introduction

The purpose of this chapter is to contribute toward resolving RQ2, which asks ‘what is the role of rice farmers in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka?’ To answer these, the chapter relied on data derived from survey questions, probing information on farmers’ knowledge and experience in farming, income sources, area and rights to cultivated land, labour arrangements, production, income, and variable costs of rice farming, and measures of chemical and ‘straw and organic fertilizers’ usage (Appendix 4). These data were analysed using both statistical and qualitative methods and the outputs of those analyses are used here to construct a profile of the farmers’, a profile of the organization of rice farming, and trends in fertilizer use among rice farmers across the different irrigation regimes with comparisons of fertilizer use trends against farmers’ and farming profiles.

The chapter is organised into seven sections. Section 4.2 outlines the profile of rice farmers and rice farming. Section 4.3 presents results on the trends in current fertilizer usage subject to the current rice fertilizer subsidy scheme. Next, Section 4.4 presents the results for past fertilizer usage, prior to the commencement of the current subsidy scheme, which is followed by an analysis of the change in fertilizer usage over the period. Section 4.6 then moves on to locate the trends in straw and organic fertilizers use of the farmers. In conclusion, Section 4.7 highlights the key findings and maps the contributions of the chapter to resolving RQ2.

4.2 A Profile of the Farmers and Farming

Elderly, experienced farmers, with little formal education, who pursued farming as an inherited livelihood characterised the farmers in the study sample. More than 60% of the farmers were aged 50 years or over (Figure 4.1) and more than 70% had been in farming for over 20 years (Table 4.1). Close to a third of the farmers had received only a primary education (Table 4.1) and more than 90% had learnt farming from their fathers (Table 4.2). Rice farming was a major income source for 73.5% of the farmers. The proportion of farmers relying exclusively on rice farming for income
generation was 16.4%. The rest had a diversity of incomes including farming other crops, tendering labour, and running small businesses (Table 4.1).

![Histogram of farmer's age in the aggregate sample]

**Figure 4.1 Distribution of farmer’s age in the aggregate sample**

In terms of farm organization 64% of farmers cultivated a land area less than hectare. More than 60% of the farmers owned at least half the total land they cultivated. However, close to a 15% of farmers did not own any cropland and close to a 25% did not own any rice land (Table 4.1). Share cropping was the most common land tenancy arrangement among those farmers who cultivated land other than their own (Table 4.2).
Table 4.1 Frequency of farmer responses on variables explaining the structure of farming in the aggregate sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Count</th>
<th>Percentage of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration of farming</strong> (N=189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time in farming &lt; 5 years</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>5 years ≤ time in farming &lt; 10</td>
<td>9</td>
<td>4.8</td>
</tr>
<tr>
<td>10 years ≤ time in farming &lt; 15</td>
<td>18</td>
<td>9.5</td>
</tr>
<tr>
<td>15 years ≤ time in farming &lt; 20</td>
<td>23</td>
<td>12.2</td>
</tr>
<tr>
<td>Time in farming ≥ 20 years</td>
<td>134</td>
<td>70.9</td>
</tr>
<tr>
<td><strong>Extent of all land under cultivation</strong> (N=189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An area &lt; 1/2 acre</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>1/2 acre ≤ an area &lt; 1 acre</td>
<td>9</td>
<td>4.8</td>
</tr>
<tr>
<td>1 acre ≤ an area &lt; 2 acres</td>
<td>23</td>
<td>12.2</td>
</tr>
<tr>
<td>2 acres ≤ an area &lt; 5 acres</td>
<td>87</td>
<td>46.0</td>
</tr>
<tr>
<td>An area ≥ 5 acres</td>
<td>68</td>
<td>36.0</td>
</tr>
<tr>
<td><strong>Ownership of all land under cultivation</strong> (N=189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owns none</td>
<td>29</td>
<td>15.3</td>
</tr>
<tr>
<td>Owns &lt; a 1/4 of the land</td>
<td>15</td>
<td>7.9</td>
</tr>
<tr>
<td>Owns 1/4 ≤ of the land &lt; 1/2</td>
<td>30</td>
<td>15.9</td>
</tr>
<tr>
<td>Owns 1/2 ≤ of the land &lt; 3/4</td>
<td>37</td>
<td>19.6</td>
</tr>
<tr>
<td>Owns ≥ 3/4 of the land</td>
<td>78</td>
<td>41.3</td>
</tr>
<tr>
<td><strong>Extent of rice land under cultivation</strong> (N=189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An area &lt; 1/2 acre</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>1/2 acre ≤ an area &lt; 1 acre</td>
<td>19</td>
<td>10.1</td>
</tr>
<tr>
<td>1 acre ≤ an area &lt; 2 acres</td>
<td>30</td>
<td>15.9</td>
</tr>
<tr>
<td>2 acres ≤ an area &lt; 5 acres</td>
<td>76</td>
<td>40.2</td>
</tr>
<tr>
<td>An area ≥ 5 acres</td>
<td>59</td>
<td>31.2</td>
</tr>
<tr>
<td><strong>Ownership of rice land under cultivation</strong> (N=188)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owns none</td>
<td>45</td>
<td>23.9</td>
</tr>
<tr>
<td>Owns &lt; a 1/4 of the land</td>
<td>14</td>
<td>7.4</td>
</tr>
<tr>
<td>Owns 1/4 ≤ of the land &lt; 1/2</td>
<td>18</td>
<td>9.6</td>
</tr>
<tr>
<td>Owns 1/2 ≤ of the land &lt; 3/4</td>
<td>32</td>
<td>17.0</td>
</tr>
<tr>
<td>Owns ≥ 3/4 of the land</td>
<td>79</td>
<td>42.0</td>
</tr>
<tr>
<td><strong>Formal Education</strong> (N=189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary education</td>
<td>51</td>
<td>27.0</td>
</tr>
<tr>
<td>Up to ordinary level</td>
<td>59</td>
<td>31.2</td>
</tr>
<tr>
<td>Completed ordinary level</td>
<td>52</td>
<td>27.5</td>
</tr>
<tr>
<td>Up to advanced level</td>
<td>8</td>
<td>4.2</td>
</tr>
<tr>
<td>Completed advanced level</td>
<td>13</td>
<td>6.9</td>
</tr>
<tr>
<td>Tertiary level</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td>.5</td>
</tr>
</tbody>
</table>
Table 4.2 Frequency of farmer responses on multiple response variables explaining the structure of farming in the aggregate sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Responses</th>
<th>Percentage (%)</th>
<th>Percentage of Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of farming knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N=192)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On my own</td>
<td>11</td>
<td>5.7</td>
<td>5.9</td>
</tr>
<tr>
<td>From my father</td>
<td>171</td>
<td>89.1</td>
<td>91.0</td>
</tr>
<tr>
<td>From a relative</td>
<td>3</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>From a friend</td>
<td>4</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Source of income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(N=339)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice farming</td>
<td>139</td>
<td>41.0</td>
<td>73.5</td>
</tr>
<tr>
<td>Other crops farming</td>
<td>67</td>
<td>19.8</td>
<td>35.4</td>
</tr>
<tr>
<td>Labour work</td>
<td>38</td>
<td>11.2</td>
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</tr>
<tr>
<td>Small business</td>
<td>27</td>
<td>8.0</td>
<td>14.3</td>
</tr>
<tr>
<td>Other</td>
<td>68</td>
<td>20.1</td>
<td>36.0</td>
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<tr>
<td>Land tenancy arrangement</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(N=229)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Joint ownership</td>
<td>10</td>
<td>4.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Share cropping</td>
<td>88</td>
<td>38.4</td>
<td>46.6</td>
</tr>
<tr>
<td>Tenancy rotation</td>
<td>5</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Benefit rotation</td>
<td>2</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Situation sharecropping</td>
<td>3</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Lease system</td>
<td>10</td>
<td>4.4</td>
<td>5.3</td>
</tr>
<tr>
<td>Mortgage system</td>
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<tr>
<td>Encroached</td>
<td>36</td>
<td>15.7</td>
<td>19.0</td>
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<tr>
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<td>63</td>
<td>27.5</td>
<td>33.3</td>
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<tr>
<td>Source of labour</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(N=308)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manage by myself</td>
<td>3</td>
<td>1.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Manage within family</td>
<td>31</td>
<td>10.1</td>
<td>16.4</td>
</tr>
<tr>
<td>Exchange labour with responsibility</td>
<td>44</td>
<td>14.3</td>
<td>23.3</td>
</tr>
<tr>
<td>Shared labour</td>
<td>2</td>
<td>0.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Informal ad-hoc labour</td>
<td>4</td>
<td>1.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Formal contract labour</td>
<td>91</td>
<td>29.5</td>
<td>48.1</td>
</tr>
<tr>
<td>Formal hired labour</td>
<td>133</td>
<td>43.2</td>
<td>70.4</td>
</tr>
</tbody>
</table>
4.2.1 Organization of Farming in the Three Irrigation Regimes

There were major differences in the organization of farming, among the three irrigation regimes. The priority received by rice farming as an income source, land area brought under cultivation, investment in inputs, labour arrangements, the size of output, and gross margin were the key variables that marked this difference.

In the major irrigation regime rice farming generated the main income for 44.9% of farmers. The equivalent proportions in the minor and rain-fed regimes were 33.3% and 32.7% respectively (Figure 4.2).

![Figure 4.2 The proportion of farmers deriving an income from different income sources by irrigation regime](image)

In comparison to other two irrigation regimes, farmers in the major regime cultivated more land, (Figure 4.3), relied more on paid labour (Figure 4.4), incurred higher cultivation costs (Figures 4.5 and 4.6), produced more rice yield, earned a higher income from rice (Figure 4.7), and secured a higher gross margin (Figure 4.8).

On the other hand, in the rain-fed regime, farmers cultivated less land (Figure 4.3). Only 15.6% of farmers in the rain-fed regime cultivated a land area of two acres (0.8 ha) or more. The most common labour arrangements in the regime were those that did not incur any cost, which included personal, family, and exchange of labour (Figure 4.4). There, the farmers incurred lower farming costs (Figures 4.5 and 4.6). More than 50% of the farmers did not incur any cost on paddy seeds (Figure 4.6(d)). The rice output in the rain-fed regime was the lowest among the three (Figure 4.7). However, despite lower yields, owing to lower variable costs, the rain-fed regime registered a higher gross margin than the minor regime (Figure 4.8).
Figure 4.3 The proportion of farmers cultivating different land size classes by irrigation regime

(a) total cultivated acreage

(b) cultivated rice acreage

Figure 4.4 The proportion of farmers employing different labour arrangements by irrigation regime

Manage by myself
Manage within family
Exchange labour with responsibility
Shared labour
Informal ad-hoc labour
Formal contract labour
Formal hired labour
Figure 4.5  Total cost of production per season by irrigation regime

Figure 4.6  Proportion of farmers incurring different variable costs by irrigation regime

(a) weedicides  (b) nsecticides  
(c) labour  (d) paddy seed
In relation to land area brought under cultivation (Figure 4.3), investment in labour arrangements and farming inputs (Figures 4.4, 4.5, and 4.6), and rice output (Figure 4.7), the organisation of farming in the minor regime was somewhere in between the major and the rain-fed. But with higher variable costs and lower incomes among the three irrigation regimes, rice farming was least profitable in the minor regime (Figure 4.8).

Figure 4.7 Rice production and the income derived in Maha and Yala cultivation seasons by irrigation regime

Figure 4.8 Mean gross margin in rice production in Maha and Yala cultivation seasons by irrigation regime
4.3 Reported Fertilizer Usage among Farmers Following the Introduction of the Current Subsidy Scheme

The questions probing current fertilizer usage were open-ended. The farmers reported the total amount (as a weight measure per unit area) for each of the three fertilizers. Potash fertilizers used in the past included both MOP and TDM. Therefore, no distinction was made between the two, instead, reported as potash fertilizer in common. For clarification, additional data on the amount of fertilizers of each type used at each application within a single application cycle were collected (e.g. at basal application, first top dressing, second top dressing and occasionally a third top dressing). This breakup was used to validate the total amount reported for each type of fertilizer. In cases of discrepancy between the total and the break-up, further clarifications were sought and appropriate notes and qualifying qualitative comments were added.

Table 4.3 presents the sample statistics of current fertilizer usage for each irrigation regime. Based on the findings, the total fertilizer usage on average in the major irrigation regime was 188.3kg per acre (SD 31.1), while it was 154.4kg per acre (SD 29.3) in the minor regime and 137.8kg per acre (SD 29.3) in the rain-fed regime. As the high SD values suggest, despite the standardised allocations of fertilizer provided under the subsidy scheme, there was high variability in fertilizer usage reported by farmers.
**Table 4.3** Sample statistics of central tendency and variability of current TSP, MOP, and urea usage of farmers by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Fertilizer Type (N)</th>
<th>Mean (kg/acre)</th>
<th>Std. Deviation (kg/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a). Aggregate</td>
<td>TSP (N=183)</td>
<td>39.64</td>
<td>9.82</td>
</tr>
<tr>
<td></td>
<td>MOP (N=180)</td>
<td>32.01</td>
<td>8.48</td>
</tr>
<tr>
<td></td>
<td>Urea (N=185)</td>
<td>102.76</td>
<td>30.61</td>
</tr>
<tr>
<td>(b). Major</td>
<td>TSP (N=123)</td>
<td>41.97</td>
<td>7.89</td>
</tr>
<tr>
<td></td>
<td>MOP (N=123)</td>
<td>32.64</td>
<td>7.24</td>
</tr>
<tr>
<td></td>
<td>Urea (N=125)</td>
<td>114.07</td>
<td>24.10</td>
</tr>
<tr>
<td>(c). Minor</td>
<td>TSP (N=31)</td>
<td>39.00</td>
<td>8.14</td>
</tr>
<tr>
<td></td>
<td>MOP (N=29)</td>
<td>34.90</td>
<td>11.52</td>
</tr>
<tr>
<td></td>
<td>Urea (N=31)</td>
<td>78.84</td>
<td>30.06</td>
</tr>
<tr>
<td>(d). Rain-fed</td>
<td>TSP (N=29)</td>
<td>30.43</td>
<td>13.11</td>
</tr>
<tr>
<td></td>
<td>MOP (N=28)</td>
<td>26.25</td>
<td>7.51</td>
</tr>
<tr>
<td></td>
<td>Urea (N=29)</td>
<td>79.55</td>
<td>29.25</td>
</tr>
</tbody>
</table>

### 4.3.1 Discrepancy between the Allotted and the Reported Use of Fertilizers

To probe further, the differences between the allotted and the reported values were re-coded into a new categorical variable. For each case, the fertilizer amounts allotted under the subsidy scheme (Table 4.4) was subtracted from the fertilizer amount reported by the farmers. The resulting variable gave the discrepancy value in kilograms per acre. A positive value of the discrepancy was identified as an instance of “over-reporting”, a negative value as an instance of “under-reporting” and a zero value as an instance of “exact-reporting”. The proportion of farmers reporting in each discrepancy category is given in Table 4.5.

**Table 4.4** Fertilizer recommendation issued under the subsidy scheme for lowland dry and intermediate climatic zones which included Polonnaruwa and Kurunegala districts

<table>
<thead>
<tr>
<th>Nutrient (in the form of)</th>
<th>Fertilizer type</th>
<th>Fertilizer allotments by irrigation scheme in kg per ha (kg per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>Phosphorous (P2O5)</td>
<td>TSP</td>
<td>112.5 (45)</td>
</tr>
<tr>
<td>Potassium (K2O)</td>
<td>MOP</td>
<td>87.5 (35)</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>Urea</td>
<td>312.5 (125)</td>
</tr>
</tbody>
</table>

Source: Secretary to the Ministry of Agriculture Development and Agrarian Services 2008

In the aggregate sample, less than a quarter of farmers reported the fertilizer amounts confirmed to the exact allotted. However, when considering the direction of the discrepancy, there is a tendency to under-report. Urea was the fertilizer under-reported by most farmers. In major irrigation regime a
great majority of farmers underreported all three fertilizer types whereas in the minor regime there was a tendency to over-report both TSP and MOP. In the rain-fed regime there was a tendency to over-report MOP.

Table 4.5 The proportion of farmers reporting the amounts of subsidized TSP, MOP, and urea used with a discrepancy by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Fertilizer Type</th>
<th>Percentage of farmers (%)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Exact-reporting</td>
<td>Over-reporting</td>
<td>Under-reporting</td>
<td></td>
</tr>
<tr>
<td>Aggregate</td>
<td>TSP</td>
<td>24.3</td>
<td>33.0</td>
<td>42.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOP</td>
<td>22.8</td>
<td>28.8</td>
<td>48.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>16.2</td>
<td>17.8</td>
<td>65.9</td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>TSP</td>
<td>21.6</td>
<td>27.2</td>
<td>51.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOP</td>
<td>25.0</td>
<td>19.4</td>
<td>55.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>19.2</td>
<td>15.2</td>
<td>65.6</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>TSP</td>
<td>32.3</td>
<td>41.9</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOP</td>
<td>16.1</td>
<td>58.1</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>3.2</td>
<td>16.1</td>
<td>80.6</td>
<td></td>
</tr>
<tr>
<td>Rain-fed</td>
<td>TSP</td>
<td>27.6</td>
<td>48.3</td>
<td>24.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOP</td>
<td>20.7</td>
<td>37.9</td>
<td>41.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>17.2</td>
<td>31.0</td>
<td>51.7</td>
<td></td>
</tr>
</tbody>
</table>

As shown in Figure 4.9, 4.10, and 4.11, a great proportion of farmers reporting with a discrepancy did so within a range of quarter a bag of fertilizer (±12.50kg). Nearly all farmers reported the amounts of TSP and MOP within half a bag of fertilizer (±25.00kg). A considerable proportion (13.8%) reported urea with a discrepancy over a bag (±50.00kg). A chi-square goodness of fit test was carried out to determine the proportion of farmers reporting total fertilizers confirming to a range within half bag of fertilizers from the allotted. According to the test results at least 75% of the rice farmers were likely to report the fertilizers within a range of ±25.00kg ($\chi^2$ (1, n =182) = 3.231, p = .072).

---

21 The farmers often used fractions of fertilizer bags as a measure when reporting the amounts of fertilizers they used. A bag of fertilizer is equivalent to 50kg and a quarter of a bag was the smallest measurement used, which is equivalent to 12.5kg. Therefore, the categorical boundaries were set based on this smallest measure (sensitivity) of fertilizer reporting.
Figure 4.9 The direction and magnitude of discrepancy in farmers’ reporting of TSP by irrigation regime
Figure 4.10  The direction and magnitude of discrepancy in farmers’ reporting of MOP by irrigation regime

(a) aggregate

(b) major

(c) minor

(d) rain-fed
To explore the discrepancy in fertilizers reporting across the different types and among irrigation regimes, a mixed-effects ANOVA model was fitted with fertilizer type (FertType1=TSP, 2=MOP, 3=urea) and irrigation (Irrigation1=major, 2=minor, 3=rain-fed) as fixed factors, and farmer ID as a random factor. Cases with missing values were removed. In order to stabilise the residual variance, a weighted least squares model was fitted with weights proportional to the fitted values. To compare fertilizer types for each level of irrigation, separate ANOVAS were run. Post-hoc comparisons using Tuckey HSD test were done to find out where the differences were within each irrigation type.
The output of the mixed-effects model is given in Table 4.6. As the results show, there was a significant fertilizer type:irrigation interaction (F(4,353)=9.39, p<.0001). Different types of fertilizers responded differently depending on irrigation type. As the ANOVAs comparing differences among fertilizer types within each irrigation show, only minor and rain-fed regimes showed significant differences in the discrepancy of fertilizer reporting among fertilizer types. The order of the mean values of fertilizer types of the Tukey tests, were the same across irrigation types, although the absolute differences among the means were different. In the minor regime discrepancy in urea reporting was significantly different from the discrepancies of TSP and MOP reporting. In the rain-fed regime there was a significant difference between the discrepancy in reporting urea and TSP.

Table 4.6 Linear mixed-effects ANOVA output comparing the discrepancy in fertilizers reporting across fertilizer types and among irrigation regimes

<table>
<thead>
<tr>
<th></th>
<th>numDF</th>
<th>denDF</th>
<th>F-value</th>
<th>p-value</th>
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</thead>
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<td>(Intercept)</td>
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<td>357</td>
<td>5.434663</td>
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<td>FertType</td>
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<td>0.495412</td>
<td>0.6097</td>
</tr>
<tr>
<td>Irrigation</td>
<td>2</td>
<td>182</td>
<td>14.33761</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>FertType:Irrigation</td>
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<td>357</td>
<td>9.39066</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AIC</th>
<th>BIC</th>
<th>logLik</th>
</tr>
</thead>
<tbody>
<tr>
<td>64.5276</td>
<td>116.0042</td>
<td>-</td>
</tr>
</tbody>
</table>

Random effects:

Formula: ~1 | ID

| StdDev: | 0.087235 | 0.371159 |
Fixed effects: SubDiscrep ~ Allot FertType * Irrigation

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Std.Error</th>
<th>DF</th>
<th>t-value</th>
<th>p-value</th>
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</thead>
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</tr>
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<td>FertType3</td>
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<td>0.027047</td>
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<td>-0.90165</td>
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<tr>
<td>Irrigation2</td>
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<td>0.050285</td>
<td>182</td>
<td>2.898476</td>
<td>0.0042</td>
</tr>
<tr>
<td>Irrigation3</td>
<td>0.252253</td>
<td>0.051364</td>
<td>182</td>
<td>4.911077</td>
<td>0</td>
</tr>
<tr>
<td>FertType2:Irrigation2</td>
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<td>0.068144</td>
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<td>-0.07923</td>
<td>0.9369</td>
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<td>357</td>
<td>-4.57118</td>
<td>0</td>
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<td>FertType2:Irrigation3</td>
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<td>357</td>
<td>-2.17115</td>
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<tr>
<td>FertType3:Irrigation3</td>
<td>-0.27512</td>
<td>0.068505</td>
<td>357</td>
<td>-4.01603</td>
<td>0.0001</td>
</tr>
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</table>

Correlation:

<table>
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<th>FrtTy3</th>
<th>Irrgt2</th>
<th>Irrgt3</th>
<th>FT2:I2</th>
<th>FT3:I2</th>
<th>FT2:I3</th>
</tr>
</thead>
<tbody>
<tr>
<td>FertType2</td>
<td>-0.646</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>FertType3</td>
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<td>0.487</td>
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</tr>
<tr>
<td>Irrigation2</td>
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<td>0.262</td>
<td>0.258</td>
<td>-</td>
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<tr>
<td>Irrigation3</td>
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<td>0.257</td>
<td>0.253</td>
<td>0.161</td>
<td>-</td>
<td></td>
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<tr>
<td>FertType2:Irrigation2</td>
<td>0.25</td>
<td>-0.387</td>
<td>-0.188</td>
<td>-0.645</td>
<td>-0.099</td>
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<td>FertType3:Irrigation2</td>
<td>0.237</td>
<td>-0.182</td>
<td>-0.373</td>
<td>-0.61</td>
<td>-0.094</td>
<td>0.448</td>
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<tr>
<td>FertType2:Irrigation3</td>
<td>0.254</td>
<td>-0.394</td>
<td>-0.192</td>
<td>-0.103</td>
<td>-0.672</td>
<td>0.152</td>
<td>0.072</td>
<td></td>
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<tr>
<td>FertType3:Irrigation3</td>
<td>0.251</td>
<td>-0.192</td>
<td>-0.395</td>
<td>-0.102</td>
<td>-0.66</td>
<td>0.074</td>
<td>0.147</td>
<td>0.508</td>
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Standardized Within-Group Residuals:

<table>
<thead>
<tr>
<th></th>
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<th>Med</th>
<th>Q3</th>
<th>Max</th>
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<tbody>
<tr>
<td></td>
<td>-3.9183</td>
<td></td>
<td>0.042054</td>
<td>0.337267</td>
<td>6.154742</td>
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</table>

Number of Observations: 548
Number of Groups: 185
In explaining these trends and the deviations from the expected, the remarks and comments farmers added while reporting their fertilizer usage, proved helpful. These qualifications revealed a number of reasons explaining the difference between the subsidy allotments and the fertilizer amounts.
reported by the farmers. There exist a number of possibilities to over-reporting. Based on what the farmers said, much of the over-reporting takes root in using extra fertilizer applications in addition to the subsidy allotments. The comments by farmers were indicative of the need for additional fertilizer on top of the subsidy allotments.

I get an additional bag of urea from other farmers in the Yala season. (FS67)

I obtain two bags of urea from the outside - from other farmers. (FS186)

I bought one bag extra, new paddy seeds need fertilizers. (FS189)

Some farmers admitted to trafficking and other illicit activities involved in securing additional fertilizer supplies. When considering the direction and the magnitude of the discrepancy in fertilizer reporting, it is possible that trafficking would explain a considerable proportion of the discrepancy, resulting in net sellers using less than the subsidy allotments and net buyers using more than subsidy allotments.

For the deficit, we look for one or two fertilizer bags extra, to purchase even for Rs. 1000/-. When needy, the poor farmers sell their fertilizer. (FS167)

Farmers sell it. They do it underhanded. If exposed [the government] will seize them. (FS34)

There is a balance [of fertilizers] that gets accumulated each season. I seized some fertilizers, as a punishment for setting up fire to the straw and that is what I roll over and over. (FS162)

Due to the lack of clear land records, there was an opportunity to tamper the land area figures of cultivation. The numerous local measures used in land reporting (Table 4.7) that were used in addition to the metric and imperial units probably added to the confusion over land area conversions and facilitated any opportunity to fake land area reports. In addition to the confusion that may involve conversions, there were instances where an exact measure of the land was uncertain. For example, some farmers reported the land area as being equal to “a little over a bushel” or “a little less than a amuna”. While the possibility of any reporting errors in land area remained real, there was ample opportunity for deliberate inflations of land records to claim for more fertilizers. As FS167 explain, such attempts explain some over-reporting. Such inflated land reporting is another possibility explaining fertilizer over-reporting “They give a limited amount. Because we do the farming properly, we tell the lady [officer] and blow the acreage up and acquire more fertilizer” (FS167).
There were some reasons thought up by the farmers, which to them seemed logical enough to not stick by the official fertilizer recommendations. For example, some farmers believed that the subsidy allocations were excessive and so avoided using the full allocation on rice.

Now, I don’t have to spend that much on fertilizers. Some fertilizer was even left over (FS28)

TSP gets left over. The subsidy gives too much fertilizer. Many don’t apply MOP. Sometimes, we keep the fertilizers and apply to vegetables (FS104).

Our fields are good. TSP and MOP aren’t important (FS187)

Some believed that the fertilizer amounts were inadequate for rice, and altered the cultivation practices to adjust for the deficit. F59 explained how he balances the fertilizer between crops.

I grow peanuts in the Yala season. It doesn’t need that much fertilizer. I save some fertilizer from there and apply to the rice field in the Maha season. In the past, I grew rice more [often]. When cultivating rice, it requires more fertilizer. (FS59)

In some instances weather conditions were a decisive factor in determining the types and the amounts of fertilizer used. According to FS153, farmers in the rain-fed regime, adapted their fertilizer application practices to changes in the rain.

We tend to apply less fertilizer into the mud. 8-10 days after broadcasting, if we receive water, that means if it rains, we mix TSP with urea and apply. If it does not rain, the paddy will die off, so we do not apply fertilizer. (FS153)

---

22 Used as a land area measure, derived from the equivalent number seed paddy bushels sown in a land area. Has become a standard land area measure regardless of the actual number of seed paddy bushels sown
A tendency to round fertilizer amounts when reporting, possibly to the nearest fifth or fraction of a fertilizer ‘bag’ may also explain some of the observed variability.

Therefore, in addition to the amount of fertilizers farmers had access to, there were other factors, confounding their choice in using it. Therefore, it suggests that access to fertilizer does not necessarily specify how farmers would use it.

4.4 Reported Fertilizer Usage among Farmers Prior to the Current Subsidy Scheme

The questions probing past fertilizer usage was similar to the questions probing current fertilizer usage. Table 4.8 shows past fertilizers usage reported by the farmers. The mean past total fertilizer usage in the aggregate sample was 141.5 (SD 4.4kg). By individual fertilizer type, the usage of TSP, potash and urea were 33.0kg (SD1.9), 36.9kg (SD 1.6) and 71.4kg (SD 4.4) respectively. The variation in past fertilizer usage for all the fertilizers was high, and the highest variation was reported in urea.

Across the three irrigation schemes mean past TSP usage ranged from a low 29.1kg (SD 4.0) in minor to a high 34.4kg (SD 5.1) in rain-fed irrigation. Mean past potash usage ranged from a low 34.1kg (SD 4.4) in minor irrigation to a high 38.2kg (SD 1.8) in major irrigation. A similar pattern existed in urea with a low 51.8kg (SD 5.3) in minor irrigation and a high 79.4kg (SD 3.3) in major irrigation. According to the results, usage of all three base fertilizers in the past was lowest in the minor irrigation regime and highest in the major irrigation regime.
Table 4.8 Sample statistics of central tendency and variability of past TSP, MOP, and urea usage of farmers by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Fertilizer Type</th>
<th>N</th>
<th>Mean± Std. Error</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>TSP</td>
<td>180</td>
<td>33.07± 1.859</td>
<td>24.948</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td>180</td>
<td>36.86± 1.649</td>
<td>22.127</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>181</td>
<td>71.35± 2.707</td>
<td>36.426</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>180</td>
<td>141.53± 4.43</td>
<td>59.41469</td>
</tr>
<tr>
<td>Major</td>
<td>TSP</td>
<td>121</td>
<td>33.79</td>
<td>25.201</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td>121</td>
<td>38.15± 1.841</td>
<td>20.256</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>121</td>
<td>79.39± 3.333</td>
<td>36.667</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>121</td>
<td>151.33± 4.76512</td>
<td>52.41634</td>
</tr>
<tr>
<td>Minor</td>
<td>TSP</td>
<td>31</td>
<td>29.13</td>
<td>22.274</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td>31</td>
<td>34.23± 4.398</td>
<td>24.486</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>31</td>
<td>51.84± 5.294</td>
<td>29.476</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>31</td>
<td>115.193± 11.6235</td>
<td>64.71704</td>
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<tr>
<td>Rain-fed</td>
<td>TSP</td>
<td>28</td>
<td>34.36</td>
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</tr>
<tr>
<td></td>
<td>Potash</td>
<td>28</td>
<td>34.18</td>
<td>27.079</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td>29</td>
<td>58.62± 5.777</td>
<td>31.110</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>28</td>
<td>128.357± 13.5381</td>
<td>71.63706</td>
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</tbody>
</table>

To explore the differences in reported fertilizer usage across fertilizer types and irrigation regimes, a mixed-effects ANOVA model was fitted with fertilizer type (FertType1=TSP, 2=potash, 3=urea) and irrigation (Irrigation1=major, 2=minor, 3=rain-fed) as fixed factors, and farmer ID as a random factor. The method adopted was similar to that adopted in the mixed-effects ANOVA model detailed in Section 4.3.1. Results of the output are given in Table 4.9.

Table 4.9 Linear mixed-effects ANOVA output comparing the reported fertilizer usage in the past across fertilizer types and among irrigation regimes

Notation: FertType1=TSP, FertType12=potash, FertType13=urea, Irrigation1=major, Irrigation2=minor, Irrigation3=rain-fed

<table>
<thead>
<tr>
<th></th>
<th>numDF</th>
<th>denDF</th>
<th>F-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
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<td>354</td>
<td>191.2245</td>
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<tr>
<td>FertType</td>
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<td>Irrigation</td>
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<tr>
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<td>8.24343</td>
<td>&lt;.0001</td>
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110
### AIC | BIC | logLik
---|---|---
4994.99 | 5046.314 | -2485.5

### Random effects:

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<tr>
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### Fixed effects: FertAmt5Ago ~ FertType * Irrigation

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<tr>
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### Correlation:

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<th>Irrgt2</th>
<th>Irrgt3</th>
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<th>FT3:I2</th>
<th>FT2:13</th>
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<td>-</td>
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</tr>
<tr>
<td>FertType3:Irrigation3</td>
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<td>-0.54</td>
<td>-</td>
<td>-</td>
<td>0.24</td>
<td>0.087</td>
<td>0.321</td>
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### Standardized Within-Group Residuals:

<table>
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<th>Q1</th>
<th>Med</th>
<th>Q3</th>
<th>Max</th>
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</thead>
<tbody>
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<td>-1.7922</td>
<td>-0.14033</td>
<td>0.641589</td>
<td>3.753166</td>
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</tr>
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### Number of Observations:

| Number of Groups: 181 |
### Simultaneous Tests for General Linear Hypotheses

#### Multiple Comparisons of Means: Tukey Contrasts

#### Linear Hypotheses:

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<tr>
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<th>denDF</th>
<th>F-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td>numDF</td>
<td>denDF</td>
<td>F-value</td>
<td>p-value</td>
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<tr>
<td>Irrigation 2</td>
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<td>denDF</td>
<td>F-value</td>
<td>p-value</td>
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<td>FertType</td>
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</tr>
<tr>
<td>Irrigation 3</td>
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<td>denDF</td>
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<td>p-value</td>
</tr>
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<td>54</td>
<td>45.14365</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

---

| Irrigation 1 | Estimate | Std.Error | z value | Pr(>|z|) |
|--------------|----------|-----------|---------|---------|
| 2 - 1 == 0   | 5.494    | 2.794     | 1.967   | 0.119   |
| 3 - 1 == 0   | 45.152   | 3.459     | 13.052  | <0.001  ***|
| 3 - 2 == 0   | 39.658   | 3.537     | 11.212  | <0.001  ***|

---

| Irrigation 2 | Estimate | Std.Error | z value | Pr(>|z|) |
|--------------|----------|-----------|---------|---------|
| 2 - 1 == 0   | 4.092    | 3.203     | 1.278   | 0.405   |
| 3 - 1 == 0   | 22.069   | 4.03      | 5.476   | <1e-04  ***|
| 3 - 2 == 0   | 17.976   | 4.12      | 4.363   | <1e-04  ***|

---

| Irrigation 3 | Estimate | Std.Error | z value | Pr(>|z|) |
|--------------|----------|-----------|---------|---------|
| 2 - 1 == 0   | 4.01E-11 | 6.14E-12  | 6.53    | 1.32E-10 ***|
| 3 - 1 == 0   | 3.94E+01 | 6.21E+00  | 6.351   | 4.28E-10 ***|
| 3 - 2 == 0   | 3.94E+01 | 6.21E+00  | 6.351   | 4.28E-10 ***|

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Adjusted p values reported -- single-step method)
According the results of the model, there was a significant mains effect in fertilizer type which was qualified by fertilizer type:irrigation interaction. SD due to ID was high relative to the residual, and hence there was a strong among-farmer variation in reported past fertilizer usage, even accounting for fertilizer type and irrigation type. All ANOVAs comparing differences in reported past fertilizer usage within irrigation schemes were significant. Tukey tests showed that the order of the mean values of fertilizer type were the same across irrigation types, although the absolute differences among the means were different. Reported past usage of each fertilizer type differed from all the others (within Irrigation type), except for usage between TSP and potash which were not significantly different from each other in major and minor schemes.

However, some farmers added qualifying remarks, indicating that their fertilizer usage in the past was hap-hazard; “Those days, we did not measure to the exact when we worked (FS59)”. According to these qualitative remarks, farmers used extra applications in addition to the recommended basal and top dressings. As explained by FS40 and FS33 below, these extra applications were mostly added before the heading stage, and depended on the state of the crop or the weather condition.

In the past, if the field turned yellow after we applied the fertilizer, we brought in more fertilizers and applied. (FS40)

In the past there were plenty of fertilizers. We bought as much as we wanted and applied. If the crop turned a little yellow or if the rains washed the fertilizers away, we bought more and applied. (FS33)

If the additional dressings depended on the state of the crop which may vary from season to season and if the farmers did not keep track of these additional dressings, it is possible that the past fertilizer usage disclosed by those farmers were less the actual they used.

4.5 Trends in the Change in Reported Fertilizer Usage following the Commencement of the Current Rice Fertilizer Subsidy Scheme

Analytical methods adopted in determining the change in fertilizer usage was similar to the method explained in Section 4.3 for determining the discrepancy in reporting. Based on the amounts reported the total fertilizer usage have increased across all irrigation schemes (Figure 4.12). However, differences existed. TSP usage has dropped over the years in rain-fed irrigation. Potash usage has decreased in both major and rain-fed irrigation. Figure 4.13 shows a comparison between
mean fertilizer usage prior to the current subsidy scheme and after its commencement. When compared with current fertilizer usage, the variability in past fertilizer usage was high. Across irrigation schemes this variability was minimal in major irrigation. Variability of past and current urea usage is interestingly similar in minor and rain-fed irrigations.

Figure 4.12 Mean change in TSP, potash, and urea usage and its variance by irrigation regime
Table 4.10 shows the percentage of farmers registering a change in fertilizers usage. Total fertilizer usage has increased among 68.8% of the farmers. In the aggregate sample, 45.0% reported an increase in TSP and 70.9% reported an increase in urea. On the other hand, 50.8% reported a decrease in potash usage. In the major irrigation regime 58.1% indicated an increase in TSP (and urea (75.83%) usage. In the minor irrigation regime all types of fertilizer usage had increased among a majority urea usage had increased across all irrigation schemes. Figures 4.14, 4.15, and 4.16, show the scale of these changes. For TSP and potash, a majority of farmers showed an increase or decrease equivalent to a quarter to a half a bag of fertilizer. For urea a majority showed an increase or decrease equivalent to a bag of fertilizer or more.
Table 4.10  The proportion of farmers reporting a change in TSP, potash, urea and total fertilizers usage since the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Fertilizer Type</th>
<th>Percentage of farmers (%)</th>
<th>No change</th>
<th>Increased usage</th>
<th>Decreased usage</th>
<th>Do not know</th>
<th>Less than 5 years into farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>TSP</td>
<td></td>
<td>16.9</td>
<td>45.0</td>
<td>32.8</td>
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<td>1.6</td>
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<td></td>
<td>Potash</td>
<td></td>
<td>13.2</td>
<td>30.2</td>
<td>50.8</td>
<td>4.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td></td>
<td>13.8</td>
<td>70.9</td>
<td>10.1</td>
<td>3.7</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>6.3</td>
<td>68.8</td>
<td>19.0</td>
<td>4.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Major</td>
<td>TSP</td>
<td></td>
<td>20.6</td>
<td>42.9</td>
<td>31.7</td>
<td>3.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td></td>
<td>11.9</td>
<td>27.0</td>
<td>55.6</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td></td>
<td>12.7</td>
<td>74.6</td>
<td>7.9</td>
<td>3.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>4.8</td>
<td>75.4</td>
<td>14.3</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Minor</td>
<td>TSP</td>
<td></td>
<td>12.9</td>
<td>58.1</td>
<td>29.0</td>
<td>.0</td>
<td>.0</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td></td>
<td>19.4</td>
<td>45.2</td>
<td>35.5</td>
<td>.0</td>
<td>.0</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td></td>
<td>16.1</td>
<td>71.0</td>
<td>12.9</td>
<td>.0</td>
<td>.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>9.7</td>
<td>67.7</td>
<td>22.6</td>
<td>.0</td>
<td>.0</td>
</tr>
<tr>
<td>Rain-fed</td>
<td>TSP</td>
<td></td>
<td>6.3</td>
<td>40.6</td>
<td>40.6</td>
<td>9.4</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Potash</td>
<td></td>
<td>12.5</td>
<td>28.1</td>
<td>46.9</td>
<td>9.4</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
<td></td>
<td>15.6</td>
<td>56.3</td>
<td>15.6</td>
<td>9.4</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>9.4</td>
<td>43.8</td>
<td>34.4</td>
<td>9.4</td>
<td>3.1</td>
</tr>
</tbody>
</table>
Figure 4.14 The direction and magnitude of change in farmer’s TSP use since the commencement of the current subsidy scheme by irrigation regime.
Figure 4.15 The direction and magnitude of change in farmer’s potash use since the commencement of the current subsidy scheme by irrigation regime.
These findings also point to other important trends in fertilizer usage. There was a considerable proportion of farmers, who had not used fertilizers before the introduction of the current subsidy scheme (Table 4.11). Only a very small proportion of farmers indicated of not having used urea (1.6%) in the past. In fact there was none in the major irrigation scheme who had not applied urea. But the proportion of farmers who had not used TSP (25.9%) and potash (14.8%) was considerable across all three irrigation schemes. The results indicate that around 10 to 25% of farm plots were operated under a nutrient imbalance. Although some indicated that their fields did not require MOP, the most common remark on explaining zero-usage was financial difficulties.
In the past, it was financially difficult to get the fertilizers. Now we get it subsidized. (FS25)

In the past, muddy fertilizers\textsuperscript{23} were expensive, so we didn’t apply it. There were times when we applied tummy fertilizer\textsuperscript{24} and there were times when we didn’t. (FS67)

Now we get three types of fertilizers for the subsidy. In the past we didn’t apply red powder\textsuperscript{25}. We didn’t even think that red powder mattered. (FS56)

Therefore, there exists a possibility that the current subsidy scheme may have improved the nutrient balance of at least some rice fields. Considering that at times the subsidy only supported nitrogenous fertilizers (Section 2.4.2), the current scheme does help in maintaining the nitrogen, phosphorous, and potassium balance by providing all three types of fertilizers.

Table 4.11 The proportion of farmers reporting zero-application of fertilizers prior to the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSP</td>
</tr>
<tr>
<td>Aggregate</td>
<td>25.9</td>
</tr>
<tr>
<td>Major</td>
<td>25.4</td>
</tr>
<tr>
<td>Minor</td>
<td>29.0</td>
</tr>
<tr>
<td>Rain-fed</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Another positive outcome of the current subsidy scheme is the possible curtailing of excessive fertilizer usage. Again a considerable proportion of farmers indicated a decrease in fertilizer usage (Table 4.12). Provided that the current subsidy allocates fertilizers for a maximum possible yield at an optimum (Table 2.3 in Section 2.4.3), any usage above this is deemed excessive. In such circumstances the current fertilizer subsidy had contributed positively. For example, the fertilizer use efficiency of nitrogen fertilizers is only 30 to 50 %. In large acreages with excessive fertilizer usage, large amounts of fertilizers that do not get utilised by the crop contribute to air and water pollution (Aulakh 1996). Therefore, if the subsidy has curtailed excessive fertilizer usage, thereby it may have contributed to more efficient financial and environmental outcomes.

\textsuperscript{23} TSP (Appendix 1)

\textsuperscript{24} Potash (Appendix 1)

\textsuperscript{25} Potash (Appendix 1)
Table 4.12  The proportion of farmers reporting a decrease in fertilizer usage over the five years since the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSP</td>
</tr>
<tr>
<td>Aggregate</td>
<td>32.8</td>
</tr>
<tr>
<td>Major</td>
<td>31.7</td>
</tr>
<tr>
<td>Minor</td>
<td>29.0</td>
</tr>
<tr>
<td>Rain-fed</td>
<td>40.6</td>
</tr>
</tbody>
</table>

4.6 Reported Straw and Organic Fertilizers Usage

Farmers were also surveyed about their organic fertilizer usage. Table 4.13 shows the frequency of organic fertilizer usage among farmers. During land preparation, a majority of farmers (62.9%) applied rice straw at least once in the cropping cycle. About one-thirds of the farmers (34.5%) did not add any organic fertilizers. The percentage of farmers (2.6%) who used other forms organic fertilizers such as organic manure was extremely low.

Table 4.13  The proportion of farmers using straw and organic fertilizers in the aggregate sample

<table>
<thead>
<tr>
<th>Frequency of straw and organic fertilizer usage in a single cropping cycle</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>34.5</td>
</tr>
<tr>
<td>Apply rice straw at least once</td>
<td>62.9</td>
</tr>
<tr>
<td>Apply rice straw and other organic fertilizers at least twice</td>
<td>2.1</td>
</tr>
<tr>
<td>Apply rice straw and other organic fertilizers more than twice</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Comparatively, application of rice straw was considerably higher in the minor and rain-fed regimes. The highest use of rice straw was reported from the minor irrigation regime. Use of other organic manures was very low across all three irrigation schemes while farmers in the minor and rain-fed irrigation regimes showed a slightly higher tendency to use organic manures than those in the major irrigation regime. The 2009 fertilizer circular requires farmers to add rice straw back into the fields as a pre-requisite to qualify for the subsidy (Section 2.4.3). The Agricultural Production and Research Assistant has to certify whether the farmers have added rice straw into the fields. Some farmers who applied rice straw into the fields, highlighted its importance, adding the qualifying remarks that they wouldn’t unless qualify for the subsidy.

They don’t give the subsidy, unless. (FS78)

---

26 The survey was conducted during January to March 2011, and therefore the phrase ‘last five years’ makes reference to a period starting from early 2006.
If we burn the straw ‘govi niyamaka’ [The Agricultural Production and Research Assistant] wouldn’t give the fertilizers. (FS 88)

But as the statistics in Table 4.14 shows, the regulation did not abide everywhere. One farmer claimed that “no matter how much the government yells, we can’t do it” (FS155). Others added passive remarks such as “the straw got burnt” (FS162) and “the whole field got caught in the fire” (FS163). Other farmers pointed to a number of problems limiting their capacity to abide by this rule. The risk of snakes, especially of vipers was a main concern. According to the farmers, rice straw when piled up or spread in the fields until the next cropping cycle, offered an ideal breeding ground for rats, and the rats attracted snakes into the fields.

Because of rat and snake problems, we set fire to the straw. (FS56)

It is good, but the thing is, it is not practical. Rats get infested. Snakes turn up to eat the rats. When furrowing with the rotary vipers roll in. There are people who were taken to the hospital, [because they got] bitten by vipers with snapped tails. (FS55)

The human-elephant conflict was another problem in the area. The farmers claimed that piles of rice straw attracted elephants into the fields.

We set fire to the straw to chase away the elephants. (FS133)

Because of all the elephant mayhem, people set fire to the straw. (FS32)

Leptospirosis was another concern. Setting up fire to the rice straw, therefore proved a safety precaution to the farmers. “We burn the straw because of these rat-fever [leptospirosis] talks” (FS147). Some farmers indicated instances of public health officer advising for the burning of rice straw. “PHI [public health officer] gentleman, tells it causes rat-fever. Because of that some set fire to the straw” (FS87).

All these claims were made by farmers from the major irrigation schemes in Polonnaruwa District. Polonnaruwa is in the dry zone, where the incidence of mortality from snake bites in Sri Lanka is at the highest. Rice farmers are the common victims of snake bite (Kularatne 2002; Kasturiratne et al. 2005; Kularatne et al. 2011). The area is also the where the human elephant conflict is most severe. The human elephant conflict in Sri Lanka kills over 200 elephants and 80 humans, mainly farmers annually (Fernando et al. 2005; Fernando et al. 2011). These issues were not prevalent in the wetter regions in Kurunegala district. Leptospirosis, although not geographically restricted to the dry zone, is a disease mainly associated with rice farming and spreads at times of heavy rainfall and flooding (World Health Organization 2010; Epidemiology Unit 2011). The Epidemiology Unit of the Health
Ministry advises farmers to “keep the area around paddy fields clean, to ensure the existing water is flushed prior to cultivation and to keep the ‘Niyara’ [dike] narrow and free of rat burrows”. Therefore, these concerns of the farmers over the use of rice straw, although seemingly excuses were not totally ill found.

Apart from these environmentally determined limitations, farmers also talked about other problems. As FS59 and FS140 explain below, timing of irrigation supply was one such limitation that prevented farmers from adding the straw.

From the time they release water, there is not enough time left to spread the straw and (let it) decompose. (FS59)

There isn’t enough time left [to add straw]. We just finished cutting [the harvest]. They have opened water and it is time to sow again. (FS140)

Others pointed to the time constraints. According to FS138 and FS173, “there is no time for that; we do labour work”. Despite complying, some indicated disinterest. “I don’t make the effort in making compost because of the subsidy. I apply the straw also because the government asks us to (FS78)”. Others indicated to agronomic disadvantages (comment by FS153).

After you spread the straw, it needs to get decomposed by the time you come to till. So we do not spread straw in the paddy field. We add it to the Betel crop. If you add straw one or two seasons, the paddy grows too much. The paddy plant gets heavy and fall down. The parts that drown decompose. Then the income is low. When you add straw, after about two seasons, the paddy seeds catch a disease, they turn into black. And making compost for an acre is a difficult task considering the labour inputs. (FS153)

In some areas, alternatives were put in place to bypass the regulation. FS27 explained such an alternative. “They have imposed a regulation to add straw. “The farmer society charges a fine of Rs. 500/-. If you do not pay the fine you don’t get the fertilizers” (FS27).

Again these remarks added a number of dimensions to the fertilizer usage habits of the farmers. The government, according to the recommendation by the Department of Agriculture, has made the optimum amounts of fertilizers needed for a maximum possible yield in a given agroclimatic-irrigation zone, available to the farmers. However as the data reveals, making the fertilizers available to farmers alone has not guaranteed the expected behaviour.
4.7 Conclusions

This chapter partially contributed in answering RQ2 by establishing the key trends in fertilizer usage over the years since the introduction of the current subsidy scheme in late 2005. Trends of fertilizer usage among farmers over the period showed positive changes. An increase in fertilizer usage among farmers was one of them. Close to a 70% of farmers reported an increase in fertilizer usage and on average this amounted to an increase of about 90kg of total fertilizers per hectare. Another benefit of the rice fertilizer subsidy is a possible improvement from the previous haphazard use of fertilizers. On the one hand, limiting the fertilizer issues by the recommended requirement for land area cultivated, has possibly curbed excessive fertilizer usage and on the other hand provisioning all three nutrients in the recommended ratios has also augmented the use of phosphate and potash fertilizers contributing to an improvement in using nutrients in balance.

However, a trend of suboptimal fertilizer usage still existed. Again, when judging by the measures of subsidy’s recommendations, some farmers reported under-usage and some reported over-usage. A number of illegal and unwelcome activities explained some of this undesirable trend in fertilizer usage. These included fertilizer trafficking, leakage to other crops, claiming for more land area than the cultivated, non-usage of the full allocation, and purchasing fertilizers outside the subsidy’s market. Opportunity for such activity was a major disadvantage of the subsidy at the operation scale. Nevertheless, these relative estimates of deviation from the optimal and the so decided benefits and damages of the rice fertilizer subsidy scheme are subject to the assumptions that the fertilizers allocation of the subsidy was equal to the optimal nutrient requirement of the soils of each sampling location and the farmers’ fertilizer usage reporting was accurate.

In between the government making fertilizer available and farmers adopting fertilizers, there are a number of choices and obligations. The final decision of what and how much fertilizer is used depends on these choices and obligations which may involve administration, weather conditions, nutrient requirements, knowledge, and finances. These have altered the expected outcomes of the subsidy to some degree. Chapter 5 will further explore these choices and obligations in the lights of farmers’ attitudes and perceptions towards fertilizer usage and other agricultural services which explain much of the trends observed in this chapter to complete an answer to RQ2.
Chapter 5 Farmers’ Rationale to their Behaviours

The task is...not so much to see what no one has yet seen; but to think what nobody has yet thought, about that which everybody sees.

Erwin Schrödinger

5.1 Introduction

Chapter 4 attempted to detect farmers’ practical response to the rice fertilizer subsidy policy by profiling their current fertilizer use and how different it is to their previous fertilizer use practices and there by answered RQ2, partially. This chapter attempts to detect how the farmers’ rationalise the trends observed in the previous chapter and how they relate it to their performance in rice farming and complete an answer to RQ2.

There are eight sections to this chapter. To bring farmers’ response to the rice fertilizer subsidy into context, Section 5.2 explores farmers’ perception over the contributions of other agricultural input and output services to rice farming. Section 5.3 explores farmers’ attitudes over the current fertilizer subsidy scheme. In Section 5.4 farmers’ perception of the relative advantages of chemical and organic fertilizers is assessed and the reasoning for low adoption of organic fertilizers is further explored. Farmers’ interpretation of the differences between past and current fertilizer use is presented in Section 5.5. Section 5.6 addresses how farmers explain trends in rice harvests. Trends in personal wealth follow in Section 5.7. Section 5.8 concludes the chapter by summarising its resolution to RQ2.

5.2 Attitudes on the Availability and Access to Agricultural Input and Output Services

Any attempt to understand farmers’ response to the fertilizer subsidy must locate this response in context. As noted in Section 2.3.2, a farmer’s decision on fertilizer use depends on a number of risk factors other than the availability and access to fertilizer. In order to detect any constraints imposed on the efficacy of the subsidy scheme by such risk factors, this section explores farmer’s attitudes on major agricultural input and output services influencing the rice sector, including the availability and access to extension, irrigation, seed paddy, and the guaranteed price scheme for rice purchasing. Throughout the chapter, it makes an attempt to detect ‘who said what’ and any associations that would explain the trends in fertilizer use and the attitudes that have shaped such trends. Introducing
these variables representing agricultural input and output services here at the beginning of the chapter permitted associations to be looked at as and when required.

### 5.2.1 Extension

A majority of farmers (83.1%) believed that there has been an improvement in knowledge over the years (Table 5.1). But only 50.3% perceived an improvement in extension services and only 33.3% believed that it has contributed positively towards improvements in yields. Less than 1% ranked the role of extension services among the most important factors contributing towards improvement in yields. Table 5.1 lists the farmers’ satisfaction rating over extension officer’s knowledge, commitment, and opportunity for interaction. A large proportion of farmers was either dissatisfied with (19.1%) or unaware of (30.9%) the knowledge of the extension officer. More than half of the farmers (56.4%) were dissatisfied with the commitment of the extension officers.

Do not know whether such person exists or not. (FS157)

Now it is the time to apply insecticides. There is not anyone even to seek for advice on quantities. In the past, there was a gentleman, who used to come to the field and explained, this is an aphid, this a paddy hopper, this is how you control it. (FS160)

Some farmers did not perceive the need to interact with the extension officers.

I did not have the need to meet him. (FS39)

Some passively highlighted the lack of commitment in the extension officers and their capacity to manage without inputs from extension. Others stressed that they know better than the extension officers. In combination these figures depict a portrayal of a practice carried out by heart.

We can obtain more harvests from doing by our experience and feeling than from what they say. (FS183)

Similarly, 48.7% farmers were dissatisfied with the opportunity to interact with the extension officer.
Table 5.1 The frequency of farmer responses on perceived satisfaction over the knowledge and commitment of extension service in the aggregate sample

<table>
<thead>
<tr>
<th>Aspects of extension assessed</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Dissatisfied</th>
<th>Do not know</th>
<th>Not Relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of the extension officer</td>
<td>45.2</td>
<td>2.1</td>
<td>19.1</td>
<td>30.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Commitment of the extension officer</td>
<td>37.2</td>
<td>3.7</td>
<td>56.4</td>
<td>2.1</td>
<td>.5</td>
</tr>
<tr>
<td>Opportunity for interaction with the extension officer</td>
<td>36.0</td>
<td>4.2</td>
<td>48.7</td>
<td>2.1</td>
<td>9.0</td>
</tr>
</tbody>
</table>

However there was confusion among farmers about the Agriculture Instructors appointed by the Agriculture Department and the Agriculture Research and Development Assistants appointed by the Agrarian Development Department (Section 2.4.2.4). One was mistaken for the other by some and even those who were aware of the difference did not make the distinction. Because the Agriculture Research and Development Assistants were more accessible they were mistaken as Agriculture Instructors by some farmers. However the lack of agricultural knowledge of Agriculture Research and Development Assistants and them being more accessible than the Agriculture Instructors, further contributed toward the deterioration of trust in extension.

Farmers’ satisfaction ratings over extension were cross tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, and the difference in current and past fertilizer use. Fisher’s Exact Test was used in determining the significance of the associations. Farmer’s perception over the commitment of the extension officer showed a significant association with the cost incurred on weedicides (p=.025). The proportion of farmers dissatisfied over the commitment of the extension officer was highest among those who incurred some cost less than Rs.2000/- on weedicides. The discrepancy in MOP reporting showed a significant association with farmers’ satisfaction over the opportunity to interact with extension officers (p=.049). Farmers dissatisfied with the opportunity to interact with extension tended to underreport MOP.

5.2.2 Irrigation

Although irrigation water was free, there were limitations with its supply (Table 5.2). Timing of irrigation supply was the concern among most farmers (34.9%) while quantity (27.5%) and frequency (22.2%) of releasing bouts were also factors that around quarter of the farmers were dissatisfied with. Understandably, the dissatisfaction over water supply was prevailing in the rain-
fed regime (Figure 5.1). Between rain-fed and minor regimes, more farmers in the minor regime were dissatisfied with the quantity of supply and more farmers in the major were dissatisfied with the timing of water supply. In major and minor regimes, proximity to the delivery pipe was a determinant in the quantity of supply. In the Mahaweli schemes, farmers complained of disorder in irrigation scheduling and lack of conformity in adhering to the schedule. According to the farmers many best management practices were constrained by this discordance as they were forced to resort to quick fixes in land preparation to meet the scheduling in water release. Failure in adding straw, failure in manual weeding, and the usage of excessive weedicides were accounted for mismanagement of water supply by the irrigation authorities.

| Table 5.2  The frequency of farmer responses on perceived satisfaction over availability, timing and frequency of irrigation in the aggregate sample |
|--------------------------------------------------|---------|---------|----------|----------|---------|
| Aspects of irrigation assessed                   | Satisfied | Neutral | Dissatisfied | Do not Know | Not Relevant |
| Quantity of irrigation water available           | 68.3     | 3.7     | 27.5       | 0.5       | 0.0       |
| Timing of irrigation water release               | 63.0     | 1.6     | 34.9       | 0.5       | 0.0       |
| Frequency of irrigation water release            | 75.7     | 1.6     | 22.2       | 0.5       | 0.0       |
These variables characterising irrigation supply were cross tabulated with the level of formal education, time in farming, the total and rice acreage cultivated, the total and rice acreage owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, and satisfaction over extension. Fisher’s Exact Test was used in determining the significance of the associations.

The irrigation regime under which the cultivation was carried out showed significant association with the quantity of irrigation water made available (p=.009) and the frequency of irrigation frequency (p=.025). More farmers in major irrigation regime were satisfied with the quantity of irrigation water quantity and the frequency of irrigation water release. There were significant associations between the perception over certain aspects of extension and irrigation. Satisfaction over extension officer’s knowledge was significantly associated with perception over the quantity of
irrigation water available (p=.009), the timing of irrigation water release (p=.024), and the frequency of irrigation water release (p=.045). Satisfaction over the commitment of the extension officer also showed significant associations with the timing of irrigation water release (p<.001) and the frequency of irrigation water release (p=.019). Satisfaction over opportunity for interaction with the extension officer showed a significant association with the timing of irrigation water release (p<.001).

5.2.3 Seed Paddy

Seed price (57.4%) and seed quality (39.2%) were two issues most farmers were dissatisfied with (Table 5.3). More farmers in the minor irrigation regime expressed satisfaction over price, availability, and quality of seed paddy (Figure 5.2). Across all three irrigation regimes dissatisfaction over paddy seed price prevails. More farmers in the major irrigation regime were dissatisfied with paddy seed availability than in minor and rain-fed regimes. Regarding the quality of seeds more farmers in major and rain-fed regimes were dissatisfied than in minor regime.

Table 5.3 The frequency of farmer responses on perceived satisfaction over the price, availability, and quality of seed paddy in the aggregate sample

<table>
<thead>
<tr>
<th>Aspects of seed paddy</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Satisfied</td>
</tr>
<tr>
<td>Price</td>
<td>31.4</td>
</tr>
<tr>
<td>Availability of seeds</td>
<td>66.1</td>
</tr>
<tr>
<td>Quality of seeds</td>
<td>50.3</td>
</tr>
</tbody>
</table>
As shown in Figure 4.6(d), 61.3% of the farmers in minor regime incurred no cost on paddy seeds. In the rain-fed 54.8% of the farmers claimed to incur no cost on paddy seeds. But in the major regime 67.5% farmers incur some cost on seed paddy, and 45.3% farmers incurred a cost greater than Rs.2000/- (Section 4.2.1). This explains why more farmers in minor regime are satisfied with paddy seeds. In the major regime more farmers are cultivating larger land plots, therefore availability also becomes an issue. Farmers from the major irrigation regime complained about the limitedness of seed paddy in the agriculture centres, and having to purchase seeds from the private sector. CIC seeds a private agro input giant was considered of good quality. But mixing of good seeds with poor quality void seeds and black seeds were the major complaints. Instead of buying from the seed outlets, farmers exchange seeds among themselves. After purchasing new seeds from the agriculture centres in one season, the farmers used it over two to three progenies over the next seasons. Some farmers bought the seeds from others farmer who has got a second or third progeny

Figure 5.2  The frequency of farmer responses on perceived satisfaction over the price, availability, and quality of seed paddy by irrigation regime
of seeds purchased from outside. Therefore although many farmers claimed to cultivate new varieties, it was not dedicated seed paddy.

Farmers satisfaction over seed paddy was cross tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, irrigation regime, and satisfaction over irrigation and extension. Fisher’s Exact Test was used in determining the significance of the associations. Farmers’ satisfaction over availability of seed paddy for purchase in the market showed a significant association with the cost incurred on paddy seed (p=.003). The highest proportion of farmers satisfied over availability of seed paddy tended to be those incurring Rs. 2000/- per acre or less. A similar association was observed between satisfaction over the quality of paddy seeds and the discrepancy in reporting the total amount of fertilizers (p=.018). Farmers dissatisfied with seed quality also tended to underreport the total amount of fertilizers.

5.2.4 Guaranteed Price Scheme

Table 5.4 lists farmers’ satisfaction rating over governments’ guaranteed price scheme on procuring rice harvests. A majority of 59.9% of the farmers were dissatisfied with the price given for paddy by the government under the guaranteed pricing scheme. Similarly, 55.6% expressed dissatisfaction over the quality controls exercised by the government when purchasing paddy from farmers. Among them some farmers complained of the employed regulations being too strict, and others about the double standards employed over the average farmer and the traders. Those who were satisfied with the quality controls (31.7%), recognised the importance of stringent rules such as drying up the paddy to maintain an optimum moisture content at 14% or less and removing void and black grains, considering the need for long term storage.

<table>
<thead>
<tr>
<th>Aspects of the Guaranteed Price Scheme</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Satisfied</td>
</tr>
<tr>
<td>Price</td>
<td>33.9</td>
</tr>
<tr>
<td>Quality regulations</td>
<td>31.7</td>
</tr>
</tbody>
</table>
The guaranteed price scheme variables were cross tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, the perceptions over relative advantages of fertilizers, adequacy of fertilizers, rice harvests, personal wealth, and other input output services. Fisher’s Exact Test was used in determining the significance of the associations. According to the results of the cross tabulations, there was a significant association between the level of formal education and satisfaction over the price given for paddy rice by the governments’ guaranteed price scheme (p=.039).

5.3 Attitude over the Current Fertilizer Subsidy Scheme

This section explored farmers’ attitude towards the structure and the operation of the subsidy scheme. The data was derived from two survey questions, one rating farmers’ satisfaction over the three aspects of pricing, timing of distribution, and the organization of distribution, and another rating the perception of adequacy on different fertilizers.

A Likert scale was used in gauging satisfaction over pricing, timing of distribution, and the organization of distribution. Table 5.5 summarises the results. A majority of the farmers were satisfied with the subsidy scheme overall, and a great majority confirmed extreme satisfaction. Fertilizer price registered the highest satisfaction rating with 96.8% confirming satisfaction. Close to a fourth of the farmers expressed dissatisfaction over the organization and timing of distribution. The organization of distribution made 22.2% of the farmers dissatisfied, while the timing of distribution made 29.6% of the farmers dissatisfied. In their remarks, farmers directed discontent toward, the cost and the time spent in travelling to distant fertilizer distribution centres in the absence of an agrarian services centre in the village, time wasted in dealing with ineffective bureaucracies and the paper work involved, and the wastage of fertilizers during delivery. Receiving fertilizers towards the end of the cropping season and the unavailability of TSP at the time of land preparation were seen as the major drawbacks. These were common complaints of all those who expressed dissatisfaction over the timing of fertilizer distribution.
Table 5.5 The frequency of farmer responses on perceived satisfaction over pricing, quantity allocation, organization of distribution, and timing of distribution of subsidised fertilizers by irrigation regime

<table>
<thead>
<tr>
<th>Sample</th>
<th>Aspects of the Rice Fertilizer Subsidy Scheme</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Satisfied</td>
<td>Satisfied</td>
</tr>
<tr>
<td>Aggregate</td>
<td>Timing of Distribution</td>
<td>58.7</td>
</tr>
<tr>
<td></td>
<td>Pricing</td>
<td>95.2</td>
</tr>
<tr>
<td></td>
<td>Logistics of Distribution</td>
<td>66.1</td>
</tr>
<tr>
<td>Major</td>
<td>Timing of Distribution</td>
<td>65.1</td>
</tr>
<tr>
<td></td>
<td>Pricing</td>
<td>98.4</td>
</tr>
<tr>
<td></td>
<td>Logistics of Distribution</td>
<td>63.5</td>
</tr>
<tr>
<td>Minor</td>
<td>Timing of Distribution</td>
<td>54.8</td>
</tr>
<tr>
<td></td>
<td>Pricing</td>
<td>96.8</td>
</tr>
<tr>
<td></td>
<td>Logistics of Distribution</td>
<td>77.4</td>
</tr>
<tr>
<td>Rain-fed</td>
<td>Timing of Distribution</td>
<td>37.5</td>
</tr>
<tr>
<td></td>
<td>Pricing</td>
<td>81.3</td>
</tr>
<tr>
<td></td>
<td>Logistics of Distribution</td>
<td>65.6</td>
</tr>
</tbody>
</table>

The farmers were also asked to gauge the adequacy of the allotments of TSP, MOP, and urea by comparing the amounts they receive, with the amounts they think they require for the rice cultivation (Table 5.6). Again a Likert scale was used in rating the adequacy. In general, a majority of farmers found the amounts of fertilizers allotted adequate. The proportion of farmers, who found TSP, MOP and urea to be adequate were 61.4%, 74.6%, 73.0% respectively. However, nearly one-fourth of the farmers found all fertilizers to be inadequate. In the aggregate sample, 38.1% considered the allotted TSP amounts to be below what was necessary. Similarly, 24.9% found MOP to be less than what was necessary and 27.0 % found urea to be less than what was necessary.

Perception of inadequacy was predominant in the major irrigation regime. In the major irrigation regime, 41.3% found TSP to be inadequate and more than a quarter of farmers found all fertilizer types to be inadequate. In minor irrigation urea was recognised as being the most inadequate by 32.3% of farmers. In the rain-fed regime, TSP was recognised as being the most inadequate by 37.6% of farmers. TSP was considered to be the most inadequate, in terms of allocation of all the fertilizers, across all three irrigation schemes. MOP was recognised the least inadequately allocated, and 4.8% found MOP to be more than what is necessary. For example, FS44 who was accurate in reporting the fertilizer amounts added the following comment; “Now 9.5 bags of fertilizers get applied. In the past it was 7.5 fertilizer bags. They say red powder isn’t needed here (FS44)”.

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Table 5.6 The frequency of farmer responses on the perceived adequacy of subsidized TSP, MOP, and urea allotments by irrigation regime

<table>
<thead>
<tr>
<th>Fertilizer type by irrigation regime</th>
<th>Percentage of farmers (%) N=189</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Far below what is necessary - more than 20kg per acre</td>
</tr>
<tr>
<td>TSP</td>
<td>21.7</td>
</tr>
<tr>
<td>MOP</td>
<td>11.1</td>
</tr>
<tr>
<td>Urea</td>
<td>14.8</td>
</tr>
<tr>
<td>Major</td>
<td>TSP</td>
</tr>
<tr>
<td></td>
<td>MOP</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
</tr>
<tr>
<td>Minor</td>
<td>TSP</td>
</tr>
<tr>
<td></td>
<td>MOP</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
</tr>
<tr>
<td>Rain-fed</td>
<td>TSP</td>
</tr>
<tr>
<td></td>
<td>MOP</td>
</tr>
<tr>
<td></td>
<td>Urea</td>
</tr>
</tbody>
</table>

Farmers’ satisfaction over variables gauging the performance of the current subsidy scheme was cross tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, and input output services. Fisher’s Exact Test was used in determining the significance of the associations.

There were significant associations between farmers’ satisfaction over timing and organisation of fertilizer distribution under the subsidy scheme and satisfaction over availability and access to irrigation. Timing of distribution of subsidized fertilizers showed significant associations with irrigation regime (p=.008), cost incurred on paddy seed (p=.024), satisfaction over the quantity of irrigation water available (p=.038), the timing of irrigation water release (p=.001), the frequency of irrigation water release (p=.004), availability (p=.022) and the quality (p=.001) of paddy seeds, and district (p=.016). The proportion of farmers who was satisfied with the timing of distribution was highest in the major irrigation regime and lowest in the rain-fed regime. Among those farmers incurring a cost less than Rs. 10,000/- on paddy seeds, the proportion of farmers dissatisfied with the timing of distribution tended to decrease, as the cost on paddy seeds increased. Satisfaction
over. Those farmers who were satisfied with paddy seed availability and quality tended to be satisfied with the timing and organization of fertilizer distribution. In terms of irrigation those farmers who were satisfied with irrigation supply tended to be satisfied with the timing of fertilizer distribution. Those farmers who were satisfied with paddy seed availability and quality tended to be satisfied with the timing and organization of fertilizer distribution. District wise, the proportion of farmers satisfied with the timing of distribution was less in Kurunegala district.

Satisfaction over the organization of fertilizer distribution showed significant associations with satisfaction over the timing of irrigation water release (p=.002), the commitment of extension officer (p=.032), the opportunity to interact with the extension officer (p=.019), and the availability (p<.001) and quality (p=.035) of paddy seeds. Again, the proportion of farmers satisfied with the organization of fertilizer distribution among those satisfied with the performance of these other variables was higher.

Farmers’ perception over adequacy of fertilizers also showed significant associations with the distribution of fertilizers, and agriculture output services. Perception over TSP adequacy showed a significant association with the organization of fertilizer distribution under the subsidy scheme (p=.011), the timing of distribution of subsidized fertilizers (p=.048), and guaranteed price scheme quality regulations (p=.029). The farmers satisfied with the organization of distribution tended to perceive TSP to be adequate. The proportion of farmers who perceived TSP to be inadequate was higher among those dissatisfied with the timing of distribution. Farmers who reported TSP to be inadequate also tended to be dissatisfied with guaranteed price scheme quality regulations. Perception of urea adequacy also showed similar significant associations with the timing of distribution (p=.046) and guaranteed price scheme quality regulations (p=.021). Those farmers who perceived urea allocations to be adequate tended to be satisfied with the timing of distribution, and the quality regulations of the guaranteed price scheme.

5.4 Attitudes on Chemical and Organic Fertilizers

Despite being prescribed by the rice fertilizer subsidy policy (Section 2.4.3), Section 4.6 observed the farmers’ adoption of straw and organic fertilizers to be low. The unprompted remarks added by the farmers in explaining the low adoption of straw and organic fertilizer use analysed in Section 4.6, identified a number of reasons that prevented farmers from adding straw to the rice cultivation. This section explores reasons for the low adoption of organic fertilizers at depth by probing attitudes over the comparative importance ascribed to the chemical and organic fertilizers and the reasons for not adopting composting.
In a survey question, comparing the relative advantages of organic and chemical fertilizers, farmers rated a given fertilizer on productivity, ease of use, cost, and the impact on environment (Table 5.7). A statement presenting a proposition relating to these indicators were read out and a Likert scale was used in gauging the farmer’s response.

A majority (64.9%) perceived organics to be a cheap option while, 26.6% perceived it was not. A great majority agreed that organic fertilizer was the better alternative for environmental health (94.1%). Within these responses 79.9% of the farmers perceived producing compost as a difficult undertaking, 52.4% farmers, strongly disagreeing with the proposition, that ‘organic fertilizers are easy to produce’. Among the issues raised, difficulty in making large volumes of compost that is required for a sizable plot of rice, difficulty in finding and delivering the required materials, lack of land space for deploying a compost pit, and the amount of labour required in managing a large compost pit were the most frequent. The same issues were raised in relation to the cost of producing compost by those farmers (26.6%) who believed it was a costly undertaking. According to them, labour cost, material collection and transport costs and especially the time spent on all these activities (opportunity cost), made chemical fertilizers a cheaper option. In overall, 96.3% believed inorganic fertilizers to be an easier alternative to compost in terms of application and usage.

Table 5.7  The frequency of farmer responses explaining the relative advantages of organic and chemical fertilizers in the aggregate sample

<table>
<thead>
<tr>
<th>Comparison of organic and chemical fertilizers</th>
<th>Percentage of farmers (%)</th>
<th>N=189 in all instances except where denoted by # where N=188</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Organic fertilizers are easy to prepare</td>
<td>52.4</td>
<td>27.5</td>
</tr>
<tr>
<td>Organic fertilizers are cheaper #</td>
<td>11.2</td>
<td>15.4</td>
</tr>
<tr>
<td>Organic fertilizers are less harmful to the environment</td>
<td>0.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Chemical fertilizers are an easier alternative</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Chemical fertilizers are more efficient in terms of productivity</td>
<td>2.6</td>
<td>15.3</td>
</tr>
</tbody>
</table>

A majority (62.4%) of farmers in the aggregate sample agreed with the proposition that ‘chemical fertilizers are more efficient in terms of productivity’. Among the irrigation regimes the proportion of farmers who perceived chemical fertilizers to be more efficient was highest in the minor regime (74.2%). More farmers in the rain-fed regime (34.4%) than in major (12.7%) and minor (12.9%) regimes believed that organic fertilizers are easy to prepare. More farmers in the major regime
believed that organic fertilizers are not a cheap option (31.7%), registering twice as many as those in minor and rain-fed regimes who disagreed with the proposition organics are cheap.

The survey also probed reasons for the difference in chemical and organic fertilizer usage. Farmers were asked to give up to three reasons that were of most relevance, explaining low adoption of organic fertilizers. The question was presented as an open-ended question, and prompts were given where necessary. Considering the frequency of occurrence, the responses were post-coded into 13 representative categories. Multiple responses were considered in calculating the frequencies and Table 5.8 summarises the results. ‘Chemical fertilizers are an easy option’ was the most frequent reason given by 38.1% of farmers. Other most common reasons hindering farmers from adopting organic fertilizers were the difficulty in finding the ingredients for making compost (33.3%), and not having the time to make compost (23.3%). Additionally, labour requirement, difficulty in making large quantities of organic fertilizers, effectiveness of chemical fertilizers, indolence, and risk of pest and disease outbreaks associated with the use organic fertilizers were cited frequently. Reasons cited by less than 5% of the farmers were categorised as ‘other’ and these included reasons such as not having enough land space to deploy a compost dump, delays in meeting water allocations, and people and the fields having gotten used to inorganic fertilizers.

Table 5.8 The frequency of farmer responses explaining reasons for the difference in chemical and organic fertilizer usage in the aggregate sample

<table>
<thead>
<tr>
<th>Reasons (includes up to three multiple responses)</th>
<th>Responses</th>
<th>Percentage (%)</th>
<th>Percentage of Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical fertilizers are an easy option</td>
<td>72</td>
<td>20.93</td>
<td>38.10</td>
</tr>
<tr>
<td>Chemical fertilizers are more effective in terms of productivity</td>
<td>22</td>
<td>6.40</td>
<td>11.64</td>
</tr>
<tr>
<td>It is difficult to find raw materials for making compost</td>
<td>63</td>
<td>18.31</td>
<td>33.33</td>
</tr>
<tr>
<td>Do not have the time to make compost</td>
<td>44</td>
<td>12.79</td>
<td>23.28</td>
</tr>
<tr>
<td>Difficult to make large quantities of compost required for my</td>
<td>18</td>
<td>5.23</td>
<td>9.52</td>
</tr>
<tr>
<td>Labour cost involved in making compost is too high</td>
<td>11</td>
<td>3.20</td>
<td>5.82</td>
</tr>
<tr>
<td>Do not have the knowledge to make compost</td>
<td>11</td>
<td>3.20</td>
<td>5.82</td>
</tr>
<tr>
<td>Indolence</td>
<td>15</td>
<td>4.36</td>
<td>7.94</td>
</tr>
<tr>
<td>Organic fertilizers increases the risk of pests and diseases</td>
<td>13</td>
<td>3.78</td>
<td>6.88</td>
</tr>
<tr>
<td>Making compost requires a lot of labour</td>
<td>21</td>
<td>6.10</td>
<td>11.11</td>
</tr>
<tr>
<td>Subsidy gives enough inorganic fertilizers</td>
<td>10</td>
<td>2.91</td>
<td>5.29</td>
</tr>
<tr>
<td>Other</td>
<td>43</td>
<td>12.50</td>
<td>22.75</td>
</tr>
<tr>
<td>Not relevant</td>
<td>1</td>
<td>.29</td>
<td>.53</td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>100.00</td>
<td>182.01</td>
</tr>
</tbody>
</table>
As shown in Figure 5.3, 39.7% in the major irrigation regime indicated a difficulty in finding raw materials for making compost. The equivalent proportions in the minor (16.1%) and rain-fed regimes (25.0%) were low. In the minor regime, 32.3% of farmers indicated a lack of time as a reason for the low adoption of organic fertilizers. The corresponding numbers from major (22.2%) and rain-fed regimes (18.8%) were again low. In the minor regime, 22.6% pointed to the difficulty in making large quantities of compost. While a small proportion of farmers in the major regime (8.7%) identified it a problem, none from the rain-fed regime did so. Similarly, a high labour requirement in making compost was considered an issue only by farmers in major (14.3%) and minor (9.7%) regimes. Labour cost (8.7%) was a problem exclusive to the major irrigation regime. As opposed to the 3.2% from major and 6.5% from minor regimes, 15.6% in the rain-fed regime indicated a lack of knowledge as an impediment to making compost. In the rain-fed regime 9.4% cited the high risk of pest and disease outbreaks associated with compost as a reason for low adoption. The numbers from major (6.3%) and minor (6.5%) regimes considering this a problem were comparatively low.

Predominantly the distinction among the three irrigation schemes, in the organisation of farming and the commitment in farming explained the differences observed in the usage of organic manures and the reasoning for the differences in adoption. It was likely that finding raw materials for making
compost in the minor and rain-fed regimes was relatively trouble-free where the farming is less populous and of smaller scale when compared to the major irrigation regime. Both cost and the availability of labour were considered problems in the major irrigation regime in undertaking composting. As discussed in Section 4.2.1 arrangements in labour inputs in the major scheme tended to be paid arrangements and the costs incurred were higher than in minor and rain-fed regimes. In general the commitment in farming, whether a full time professional commitment, or a part-time ad-hoc commitment, explained the results across all three irrigation regimes. In minor and rain-fed regimes the reasoning tended to reflect the partial commitment to farming.

Farmers’ attitude on the relative advantages of inorganic and organic fertilizers was cross tabulated against the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, attitudes over current fertilizer subsidy, and satisfaction over input output services. Fisher’s Exact Test was used in determining the significance of the associations.

Perception over the relative productivity of fertilizers showed significant associations with the level of formal education (p<0.001), labour cost (p=.02), and guaranteed price scheme quality regulations (p=.007). The frequency of farmers agreeing on higher productivity of inorganic fertilizers tended to decrease with increasing education level. There was an increasing tendency among those who incurred higher labour costs to not agree with the proposition with higher productive capacity of inorganic fertilizers. Those who perceived inorganic fertilizer to be more productive tended to be dissatisfied with the guaranteed price scheme quality regulations.

Perception over relative environmental impact showed significant associations with the extent of own total acreage (p=.015), and own rice acreage (p=.011). Agreement with the lower impact of organic fertilizers on the environment tended to increase as the extent of the portion of ownership increased.

Perceiving organic fertilizers as a cheaper option showed a significant association with the extent of rice acreage cultivated (p=.006), weedicide cost (p=.046), seed quantity (p=.046), paddy seed price (p=.007), irrigation (p=.032). The proportion of farmers who disagreed with the proposition that organics are a cheaper option increased as the acreage of rice and cost incurred on weedicides increased. A higher proportion of farmers in the minor and rain-fed regimes, and who were satisfied with the availability of paddy seeds agreed that organics are a cheaper option. Perception of ease of preparation of organic fertilizers showed a significant association with paddy seed cost (p=.003),
and the proportion of farmers disagreeing with the proposition increased as the cost incurred on paddy seeds increased. It also showed a significant association with irrigation (p=.038), as more farmers from the rain-fed regime agreed with the proposition.

### 5.5 An Explanation to the Difference in Past and Current Fertilizer Usage

Farmers were asked to identify up to three reasons that best described any changes in their chemical fertilizer usage over the last five years. The list of responses comprised of statements explaining the reasons for any change in fertilizer usage. Frequencies of responses were calculated considering multiple responses and the results are presented in Table 5.9.

The most cited reason causing a change in fertilizer use over the five year period was the fertilizer subsidy. The proportion of farmers who identified the subsidy as the reason for increased fertilizer use was 45.5%. Some farmers like FS31, added remarks explaining how the subsidy has benefited them. “In the past, sometimes I didn’t apply muddy fertilizer27; if I couldn’t find tummy fertilizers28, didn’t apply to the tummy stage. I just applied urea. Now it isn’t like that. We get the right amount, at the right time” (FS31). While, identifying their reason causing a change in fertilizer use, some farmers, added comments praising access to TSP. “Those days, if we apply TSP in one season, we would not apply it in the other season” (FS26). “In the past we bought fertilizers depending on the money we had in hand. Those days we didn’t use TSP” (FS15). Being able to obtain all the fertilizers at once was considered another advantage. “Under the subsidy, they give all the fertilizers at once beforehand” (FS22). Another added, “in the past, we bought fertilizer only when we had the money-now we can obtain fertilizers at the right time” (FS171). In addition to the many benefits of the subsidy some expressed gratitude, “it is because of the subsidy, may the president acquire merit” (FS130).

The second most common reason causing an increase in fertilizer use was a decrease in soil fertility levels (13.4%). Some of them were keen to emphasise that the subsidy had no influence upon increase in fertilizer use. “The flavour of soils has changed. It is not because of the subsidy. Soil fertility has diminished” (FS80).

On the other hand, unavailability (16.57%) and high cost (11.05%) of fertilizers in the open market were the main reasons identified for decreased fertilizer use. Comments by FS48 and FS58, explained the situation.

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27Phosphate fertilizers (Section 1.7 for an explanation)
28Potash fertilizers (Section 1.7 for an explanation)
In the past, when the rice field wasn’t growing well, we increased the amount of fertilizers. Now they have given the amount. If it [the crop] grows, it grows, if it doesn’t, it doesn’t. Can’t increase. No fertilizer is available outside [in the open market] to buy. Even if it is available outside, it is expensive. In the past enough fertilizer was available to be used the way we wanted. With the increased cost it is difficult. (FS48)

In the past we used more [fertilizers]. Now we have to save up [be frugal with] the little they give. Can’t do just with the little they give. Need to bring one-two sacks [of fertilizers] from the shop. I bought urea and TDM from the shop. In the past plenty was available to buy. (FS58)

While limited access due to unavailability and high cost in the market were both spill over effects of the subsidy scheme, 5.3% pointed directly to the subsidy as a reason for reduced fertilizer usage. Except for the reasons “decrease in soil fertility” all the reasons identified by the farmers for their change in fertilizer usage were linked with the fertilizer subsidy scheme in some way or another.

Table 5.9 The frequency of farmer responses explaining reasons for the reported changes in fertilizer usage over the five years since the commencement of the current subsidy scheme in the aggregate sample

<table>
<thead>
<tr>
<th>Reasons for change in fertilizer usage</th>
<th>Responses</th>
<th>Percentage (%)</th>
<th>Percentage of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My fertilizer usage has increased because soil fertility levels have decreased over time</td>
<td>25</td>
<td>11.1</td>
<td>13.4</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because fertilizer is not readily available in the open market</td>
<td>30</td>
<td>13.3</td>
<td>16.0</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because fertilizer is very expensive in the open market</td>
<td>20</td>
<td>8.8</td>
<td>10.7</td>
</tr>
<tr>
<td>My fertilizer usage has increased because of the subsidy allotments</td>
<td>85</td>
<td>37.6</td>
<td>45.5</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because of the subsidy allotments</td>
<td>10</td>
<td>4.4</td>
<td>5.3</td>
</tr>
<tr>
<td>There has been no change in the amount of fertilizers I apply</td>
<td>33</td>
<td>14.6</td>
<td>17.6</td>
</tr>
<tr>
<td>Other reasons</td>
<td>17</td>
<td>7.5</td>
<td>9.1</td>
</tr>
<tr>
<td>Do not know</td>
<td>3</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Less than 5 years into farming</td>
<td>3</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>100.0</td>
<td>120.9</td>
</tr>
</tbody>
</table>

Computed using multiple responses. Each farmer identified up to three reasons for change in fertilizer usage.

In all three irrigation schemes subsidy was the foremost reason for the increased usage in fertilizer (Figure 5.4). The frequency of farmers attributing the subsidy as the main reason for increased fertilizer usage was considerably higher in the minor regime than in the major and rain-fed regimes. Decrease in soil fertility was not recognised as a reason for change in fertilizer usage in the rain-fed
regime. Unavailability and the high cost in the open market were the main reasons for decreased fertilizer usage in the rain-fed regime.

As observed in Chapter 4 (Section 4.5), based on the amounts of fertilizers the farmers reported for current and past usage, total fertilizer use had increased among 68.8% farmers and decreased among 19.0% farmers. The percentage of farmers who showed no change was 6.3%. As shown in Table 5.10, in a cross tabulation between this change in fertilizer use indicated by the reported amounts of past and current fertilizers used and the reasons given for the change, there was a mismatch. In Table 5.10, these instances of mismatches are shaded in grey.
Table 5.10 Cross-tabulation between the reported change and the reason given for the change in fertilizer usage over the five years since the commencement of the current subsidy scheme in the aggregate sample

<table>
<thead>
<tr>
<th>Reason for change in fertilizer usage</th>
<th>Direction of change in fertilizer usage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>My fertilizer usage has increased because soil fertility levels have decreased over time</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because fertilizer is not readily available in the open market</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because fertilizer is very expensive in the open market</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>My fertilizer usage has increased because of the subsidy</td>
<td>78</td>
<td>80</td>
</tr>
<tr>
<td>My fertilizer usage has decreased because of the subsidy</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>There has been no change in the amount of fertilizers I</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Other reasons</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>175</td>
</tr>
</tbody>
</table>

*Instances of mismatches between reported amounts of past and current fertilizers used and the reasons given for the change are shaded in grey

Apart from ignorance, the only explanations to this mismatch may include the following. One possible explanation is the haphazard nature of past fertilizer use practices that permitted the liberty of any number of additional dressings. If the farmers had used extra dressings in a spontaneous response to the state of the crop, these additional dressings would go unaccounted for in an aggregate estimate of the amount of fertilizers used but not in their feeling. Another possibility is the difference in the relative importance farmers ascribe to different fertilizers. While the change in total fertilizer use may indicate one thing, the direction of change in a fertilizer type that the farmers consider to be the most important might be another. A difference between the exact change in fertilizer use and the amount of change farmers qualify as a considerable change, may similarly explain some of the mismatch. That is, while some change in the amounts of fertilizers used has occurred, farmers may not consider this change to be considerable.

For example, despite the change that has occurred in actual fertilizer applications, the rationed usage and the inability to use fertilizer at will, left some feeling that their fertilizer use has decreased. High price and unavailability in the open market were the main reasons giving them a feeling of restriction (comments by FS88, FS42, and FS54).

There isn’t that much change. There are times when it is low. Now fertilizer isn’t available in the shops to buy”. (FS88)

There has not been a change in fertilizer usage, now the usage of red powder has increased”. (FS42)
There has been a change in only muddy fertilizers. Now there isn’t any muddy fertilizer to buy in the shops. It is available in phoney places. But that is very expensive. Fertilizer is brought only to government stores”. (FS54)

For some farmers, had a drop in the use of at least one fertilizer occurred, it spilled over into the perception of the overall trend in fertilizer usage. For example, FS97, reported a 5kg increase in the total amount of fertilizers used, but perceived a decrease in usage; “In the past there was an ample of fertilizers available to be bought. It was in the past that we applied more fertilizers” (FS97). Despite 40kg and 30kg increases in TSP and potash amounts respectively, there was a major decrease of 65kg in his urea usage. Similarly for FS159, despite an increase in urea (by 35kg, there were decreases in TSP (by 5kg) and potash (by 20kg): The farmer added, “In the past it was higher. The amounts available now are adequate. In the past the fertilizers were amply available, now there isn’t any to be bought”. FS160 reported an 80kg increase in the usage of total fertilizers including a 100kg increase in urea usage. But the farmer, whose TSP (by 10kg) and potash (by 10kg) usage had decreased believed that “now it’s less. Now we apply frugally. There isn’t any in the shop to buy” (FS160).

Farmers’ explanation to the difference in past and current fertilizer usage was cross tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, satisfaction over the current subsidy scheme, the perceptions over relative advantages of fertilizers, and input output services. Fisher’s Exact Test was used in determining the significance of the associations.

The difference in current and past fertilizer use also showed significant associations with input services. The difference in current and past TSP (p=.037) and urea (p=.043) showed significant associations with satisfaction over the frequency of releasing irrigation water. The proportion of farmers satisfied with the frequency of irrigation water release was lowest among those reported a decrease in TSP usage and highest among those who reported no change in TSP use. The proportion of farmers dissatisfied with the frequency of irrigation water release was highest among those who report an increase in urea usage.
5.6 Attitudes Linking the Rice Fertilizer Subsidy to the Rice Harvests

From a list of scenarios, specifying the direction and magnitude of any change in paddy harvests, farmers were asked to choose the scenario that best explained the condition of their harvests over the last five years. In order to distinguish between moderate and large harvest changes, a rough estimate of the change in harvests was sought. A change of 500kg per acre or more in the harvest was considered a large change while a change less than 500kg per acre was considered a moderate change. Results are given in Table 5.11.

Table 5.11 The frequency of farmer responses on the perceived changes in yields over the five years since the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Trends in harvests</th>
<th>Percentage of farmers by irrigation regime (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aggregate</td>
</tr>
<tr>
<td>Far below harvests 5 years ago</td>
<td>12.7</td>
</tr>
<tr>
<td>Somewhat below harvests 5 years</td>
<td>16.9</td>
</tr>
<tr>
<td>Almost the same as harvests 5 years</td>
<td>23.3</td>
</tr>
<tr>
<td>Somewhat above harvests 5 years</td>
<td>26.5</td>
</tr>
<tr>
<td>Far above harvests 5 years ago</td>
<td>18.0</td>
</tr>
<tr>
<td>Do not know</td>
<td>1.1</td>
</tr>
<tr>
<td>Less than 5 years into farming</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Nearly half of the farmers (44.5%) indicated an increase in harvests over the last 5 years, including 26.5% who indicated a moderate increase and 18.0% who indicated a large increase. Close to a fourth of the farmers said that their harvests have remained the same over the period. 29.6% indicated a decrease in harvests, including 12.7% who reported a large decrease in harvests. In rain-fed a majority of 40.63% farmers believe their harvests have declined over the five year period as opposed to the 25% who claim an increase in the harvests. In minor irrigation regime 71.0% believe that their harvests have increased and only 16% claim of decreased harvests. In the major regime 43% believe their harvests have increased while 30% believe harvests have decreased.

From a list of potential determinants of harvest change, farmers were asked to choose up to three determinants, that have been most influential in the change in harvests described above, and to rank them in order of descending influence from rank 1 to 3. Table 5.12 presents the frequency of responses confirming with the ranking for each harvest determinant. The most influential determinants predominantly dealt with soil fertility and fertilization. Fertilizer subsidy was considered the most influential determinant of harvest change, with 23.8% of farmers ranking the subsidy at the top. Soil fertility was ranked the top reason for harvest changes by 14.3%, while 8.5% ranked changes in rain fall as the top reason. The aggregate influence ascribed for each
determinant was calculated by weighting the rank scores to signify its influence factor (Rank 1 weighted by 3, Rank 2 weighted by 2 and Rank 3 weighted by 1). In overall, the three most influential factors for determining harvest changes were fertilizer usage, fertilizer subsidy, and changes in soil fertility. Among the other key determinants identified by the farmers were changes in rainfall, use of pesticides and use of new varieties. Frequencies for ‘not relevant’ correspond to those that did not experience any change in harvests over the period.

Understandably, more farmers in rain-fed irrigation (22%) attributed changes in harvest to changes in rain fall than in major (5%) and minor (7%). 19% of the farmers in rain-fed irrigation also attributed the change in harvest to fertilizer usage but very few (6%) attributed it to the subsidy. In minor irrigation 38% attributed the harvest change to the fertilizer subsidy and 10.34% to the changes in soil fertility. In the major regime 25% attributed the changes in harvest to fertilizer subsidy while 18% attributed it to the decrease in soil fertility.

Table 5.12  The frequency of farmer responses on the perceived relative importance of factors responsible for determining the perceived changes in rice yields over the five years since the commencement of the current subsidy scheme in the aggregate sample

| Changes in rainfall | 8.5  | 1.6  | 1.1  | 21   | 5.4  | 11.1 |
| Changes in temperature | 0.0  | 0.5  | 0.0  | 1    | 0.3  | 0.5  |
| Fertilizer subsidy | 23.8 | 4.2  | 0.0  | 53   | 13.7 | 28.0 |
| Changes in soil fertility | 14.3 | 2.6  | 0.0  | 32   | 8.2  | 16.9 |
| Use of new varieties | 6.9  | 3.2  | 0.0  | 19   | 4.9  | 10.1 |
| Use of novel planting techniques | 1.6  | 1.6  | 0.0  | 6    | 1.5  | 3.2  |
| Use of novel farming equipment | 1.6  | 1.6  | 1.1  | 8    | 2.1  | 4.2  |
| Use of pesticides | 4.2  | 4.8  | 1.6  | 20   | 5.2  | 10.6 |
| Use of fertilizer | 6.3  | 24.3 | 2.6  | 63   | 16.2 | 33.3 |
| Extension services | 0.5  | 0.0  | 1.1  | 3    | 0.8  | 1.6  |
| Irrigation | 2.6  | 1.6  | 0.5  | 9    | 2.3  | 4.8  |
| Other | 6.9  | 4.8  | 2.1  | 26   | 6.7  | 13.8 |
| Do not know | 0.5  | 0.5  | 0.5  | 3    | 0.8  | 1.6  |
| Not relevant | 20.6 | 20.6 | 20.6 | 11   | 29.6 | 60.8 |
| Less than 5 years into farming | 1.6  | 1.6  | 1.6  | 9    | 2.3  | 4.8  |
| No response | 0.0  | 26.5 | 67.2 | 38   | 100.0 | 205.3 |
Perception over trends in rice harvests was cross-tabulated with the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, the satisfaction over the current subsidy scheme, the perceptions over relative advantages of fertilizers, an explanation to the difference in current and past fertilizer use, perceived trends in rice harvests, and input output services. Fisher’s Exact Test was used in determining the significance of the associations.

Significant associations were found between the perception over harvest changes and discrepancy of TSP (p=.043), MOP (p=.013), and total fertilizers reporting (p=.027), irrigation (p=.014), satisfaction over availability of seed (p=.038), satisfaction over TSP (p<.001) and MOP adequacy (p=.019), satisfaction over the timing of fertilizer distribution (p=.042) and organization of fertilizer distribution (p=.024). Among those farmers who reported TSP, MOP, and total to the exact or over the allocated, more tended to claim increased harvests. More farmers in the major and minor regimes reported an increase in harvests. Most farmers who claimed of increased harvests tended to be satisfied with paddy seed availability. Farmers who perceived subsidy allocations of TSP and MOP to be adequate tended to perceive an increase in harvests over the past five years. Similarly, those satisfied with the timing and organization of fertilizer distribution tended to report an increase in harvests.

5.7 Attitudes on Linking the Rice Fertilizer Subsidy to Personal Wealth

A great majority believed that their wealth has improved over the last five years (Table 5.13). 48.7% indicated a moderate improvement in wealth, while another 4.8% indicated a great improvement. On the other hand, 5.9% claimed a decline in wealth over the period. In total, 15.9% believe that their wealth has worsened. Close to a third (30.2%) of the farmers believe that their status of wealth has remained unchanged. The percentage of farmers claiming improved wealth from major (54.8%) and minor (64.5%) regimes were much higher than the percentage claiming improved wealth from the rain-fed regime (37.5%). An increase in the living cost and an increase in the additional income were the two most common reasons identified for the perceived changes in wealth (Table 5.14).
Table 5.13  The frequency of farmer responses on the perceived changes in wealth over the five years since the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Status of wealth</th>
<th>Percentage of farmers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aggregate</td>
</tr>
<tr>
<td>Greatly worsened</td>
<td>5.8</td>
</tr>
<tr>
<td>Somewhat worsened</td>
<td>10.1</td>
</tr>
<tr>
<td>Remained the same</td>
<td>30.2</td>
</tr>
<tr>
<td>Somewhat improved</td>
<td>48.7</td>
</tr>
<tr>
<td>Greatly improved</td>
<td>4.8</td>
</tr>
<tr>
<td>Do not know</td>
<td>.5</td>
</tr>
</tbody>
</table>

Table 5.14  The frequency of farmer responses explaining reasons for the perceived changes in wealth over the five years since the commencement of the current subsidy scheme in the aggregate sample

<table>
<thead>
<tr>
<th>Reason</th>
<th>Responses</th>
<th>Percent of Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percentage (%)</td>
</tr>
<tr>
<td>Credit burdens</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>Increase in additional income</td>
<td>54</td>
<td>20.8</td>
</tr>
<tr>
<td>Decrease in additional income</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Increase in paddy yields</td>
<td>24</td>
<td>9.3</td>
</tr>
<tr>
<td>Decrease in paddy yields</td>
<td>8</td>
<td>3.1</td>
</tr>
<tr>
<td>Increase in living cost</td>
<td>61</td>
<td>23.6</td>
</tr>
<tr>
<td>Effort</td>
<td>21</td>
<td>8.1</td>
</tr>
<tr>
<td>Fertilizer subsidy</td>
<td>14</td>
<td>5.4</td>
</tr>
<tr>
<td>Health condition and diseases in the family</td>
<td>11</td>
<td>4.2</td>
</tr>
<tr>
<td>Higher price given for paddy</td>
<td>12</td>
<td>4.6</td>
</tr>
<tr>
<td>Other</td>
<td>40</td>
<td>15.4</td>
</tr>
<tr>
<td>Do not know</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>259</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As shown in Table 5.15, more farmers from the minor regime (12.9%), than those from major (4.8%) and rain-fed (3.1%) regimes attributed the increase in wealth to fertilizer subsidy. In the rain-fed regime (46.9%) decrease in rice yields, prevailed the reasons attributed to change in wealth. A decrease in additional income was identified for changes in wealth by a majority of farmers in the minor regime (19.4%).
Table 5.15 The frequency of farmer responses explaining reasons for the perceived changes in wealth over the five years since the commencement of the current subsidy scheme by irrigation regime

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage within irrigation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>Credit burdens</td>
<td>4.0</td>
</tr>
<tr>
<td>Increase in additional income</td>
<td>30.2</td>
</tr>
<tr>
<td>Decrease in additional income</td>
<td>15.1</td>
</tr>
<tr>
<td>Increase in paddy yields</td>
<td>6.3</td>
</tr>
<tr>
<td>Decrease in paddy yields</td>
<td>31.0</td>
</tr>
<tr>
<td>Increase in living cost</td>
<td>13.5</td>
</tr>
<tr>
<td>Effort</td>
<td>8.7</td>
</tr>
<tr>
<td>Fertilizer subsidy</td>
<td>4.8</td>
</tr>
<tr>
<td>Health condition and diseases in the family</td>
<td>17.5</td>
</tr>
<tr>
<td>Higher price given for paddy</td>
<td>3.2</td>
</tr>
<tr>
<td>Other</td>
<td>5.6</td>
</tr>
<tr>
<td>Don not know</td>
<td>0.8</td>
</tr>
<tr>
<td>Not relevant</td>
<td>0.0</td>
</tr>
</tbody>
</table>

A cross tabulation was performed between the change in wealth and the reasons identified by farmers for the given directional change. According to the results (Table 5.16), those who claim of worsened wealth, ascribe the change to the increasing living cost (46.67%), health condition and diseases in the family (23.3%), and decrease in paddy yields (23.3%). Those who believe that their wealth has not changed, identify the increasing living cost as the main reason. Increase in additional income (53.47%), increase in paddy yields (25.74%) and effort (19.80%) are the three main reasons identified by those claiming of improved wealth. Another 13.86% believe that the fertilizers subsidy has contributed to their status of improved wealth.
<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage within perceived change in wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Worsened</td>
</tr>
<tr>
<td>Credit burdens</td>
<td>16.7</td>
</tr>
<tr>
<td>Increase in additional income</td>
<td>0.0</td>
</tr>
<tr>
<td>Decrease in additional income</td>
<td>10.0</td>
</tr>
<tr>
<td>Increase in paddy yields</td>
<td>0.0</td>
</tr>
<tr>
<td>Decrease in paddy yields</td>
<td>20.0</td>
</tr>
<tr>
<td>Increase in living cost</td>
<td>46.7</td>
</tr>
<tr>
<td>Effort</td>
<td>0.0</td>
</tr>
<tr>
<td>Fertilizer subsidy</td>
<td>0.0</td>
</tr>
<tr>
<td>Health condition and diseases in the family</td>
<td>23.3</td>
</tr>
<tr>
<td>Higher price given for paddy</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>36.7</td>
</tr>
<tr>
<td>Don not know</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Perception of wealth was cross-tabulated with the the level of formal education, time in farming, the extent of total and rice cultivation acreages, the extent of total and rice cultivation acreages owned by the farmer, variable cultivation costs including labour, weedicide, and paddy seeds, irrigation regime, discrepancy in fertilizer reporting, the difference in current and past fertilizer use, the perceptions over relative advantages of fertilizers, adequacy of fertilizers, rice harvests, and input output services. Fisher’s Exact Test was used to detect any significant associations.

Formal education (p=.002), time in farming (p=.018), total acreage (p=.009), rice acreage (p=.033), own total acreage (p=.038), TSP adequacy (p=.027), and quality regulations in the guaranteed price scheme (p=.003) showed significant associations with the farmers’ perception over wealth. The proportion of farmers reporting an increase in wealth was higher among those who had studied beyond the primary level and those who had completed ordinary level. Similarly, the proportion of farmers reporting an increase in wealth was higher among those who had been in farming between 10 to 20 years. The proportion of farmers who claimed their wealth to have improved tended to increase as the extent of total, rice, and own total cultivation acreages increased. Farmers who perceived TSP amounts allocated by the subsidy to be adequate tended to perceive an improvement in their wealth. The proportion of farmers dissatisfied with guaranteed price scheme quality regulations tended to decrease as perception over wealth improved.
5.8 Conclusions

The purpose of this chapter was to complete an answer to RQ2. Chapter 4 found a number of positive changes in the trend of fertilizer usage among farmers following the introduction of the current fertilizer subsidy scheme. During the same period there was a parallel increase in rice production. A majority of farmers attributed the increase in fertilizer usage and increase in rice output to the rice fertilizer subsidy. A majority considered the fertilizer allocations to be adequate, and were satisfied with the structure and operation of the subsidy scheme, timing of fertilizer distribution being the only concern for a considerable proportion. Many farmers perceived the subsidy to be an important contributor, in the increasing trends experienced in yields following the subsidy’s implementation.

For farmers, soil fertility, fertilizing soil, and the current fertilizer subsidy were the key factors that determined the trends experienced in yields. Therefore, farmers’ response to the subsidy was founded in their response to dealing with soil fertility issues. Farmers’ response to the use of straw and organic fertilizer, which is a prerequisite to qualify for receiving subsidized chemical fertilizers, did not receive a similar response. The farmers perceived that chemical fertilizers are an easier, more effective alternative to organic fertilizers and reported the problems and limitations in using and making straw and organic fertilizers. Consequently, farmers resisted adopting the practice, and village level administration acquiesced in this non-compliance. Unlike extension, the subsidy on fertilizer catered a demand that accommodated the commitment the farmers could afford to make in rice farming. Many did not undertake commercial farming, and as the agricultural system continued to maintain a suboptimal enabling environment in terms of other agricultural services, the subsidy is unlikely to give enough leverage to elevate the current subsistence farming to a commercial level. Therefore, given the prevailing conditions the farmers will support the subsidy scheme in its current form and will continue to create a demand for cheap fertilizers into the foreseeable future. This appears to be a perverse outcome. However, subsequent chapters explain it as a logical extension of the current cultural settings.
Chapter 6 The Science and the Bureaucracy of the Rice Fertilizer Subsidy

All of our reasoning ends in surrender to feeling

Blaise Pascal

6.1 Introduction

Chapters 4 and 5 explored the farmers’ interpretation on how they have responded to the current rice fertilizer subsidy to construct their role in its constituting and mediating to answer RQ2. The purpose of this chapter is to construct a similar picture on the role of agricultural bureaucrats and researchers to answer RQ3, which asks, ‘what is the role of the agricultural bureaucracy and research and development in constituting and mediating the rice fertilizer subsidy policy?’ To address this, the chapter locates the agricultural bureaucrats and researchers response to the subsidy’s current role as well as its desired future role and thereby contributes to the building up of resolutions to RQ4 and RQ5 which are addressed in Chapter 7.

As explained in Chapter 3, the approach adopted in constructing the role of the agricultural bureaucrats and researchers’ was different to that of the farmers’. In the case of farmers they are the ‘takers’ of the policy and they respond to the outputs and outcomes of the policy. Therefore, the farmers’ role in constituting and mediating the rice fertilizer subsidy was constructed by gaining an understanding on how farmers respond to the outputs and outcomes of the subsidy. This chapter is different because in the case of the bureaucrats and researchers they are the ‘givers’ that their role in constituting and mediating the policy is deliberate and influential. As the population of agriculture bureaucrats and researchers was small, qualitative methods were employed to gain in-depth insight into what guides their role in constituting and mediating the rice fertilizer subsidy policy. The data was derived from 22 semi-structured interviews (Appendix 3) and three focus groups (Appendix 5) with 24 agriculture bureaucrats and researchers (Table 3.2). The participants included top-level agricultural administrators and researchers representing the fields of agriculture economics, crop science, agronomy, soil science, extension and monitoring, rice breeding, and ecology. The topics discussed in the focus group and interviews included but did not limit to the following; the importance of the fertilizer subsidy, implications of the fertilizer subsidy, issues in rice and agriculture sectors, preferred futures in agriculture, and obstacles in achieving the preferred futures. The data was analysed using the methods outlined in Section 3.4.4. The conceptions formulated in

29 All top-level agricultural administrators have a background in agriculture with at least a Master’s level qualification.
the analysis that sit at the highest level are presented here in this chapter. Therefore, these conceptions are more than recapitulations of what was said and represent an interpretation. In order to permit transparency in the process of abstracting the concepts, to give grounds to the credibility of the formulated conceptions, and to allow the reader to get a feel of the scope and the depth of data, each formulated conception lays out direct quotes from the interviews and focus groups exhaustively. It is important to note that no attempt was made to draw generalisations based on the expertise of the participants so as to distinguish who said what. The views and perceptions of the agricultural bureaucrats and researcher presented here are treated as a set of ideas that permeate the agricultural bureaucracy and research and development community.

6.2 The Benign Crop

“Rice is the staple food. . . . [Rice offers] food security. It is not in the sense of rupees and cents or the money. [Rice provides] employment …, income, nutrition, and everything” (FGD5). As summed up in this informant’s remark, rice received a status of ‘benign-ness’, in the views of the participants. Reasons brought up in establishing the significance of rice and the fertilizer subsidy, in many ways highlighted the non-market value attached to the crop. The importance of rice as a staple and more so as a healthy staple was key to this attitude. Another strong point of argument was the importance of the crop, culturally. Allied to this was its role in generating livelihoods. Other informant points that confirmed the perceived superiority of the crop were the suitability for existing growing conditions and the absence of major environmental impacts.

The participants valued rice highly as a staple “Rice should be the first crop. It is our priority. . . . It is our culture. It is the staple of the people of Sri Lanka” (FGD16). Rice was not any staple, but the wholesome staple. In Sri Lanka, people eat rice for all three meals. Two rice meals a day is the norm, and at least one meal of rice per day is a must, especially for lunch. If one has not have eaten rice all day, people in Sri Lanka will greet he or she with sympathising remarks ‘has not even had rice’ which in meaning is synonymous with ‘has not even had food’. As noted in Chapter 2, rice is one of the more nutritious grains and has many advantages as a staple (Section 2.5.1). It is a superior source of energy and contains both carbohydrates and proteins in sufficient amounts to for a complete meal. Therefore, the superior status of rice in the Sri Lankan diet has basis beyond simple cultural preference. To date rice is a symbol of prosperity and social status. The adequate consumption of rice is a measure of adequate nutrition and connotes a superior status of consumption and a noble mode of sustenance.
The importance of rice, in provisioning food security at the household level, and at national level elevated the value of the crop beyond a staple. It was in fact the primary reason that was highlighted over and over again in attesting the merit of the crop. According to one informant, “Even if you don’t sell the harvest in market . . . if you can use it over an extended period, say more than three months, without buying rice from the market, it gives food security, especially when considering price fluctuations in the market” (FGD13). Another idea highlighted the importance of achieving food security at national level.

If the subsidy was not given, see the impact of 2008 food crisis, if we had to import rice, there was no rice in the world market. Therefore, other than the monetary value, there are some social impacts and also political repercussions that one needs to consider; we haven’t had political repercussions in the country-starving of poor people and rising against government like in some other countries—because we have some sort of food security, because we cultivate rice. (FGD5)

This is a shared attitude among many countries in which a large proportion of the population is rural. As noted in Section 2.3, across South and Southeast Asia, rice self-sufficiency has always been considered a prerequisite for achieving food security.

“Rice farming is the livelihood of many Sri Lankans” (FGD5). “Culturally, in Sri Lanka 70% of the people are rural, majority of the rural people are farmers, mainly paddy. Paddy is kind of culture. In the dry zone, their entire life cycle is determined . . . by the life cycle of the paddy plant, socioeconomic aspects, . . . all those things. . . . So it is a cultural thing” (FGD2). As revealed by these informant remarks, rice farming was appreciated greatly, for providing a livelihood and so becoming the lifestyle, and setting the cultural backdrop of the rural people. “What would the farmers do if they don’t cultivate paddy? Traditionally, they have been paddy farmers for generations” (FGD6). The participants concurred with the notion that rice is a mainstay of the rural economy and the social fabric. On one hand this was presented in defence of the continuation of rice cultivation despite its unprofitability, and in turn as a justification for the fertilizer subsidy. On the other hand this presented an explanation for the lack of adaptive capacity of the farmers.

Agronomic limitations to agriculture in Sri Lanka make the existing conditions unsuitable for many crops (Section 1.4.1). As noted in Section 2.5.2, rice is an exception to this. The point was brought up in establishing the appropriateness of the crop, agronomically.

FGD9: There are some lands in the country, where you can cultivate only paddy.

FGD10: Especially, in the low-lying water logged areas.
Adding to the above justification of continuing with cultivating rice and subsidizing fertilizer, the agronomic appropriateness of rice, further promoted its suitability as a staple.

Rice should be the staple food, even if you leave aside tradition and food habits, if we take land availability, it is difficult to cultivate in this climate situation. . . . We can’t grow anything else in around 0.5 million hectares - there is always water. When you consider climate and everything, paddy is the crop that suits these conditions and therefore definitely becomes the staple food. (FGD17)

We grow paddy, in lands where you cannot grow anything else. If we fill up the lands - we know what has happened - those lands get inundated even from a small flood. We grow paddy in lands you cannot grow anything else. Paddy is the crop that you can grow under any condition. That is the one reason why it has become the staple. (FGD21)

Unlike in other crops, the environmental impact of rice cultivation was considered to be minimal. “The rice ecosystem is extremely stable. It has been there for thousands of years. There had been no problem” (FGD11). This was another positive attribute that added to the importance of the crop, making it the one environmentally friendly option, in agriculture.

In paddy we are not using fertilizer excessively, although the efficiency is low . . . may be around 25%. We analysed the water samples and we did not find any nitrogen fertilizers. In some other areas, like in the intensive vegetable cultivation in upcountry areas, a number of studies indicate that the nitrogen content in ground water is high. (FGD5)

Based on these perceptions, the importance of the crop, in terms of nutrition, economy, culture and agro-ecology is immense and undeniable. On one hand these attributes attached an eminence to rice that no other agricultural commodity could match. On the other hand these same attributes were overplayed in defending the weaknesses in the rice sector, containing opportunity for any improvement.

6.3 Rice Beyond Food

Whether at the individual level, house-hold level, or national level, food security is a basic necessity. Considering both local and international pressures, SSI14 explained the value of food security.
We had such a war. People of our country didn’t die. They didn’t face any food shortages. Although we fought a war of 30 years, we weren’t affected that much, because our people had food to eat. . . . Our people are not that prone to things happening overseas, whether it’s a food shortage or an unexpected drought. (SSI14)

As observed in Section 6.2, for the focus group and interview participants, food security was more or less synonymous with rice security. For them, food self-sufficiency was a pre-requisite for food security. In its practical adoption, it was rice self-sufficiency that was seen as a pre-requisite for food security. “Having our own rice” and independence from imports “arriving at Colombo port” were considered as key elements of food security. The following focus group excerpt elaborated this premise.

FGD10: This year, the government spent Rs.40,000 million [on the fertilizer subsidy]. Is it worth? I don’t know. We can import may be a whole stock of rice - of course we have to protect the farmers.

[After some discussion that followed] Moderator: I would like to revisit a point you [FGD10] mentioned earlier. You said we could import rice at a cheaper price. Then why do we give so much importance to this concept of self-sufficiency?

FGD10: I never say that we should import rice - [we shouldn’t] at any cost.

FGD6: Theoretically we could do it. But there should be food security and social security. As a nation we should have our food security. Look at what is happening around the world-natural disasters and all that. We should be having our own rice. That is a part of our life. We cannot be depending on ships arriving at Colombo port.

The self-sufficiency goal that is the aim of the agriculture policy, as the agricultural bureaucrats and researchers report, was partly founded in achieving national food security. However the unwillingness, even to ponder the possibility of imports, added another dimension to the drive in self-sufficiency-the importance of food sovereignty.

It is not the farmer who should become independent, it is the country. To become independent from other countries, the main thing is food. We need to take every measure to become sovereign in food. . . . If the country is self-sufficient, what it says is that there is a good future. As a nation, when the country is sovereign, everything is sovereign”. (FGD21)
Therefore, the subtleties of food security, food self-sufficiency, and food sovereignty are fundamental to understanding the rice policy itself and the attitudes and perceptions of agriculture bureaucrats and researchers that guide the rice policy orientation.

6.4 Rice, More Rice, and Some More Rice

In discussing the opportunities for improvement in the rice sector, maintaining self-sufficiency and targeting further increases beyond self-sufficiency remained a key priority. A number of possibilities and opportunities were identified in this regard. One idea was to bring more land into cultivation.

After the war new areas of north and east were opened up. Some of these areas, we call the rice bowl. In the eastern area productivity is high. 25% of the production is coming from North and East area. Rice cultivation is their major thing, they don’t have any other thing and their land does not have any other opportunity cost. So even if we withdraw the subsidy still we can go for self-sufficiency. (FGD1)

In parallel a need to bring more farmers into the industry was another possibility.

In a farming family, children are always trying to find other jobs. The reason is that, there is a gap in social status . . . If you can improve the public image of the social status of farmers somehow, you can bring more people into farming and increase productivity. (FGD13)

Another opportunity was present in closing up the gap in the yield potential.

Now our average yield is about 88 bushels per acre\(^{30}\), but if we take the range there is a huge variation between the minimum and the maximum. The minimum is around 30-40 bushels per acre\(^{31}\) and at the other end it is around 200-230 bushels per acre\(^{32}\). One thing we're trying to do is to raise the lower range. There are fields with issues. We try to breed varieties suitable for those fields with issues. For example, varieties that can withstand iron toxicity, floods, and drought, and thereby increase the average yield, and we can reach self-sufficiency in that way as well. (FGD18)

Eliminating the priority given to other crops, presented an opportunity to augment the efforts in the rice sector.

\(^{30}\) 4530kg/ha
\(^{31}\) 1550-2060kg/ha
\(^{32}\) 10310-11860kg/ha
Some crops that should not receive priority, receives priority. This should be eliminated. For example, potatoes - we import everything including seed potato. Our only input is labour. It is true that it is a political crop, but if it is available for a cheaper price in the world market, we should import it and we can save on everything and protect the environment too. (FGD17)

Provided that self-sufficiency is a target that has been achieved, these opportunities in further increasing rice productivity would yield plenty in excess of the local rice demand. Opening up opportunities to improve the commercial value and appeal of rice, was the main intention behind managing the excess. Although, there was no evidence to justify such potential seizing export markets was considered a possibility.

I'd like to see Sri Lanka becoming the best country exporting highest quality rice. . . . We need to enforce laws to bring abandoned paddy lands into cultivation. Once the production has increased [by bringing abandoned paddy lands into cultivation], we need to find solutions to the problems that arise. (FGD20)

If exporting rice, we need export taxes to make sure that we do not end up at a loss. We need to cover the cost of the subsidy; we should not export at a cheaper price. (FGD17)

Another implication was to promote rice based products.

This is what I mentioned to my former director 15 years ago . . . to subsidise tax benefits, tax holidays to food processing companies who are using rice based products. Therefore the value of the rice farmer increases, over time. Subsidies to big, for instance, biscuit companies, you give them huge tax breaks for whatever the number is, again phased out. So that they are using rice based food products rather than wheat based food products and do research into instant food products, so that they are using mostly rice. (FGD11)

We must think about diverting this whole rice program. We are almost self-sufficient. Now we must think about exporting rice, finding a niche market. We must also go for rice based products and also fulfil the needs of the hotel industry. We should have substitutes for imported varieties. We do have two basmati varieties. . . . We need to think about the next ten years, what would be the needs of the rice industry and have a program and address those needs. We need to have rice based products that can attract the younger generation, like snacks or fast food. My daughter brought something [rice based] a couple of days back . . . like chips . . . or puffs. They were good. We have to identify the needs of the people, and work on those areas. (SSI41)
However there were existing issues in current production and processing that limited the potential of the industry for expansion. The quality standard of milled rice was a major barrier in entering into export markets.

We have achieved self-sufficiency but we cannot compete with the export markets, because we don’t have the necessary quality standards. . . . Now we should focus on quality improvement rather than increasing productivity, if we are to export we need to find a niche market and improve the technology, so that we can compete with other countries. (FGD20)

Another major constraint was the inadequacy of storage facilities.

With the North and East coming into cultivation the extent of paddy has increased by about 0.2 million hectares. In the past there was only about 0.8 million hectares. Now there is about 1.1 million hectares. With the subsidy the yields could increase and there could be a surplus, but the government does not have any plan for the surplus. (FGD18)

As noted in section 1.4.1, beginning from around the middle of the last decade, Sri Lanka has continued to produce rice well in excess to meet its rice demand. But the views of the agriculture bureaucrats and researchers revealed a continuing effort to further increase rice production and identified opportunities for commercialisation beyond existing markets.

### 6.5 The Desirable Subsidy

Based on what the participants revealed, the fertilizer subsidy has contributed in a number of ways to improve fertilizer usage practices among farmers and the development of the rice sector. One such improvement was the increase in fertilizer usage. There was a perception that the removal of the subsidy would lead to a decrease in fertilizer usage.

If you remove the subsidy, the farmer gets discouraged and wouldn’t apply the appropriate fertilizer recommendation. They gauge the cost and try to minimise [fertilizer application]. Now they apply the recommended dose in a way to get the best yields. (FGD19)

What I say is that the subsidy should be given. It is right. If we’re removing the subsidy we should do it over long term. . . . You should condition the farmers to it little by little. Only in that case would the farmers use inputs properly. Otherwise they give up using fertilizers and farm without applying fertilizers. (FGD14)
For two years the fertilizer subsidy had been withdrawn for TSP and MOP. During those times usage of potash was as low as 40%. (FGD21)

As FGD19 and FGD21 suggest above, using fertilizers at the optimum was one positive implication of increased usage. Another related positive implication emerged from subsidising all three N-P-K fertilizers. “Which type of fertilizers you get the subsidy for? If you subsidise N farmers might apply more N (FGD2)”. Therefore subsidising all three fertilizers was perceived as a positive contribution in advancing towards improvements in maintaining nutrient balance. The other side of this argument was that the subsidy has contributed to controlling excessive usage of fertilizers among rice farmers. Farmers had limited access to fertilizers outside of the government distribution schemes because of two reasons - the first was the limited availability of fertilizers in the open market and the second was the high price. Therefore the farmers are compelled to use the government’s fertilizer recommendation. FGD4 elaborated on this.

I have felt that this fertilizer subsidy has controlled fertilizer usage of farmers in Sri Lanka, in a way, indirectly. Farmers can’t purchase any quantity of fertilizer they want, they are limited to the land size and thereby the recommendation. . . . The recommendation is not an excess amount. It is for a certain yield. So you cannot purchase above that. In a way the fertilizer subsidy has served to control - in paddy lands we don’t get this excess nitrate problem that much. In a way the government has this controlling hand through the subsidy to control the farmers’ fertilizer usage. (FGD4)

As SSI20 reported, increase in the profitability of rice farming was another desirable outcome of the subsidy.

Smallholders dominate the paddy sector - 95% of farmers operate less than one acre. When the fertilizer price drops, it works as an indirect income transfer to smallholders. If we look at the cost of cultivation, before the subsidy, farmers in the wet zone were at a loss. After the fertilizer subsidy was given, every [rice] production system in Sri Lanka became profitable. . . . There has been an increase in fertilizer usage. With the increase in farm gate price, profitability has increased. (SSI20)

Therefore the subsidy was considered an encouragement for farming. “The subsidy brought about a boost in production. . . . It became a great impetus for the poor farmer” (SSI22). According to what the participants revealed, this drive was so strong that the subsidy even attracted people who had abandoned farming altogether, back into cultivating rice. Comments by FGD16 and FGD5 are indicative of this. Although the return from other crops to rice was perceived as showing resistance
to natural adaptation, bringing people who had left farming back into the industry was seen as showing positive signs for the industry.

Even abandoned land was brought into cultivation. One reason is the fertilizer subsidy and the other reason is that the price of rice was raised. (FGD16)

Land abandonment in the wet zone was about 30%. We have now brought it down to 10%. Paddy farmers have come back into farming. . . . Farmers engaged in activities other than paddy farming. There were part time farmers. They had other occupations and incomes and they cultivated during the weekend. Now they have come back into farming. (FGD5)

All in all, the participants considered the subsidy an important agent contributing to the increase in the extent of cultivation, increase in yields and achieving self-sufficiency.

6.6 The Undesirable Subsidy

The focus group and interview participants voiced their disapproval of a number of undesirable aspects of the fertilizer subsidy. Among, there were problems and limitations, which will be analysed using the following definitions.

A problem is defined here as an unwelcome or harmful matter or situation of the system needing to be dealt with and overcome to achieve the desired or the expected state of the matter or the situation. The system is considered to have some control over the matter or situation.

A limitation is defined here as a measure or condition that keeps someone or something under control and the system at stake may or may not have control over a given limitation.

6.6.1 Problems

The focus group and interview participants identified a number of problems in the rice sector in Sri Lanka, involving the fertilizer subsidy scheme. According to the participants, the main problems of the subsidy were the cost of the subsidy to the government, pricing of subsidised fertilizer, shortcomings in the distribution of fertilizers, and shortcomings in the manipulation of fertilizer usage.
Relating to the state level, the cost of the subsidy was a major concern of disapproval. According to FGD3, “It is equivalent to the Samurdhi payment. It’s a huge cost. . . . Something needs to be done. This uniform application is highly costly to the government” (FGD3). Concomitantly, relating to affairs on the ground, the pricing of the subsidy was disapproved for being unreasonably low. “If you give it for free, it gets washed away in the waters. If you have to spend money on it, you take it home and keep it back” (FGD17). As FGD23 suggests, “because fertilizer is so cheap and because it is unavailable in the market, there is opportunity for corruption” (FGD23).

Hence there was much reservation among the participants about the integrity of the fertilizer distribution machinery on the ground level. “Cheating is going on” (FGD1)—fertilizer trafficking and fertilizer leakage to other crops were the key issues. FGD5 explained the situation as follows.

Now we have three bands [of yield targets], 100, 120 and 140 bushels and above per acre. This is roughly about 5, 6 and 7 t/ha. At the beginning, the subsidy was given for 100 bushels or 5 t/ha band. Later we revised that based on irrigation schemes to get the full potential. . . . Lets say we want to increase their productivity, from 5 to 7 t/ha. . . . Unfortunately, what farmers do is, they apply the quantity equivalent to say about 100 bushels/acre, and sell the remainder. There are people ready to purchase those fertilizers and apply to other crops. In the Yala season, . . . they don’t worry about selling fertilizers. . . . They cultivate other crops in their paddy lands. . . . Those are economical crops, especially maize and they apply the fertilizers to maize. (FGD5)

In addition to trafficking and leakage, the participants were also concerned about the trustworthiness of the farmland areas disclosed by farmers.

It is a drawback that we don’t have a database of farmland area. It is either the farmer or the agriculture officer, who discloses the information about land area. In some areas fertilizers are given in excess than required and in some areas in less. (FGD23)

The logistics and scheduling fertilizer distribution was another major problem identified in the focus groups and interviews. The participants reported major delays in getting the fertilizers to farmers on time. “Farmers receive the basal fertilizers, which should be applied at land preparation, 2-3 weeks after when the crop has already established” (FGD5). “Issues in logistics, and

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33 The government social welfare program for comprehensive development among disadvantaged groups
34 A Sinhalese idiom suggesting ‘going to waste’
35 5155 kg/ha
36 6186 kg/ha
37 7217 kg/ha
weaknesses in the public sector distribution system” (SSI20) were identified as the main reasons causing the delays. Below, SSI22 further elaborates the situation.

There are some agrarian services operation areas, where there are 1500-2000 and sometimes even 5000 acres of paddy lands. Those areas should have storage facilities to store enough fertilizers for that many acres. But there aren’t such storage facilities. For the farmers to receive fertilizers on time, there should be networking, transportation, stores, and all those things. There are shortages in infrastructure to implement this. (SSI20)

The amount of paperwork, the farmers have to deal with, when procuring fertilizers from the Agrarian Services Centres was also considered an unnecessary bureaucratic restraint. “There is too much paperwork, this and that” (SSI22). “The farmers have to apply through the Agrarian Services Centres and that process is quite annoying” (FGD16). There was a perception that a simplified process should replace the existing paperwork. If it could be made available in the open market, for a price a little higher than this, say Rs. 1000/- or Rs.1200/-, it would be much more useful” (FGD16). However, a contrary view perceived, the bureaucracy involved in obtaining fertilizers, as a deterrent discouraging capable farmers from accessing the subsidy - FGD6 explained this point.

This is beside the point. But we’re giving free uniforms [to school children]. Do we need it? . . . There are very rich people and they don’t need it. But the government tried to do it with some control. . . . If I want to get the free uniform, I need to go to the divisional secretariat and get the form signed. If I’m rich enough, I wouldn’t do it. That is what the government expected. The idea of filling forms and getting signatures and certifications is a form of bureaucratic discouragement. (FGD6)

Incompetence of the extension service received much criticism and was perceived another major problem. According to FGD14 there was a shortage of qualified AIs monitor the farmers.

What should be grown, and how it should be grown, depending on climate, soil, and financial conditions—there is no one to monitor that. Then let’s say some disease or pest attack is emerging, there is no one to make the farmer aware of it in advance. Therefore, the farmers are using chemicals, unnecessarily. What they use isn’t the pertinent. Because of that the cost of farming has gone up. (FGD14)

As SSI22 explained, the subsidy was perceived to be promoting chemical fertilizer usage among farmers.
Here [in the subsidy], we are encouraging the use of chemical fertilizers, largely. Later, a condition was brought binding the farmers to add organic fertilizers. But that doesn’t happen in practice. The agriculture officer must issue a certification saying that the farmer is applying organic matter. But because of personal connections, everyone signs for everyone. (SSI22)

6.6.2 Limitations

According to the focus group and interview participants, politics was a key limiting-factor, preventing the desired improvements in the fertilizer subsidy scheme and the agriculture sector as a whole. While the desired improvements varied from one individual participant to another, there was a common consensus over the limitations imposed by politics. Comments by FGD13 and FGD1 given below are suggestive of this.

Rice is a political crop by all means. Every government that came to power has incorporated rice into their agenda. Then the fertilizer subsidy indeed becomes a part of that agenda. (FGD13)

It is political. Whatever the cost, any government cannot withdraw the subsidy. It is their rural hand. (FGD1)

The agriculture bureaucracy, itself, was also perceived a limitation. The participants criticised the bureaucracy for resorting to the easy, instead of the desirable. For example, in response to comment suggesting that the farmers are unwilling to adopt organic fertilizers, FGD5 who is a bureaucrat himself, reveals his resentment towards the bureaucracy - “No, the farmers can do it. It is the bureaucrats. They don’t like it. They like rather simplified systems” (FGD5).

The failing of extension was another major limitation constraining the desired improvements and innovations, on the ground. A number of limiting circumstances within the extension service were identified in this regard. But the major constraint was the shortage of extension officers. According to SSI14 the density of AIs in certain areas was very low.

There are areas where there are about 6000-7000 farm families. In certain areas we have increased the density of AIs. . . . In areas where we have allocated one agriculture officer to 1000-1500 families, it is manageable. But if there is only one AI for the whole agrarian services division, then it is not practical. How can one person monitor 6000-7000 farm families? (SSI14)
According to the agriculture bureaucrats and researchers, some officers, mainly the Agriculture Research and Development Assistants, attached to the Agrarian Services Department who engages in extension work at village level (Section 2.4.2.4) lacked the necessary knowledge. SSI14 explains why.

At the beginning the ‘krupanisas’ [Agriculture Research and Development Assistant] were recruited in an ad hoc manner. Those recruitments were based on political affiliations and even an entry-level qualification hadn’t been set. Among them, there are graduates and there are even those who haven’t got through their SSC\textsuperscript{38}. . . .You can’t cater the farmers of the 21\textsuperscript{st} century by barely knowing some agriculture. Their problems are more complicated. . . . To be able to analyse a field problem and to do what’s necessary, there needs to be someone with a sound knowledge in agriculture. (SSI14)

There were other issues limiting the commitment of AIs. As SSI14 further explained:

They have mobility issues. Many of them don’t have motorbikes. Some have housing problems. They don’t have quarters. . . . They have issues in getting transfers. (SSI14)

According to the focus group and interview participants the attitude of the rice farmers was another major constraint. The farmers were reluctant to move away from cultivating rice, and as the participants revealed, this prevented the sector from improving. As the following remark suggests, farmers believe that they are predestined to cultivate rice. “Most of them have resigned to their fate. They have this attitude that we’re paddy farmers and we’ll be cultivating rice for the rest of our lives” (FGD6). As for this loyalty to rice, amidst efforts to diversify farmers keep cultivating rice and even those who attempt cultivating other crops return to cultivating rice after some time. Below FGD2 describes one such effort by the agricultural bureaucracy that was let down. For the focus group and interview participants, farmer’s loyalty to rice was another reality that constrained adaptation and improvement in the sector.

Even if you do not give the subsidy they would cultivate paddy and might not use fertilizer in appropriate levels, putting their lands into (FGD5 interrupts FGD2 and adds) an unproductive state. (FGD2 resumes)There was a project we started in Mahaweli B area, a Mahaweli Agricultural and Development project funded by USAID. The main aim was to get the farmers to diversify from paddy to oil seed. It did not happen. With all the coal chain facilities provided and with various subsidies, they did not [convert]. It is like the tail of the stray dog, they come back to paddy. (FGD2)

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\textsuperscript{38} Secondary School Certificate. Obsolete reference to General Certificate of Education for Ordinary Level exam (equivalent to British Ordinary level), which replaced SSC in 1963
On the other hand, the subsidy itself was perceived as a culprit constraining natural adaptation. As FGD1 reveals, with the introduction of the subsidy, farmers that had adopted other crops were forced back into cultivating rice.

In Embiliptitya [a district in the Southern Province] rice lands were converted to banana. When they get the subsidy they come back to cultivating rice. (FGD1)

The subsidy was also perceived to be limiting the adoption of best management practices in agriculture. “They don’t apply organic matter because fertilizer is cheap” (FGD19). There was a concern that the subsidy has dwarfed the importance of organic fertilizers and displaced its usage.

It is difficult to push people to adopt integrated plant nutrition . . . because fertilizer price is low. If the cost was a bit higher, people would then compensate the balance using organic fertilizers. (FGD16)

Below FGD5 gives an example of how the fertilizer subsidy has become an obstacle, for implementing the existing soil testing program.

This fertilizer subsidy program has really changed the whole . . . picture of the system. For example, we had a soil-testing program to determine the fertilizer recommendation. Farmers can test their fertilizer [sic soil] by paying Rs. 300/- and get the recommendation . . . and some advice as well. That program is dead now. Because, who is going to test soil by paying Rs.300/-? Instead he will prefer to purchase a bag of fertilizer for Rs. 350/-. (FGD 5)

Absence of a long-term agriculture policy was another major constraint that received participants’ criticism. “The A government would come into power and withdraw some policy. But when the B government comes into power, they will re-instigate it” (FGD17). Therefore, as FGD13 reveals below, long-term investments and developments in the sector have become unworkable.

After every election, all the policies get changed. In India . . . whoever it is that come power, their agriculture policy remains the same. In Sri Lanka when a new government or a new leader gets elected, they change all the policies and start from scratch. Then everything falls 4-5 years behind. We need an agricultural policy that would go on for 20-25 years. (FGD13)

6.7 Risks

A risk is a state involving exposure to danger, over which the system at stake has no control. There was one such state over which the focus group and interview participants voiced great concern—the
uncertainties in global food commodity markets. Fluctuations in both price and supply of food grains, mainly of rice, was regarded a high risk. “If the subsidy was not given, see the impact of the 2008 food crisis, if we had to import rice, there was no rice in the world market” (FGD5). “India imposed an export ban. Thailand banned their rice exports” (SSI20). In addition to the supply, price of rice in the world market was also considered unfavourable (FGD5). Therefore, as the participants perceived, dependence on foreign markets for rice needed to be avoided and local food security to be sought, in response.

Our rice production dropped somewhat when the fertilizer subsidy was removed. We had to import the balance from overseas. If you take the amount of foreign currency needed to import rice, and if the amount spent on fertilizer is less, what is wrong in giving a subsidy? We achieve self-sufficiency and . . . we don’t have to import rice from overseas. There were two food crises in 2008. But we were able to withstand them, because we were self-sufficient. (FGD21)

The importance of local food security was highlighted again, in the lights of natural disasters and possible future climatic hazards. “Look at what is happening around the world-natural disasters and all that. We should be having our own rice. . . . We cannot be depending on ships arriving at the Colombo port” (FGD6). There was some concern over risks involving future climatic hazards. FGD20 pointed to importance of having safety nets to compensate for any unavoidable damage. “Paddy cultivation relies on weather conditions. Considering climatic changes and the resulting hazards, there needs to be a crop insurance scheme” (FGD20).

6.8 Subsidising Culture

As noted in Section 6.3, ‘culture’ was a key contention justifying the existence and the continuation of the rice fertilizer subsidy. As this informant suggests, the association between culture and subsidy was rather direct - “in a way when you talk of the fertilizer subsidy you have to appreciate that paddy is a part of culture” (FGD2). This perception insinuated an immediate connection between culture and the subsidy than a remote connection that one would otherwise deduce through several linkages. The following excerpt from a focus group discussing the significance of rice, established this strong connection between rice and the subsidy. As the participants maintained rice has been, continues to be, and most notably, will be the persistent way of rural life and culture.

Moderator: Earlier FGD7 said that rice is not a profitable crop. So then why are we continuing to cultivate rice?
FGD6: I think it is the food security. What would the farmers do if not for paddy cultivation? They have been paddy farmers for generations.

FGD9: There are some lands in the country, where you can cultivate only rice. Then those farmers have to continue with paddy.

FGD6: Especially in the low lying water locked areas. It is a part of their life. What else can they do? They are not doing it for profit. It is their livelihood. Most of the farmers in this region cultivate for their own consumption. Most of them have resigned to their fate. They have this attitude that we’re paddy farmers and we will be cultivating rice for the rest of our lives, it’s like a vicious cycle.

FGD9: Another problem is that in some rural areas agriculture is not a business. It is the culture.

FGD6: There is pride in possessing a lot of rice.

Elements of this sentimental attachment to rice were involuntarily delegated to the subsidy. As one informant asserted, “there is a moral obligation to subsidise, because rice is not a profitable crop” (FGD1). The same cultural connotations feeding the impetus of the fertilizer subsidy passed on to its effects, likewise. According to the participants, the subsidy had far reaching consequences over the entire social fabric-“the fertilizer subsidy has a direct positive impact on the nutritional wellbeing, social well being, financial wellbeing, and particularly social harmony” (FGD10). The fertilizer subsidy was therefore perceived as an essential constituent supporting this rice based socio-cultural system.

6.9 Past: A Rationale for the Future

This country had been fighting mainly European nations for 300 years. How did they survive? Simply by Ala, Amuna and Wewa-for the dry zone wewa system, or the ilandawa system, or what we call the cascade system, for the wet zone and the mountains the amuna system. We had a farming system, which is partly documented by Robert Knox, which required no extraneous inputs. These systems are self-sustaining systems. (FGD11)

As epitomised in this comment by FGD11, the agricultural bureaucrats and researchers showed a tendency to idealise ‘the past’ as the desirable. As a result, for them the past had become a premise that justified the present and the future. As noted in Sections 6.2 and 6.8, remarks such as “What
would the farmers do if not for paddy cultivation? They have been paddy farmers for generations” (FGD6) and “What else can they do? They are not doing it for profit. . . . Most of them have resigned to their fate” (FGD6), relating to the long standing history of rice farming partly justified its continuation amidst unprofitability. Similarly, the idea that the subsidy is customary was a vindication for the existence of the subsidy and also signalled an obligation for its continuation. As FGD 16 noted, “The subsidy is not something that was started today or yesterday. It has been there for a long time”. When some denounced the political roots of the subsidy, others pointed to its history to counter the argument. “The fertilizer subsidy was not political in the past. Whoever started the subsidy must have had a vision that a subsidy was necessary to overcome those problems” (FGD21). FGD17 further elaborated on this premise.

Since those days, people have got used to the subsidy. They received the subsidy in a different form. Not at fixed price, but the importers were compensated to balance off the world market fluctuations. So they got something, if you remove it, there will be a huge rise in fertilizer prices. (FGD17).

“We build the future based on the lessons learnt from the past. So if it was possible in the past, it should be possible in the future [raise in voice and shows emotion]” (FGD21). Not only was the past a justification for the present, but as FGD21 suggests here, it also defined the future. Therefore as FGD1 said “You need to understand the reality. The government cannot withdraw the fertilizer subsidy”, the future of the subsidy policy was restrained by its own past.

6.10 The Rice Culture of Science and Policy

As already observed, the sentimental attachment to rice often governed much of the discussion content relating to the rice and fertilizer policy. The informant remarks such as “Rice should be the first crop. It is our priority” (FGD16), “The government blessing should be there for the [rice] crop” (FGD17), “I never say that we should import rice - [we shouldn’t] at any cost” (FGD10), “Sri Lanka becoming the best country exporting highest quality rice (FGD20)”, and “In paddy we are not using fertilizer excessively” (FGD5), manifested a strong sentimental attachment to rice. The participants were keen to defend the existing state of affairs of the science and policy of rice farming and fertilizer subsidising by means of this sentiment rather than logic. The following excerpt from a focus group shows the informants attempting to make a case for realising food sovereignty while importing much of the industry’s inputs.
FGD21: It is not the farmer who should become independent, it is the country. To become independent from other countries, the main thing is food. We need to take every measure to become sovereign in food.

Moderator: FGD21, do you think that our agriculture could possibly become independent, when we import 90% of our inputs from other countries?

FGD21: That’s commissioned to the researchers, [to find] how much the locally available inputs can be used as substitutes. We are working on that. That is why, as the government, we are promoting organic fertilizers. What local alternatives have we got to substitute fertilizer, one day if [the availability of chemical] fertilizers drop - we’re searching for answers for that. We have discovered varieties that give higher yields under low fertilizer conditions. As FGD13 said, we are researching into methods of increasing fertilizer efficiency. . . . We’re far ahead. There’s nothing to be afraid of.

FGD17: Now, when you say 90% of the inputs are imported, it is only the fertilizers . . . (interrupted by few others).

Other FGD participants: No, It’s all the chemicals.

FGD17: OK. We need to assess what is happening there. But on the other hand, we import 100% fuel from foreign countries - we don’t travel by cart, we don’t stop the vehicles. We do it according to the need. The reason why I mentioned [what I said about] potatoes, is it is cheap to import potatoes, because it is not a staple. You can’t do that with rice.”

To a similar question raised by the moderator, another focus group participant responded with a similar contention. These were attempts by bureaucrats and researchers to portray the policy and its outcomes as being priceless.

Fertilizer is the only input we need to import to grow rice. Our culture, land, soil, air, water, everything is there. . . . If we give a value to these inputs what’s the ratio [when compared with the imported inputs]? (FGD10)

Furthermore, as suggested by the following informant remark, the rice sentiment made the fertilizer subsidy an obligation.

We can continue the subsidy. . . . (to the moderator question whether it is possible to continue the subsidy considering the economy of Sri Lanka) We need to find the necessary conditions for that. (FGD21)
6.11 The Contradictory Points of View

There was much consensus among agriculture bureaucrats and researchers regarding most opinions, but not all. Certain issues did not receive the same level of agreement as others and the polarity was prominent. One such issue was the effect of the fertilizer subsidy on rice yields. One view suggested that the subsidy has significantly contributed to an increase in yields, whilst another argued that it has not. Participant remarks quoted below refer to the different implications of the fertilizer subsidy contributing to an increase in the yields.

We need fertilizers to get the potential yield. Because fertilizers are provided at a lower price it encouraged farmers to use fertilizers and as a result the yields have increased. (FGD18)

When you take rice cultivation as an industry, because of the subsidy, the profit margin has increased. Because of that people get encouraged in cultivating more rice. (FGD19)

In our country the production has increased clearly. One reason is the increase in yield. But the main reason is the increase in extent, there are two reasons for that, one is the fertilizer subsidy and the other is rice price. Because the cost for fertilizers is low, there is a great influence for the increase in extent, the profit margin is high. Even abandoned lands were brought into cultivation. (FGD16)

A contradicting view stated that the impact of the subsidy on yields has been negligible if any.

The yields have not increased significantly because of the fertilizer subsidy. The reason is there are other factors, they don’t use organic matter, and also don’t necessarily apply the fertilizers to the [rice] crop. . . . When you take the cost of production there is only a little component of the fertilizer subsidy. Labour cost and all those other things have increased. That’s why people sell it to the outside. You can’t subsidise over long term. [Farmers] haven’t reached the potential yield yet. May be a few farmers have achieved that. But when you take the whole, there is no big increase. (FGD15)

A counter argument to this suggested that maintaining the current yield level would not have been possible if not for the subsidy.

You can put it in another way, is it possible to maintain this yield level, if there was no subsidy. Can’t say [the production] has not increased at all. In general it has increased. (FGD17)
As the participants quoted below suggest, the main reason for such disagreement regarding the productivity of the subsidy was the absence of a proper appraisal of its costs and benefits.

We even made a request to do an assessment - this much is the investment, what of it is the yield? And what of it is the production? To the extent of my knowledge, no proper study has been done. It seems like one is underway. (SSI22)

I have read all the documents related to the fertilizer subsidy in Sri Lanka, the published ones. I could not find a single study which I can accept as a scientific study to show these are the factors influencing productivity or profitability of paddy farming and this is the contribution the subsidy scheme has made. We have our beliefs, we have our perceptions and all types of educated guesses. (FGD3)

As FGD3 reveals much of the contention regarding the impact of the fertilizer subsidy was based on belief and speculation rather than on any cost-benefit appraisal.

The environmental impact of the subsidy was another contention that attracted dispute. The focus group excerpt below presents both sides of the argument.

FGD21: As researchers we believe there is no environmental effect. Subsidy is for the recommendation. It doesn’t intend excessive fertilizer application. Therefore we believe that based on the amounts we have recommended there cannot be any environmental effect. But we’re researching into how we can increase efficiency and reduce fertilizer usage. If there are environmental effects then there should something wrong with the recommendation.

FGD17: Now with the subsidy if you look at the field, the whole range is green. They are using in excess.

FGD16: Is it in excess? You can’t say it is in excess.

FGD17: Excess means to get this greenness, they are using more than what they used to in general. This greenness was not there before. Definitely there are more leakages. . . . That negative impact is there. . . . When there’s more fertilizer there are more pest attacks and diseases. Then you have to apply more pesticides. Farmers don’t apply straw or organic matter anymore. The damage is greater than before. The environmental impact caused by this is greater than before - the negative impact. . . . If you look in every house there is fertilizer left lying to no purpose. One-two sacks of urea lying for nothing. It is the remainder that’s left after application. Of course they apply it to other crops. All these problems arise because it is so cheap.
FGD19: They don’t apply organic matter because fertilizer is cheap. There is more loss, more leakage and more wastage . . .and could have an environmental impacts.

FGD16: Then there is something wrong with our recommendation.

FGD21: Then it is our mistake.

FGD17: This is the 2001 recommendation. Now we don’t tell people to use that recommendation any more. It is only for the subsidy we use this recommendation. I never ask to apply a blanket recommendation.

FGD21: We're the ones who should say that [you] shouldn’t be using this recommendation. We should take that responsibility.

Government’s attempt to promote organic fertilizers was one mitigating circumstance presented to counter the speculations about possible environmental damage caused by the subsidy. However, an opposing view questioned the feasibility of the notion considering its effectiveness. The comments by FGD5 and FGD2 characterise this contrast.

The government has recognised that this is one of the core problems. They have what you call the organic promotion program to make farmers use and produce organic fertilizers. Their aim is to cut down chemical fertilizer at least by 25% by using the organic fertilizers. (FGD5)

I'm not a knowledgeable person on this side. But we're working high yielding varieties, which are responsive to fertilizers. In such a context we're trying to promote organic fertilizers, I don’t know to which extent the government or the Department of Agriculture has invested in coming up with varieties which can be improved through organics. (FGD2)

A separate but similar issue in line with the above was the question regarding the possibility of cultivating without chemical fertilizers. There was much polarity against this opinion, and for those who opposed, the feasibility in achieving self-sufficiency without the chemical inputs seemed an unrealistic goal. Therefore, as the response by FGD6 indicates, the idea of eliminating the dependence on agrochemicals was received with much cynicism.

We had a farming system . . . which required no extraneous inputs. . . . What we’re practising [now] is temperate agriculture. With the subsidy what we’re doing is we’re working against the ecosystem. . . . Our tropical ecosystems has been misunderstood and mismanaged for the last 30 or 40 years. . . . Therefore we need these temperate or western
energy substitutes. . . . If I’m given the authority, I’ll develop a plan that at the end of my term would give national food security without any external inputs. (FGD11)

We need to feed our population. How can we feed the nation? . . . How would you do it? Tell us how you plan to implement it . . . Give us an alternative [to chemical fertilizers] that will keep at least half the population fed. (FGD6)

Dependency of farmers on subsidies was another issue that was questioned. There was a strong support for the subsidy among the participants and therefore the counter argument came with force and spirit.

My idea is that the farmer needs to be self-reliant. There can’t be any dependency, there should be no dependency. In countries they have subsidised, I know there are many failures. . . . We need to get to self-reliant farming and sustainable development. We should eliminate dependency. . . . Subsidies don’t last over long-term. As a country, people get used to it and expect a subsidy for everything. (FGD15)

It is not the farmer who should become independent, it is the country. To become independent from other countries, the main thing is food. We need to take every measure to become sovereign in food. (FGD21)

As these informant remarks reveal, the disagreement in opinions revolved much around the effectiveness of the dependency on chemical fertilizers and its subsidising. While the section attempts to give credence to the different opinions, it is important to note that those opinions that questioned the subsidy were not as common and those that supported the subsidy.

6.12 The Multiple Realities

Given the higher prices of fertilizers in the world market, given the livelihood and economic situation and also the income situation of the farmers, who are generally, not well-off people in Sri Lanka, we need to have a fertilizer subsidy. (FGD6)

This observation portrays the reality of the fertilizer economy from the world fertilizer markets to the rural subsistence farmer - fertilizers are expensive and the rice farmers are poor. Leaving aside the question whether this alone should decide subsidising, it projects one single construct of the problem. What makes the problem difficult to tackle is that there are multiple possible constructs; all based on some fact. Therefore this section considers the various constructs of the reality
portrayed by the interview and focus group participants. The reality is construed as deriving from fact rather than opinion. Facts carried a major distinction from opinion; given the context those were indisputable.

Paddy is not a profitable crop and the farmers are poor. So that is another reason why the fertilizer subsidy should be there. . . . Without the subsidy farmers cannot continue rice cultivation” (FGD7) - this comment by FGD7 further elaborated the situation addressed by FGD6 above.

As noted before, focus group and interview participants identified rice farming as an unprofitable enterprise. FGD2 further elaborated the situation as follows.

Farmers do not have that much of bargaining power to determine the price. They are price takers. On the other hand they are trapped in a vicious cycle, since it is not profitable. When you harvest paddy price goes down. People don’t have the economic power to store the harvest and sell later. So most of the farmers are compelled to sell [as soon as they harvest]”. (FGD2)

As FGD7 pointed above, this is one reason why the subsidy was deemed important. However, the high cost of the subsidy which amounted to a considerable proportion of the national economy (Section 1.4.3) was another reality.

When you say how significant, the first thing that came to my mind is, how big is the subsidy? Right now the difference between the price of subsidised fertilizer and the market is like 60-70percent. There was a time when it was around 90%. During the crisis time, the subsidized price was Rs.350/- and the market price was Rs.7000/-. . . . So it is a huge outlay to the government. (FGD3)

Further, as the comments by FGD6 and SSI20 indicate, there is an additional transaction cost involved in administering the subsidy scheme which has been ignored when valuing the subsidy. This unaccounted cost adds to the given cost of the subsidy.

Under the subsidy now we give the fertilizers - the government gives it for 350/-, irrespective of the world market price. But there is a huge administrative cost there. This hasn’t been added to the fertilizer subsidy. There is a government mechanism [to distribute fertilizers]. It pays overtime and hires workers. The subsidy [amount] is calculated without this cost. (SSI20)

There is a huge transaction cost in the fertilizer subsidy. The agrarian service department, their only duty is to distribute fertilizers. (FGD6)
According to the bureaucrats and researchers, the use of fertilizers was essential for cultivation. This was another reality. As described in Section 1.4.1, the existing biophysical conditions in Sri Lanka, is less than an ideal for crop growth. FGD4 and FGD5 discussed this.

FGD4: When you compare wet zone and dry zone paddy cultivation, wet zone is considered just profitable.

Moderator: I’m curious. Is there a biophysical or social reason?

FGD4: Basically, biophysical - many factors contribute, rain pattern and sunlight.

FGD5 [Interrupts]: Basically the soil - we have many problems with the soils in the wet zone. So the yield potential is somewhat lower.

Therefore, as FGD6 noted, “Given the types of soils we have in the country - we are in the tropical belt, we need to apply fertilizers. That is a must” (FGD6). In addition to that, FGD8 pointed to the fertilizer demand of the cultivated varieties. “The rice varieties we grow here in Sri Lanka require chemical fertilizers. Otherwise they don’t yield much” (FGD8).

While the factors contributing to the increase in rice production remained a matter of dispute (Section 6.11), the increase in production especially in terms of the extent of cultivation was a fact.

This magnitude of this subsidy is huge - 95% of the fertilizer cost is subsidized. People even quit other crops and started coming into paddy. People respond to paddy price as well and therefore, the paddy area became larger and larger. By this year we had 765,000 ha [of paddy] in the Maha season. Since 2005 it has been increasing. (SSI20)

This [the fertilizer subsidy] became a support in cultivating abandoned lands in the North and East. (SSI22)

The political origins of the current fertilizer subsidy also remain an important fact. It was an election promise and below SSI20 explains how the scheme was incorporated into the political agenda of the then presidential candidate Mahinda Rajapaksa.

This is not a decision that came from the ministry. It’s political. It was the UNP39 who proposed it first. It was in their election manifesto to give a subsidy for fertilizer at 350/-

39 United National Party, the main opposition
Afterwards, the PA\textsuperscript{40} adopted the same thing. No, they [the UNP] promised for 450/- and then the PA promised for 350/-. That’s how it came to being. (SSI20)

This was a promise given at a presidential election. If you don’t keep it, there will be an uprising by certain groups. It didn’t come from the technical side or the environmental side. Because it is a political decision, we’re compelled to continue it. (SSI22)

As FGD13 reveals below, the fertilizer allocations provided under the subsidy scheme assumes optimal growth conditions. This is another construct of the reality. As the informant explains, in instances where other growth conditions operate at a suboptimal level, the subsidy allocations may make the nutrients available in oversupply.

Fertilizer recommendations have been made on the assumption that other factors are operating at an optimum. But that is not the case. Even in the major irrigation schemes, although there is plenty of water for some farmers, others don’t get enough water at critical times. (FGD13)

As noted in section 6.11 the contradictory views over the impact of the fertilizer subsidy on yields and the absence of a proper appraisal were partly attributable to the difficulty in isolating the impacts of the fertilizer subsidy from the impacts of many other simultaneous variables. This is another reality what makes dealing with wicked problems such as the fertilizer subsidy issue difficult. Below FGD4 explains why.

Fertilizer subsidy is not the only thing that has changed throughout the period. Let’s say from 1961, there were certain other policy implications, revolutionised varietal improvement, research and development, irrigation development and etc...So fertilizer is not the only thing. For paddy there is price support as well. . . . Fertilizer subsidy in isolation - how it has affected farmers’ profitability and let’s say their behavioural attributes has not been recorded. (FGD 4)

Another related reality, observed by the agriculture bureaucrats and researchers was the uncertainties existing in the world food markets both in terms of price and supply.

In 2007 our paddy production dropped. There wasn’t any country to import from. The government took a decision to achieve food security at any cost. They had to take that decision because of the uncertainty in the world market. India imposed an export ban.

\textsuperscript{40} People’s Alliance, the ruling party at the time
Thailand banned their rice exports. The only place from where we could import - India did give us a little - was Myanmar. (SSI20)

These different constructs of the reality, illustrated in the diagram below, remain facts free of dispute, virtually. A clear understanding of these realities and distinction of fact from opinion is critical in addressing the fertilizer subsidy issue in Sri Lanka.

6.13 The Fertilizer Subsidy: The Key Stone

As noted in the preceding themes, in interpreting the rice fertilizer subsidy policy’s current role, agriculture bureaucrats and researchers identified a number of reasons for the existence and continuation of the fertilizer subsidy scheme. Among there was a common set of reasons upon which the study participants grounded and justified the rice fertilizer subsidy again and again. These reasons are, shown in Figure 6.1, along with example informant remarks that encapsulate the suggested argument.
Figure 6.1  Ten key reasons used by agriculture bureaucrats and researchers to ground and justify the rice fertilizer subsidy

These different reasons, according to the interview and focus group participants that largely defined the current role of the rice fertilizer subsidy, connoted common derivatives and couched meanings. Based on the conceptual overlaps and underlying connotations, the key reasons presented in Figure 6.1 were identified and synthesised into seven different themes. These included food security, food sovereignty, nutrition, livelihood security, culture, history, and soil fertility. Figure 6.2 present these themes diagrammatically.
These various functions of the subsidy scheme can be identified into three main purposes, a resolution, a relief, and a norm (Figure 6.3). As the many instances in the preceding concepts suggest, the study participants considered the rice fertilizer subsidy a resolution for food security, food sovereignty, nutrition, and soil fertility. Again according to the participants, the rice fertilizer subsidy was a relief for alleviating the poor economic conditions of farmers. Further From a historical and cultural perspective, the subsidy was a norm that helped perpetuate status quo.
Food Security
Food Sovereignty
Nutrition
Soil Fertility
Culture
Livelihood Security
History

Why is it that we subsidise fertilizer?
To become independent from imports
For food security
To achieve self-sufficiency
Rice is the staple
Rice is the only crop that can be grown in some lands
The subsidy has been there for a long time
Rice farming is a culture
Rice farming is a livelihood
Rice farmers are poor
Rice farming is not profitable

Figure 6.3 The purpose of the rice fertilizer subsidy in the views of the focus group and interview participants

6.14 Preferred Alternative Futures

In responding to the preferred futures, the policy and science developers envisioned a number of alternative futures for Sri Lankan agriculture. There was a preferred future that was very much a continuation of the existing objective orientation, but with modifications to the implementation strategy. In this the subsidy remained a key component. As noted so far a number of reasons were identified in favour of the subsidy. On one hand it was deemed important in achieving its targeted purpose, food security through increases in production. On the other hand the subsidy was justified as an intervention tackling and countering existing conditions and impasses such as - because ‘farmers are poor’, ‘rice is our culture’, ‘soil conditions are poor’ and ‘rice farming is a livelihood for a majority’. Therefore, the subsidy proved an essential constituent for future agricultural
development, but with major revisions in its structural and functional organisation. “We need the fertilizer subsidy. But I 100 percent disagree with the way it is being implemented” (FGD6). Price was a major concern. “Something needs to be done - this uniform application is highly costly to the government” (FGD3). The other major criticism was on the blanket fertilizer recommendations “This is the 2001 recommendation. Now we do not tell people to use that recommendation anymore. It is only for the subsidy that we use this recommendation” (FGD17). In constructing the preferred alternative subsidy, an increase in price was universally endorsed.

My opinion is that the fertilizer subsidy should be there. Initially, rice farming was a subsistence form of agriculture. But now it is getting commercialised. Now we are catering for export markets in organic farming. So in my opinion, actually there is no need to fix the subsidy at Rs.350/-. Now the farmers’ income has increased. The poverty level has decreased - there is an increase in the profit margin . . . So even if you value the fertilizer at Rs.1000/-, people would not find it unaffordable. (FGD20).

There was much agreement that a price increase would not prove an unwelcome change by the farmers, if accompanied by easy access and ready availability.

We had some discussions with farmers in Mahiyangana, which is a high productive area. These farmers even agree that the current fertilizer subsidy which comes to about 60 to70 per cent is too much. What they say is that ‘we are willing to pay more than this, but provided that we get enough and more fertilizer with less hassle’. In the current context, to get the fertilizer subsidy the farmers have to undergo a certain procedure, which will take up - may be, 2-3 of their days, so what they are saying is … ‘if you want you can double the price, bring it up to 700 or 1000. But when we want the fertilizer we should have it freely available’. (FGD4)

Measures to increase the efficiency of the subsidy were highly sought. Better targeting of fertilizer allocations, considering site-specific recommendations and selective yield output levels were the key improvements suggested in this regard.

We need to have a production oriented subsidy scheme - identify an area and give a base yield level, persons who are getting above that, would get entitled to the subsidy. (FGD5)

Right now there is a blanket recommendation - for example, for Mahiyangana area one recommended dose of N-P-K fertilizer. But in Mahiyangana area, there might be niches of different nutrient requirements. So if you can have a small tool kit and identify the real N-P-K requirement. (FGD1)
An alternative approach suggested a phased out gradual withdrawal of the fertilizer subsidy over long term. “You have a scheme where, at the end of the time, you pay the real price of fertilizer; especially with this poverty, it has to come in phases. . . . Reduce the subsidy stepwise on long term basis” (FGD11). “This cannot be continued forever. This needs to be cut down gradually by 5-10-15-20” (SSI22). As opposed to this idea another alternative was to remove the bias towards rice and make the fertilizer subsidy available for all crops. “The subsidy should be there. . . . Not only for rice - but at an affordable price in the open market, so that everybody can get it” (FGD12).

This is a highly biased policy - because it is discriminating. The vegetable farmers do not get the subsidy. . . . Now, vegetable prices are very high, because all are trying to cultivate paddy rather than vegetables. But those other crops are highly profitable crops. (FGD9)

In a different preferred future, seeking for market solutions seemed the best alternative to tackle the existing ills in the system. “Farmers are not idiots, they are very rational people. The rationality is taken off because the bureaucrats advising the politicians . . . are preventing the free market signals reaching the farmers” (FGD11). Improvements in the supply chain were considered a high priority so that the market signals get passed on to the farmers. “Farmers are production oriented, because there are problems in the supply chain. Market signals are not passed down to the farmers. So there is no need for them to change” (FGD2). Developments in infrastructure and storage facilities were considered key, in achieving this. “[in my preferred future] I’ll invest 50% [of the agriculture development budget] to develop rural infrastructure, roads and electricity. In that way we can reduce the price difference between the producer and the market” (FGD5). In other preferred futures the idea was further advanced down towards total commercialisation. Withdrawal of state sponsored agriculture services, letting the market take its own course and macro scale structural adjustments in the economy, resorting to large scale production were recommended in moving the industry towards commercialisation.

“For rice we have to promote large scale production, for example like in Malaysia, you have rice estates. . . . Right now land consolidation is going on in the Eastern province. We can promote large scale rice production as a policy, and the government can then tax the farmers, instead of giving subsidies . . . and the national production can be maintained. Some farmers will have to leave farming and they can be absorbed into the industrial sector. (FGD1)

Another construct of a preferred future was aimed at commodity diversification. The major transformation was sought in shifting the existing rice focus to develop other field crops and livestock. “We have not focused on other field crops - chillies, red onions, onions, other
pulses - almost 50% are imported” (FGD1). However, the underlying rationale for which diversification was sought varied. The cause for action in this direction involved, achieving self-sufficiency in all basic food commodities, nutrition, bioregional diversity, and sustainability.

As the staple food there is self-sufficiency in rice. It is enough to maintain it at this level sustainably. If we think about our nutrition and food habits, it is not only rice - our other crops are weak. In the past our people consumed things like finger millet. You cannot eat a bulk of millet as the bulk you eat in rice. . . . We need to reach self-sufficiency in rice, it is the priority. But now in addition we need to give more importance to other crops such as mung beans, cowpea, and black gram. (FGD16)

In another preferred future, much greater emphasis was placed on research. Information technology based research combined with GIS for better retrieval and dissemination of agronomic information, processing, quality improvement and value addition research in rice, and research in developing other crops were the key research areas identified by the participants having greatest potential.

Agricultural research in Sri Lanka needs to be strengthened. Compared to other countries, whether in varieties or in technology, we are far behind. We need to make a lot more investments into research. . . . Although we are self-sufficient in rice, there is a problem in the quality of rice. If you go to the market and buy rice, the quality is abysmal - we need research into processing. When considering food security, it is not enough to have rice - for a balanced diet we need proteins and vitamins - there needs to be developments in research into legumes and vegetables. If we make such long term investments rather than short term investment into farming methods, I believe that we will have a good future in agriculture. (FGD18)

Major developments in extension on the other hand were a common demand across different preferred agricultural futures.

There needs to be someone to monitor the farmers. . . . There is no qualified officer in the village. Sometimes there is an intention of doing this through ‘Samurdhi Niyamaka’, but it has not been successful - either they are into politics or . . . they do not have the knowledge. . . . Extension needs to be developed hugely. (FGD14)
6.15 Conclusions

The purpose of this chapter was to answer RQ3. According to the agriculture bureaucrats and researchers, a key to the role of the rice fertilizer subsidy in agriculture was the role of rice in agriculture. In achieving food security, self-sufficiency, sourcing rice from within the country was preferred to the point that no other alternative was considered. The importance of being self-sufficient was framed in terms of the volatility in international food commodity markets and environmental catastrophes around the world and thus the risk of depending on foreign rice imports. Hence, self-sufficiency and sovereignty were considered essential elements of food security. The role of the rice fertilizer subsidy was seen as a critical link in enabling this, especially considering the poverty among farmers and inherently low fertility levels of soils.

The many advantages of the subsidy such as the increase in fertilizer use, control in excessive use, adherence to the recommended dose of all three nutrients, and the incentive to bringing farmers who had left farming or rice farming back into it, were considered important improvements contributing to gains in yields and production. Bureaucrats and researchers’ interpretations of problems in the subsidy’s operation and deficiencies in the agricultural system that have limited the subsidy’s full potential were similar to the farmers interpretation of problems and limitations found in Chapter 5.

A reversal of these desired outcomes of the rice fertilizer subsidy that may result from a withdrawal caused concern among the bureaucrats and researchers. An immediate exit was discouraged on the grounds of poverty among farmers. But crop diversification and commercialisation dominated the future agriculture preferred by the bureaucrats and researchers without any prominence being given to the subsidy. Although implicit, the current justification over ensuring livelihood security and supporting the status quo would be subject to a redesign in this future. But considering how the role of the rice fertilizer subsidy in the present was justified, what conditions would enable a transition from the existing situation to the more desirable one was unclear. Overall, the role of bureaucrats and researchers in constituting and mediating the rice fertilizer subsidy was strongly influenced much by the cultural context of rice, which dominated any scientific or objective economic or social insight they may have. This psychological dissonance clearly is a significant problem for policy development.

Chapters 1 and 2 located the problem environment including the social, political, and economic dynamics of the rice fertilizer subsidy to resolve RQ1 and Chapters 4, 5, and 6 constructed the stakeholders interpretation of the rice fertilizer subsidy to resolve RQ2 and RQ3. The next task is to synthesise this knowledge to understand its implications, this is attempted in Chapter 7.
Chapter 7 A Renewed Interpretation on Subsidising Fertilizers for Rice in Sri Lanka

*Culture makes people act unconsciously, or at least limits their options for behaviour*
Freek Colombijn

7.1 Introduction

The purpose of this chapter is to resolve the two synthesis questions RQ4 and RQ5. In answering these two questions, the chapter combined the qualitative findings with the quantitative to bring the findings built through the dissertation into perspective. In doing so the chapter answers the overarching question that guided this dissertation, ‘*why the subsidy on fertilizers for rice in Sri Lanka is continued?*’ RQ4 by asking ‘*what is a new problem definition for the rice fertilizer subsidy problem in Sri Lanka?*’, attempts a reconstruction of the roles of the environment and the stakeholders of the subsidy in its constituting and mediating. The synthesis to RQ4 draws from the resolutions to RQs1, 2, and 3 in Chapters 2, 4, 5, and 6 and extended the discussion further by engaging in a dialogue with this knowledge against the best available knowledge to critically assess the conditions that constitute and mediate the rice fertilizer subsidy policy of Sri Lanka. Based on this new interpretation of the rice fertilizer subsidy policy formulated by RQ4, RQ5 which asked ‘*what are the implications of this new problem definition for exiting or continuing the rice fertilizer subsidy scheme?*’ was resolved.

The chapter is organised into four sections. Section 7.2 synthesises its answer to RQ4. Section 7.3 builds on Section 7.2 to resolve RQ5. Section 7.4 concludes this synthesis by explaining its answer to why an exit from the rice fertilizer subsidy has been difficult.

7.2 A New Problem Definition for the Rice Fertilizer Subsidy Problem in Sri Lanka

Adoption of high yielding rice varieties, large-scale investments in irrigation, increases in the use of chemical fertilizers and pesticides, increases in land cultivated with rice, increases in production, and reaching self-sufficiency over the duration of the subsidy scheme remain undisputed facts. But the relative contribution of the fertilizer subsidy in increasing production and productivity remains disputed. The economic analyses on this have produced varied results, some proving the subsidy’s contribution to have been significant and others the opposite. Regardless, in the perceived reality of rice farmers and researchers and bureaucrats, subsidization of fertilizers has made an important
contribution in realising the above. While this is often a justification for the continuation of the subsidy, could it also present an explanation for its continuation? The discursive and material mechanisms that characterized the social, political, and economic context of the rice fertilizer subsidy in Sri Lanka suggests that these meanings are rooted much deeper.

7.2.1 The Operational Space of the Current Rice Fertilizer Subsidy

At the operational scale, the rice fertilizer subsidy of Sri Lanka has demonstrated characteristics that are very similar to those in other developing countries (Section 2.3.3). There have been both advantages and drawbacks. The subsidy's own deficiencies in its structure and the administration of its distribution have eroded the subsidy, from within. From the outside, the subsidy lacked a supportive enabling environment to work in. Deficiencies in availability and access to critical production resources and services limited any opportunity for realising the subsidy's full potential. Despite such weaknesses and limitations, the benefits of the subsidy perceived by the rice farmers and the agriculture bureaucrats and researchers are apparently compelling enough to leverage its continuation.

7.2.1.1 An Experience Very Similar to Elsewhere

The introduction of the current rice fertilizer subsidy scheme was followed by a number of changes in fertilizer use and rice output. Over the five years since its launching, there has been an increase in fertilizer use among farmers (Table 4.10 in Section 4.5) and a parallel increase in rice production (Table 5.11 in Section 5.6). A majority of farmers attributed the increase in fertilizer usage (Table 5.9 in Section 5.5) and increase in rice output (Table 5.12 in Section 5.6) to the rice fertilizer subsidy. Therefore, it is logical to consider the increase in fertilizer usage, spurred by the rice fertilizer subsidy, a benefit of its in terms of rice production.

Another benefit of the rice fertilizer subsidy is a possible improvement from the previous haphazard use of fertilizers. Prior to the commencement of the subsidy, some farmers used fertilizers at will with no quantity restrictions (comments by FS40 and FS33 in Section 4.4 and FGD4 in Section 6.5). Others used it in less than what was required especially phosphate and potash fertilizers (Table 4.10 in Section 4.5). Therefore, as some farmers and bureaucrats explained, (comments by FS25, FS67 and FS56 in section 4.5 and FGD19 and FGD21 in Section 6.5) provisioning a recommended allocation of all three nutrients has been a major advantage in overcoming suboptimal fertilizer use practices that existed before. On the one hand, limiting the fertilizer issues by the recommended
requirement for land area cultivated, has possibly curbed excessive fertilizer usage and on the other hand provisioning all three nutrients in the recommended ratios has augmented the use of phosphate and potash fertilizers contributing to an improvement by using nutrients in balance.

However, a trend of suboptimal fertilizer usage still existed. Again, when judging by the measures of subsidy’s recommendations, some farmers reported under-usage and some reported over-usage (Table 4.5 in Section 4.3). A number of illegal and unwelcome activities explained some of the undesirable trends in fertilizer usage (Sections 4.3.1 and 6.6.1). These included fertilizer trafficking, leakage to other crops, claiming for more land area than the cultivated, non-usage of the full allocation, and purchasing fertilizers outside the subsidy’s market (comments by FS189, FS67, FS186 in section 4.3.1 and FGD1, FGD23 in Section 6.6.1). Opportunity for such activity was a major disadvantage of the subsidy at the operation scale.

Regardless of the merits of its purpose or its effectiveness, some drawbacks in the implementation mechanism of the rice fertilizer subsidy scheme largely contributed to inefficiencies, limiting the opportunity for realising the subsidy’s full potential. As reported in Sections 5.3 and 6.6.1, deficiencies in the subsidy’s distributional machinery presented a major obstacle to its efficiency. Close to a third of farmers expressed dissatisfaction over the timing of fertilizer distribution (Table 5.5 in Section 5.3). There was a major delay in receiving TSP in certain areas and farmers received TSP only after they had completed land preparation. The logistics of issuing, including bureaucratic complications was another drawback registering dissatisfaction in around a fourth of farmers.

According to the farmers, the time wasted in travelling to distant fertilizer distribution centres, and the bureaucratic ‘boondoggle’ involved in procuring fertilizers were key logistical setbacks. The problem was prevalent in certain geographical areas under minor and rain-fed regimes. With fewer agrarian centres, the administrative system operating in the minor and rain-fed regimes were not as coherent as in the major schemes (comment by SSI14 in Section 6.6.2). Despite being perceived as an effective measure discouraging the capable from obtaining subsidized fertilizer (comment by FGD6 in section 6.6.1), as fertilizers were not freely available in the open market, these bureaucratic complications of the subsidy’s distribution only added to the inefficiencies of its administration.

Discrimination against other crops, unavailability of fertilizers freely in the open market, and the huge price difference between the market and the subsidized fertilizers were key factors, in eliciting corruption. Price and other market interventions of state-owned monopolies, whether it is the trading of foreign exchange, procurement of agriculture outputs, or supply of agricultural inputs, almost invariably lead to failures in the official markets and the emergence of parallel black markets (Von Braun 1988; Anderson and Martin 2009b). When large subsidies are combined with binding
fiscal, quantity and eligibility constraints, and rationing of supplies, less scrupulous buyers and sellers make mutually advantages transactions outside the official market, to evade such controls (Morris et al. 2007; Dayaratna-Banda et al. 2008). Although reliable statistics are often hard to come by there are ample casual observations to suggest that many fertilizer subsidy schemes are plagued with corruption (Morris et al. 2007). In African countries like Malawi and Gambia the fertilizer subsidies have led to organised smuggling of fertilizers across neighbouring boarders (Von Braun 1988; Tambulasi 2009). Although, such incidences of large scale black markets have not been reported in Sri Lanka, small scale black markets operating in secrecy posed as much a threat to the subsidy’s goal.

7.2.1.2 A Sub-optimal Enabling Environment

The availability and access to resources and market opportunities are critical in creating an enabling environment for the subsidy to achieve its purpose. As noted in Section 2.4.3, the fertilizer allocations under the subsidy scheme are targeted at a maximum yield potential, although the average yield is much less (comments by FGD18 in Section 6.4 and FGD5 in Section 6.6.1). As FGD13 indicated (comments in Section 6.12) these subsidy allocations are prescribed on the assumption that the enabling conditions for a maximum yield are operating at an optimum. But this has not been the case. In many instances, the availability and access to water, seed material, and extension did not enable the right conditions to reach the yield potential allowed by the fertilizer allocations of the subsidy. In effect, the system has no risk management strategy built in to its design.

As reported in Section 4.2, rice farming was characterised by a tendency of low commitment to adopting technical competencies and a high commitment to depending on chemical inputs. As the farmers lagged in the commitment for acquiring new skills and knowledge in farming, it challenged the capacity and the performance of the extension service. The farmers perceived that there was a lack of knowledge on the extension officers’ part. As explained in Section 2.4.2.4, political recruits in the agrarian service lacked both qualifications and training. The introduction of political recruits into the extension line had not only added a confusion of roles, but it has also aggravated the lack of confidence the farmers had in the service.

Despite all the weaknesses in extension, the most damaging in terms of knowledge mobilization, was the farmers’ attitude towards extension. Considering the farmers’ age, time in farming, and inheritance into farming, a lack in new technical knowledge in farming was likely. The same factors create prejudices that lead to the doubting of new knowledge. The low level of education was
another problem (Section 4.2). Overall, these factors lead to a general tendency to continue practising old methods with modifications such as replacing manual operations with machinery and increasing usage of chemical inputs. The farmers had little interaction with the extension officers and showed distrust towards their capacity and commitment. The reluctance of farmers to seek new knowledge added to the strain in the weaknesses of the service, further diminishing the extension output. This lack of provision and demand in extension were impediments to the developments in the system including the achieving of subsidy’s targets.

7.2.1.3 Benefits Matter

As Sections 7.2.1.1 and 7.2.1.2 discuss, the rice fertilizer subsidy scheme, as portrayed by the stakeholders, offers benefits but also suffers from many weaknesses and limitations. Despite the weaknesses and the limitations preventing the rice fertilizer subsidy’s full potential, the stakeholders’ response to it, suggests that what matters is those benefits. Both stakeholder groups - farmers and agriculture bureaucrats and researchers – valued the perceived benefits brought upon by the rice fertilizer subsidy scheme at the farm-level, heavily. For example, lowering land abandonment in the wet zone from 30% to 10% and brining part time rice farmers back into farming (FGD5), getting farmers to apply the recommended dose of fertilizers (FGD19), and being able to obtain all three fertilizers at the right time, notwithstanding any financial difficulty (FS15, FS22, FS171) carry value that is larger than the market value of any of these outcomes, especially for people that affiliate themselves with rice, unconditionally. The ratings of satisfaction among farmers over the subsidy scheme (Sections 5.3 and 5.6), and the passionate remarks of agriculture bureaucrats and researchers fearing for the future of farming without a subsidy (Sections 6.3, 6.5 and 6.8), is further evidence to this. As for one farmer (FS130), the rice fertilizer subsidy was reason to dedicate merit to the president. Such emotions in Sri Lankan culture are beyond material measure. Therefore, these benefits perceived by the stakeholders mediate a strong support for the continuation of the subsidy. The next section on the policy space of the rice fertilizer subsidy will further elaborate on how this unconditional association of Sri Lankan people with rice matters the rice fertilizer subsidy.

7.2.2 The Policy Space of the Rice Fertilizer Subsidy

At the policy scale, evidence to indicate that the rice fertilizer subsidy policy in Sri Lanka has been critically informed, is scarce. The important causes, phenomena, and activities manifest in the complex interplay of history, institutions, ideas, leadership, different actors, and external influences
and set amidst the response of the agriculture bureaucrats and researchers suggest that the subsidy policy is governed by ideology than by fact.

7.2.2.1 A Failure to Concede System Limitations

The findings revealed mismatches between the agricultural potential determined by the country’s agro-climatic conditions and the agricultural output expected by the bureaucrats and researchers. As noted in Section 1.4.1, the productive capacity of soils in Sri Lanka is relatively low. FGD5 and FGD6, both being soil scientists by training, acknowledged this reality, and FGD 6 in particular framed it, in his opinion as the reason for the requirement of additional fertilization and so a justification for the subsidy (Section 6.12). Although often unsuccessful, this is one reason that an attempt is made by the Department of Agriculture to promote the use of straw and organic fertilizers, as their use would contribute to soil structures and was the basis of the pre-industrial success of Sri Lankan rice cultivation. According to the famers levels of soil fertility and fertilizer application were the most critical determinants deciding the observed change in yields. More farmers ranked use of fertilizers (33.3%) at the top and change in soil fertility levels (16.9%) at third among the key reasons determining rice productivity over the period of concern (Table 5.12 in Section 5.6). As noted by FGD 4, in the wet zone, rain pattern and sunlight further limited agricultural capacity (Section 6.12).

But the bureaucrats and researchers’ expectation from agriculture did not necessarily factor in these inherent limitations of the agro-climate system. Instead, increasing agricultural production remained a primary goal. Bringing more people into farming to increase productivity (FGD13), enforcing laws to bring abandoned paddy lands into cultivation (FGD20), lack of focus on other field crops such as chillies, red onions, onions, other pulses of which about 50% is imported (FGD1), and giving more importance to other crops such as mung beans, cowpea, and black gram, while maintaining priority on rice (FGD16) were all reported by bureaucrats and researchers as they seek to improve the country’s agricultural output. These views are consistent with Sri Lankan agriculture policy. As noted in Section 2.4.2.3, the agriculture policy of Sri Lanka aims at “increasing domestic agricultural production to ensure food and nutrition security of the nation” (Ministry of Agricultural Development and Agrarian Services 2007). Yet seeing Sri Lanka as a country with fertile soils is a misconception widely held by the public, and at times this dissonance is apparent in the Agriculture Department itself. In his opening line in a paper presented at a regional conference, an official of the agriculture department wrote “Sri Lanka is endowed with fertile arable land, which makes it potentially self-sufficient in food in overall terms” (Gunawardena 2007). This misconception is a better fit in justifying the agriculture policy. On the contrary, conceding the agro-climatic
limitations, increasing agricultural production would remain unrealistic goal, unless the soils are fertilized enough.

7.2.2.2 *A Fostered Food Preference*

In April 2012, the Sri Lankan government imposed a tax amounting to Rs.15/- a kilo on wheat flour. As a result the price of a loaf of bread went up by five rupees. The Minister of Construction, Engineering Services, Housing and Common Amenities, Wimal Weerawansa, who also engages enthusiastically in promoting rice and rice based products welcomed the price increase, adding the following comment. “Even the most unfortunate family that eats bread for all three meals a day will have to spend only an additional amount of money that is equivalent to the price of two betel quids” (quoted in Daily Mirror 2012). The previous year, launching a national project to promote rice flour based products, Minister Weerawansa emphasised the importance of taking every possible step to increase the price of wheat flour over rice flour to “save the people who are dependent on wheat flour based food” (Daily News 2011). In 2010, in an attempt to discourage the consumption of wheat flour, the Health Minister, Maithripala Sirisena41, took action to stop the sale of wheat flour based food items in hospital canteens. Earlier in 2010, Minister Weerawansa and a committee member from his political party, *Jathika Nidahas Peramuna* (National Freedom Front), labelled wheat flour as another form of terrorism, urging the president and the Health and Prison Reforms Ministers to replace wheat-based products with rice-based products (Wedaarachchi 2010). In 2008, the president was quoted stating the following.

> I am exceedingly glad at the fall in consumption of wheat-flour based products. Despite the fact that we possess very fertile lands, the consumption of [imported] wheat was forced upon us, initially by the provision of wheat free of charge, and later on credit, until we were addicted to it. (President Mahinda Rajapaksa quoted in Samath 2008 as cited in (Dayaratna-Banda et al. 2008))

Although not as much as in the top ten rice eating nations, Sri Lankans do eat a lot of rice (Section 2.5.1). Yet campaigns at state level focus on further promoting the consumption of rice. As the comment by the president above indicates, these campaigns intend not only to augment rice consumption but also to discourage wheat consumption. This sequel of events is only a snapshot of the state sponsored campaign to play down wheat and wheat products while promoting rice and rice

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41 Minister Maithripala Sirisena’s brother Nipuna Sirisena owns ‘Nipuna Rice Mills, one of the leading rice mills in the country. Under the People’s Alliance government in 2004, the minister who was then the Mahaweli and River Basins Development Minister (Sri Lanka Freedom Party), was accused of engaging in a racket, controlling the paddy and rice produce from Anuradhapura, Polonnaruwa, and Amparai districts by the then Agriculture Minister Anura Kumar Disanayake (Peoples Liberation Party), although there was no substantial evidence to support the allegations (Jansz 2004)
based products. Further to this, television advertisements featuring a mother feeding her son red rice to acquire the giant strength of his ancestors who built the great dams and a woman who became obese by eating bread continue to endorse this propaganda. In the eighteenth century, on the entrance to Uppsala University, a Swedish poet inscribed: “To think freely is great. To think correctly is greater”. This was written at a time when people were expected to accept the good defined by the rulers (Kelman 1981). The rice consciousness sown by the Sri Lankan government connotes a similar ideology.

The antipathy towards wheat is partly founded in its foreign origins. In Sri Lanka, wheat is not locally grown, and the demand relies entirely on imports. While bread and other bakery products are seen as western foods, there are numerous indigenous and local foods made from wheat flour. Some bakery products have long been established and adapted to the local gastronomy that they have become a unique part of Sri Lankan cuisine. Rice flour can be used as a substitute for wheat flour in some foods and in fact is the authentic option used traditionally. But for other foods, especially of Tamil and Moor origins, rice flour is no authentic substitute. Tendency to prefer wheat products over rice with rising incomes has been observed in many countries in Asia, including Japan, South Korea, and Sri Lanka (Barker et al. 1985). On such backgrounds, attempts to replace wheat flour with rice flour, may therefore be seen, not only as parochial but also discriminatory.

White rice does have a slight nutritional advantage over white bread but this may not prove a sufficient explanation for obesity. Whole wheat bread is nutritionally far more superior to white bread and white rice. Similarly, brown rice is nutritionally superior to white rice and white bread. Of the daily caloric intake of an average Sri Lankan, (Section 2.5.1), around 75% is derived from, rice, wheat, sweeteners, and oil crops, which does not accord with the recommended dietary intake. Nutritional setbacks in this diet, therefore is not a problem in the choice between rice or bread but in the balance of proteins, vitamins, and the essential fatty acids. It is not the intention of this dissertation to make recommendations for a healthier diet or to promote bread over rice or rice over bread. But the universal superiority attributed to rice over bread has unscrupulously and misleadingly contrived an unnecessary antipathy toward bread. While advertisements, rallies and walks carried out under the direct sponsorship or the blessing of the government to promote rice consumption, are customary, no effort of similar benevolence has been made at improving the overall nutritional quality of the diet.
7.2.2.3 *A Political Manipulation of the Rice Consciousness*

Using the rice consciousness of people to the advantage of policy and politics is by no means new. Some scholars reason this pre-eminence of rice endorsed by the Sinhalese nationalists as a means exploited by the political elite to justify their presence in Sri Lankan politics. The political significance of rice therefore belies its economic value (Pain 1986). The politically endorsed ideological construct of seeing all farmers as peasants, and regarding all peasants as rice farmers has impaired economic diversification and regional crop specialisation. The state welfare measures, be it fertilizer subsidising or food rationing, constitute a part of this political agenda. Throughout the history major investments in agriculture have been hallmarked by political propaganda stirring nationalist sentiments (Moor 1989) and Pain (1986).

Begun in the 1930s and continued after independence, the dry zone settlement programme was an ambitious effort to cultivate the abandoned lands in the dry zone through irrigation and land development mainly for rice production. *Raja-rata* deserted and fallen into decay since the fourteenth century, after a number of attempts of resettlement during the British rule, which failed due to Malaria (Section 2.4.1.3) was resettled with Sinhalese family farmers in the 1930s. The main settlement areas were in the ancient capitals of ‘*Raja-Rata*’. The first settlements took place in Anuradhapura. The well preserved ruins of ancient monastic buildings, religious monuments and among all the Sri Maha Bodhi, the sacred fig-tree\(^{42}\) set off the symbolic value of the land as the setting for reviving hydraulic and agricultural glories of ancient Sri Lanka. Underneath the announced objective, a number of scholars observe the undisclosed intention of resettling the Sinhalese in the historical capitals to confirm Sinhalese territory. Between 1946 and 1971, due to the migration of the Sinhalese settlers into the new irrigation settlements, the Sinhalese proportion of the population in the Amparai, Batticaloa, Polonnaruwa, Trincomalee and Anuradhapura districts increased from 33% to 51% (Pain 1986; Moor 1989; Bandara and Jayasuriya 2009).

The accelerated Mahaweli Program was inspired by similar nationalist sentiments. J R Jayawardane, the Prime Minister elected in 1977 was a lifelong opponent of the left and adopted a pro-western position in foreign policy. He attempted to dismantle the rice subsidy once and failed. The accelerated Mahaweli Development Programme then played a crucial role in endorsing the much needed political support for the liberalisation sought by the economic policy. Gamini Disanayake, Minister of Mahaweli Development epitomized the project as “a return of the people to the ancient homeland . . . in the *Raja-Rata*” (Dissanayake 1983, cited in Tennekoon 1988).

Capitalising on this popular nationalist vision of recreating the hydraulic grandiose that was once

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\(^{42}\) It is believed to be a branch from the Bhodi tree in Bodh Gaya in India under which Buddha attained enlightenment. The Branch was brought to Sri Lanka by Sangamitta Thera, the daughter of the Emperor Asoka in India and planted in 288BC (Mahavamsa)
lost, the Accelerated Mahaweli Project became the symbol of a developmental pathway that even the politically opposite could not deny. The government evaded political antagonism from the public and the left and went on to implement major liberalisation measures. The rice subsidy scheme was later dismantled and the political left remained suppressed successfully. However, as discussed in Chapter 2 the liberalisation was not uniform (Bandara and Jayasuriya 2009). The political significance of rice can partly explain these incongruent strategies. This characterizes the power of rice in shaping the economy rather than the opposite.

A key to this vision of recreating ancient glories is to have leadership similar to that of the great kings. D S Senanayake, was the Minister of Agriculture and Lands in the British Ceylon and the first Prime Minister of independent Sri Lanka. Both he and his son Dudley Senanayake, the second Prime Minister, who claimed descent from the Sinhalese Kings, were forceful proponents of the dry zone settlement policy. Similar intentions led J R Jayawardena to revive Vap Magula Ceremony (Section 2.5.3) immediately after his election. The incumbent President, Mahinda Rajapaksa celebrates the Vap Magula in similar manner. Following victory over LTTE in 2010, the national broadcasting services, at frequent intervals sang in praise of the President ‘apitath rajek pahalawa athe’ meaning “for us too, a king has come-forth”. Although a republic, in steering the nation to recreate the ancient glories that were once lost, this vision of a king seems more compelling. The political leadership in Sri Lanka since independence has been successful in adopting this ideal.

7.2.2.4 An Antipathy toward the Foreign and Nostalgia for Ancient Agricultural Glories

In Sri Lankan history there is an overly highlighted and conceited version that boasts of a golden age of cultural and economic prosperity brought about by an agricultural surplus, mainly in rice, and made possible by the ingenuity of an advanced irrigation system, which was subsequently distorted and extinguished through foreign invasion and rule. The popular consciousness of the history fits well with a nationalist vision of recreating the glories of the past through agricultural and irrigation development (Moor 1989; Bandara and Jayasuriya 2009). Informant’s remarks such as strongly endorse this view; “Rice should be the first crop. It is our priority (FGD16)”, “The government blessing should be there for the [rice] crop (FGD17), “I never say that we should import rice - [we shouldn’t] at any cost (FGD10)”, “Sri Lanka becoming the best country exporting highest quality rice (FGD20)”, “When you talk of the fertilizer subsidy you have to appreciate that paddy is a part of culture” (FGD2), “A moral obligation to subsidise” (FGD1), “In paddy we are not using fertilizer excessively” (FGD5) “We can continue the subsidy. . . . (to the moderator question whether it is possible to continue the subsidy considering the economy of Sri Lanka) We
need to find the necessary conditions for that” (FGD21). Clearly these sentiments are widespread and are guiding the science and policy of rice and work against any objective examination of its shortcomings. Not only does the past rationalise the existing rice bias, but it also made economic development based on rice a “realistic” goal.

7.2.2.5 The Risk of Not Having Enough Food (Rice)

In parallel to the food crisis in 2008, rice prices in Sri Lanka rose unusually. The price of *samba* rose by 78% within a month from December 2007 to January 2008. During the same period, the prices of *kekulu* and *nadu* increased by about 67% (Dayaratna-Banda et al. 2008; Central Bank of Sri Lanka 2009). Sri Lanka had never experienced such drastic price increases in rice. According to the study participants the situation exemplified the risk involved in depending on rice imports which further confirmed the importance of being self-sufficient (comments by FGD5, FGD21 and SSI20 in Section 6.7). Assessing the situation Dayaratna-Banda et al. (2008) attributed this unparalleled rise in prices to import barriers on rice and wheat. In Sri Lanka, paddy price annually shows a very strong seasonal variation (Sections 1.4.1 and 6.12), following the bimodal harvesting pattern of Maha and Yala seasons. Paddy prices and rice prices are mutually reinforcing, and from October to February there is a seasonal price rise. The stock to utilisation ratio of rice in Sri Lanka has always been low. In 2007, rice production dropped by 6.4%. Higher import tariffs introduced in 2006 had reduced the incentive for traders to import rice. Prior to this, during supply shortages, the government waived the import tariffs. But in 2008, the tariff remained and by the time it was lowered in March, any effect of its ramifications on the price of rice had started to diminish (Weerahewa 2006; Dayaratna-Banda et al. 2008).

In addition, the government also exercise import restrictions over wheat. In Sri Lanka wheat is widely substituted for rice. According to Dayaratna-Banda et al. (2008) while, domestic and imported rice prices show no association, there is a positive association between domestic rice and wheat prices. When wheat prices rise, it brings down the demand for wheat and increases the demand pressure on rice. Since 2006 wheat has been subjected to 15% import duty, 10% import surcharge, 3% port and airport development levy, and 1.5% social responsibility levy. In 2007 the government also removed the wheat flour subsidy (Dayaratna-Banda et al. 2008). By March 2007, the wheat prices in the world market had already peaked (FAO 2007; Piesse and Thirtle 2009). Therefore, in 2007 the wheat imports to Sri Lankan fell, considerably. Compared to 2006, wheat imports in the first six months of 2007 dropped by 8.7% and in the second six months by 39.0%.

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43 In 1999, the tariff on rice imports was 35% and in 2001, an additional surcharge raised the tariff to 49%. In 2002 the government replaced the tariff with a lump sum tariff of Rs. 7000/- per tonne of rice. In 2005 the government raised the tariff to Rs.9000/- per tonne of rice and in 2006 to Rs.20,000/- per ton of rice (Weerahewa 2006; Dayaratna-Banda et al. 2008).
Consequently, the overall demand pressure on rice markets increased. The situation could not have been unforeseen as it had been built up from familiar trends in rice price fluctuations. As the evidence suggest, much of this problem was rooted in weaknesses in rice and wheat import policies and the governments’ failure to respond to the foreseeable market trends in advance.

7.2.2.6 A Lack of Consideration in Social, Political and Economic Drivers Operating outside Global Food Commodity Markets

The concern of science and bureaucracy over the influence of the external drivers on the rice and agriculture sector is limited to the dynamics of the international food commodity markets. Consequently, the importance in achieving self-sufficiency and sovereignty in rice, in order to eliminate dependency on international food commodity markets was a high priority. The risks associated with fluctuations in prices and shortages in food supply in the international markets were highlighted in rationalising the premise. To re-quote FGD5 from Section 6.2,

If the subsidy was not given, see the impact of 2008 food crisis, if we had to import rice, there was no rice in the world market. Therefore, other than the monetary value, there are some social impacts and also political repercussions that one needs to consider; we haven’t had political repercussions in the country - starving of poor people and rising against government like in some other countries - because we have some sort of food security, because we cultivate rice. (FGD5)

But a closer look at the 2008 food crisis does not point to evidence to justify such thinking. When the 2008 food crisis started, the stock to utilisation ratio for grains, and oilseeds was at an all-time low of about 15% the 1972-73 crisis level. Decoupling subsidies from production, low investments into agricultural research and development and major harvest failures in 2000, 2002 and 2003 contributed to a decline in the supply and stocks of grains (Mitchell 2008; von Braun et al. 2008; Piesse and Thirtle 2009). Biofuel policies in the US and the EU massively shifted the cultivation towards biofuel feedstocks and imposing a pressure over the demand for grains (Brahmbhatt and Christiaensen 2008; Mitchell 2008). The boom in non-food commodity markets added to the speculations and investments in food commodity markets further complicating the situation (Mitchell 2008; Piesse and Thirtle 2009).

However, none of these were the root causes in rice price increases. There was little change in production, consumption, or stocks of rice (Mitchell 2008; Piesse and Thirtle 2009). Between January to August 2008, having been far more stable than wheat and maize prices until then, rice prices doubled. Rice is a thin market with only about 30 million tonnes amounting to 7% of the
production being traded. Therefore the impact of trade restrictions was considerable. To ensure a secure supply of rice, countries like the Philippines bought rice from the international markets at prices higher than the usual. By July half of the rice exporting countries had imposed export restrictions, with nine of them adopting quantity controls (Brahmbhatt and Christiaensen 2008; Piesse and Thirtle 2009; Timmer and Dawe 2010). Timmer and Dawe (2010), explains the events that took place as follows.

Exporters restricted supplies to the market in order to protect their own consumers from shortages. Importers scrambled for supplies to stabilize their own markets. . . . In the end, additional supplies were located (but not used), the panic subsided, and rice prices fell sharply to the trend they had been on since recovery began from the lows in 2002.

Therefore, the situation of rice was clearly caused more by a panic than anything else (Piesse and Thirtle 2009; Timmer and Dawe 2010).

But what is even more interesting is, unlike in the 1970s food crisis, when food prices rose first, in 2008 metal and oil prices rose first and faster and food prices only followed. Agriculture has always relied strongly on oil prices. High fuel costs directly impact the cost of farm operations. But above all, high fuel costs increase the price of fertilizers and other agro-chemicals (Brahmbhatt and Christiaensen 2008; Mitchell 2008; von Braun 2008). Fertilizers, artificial nitrogen in particular, is produced using natural gas and the manufacturing process is also extremely energy intensive (Kongshaug 1998; Gellings and Parmenter 2004). During the time there was a world-wide lack of production capacity in fertilizers. The construction boom in India and China further increased the demand and price of metal, gas, and oil. The demand for fertilizers drove fertilizer prices even higher than oil prices. As noted in Section 1.4.3, in 2007 fertilizer prices increased by about 200% (FAO 2008; Mitchell 2008; FAO 2009; Heffer and Prud'hommee 2010), the very reason why the budgetary allocation for fertilizer imports for the entire year by the Sri Lankan government exhausted within the first five months.

But the impact of fertilizer prices did not attract the attention or the concern it warrants, as noted in Section 6.7, none of the study participants perceived the situation in the fertilizer market as a risk. The thinking of the agricultural bureaucracy and research and development did not ponder the dilemma of achieving rice sovereignty by relying heavily on international fertilizer and other agrochemical markets. So the risks associated with volatilities in price and supply in energy and agro-chemical markets imposed by the high volatility in energy markets did not receive similar premonition as did food markets. Internationally, biofuel policies, the initiative for global change, especially those that drive climate change mitigation policies in the energy sector, may contribute to
volatilities in energy markets. Therefore, revisiting the point that the crisis in the fertilizer market was more severe than that in the food markets, it is legitimate to conclude that enabling a secure supply of rice is more vulnerable to volatilities in fertilizer markets, than to volatilities in food-commodity markets.

This sequence debunks the food sovereignty myth and seriously questions the options for food security. The reality is that the production of food, almost everywhere in the world, is most certainly dependent on international markets for the supply of energy, fertilizer and other agrochemicals. Therefore, the concept of food sovereignty, in this day and age is open to question. The perception that food security if made dependent on global markets would run the risk of exacerbating food insecurity is also subject to question. First, considering what happened in 2008, although often characterised as a shortage in supply, the problem in the rice markets both internationally and locally, was rooted in misguided policy responses by the governments. Second, food systems around the world are subject to short-term investment volatilities and long-term environmental and energy vulnerabilities (Karl and Trenberth 2003; Rosegrant and Cline 2003; Schmidhuber and Tubiello 2007; Lobell et al. 2008). The pressures of extreme weather patterns, rising energy costs, ecological stresses and speculation, the food sovereignty campaign worldwide (Menezes 2001; Rosset 2008; Suppan 2008; Desmarais et al. 2011; McMichael and Schneider 2011), all are in play yet for Sri Lankan thinking (comment by FGD6 in Section 6.7), promoting self-sufficiency is an encompassing response. However, given the scale and the magnitude of forecast global change and the potential vulnerabilities, the relative benefits of relying on self-sufficiency may warrant careful scrutiny. The drive for localism may undermine the collective capacity for resistance and the dependency on specialisation may increase vulnerability. In this light, government’s propaganda campaign to restrict the staple to rice and eliminate wheat, which is cheaper and more available in the international markets, does not seem to be guided by any sagacious decision.

7.2.2.7 Muddled up Objectives of the Rice Fertilizer Subsidy

When the subsidy was first introduced, its purpose was to promote fertilizer use among farmers (Section 2.4.2.2). However, formulating the current subsidy scheme, President Mahinda Rajapaksa, in his election manifesto (Mahinda Chinthana 2005), stated its purpose as an attempt to ease the family burden by making agricultural produce at an affordable price for consumers (Section 1.4.2). So, what exactly is the purpose of the fertilizer subsidy scheme? Is it for the reasons for which the subsidy was introduced, originally in 1962? Or is it for the purpose for which the president reinstated the current subsidy scheme in 2005? Or is it for reasons over which the bureaucrats and
researchers justify the subsidy? Or is it for the various reasons the farmers suggest? The objectives of the current fertilizer subsidy scheme seem muddled up.

Using rice culture as a justification for the rice fertilizer subsidy is one instance, where the inherent paradoxes of its objectives become apparent. For example, among the constraints to be overcome in the rice sector, the Department of Agriculture (2005) identified the following; “less attractiveness of rice farming”, “low remuneration from rice farming”, and “low popularity of rice based products”. By overcoming these constraints, the department planned to bring more people into rice farming, make rice farming profitable, and promote rice based products. As noted in the Sections 6.5 through 6.10, the bureaucrats and researchers’ logic in justifying the subsidy was similar to this, suggesting a withdrawal of the subsidy would lead to farmers’ giving up rice farming - “rice production became unprofitable” (FGD1) and “if you give fertilizer at higher price, rice cultivation wouldn’t become profitable - then farmers don’t tend to farm” (FGD18). In this respect the subsidy was an intervention aimed at preserving rice farming that would otherwise diminish. But fearing a withdrawal that would leave farmers without a livelihood, FGD6 argued: “What would the farmers do if not for paddy cultivation? They have been paddy farmers for generations”. On this line of reasoning, the subsidy was critical not because farmers would leave farming, but because they could not leave farming. In this respect the subsidy fulfilled a demand that was raised by culture. Such circular reasoning, also offered no alternative to the rice fertilizer subsidy, but a “moral obligation” (FGD1), to continue it.

These contradictions in logic raise important questions: Whose culture are they concerned with? Is it the culture that is in need of the subsidy, or is it the subsidy that is need of culture? The evidence may suggest that the subsidy is in need of culture. Yet, culture as we know, is ever subject to change and it remains in no steady-state. Notwithstanding this reality, the subsidy aims at preserving status-quo. To some degree the subsidy has been successful in this regard that it has helped create an artificial dynamism, which resists and suppresses developments in rural economy. On the other hand, this forceful attempt to maintain status-quo has become the culture itself.

7.2.2.8 An Indecisive Agriculture Policy

Moving up the policy scale to understand how the rice fertilizer subsidy policy fits with the overall policy goals of agriculture, one need not go further beyond the policy document itself to realise the inconsistencies. The agriculture policy document of Sri Lanka is filled with feel-good statements and sweeping targets with little effort to explain how they could be achieved or at a more basic level why those targets should be achieved (Section 2.4.2.3). Further, these targets show little respect to
the capacities, limitations, problems, or the risks of the agriculture system. When the agriculture policy has no understanding about what its role in the economy, it has no chance of knowing what the farmer’s role should be in agriculture. The agriculture policy is at large undecided between supporting subsistence and commercialising. Are the farmers in need of making a profit from rice farming, or are they in need of rice to subsist the season, or are they in need of both? These are important questions for which one need answers to decide on the goals of agriculture. Expecting all farmers to make a profit worthy of a livelihood from rice farming is a myth. While everyone can plough a field and grow a crop, not everyone can make it a profitable enterprise. Ignoring these basics, the science continues to generate policy solutions for ‘both ends in one single pack’. For the farmers to cultivate rice the way their fathers did and to secure a harvest big enough to feed the family over the next six months they would not need the support of extension. The demand for fertilizers and the lack of demand for extension, the latter offered entirely freely, although seemingly stupid, does give important insights as to why the current efforts in agriculture has failed in stimulating the rural economy.

### 7.2.2.9 A Constrained Science

The mismatching goals, circular reasoning, ignored limitations, and discounted external influences would then raise concern over the role of science in informing the agriculture policy in Sri Lanka. The agriculture bureaucrats and researchers’ response to the rice fertilizer subsidy (Chapter 6) and the politicians’ response to food and agriculture policies (Sections 7.2.2.2 and 7.2.2.3) give every reason to believe that the science informing agriculture policy in Sri Lanka is impaired by a cultural construct of rice. Loaded with ideals reinforced by the constant reminding of government propaganda, rice is conditioned to evade any rationalization and it is no exception in science. The potential and suitability of rice in agriculture, economy, and nutrition thus remains taboo that no one takes the trouble in critiquing the inherent paradoxes. On any attempt of scrutiny, rice becomes the justification itself. The following excerpt of a focus group discussion was evidence to this.

**FGD10:** This year, the government spent Rs.40,000 million [on the fertilizer subsidy]. Is it worth? I don’t know. We can import may be a whole stock of rice - of course we have to protect the farmers.

[At a later stage of the discussion] **Moderator:** I would like to revisit a point you [FGD10] mentioned earlier. You said we could import rice at a cheaper price. Then why do we give so much importance to this concept of self-sufficiency?

**FGD10:** I never say that we should import rice - [we shouldn’t] at any cost.
However, this phenomenon is not unique to the rice fertilizer subsidy policy of Sri Lanka. Researching on a very different topic, the impact of ideology on developing alcohol harm reduction policies for a local population in the UK, Whittingham (2011) wrote, “the balance between ideology and evidence in national policy . . . favours ideology, to the extent of ignoring, concealing or rejecting evidence”. Similar instances of “virtuous corruption” in science and policy, where ideology has taken over evidence have been reported from other sectors. Recently, in the fields of climate change, biodiversity, GM foods, and toxic substances, science has failed again and again, in being true to the best knowledge it has (Whitfield 2006; Kellow 2007; Farebrother 2011). In the EU, a series of studies found evidence to agricultural subsidy programs encouraging less-intensive farming which lacked the desired benefits (Kleijn et al. 2001; Kleijn and Sutherland 2003; Kleijn et al. 2006). Although this opposing evidence was scientifically sound, other scientists derided the studies for encouraging cuts in agri-environmental spending and damaging a policy that has apparently had benefits. Noting the irony in such ‘scientific’ endorsements over feel-good policies of little utility, Whitfield (2006) wrote, “Europeans like farmland landscapes, and will probably continue to try and convince themselves that there are practical ways to keep areas that are rich in wildlife and pleasing to the eye, which also produce cheap food and don’t pollute streams and rivers”. Such thinking has made many problems including the subsidy problem, impossible to solve. Politics often keeps its objectives muddled up to serve its own interests. But when science gets its objectives muddled up, it denies policy makers of every opportunity for useful reform.

Many resource management issues, more often than not are undertaken and interpreted within a specific political context. But “when science is used to arbitrate in these conditions”, by intention or not, “like other high priests who mix politics with ritual”, it loses its independence and disqualifies itself (Douglas 2003). The question is ‘why? Discussing the problems related to the uncertainties and ambiguities of addressing environmental problems Mercer (1995) wrote that “the central environmental issues of the day are ultimately concerned with values, not facts”. Much of the self-deceit of science leading to unsound policy solutions can be traced to this; the role of values.

7.2.3 Where the Narratives and the Meta-narratives Fit

Not all human behaviours are rational and nor is human interaction with rice. O’Connor (2011) notes that although “we are primed to imagine individual famers choosing crops pragmatically”, growing rice in Southeast Asia shows no such pragmatic decision making. He argues that it is best understood as “a total social phenomenon . . . that is not just practical, but moral, esthetic, political, religious, and esthetic too”. The evidence from Sri Lanka agrees with his narrative. As
this dissertation has shown, rice in Sri Lanka evades rationality at all scales. Therefore, in explaining the findings of this dissertation, the appeal of rational agent models is slim.

Nevertheless, a number of theories described in Section 1.3 align with certain observations made in this study. For example, the perceived benefits of the rice fertilizer subsidy are likely to have an effect on the rural and the nationalist votes. Despite the lack of capacity to engage in collective action, being a large vote base attribute the farmers a passive form of collective power. Therefore, one cannot discount the influence, these perceived benefits of the rice fertilizer subsidy, may have on its continuation. One may also suspect a ratchet effect, considering the subsidy’s long continuing. Effect of external shocks on international terms of trade and government fiscal conditions may explain the changes in the level of protection over the years. But none of these models explain or justify the agriculture bureaucrats and researcher’s response to the subsidy. Both farmers and agriculture bureaucrats and researchers value the perceived benefits of the subsidy and hence both groups mediate a support for its continuation. While a collective action model may justify the farmers support for the subsidy these models do not justify the perception over benefits shared by the agriculture bureaucrats and researchers - those that do not directly benefit from the policy and those that apparently have the information or knowledge to oppose the policy.

When the rational agent models fall short of a reasonable justification, what could explain these stakeholders’ different responses constituting an agreeing outcome? Set in an environment that is not only accommodating but augmenting, these responses mediate a physical demand for cheap fertilizers at the operational scale and a cultural demand to maintain status-quo in the rural rice economy at the policy scale. In answering, ‘why the subsidy on fertilizers for rice in Sri Lanka is continued?’, the one model that could explain the varying but agreeing responses of these different stakeholder groups with very different objective functions, is a preference for rice both as food and crop shared across the social spectrum, since the beginning of Sri Lankan civilization. Over time, through various discursive and material mechanisms, the shared preference for rice has gained, retained, and reinforced specific meanings to articulate various ideals relating to development, nationalism, and nutrition (Sections 7.2.2.2 through 7.2.2.5). As the preference is shared it precludes the prospect of scrutinizing each others’ responses toward the subsidy, eliminating any serious opposition - this not only explains why the subsidy persists but also why an exit is difficult.

However, it is important to note that this dissertation presents no theory, but the contextual reality of the rice fertilizer subsidy that prevents it from undergoing any meaningful reform. Restricted by a number of assumptions, theories often have limited application in different contexts. Often, these assumptions are either made forgotten or left ignored making the contextual reality a universally amenable blueprint. While, the shared preference for rice explains why exiting the subsidy on
fertilizers for rice has been difficult in Sri Lanka, it may not appeal in explaining similar protectionist policies in agriculture elsewhere. Here I borrow from Lipschutz (2001), who makes this point clear, elegantly.

There is, quite evidently, no meta-narrative here. There cannot be. Meta-narratives are presented as universal truths, applicable to all places for all time, even as they are very contingent and limited. A people-centred geographical political economy cannot, and should not, ever approach this status. Capitalism is a social structure whose effects are discernible all over the world, but capitalism articulates with people in a myriad of different ways.

7.3 The Implications on Exiting or Continuing the rice Fertilizer Subsidy Policy

This portrait of a new definition to the rice fertilizer subsidy problem in Sri Lanka pointed to a number of reasons that would mediate its continuing. The similarity in the outcomes did not indicate any reason to qualify the subsidy beyond the general understanding on the effects of subsidies. The subsidy has improved fertilizer use and increased yields but did not give enough leverage to improve the economic status of the farmers. This suggests that the subsidy has not been successful in creating a change in the rural economy that would over the long-term diminish the need for it. Further the farmers’ response to the subsidy was driven by a physical constraint affecting harvests. Limited by this the farmers mediated a demand for cheap fertilizers. As the farmers were locked in subsistence this demand for cheap fertilizers would continue into the foreseeable future.

At the policy scale, the many reasons on which the subsidy was justified will not lose the appeal over the foreseeable future. The developmental ideal striving for rice self-sufficiency, antipathy toward the outside world, fostered food preference, and the rice consciousness manipulated to the political advantage would continue to constitute a socio-political environment that would accommodate any form of support for rice. The same developmental ideal, the concern over the volatility of international food markets and its vulnerability to climate risks, and the lack of concern over risks beyond food availability will continue to formulate policy solutions that would secure self-sufficiency. Furthermore, as long as the cultural construct of rice continues to prevail science and policy of agriculture in Sri Lanka, the relevance of supporting farmers for socio-cultural reasons such as maintaining culture and helping farmers do what they know would not diminish. Science’s failing to respect the limitations and the changing dynamics of rural rice farming, will continue to lock it in subsistence. As the agriculture policy is undecided of its role in the economy
and as the culturally-constrained science fails in informing policy of alternative solutions, the existing agricultural strategy is more likely to continue.

The changing dynamics of the power relationships among states, market conditions in food, energy, construction, and money sectors, and developments in international policy that may affect the fertilizer markets unfavourably may push the government for amendments in the policy toward a scaling down or a temporary arrest. But as one of the focus group participants observed, it might only create an opportunity for the next government to exploit (comment by FGD17 in Section 6.6.2). Therefore, as long as these conditions that constitute and mediate a demand for subsidising fertilizer for rice continues, a complete termination of the subsidy will not occur.

7.4 Conclusions

The resolutions to RQ4 and RQ5 bring this study to a completion. Drawing on the resolutions to the two synthesis questions, this conclusion establishes ‘why the subsidy on fertilizers for rice in Sri Lanka is continued?’

Reconstructing the roles of the problem environment and the two stakeholder groups, RQ4 formulated a new interpretation for the rice fertilizer subsidy problem in Sri Lanka. At the operational scale the rice fertilizer subsidy scheme of Sri Lanka has been an experience very similar to subsidy schemes on fertilizer in other developing countries. The problems experienced in fertilizer mismanagement owed much to the subsidy’s structure, which has brought about similar deviations from the desired, again and again, in every instance of its adoption. There was no evidence to indicate that the rice fertilizer subsidy in Sri Lanka was an exception to other subsidy schemes which would have any justification for its continuation. But the stakeholders valued the perceived benefits of the rice fertilizer subsidy, especially given the diminishing soil conditions, and mediated a demand for cheap fertilizers.

At the policy level, the importance of rice as a staple and a developmental ideal that pursued rice self-sufficiency, largely described the context and the setting of the rice fertilizer subsidy. One dynamic that has been a key in shaping the rice fertilizer subsidy policy in Sri Lanka is an ideal of seeing a future development path in rice. The possibility of recreating the past as a development ideal continued to reside in the popular consciousness of the people as well as the overarching targets of agriculture policy. An antipathy towards ‘the foreign’ nurtured to promote localism and nationalism by the political left to whom rice is a symbol, is another dynamic that shapes the policy space of the rice fertilizer subsidy. The global food crises, volatility in the food commodity markets,
and climate risks were the only risks foreseen. This lack of a complete appreciation of risks and drivers at the international level, permitted policy responses that have in fact increased vulnerability to the risks of energy markets and international policy responses.

There have been many instances throughout the history of Sri Lanka, from the ancient times to developments in recent history, in which the political leadership has used the rice-consciousness to connect with people. Sponsorship for rice has been a key to showcasing political potency of the leadership and its benevolence extended to the people. Large-scale investments in irrigation, massive land consolidation projects, continuing welfare support for rice both as food and crop, and attempts to undermine wheat, all had connotations that reached beyond the seemingly nothing but development goals to tap the popular consciousness of people. The scientific community was affected by this cultural construct of rice, and is in no position to assess the relative merits of the subsidy scheme or the rice sector. As a result the role of science in effectively informing policy is impaired.

Drawing from this portrayal of the rice fertilizer subsidy problem in Sri Lanka RQ5 questioned the implications for the future of the subsidy. The science, bounded by the cultural construct of rice and incomplete in its understanding of the system, on the one hand, locked rice farming into subsistence and on the other hand offered no options or alternatives for policy. The social, political, and economic dynamics of rice in Sri Lanka has exempted rice from any doubts over its role in the economy. These constitutes, together with a physical constraint of soil fertility, have enabled conditions conducive to the continuation of the rice fertilizer subsidy, and the existing conditions did not indicate to a change in the conditions in the near future.

With this conclusion, the study completes its task in answering ‘why the subsidy on fertilizers for rice in Sri Lanka is continued?’ As the findings through RQ1 to RQ5 indicate, the subsidy continues to persist because of an intimate food preference shared for millennia by people all across the social spectrum in Sri Lanka. The next chapter will conclude this dissertation by taking the reader through a short summary of resolutions to RQ1 through to RQ5.
Chapter 8 Conclusion

The significant problems we face cannot be solved at the same level of thinking we were at when we created them

Albert Einstein

This dissertation opened with a reflection on the nine dot problem - how unnecessary assumptions make problems impossible to solve by limiting them into spaces that have answers nowhere near. Through the preceding chapters it attempted answering ‘why the subsidy on fertilizers for rice in Sri Lanka is continued amidst a number of sustainability concerns?’ and found that this problem is indeed like the nine dot problem. The five research questions guiding the study sought to understand the response of two key stakeholder groups toward the rice fertilizer subsidy subject to their environment. Doing so the dissertation widened the boundaries for a new interpretation of the rice fertilizer subsidy beyond its existing focus of hackneyed theories and explained why an exit from the subsidy has been difficult. This chapter is a short integrated discussion of the study findings presented together with suggestions for further work in this field.

RQ1. What are the social, political, and economic dynamics that constitute the rice fertilizer subsidy policy in Sri Lanka?

Central to the many social, political, and economic dynamics that constitute the rice fertilizer subsidy policy in Sri Lanka were those same dynamics of rice: Nostalgia for recreating the ‘glories’ of the ancient hydraulic civilization and an antipathy toward ‘the foreign’ seeded by the lasting impacts of the colonial rule - dogma nurtured by the leftist think tanks to the present day to promote nationalism and localism - had secured a key role for rice in Sri Lanka’s quest for development and sovereignty from foreign powers. The global food crises served to the purpose in confirming this role. The importance of rice in the economy, in terms of GDP, employment, and staple carried an economic appeal that cut across the entire social spectrum. A noble mode of sustenance and its growing a total social phenomenon, rice to the Sri Lankan Sinhalese symbolised a moral of ‘good life’. Loaded with these ideals, rice emanated a power to stir strong emotions in people. It is this symbolic affiliation of the Sri Lankan people with rice, both as food and crop that gave credence to the priority received by rice in the socio-political market place, which reaches far beyond its economic value. This rice-consciousness was a key link between the rulers and the followers, which the rulers manipulated to their advantage. Primed by a culture of seeing welfare as an entitlement, any support for rice was received as support for development and national vitality. Subsidising fertilizer for rice in Sri Lanka takes course amidst this social, political, and economic setting. The
subsidy accommodates these various roles of rice and it is the same utility that constitutes the rice fertilizer subsidy policy in Sri Lanka.

**RQ2. What is the role of rice farmers in constituting and mediating the rice fertilizer subsidy policy in Sri Lanka?**

Subsequent to the introduction of the current fertilizer subsidy scheme in 2005 there have been a number of favourable improvements in fertilizer usage which accompanied an increase in rice harvests. To the farmers these outcomes proved effects of the current rice fertilizer subsidy. In mediating a demand for fertilizers farmers responded to a physical constraint - soil fertility - the most critical determinant of rice harvests. The subsidy offered chemical fertilizers, the easy and effective alternative preferred by the farmers, which accommodated the commitment the farmers could afford rice farming, and delivered it at a satisfying level. Therefore, unlike other production solutions delivered by the agricultural system, the rice fertilizer subsidy was a fitting solution, welcome by the farmers. But the subsidy’s harvest potential did not deliver sufficient economic outcomes to secure an improvement in wealth. The performance of other agricultural resource services fell short of enabling optimal conditions to reap the full potential of the subsidy. At the existing subsistence level the subsidy will continue to profit farmers marginally, but lacks the capacity to elevate its performance beyond subsistence. Therefore, given the prevailing conditions the farmers will continue to demand cheap fertilizers into the foreseeable future.

**RQ3. What is the role of the agricultural bureaucracy and research and development in constituting and mediating the rice fertilizer subsidy policy?**

The bureaucrats and researchers response to the subsidy was rooted in the ideals of culture and development. Achieving rice self-sufficiency and preserving the rice culture were the central themes running through these ideals. According to the agriculture bureaucrats and researchers, the subsidy assumed different roles in making this possible - resolving soil fertility problems, increasing rice production, increasing profitability of farming, helping farmers do what they know (rice farming), and maintaining a desirable culture – and so justified the persistence of the subsidy. Constrained by this cultural construct of rice, the science continued to produce policy solutions to achieve mismatching goals. There was very little appreciation of the changing dynamics of the rural sector or the world economic environment and such unforeseen risks failed the policy solutions in accounting for any shocks beyond those associated with food availability. On the one hand, these policy solutions sought to preserve status quo in an imaginary steady-state rural socio-economy and on the other hand expected farmers to advance as commercial entrepreneurs. Therefore, as these
findings suggest the agricultural bureaucracy and research and development bodies in Sri Lanka constitute and mediate a policy position that has not only been favourable for the subsidy’s persistence but also unfavourable for any exit.

**RQ4. What is a new problem definition for the rice fertilizer subsidy problem in Sri Lanka?**

Subject to the complex interplay of history, institutions, ideas, leadership, different actors, and external influences, the response of the rice farmers and the agriculture bureaucrats and researchers to the rice fertilizer subsidy suggests that its persistence is best explained by a shared preference for rice by Sri Lankans both as food and crop. This preference evades rationality at all scales, and being a shared preference, it precludes mutual critique among stakeholders. The various discursive constructs of this preference have constrained agriculture science in Sri Lanka and hence failed to critically inform agriculture policy. This cultural lock on science and policy has restrained the farming community to partial subsistence and engendered a farming culture that emanates a demand for free agricultural services, which the political opportunists have used to their advantage. Therefore, the rice fertilizer subsidy of Sri Lanka is only a symptom of a culturally constrained science critically failing policy.

**RQ5. What are the implications of this new problem definition for exiting or continuing the rice fertilizer subsidy scheme?**

The findings of this study suggest that the rice fertilizer subsidy may continue into the foreseeable future. Responses to the government’s budgetary flexibilities and price fluctuations in the international fertilizer markets may bring about alternating amendments to the scope and the scale of the subsidy with occasional exits over the short-term. But a complete termination is unlikely, because the physical and cultural demands for the rice fertilizer subsidy are unlikely to ease into the foreseeable future. The soil conditions will continue to degrade. The shared preference for rice will continue to accommodate discourses justifying the current trends in rice production and hence the rice fertilizer subsidy. This will in turn continue to leave an opening for the political opportunists to exploit. Undecided between preserving status quo and bringing the desired advancements in agriculture, mismatches in policy solutions sought by science may continue to set bounds to agriculture’s potential and restrict rice farming to subsistence—a vicious cycle catalysed by a constrained science and an ill-informed policy.
**Implications of this Study and Future Research Directions**

In answering, ‘*why the subsidy on fertilizers for rice in Sri Lanka is continued?*’ this study has found that it is a preference for rice both as food and crop shared across the social spectrum of Sri Lanka. This shared preference has created a physical as well as a cultural demand for the rice fertilizer subsidy and closed openings for scrutiny and debate. The cultural lock has not only made an exit from the subsidy difficult, but has restricted Sri Lankan agriculture and so its implications on overall economic development in to a space that has no more options for improvement. A solution lies well beyond the current interpretation and framings of the problem - where the light has been brightest and hackneyed theories have abound – where science can be freed from the cultural bounds of rice, enabling critically informed policy. Caution must be exercised in interpreting this information. This dissertation does not have anything against rice or the cultural identity of rice nor does it advocate people’s parting with those. But freeing science from the boundaries set upon by those is a must. But achieving this will be no easy task.

So ‘what needs to be done to free science from the cultural bounds of rice?’ One first step would be to open a discussion on this engaging the wider society. The only way to break a ‘taboo’ would be to discuss it openly. This may have to include what is taught in schools about history and religion. It may also include an informed discussion about nutrition. As for reform in agriculture, the sector may need to learn to understand its environment, the changing dynamics of the rural society, farmers’ demands, the limiting conditions at the operational scale, the intrinsic problems, and the real risks in the food, water, energy, and money markets. To make this understanding worthwhile, a concurrent appraisal of the role of agriculture in the Sri Lankan economy may be needed. A better understanding of the current environment of agriculture, its demands, and its role in the economy would permit targeted policy solutions that address the real demands of the sector. Among those informed policy solutions, the rice fertilizer subsidy is likely to have no place. Making attitudinal changes in the society and achieving drastic policy reforms would take time. But a first step in this - breaking the taboo - is a responsibility of the science itself. On the one hand it may need policy and administrative interventions to safeguard the integrity of science bodies working in the political environment. But on the other hand it also entails a personal responsibility from the scientist. This author has no answer to how this can be achieved, may be a psychologist or a sociologist would!


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Appendix 1 Definition of Terms

Below is a guide to terms of ambiguity that recurs throughout this dissertation. Terms that may carry multiple definitions or connotations specific to Sri Lankan understanding are explained below for the meanings which they are used in this dissertation. Table 1.3 presents a guide to the acronyms. For any ambiguous terms with single occurrence, explanations are provided through footnotes as they appear.

**Bag of fertilizer**: A bag of fertilizers is equivalent to 50kg of fertilizers.

**DS Division**: Divisional Secretariat (DS) division is the third level of the geographic administration divisions in Sri Lanka following Provinces and Districts. There are 331 DS divisions in total.

**GN Division**: Grama Niladari (GN) Division is the lowest administrative division in the island and in total there are 14022 GN divisions.

**Major irrigation regime**: An area cultivated under an irrigation scheme that has the capacity to irrigate a command area greater than 80 ha (200 acres).

**Minor irrigation regime**: An area cultivated under an irrigation scheme that has the capacity to irrigate a command area of 80 ha or less.

**Muddy fertilizer**: A colloquial term used by the farmers to refer to a fertilizer mixture made predominantly of TSP. It is applied at the time of land preparation, into the ploughed mud, and therefore called muddy fertilizers.

**Paddy**: Paddy in Asia and Sri Lanka could be used to denote the rice plant or unmilled rice grains in the husk whether gathered or still in the field.

**Rain-fed irrigation regime**: An area cultivated under rain-fed conditions.

**Red powder**: A colloquial term used by the farmers to refer to potash fertilizer.

**Rice**: Rice in common Sri Lankan usage denotes milled rice. Without such distinction, this dissertation uses the term rice throughout, to denote the crop or the grain, unless when the discussion material of study participants was recalled verbatim, or used in its original context as it appeared in names, or it was necessary to make a distinction between milled rice and unmilled rice.

**Tummy fertilizer**: A colloquial term used by the farmers to refer to a mixture of fertilizer containing predominantly potash. The mixture is applied at the stage of heading, which results in the swelling of the panicle, which is referred to as the tummy stage, and therefore called tummy fertilizers.
Appendix 2 A Translation of the Informed Consent Form

Site(s) of Research: The University of Queensland, Australia
Universities, government, and private institutions involved in policy
making and research in paddy rice farming, and paddy rice farmlands,
Sri Lanka

RESEARCH PARTICIPANT INFORMED CONSENT AND
PRIVACY AUTHORIZATION FORM

Study Title: Understanding the Sustainability Concerns Associated with Fertilizer Usage and Rice Farming
Sponsor: Privately funded
Investigator: Dilini Abeygunawardane
Date: ___/___/___

Dear Study Participant,

What you should know about this study:
• You are being asked to join this research study because you are a farmer, an extension officer, a scientist or a bureaucrat, knowledgeable in various aspects of paddy rice farming in Sri Lanka.
• The research study includes only the people who agree to participate. This consent form explains the research and what you would need to do if you agree to participate. Please read it carefully and take as much time as you need. Ask questions at any time about anything you do not understand. If you do agree to take part in the study, please note that you need to sign this consent form.
• You are a volunteer. You have the right not to take part in the study or to quit at any time. You can agree to be in the study now and change your mind later. If you wish to leave the study, please tell the investigator (me) right away. Leaving this study early or choosing not to participate in the study will not stop you from receiving routine support such as the services of the extension officers, government incentives and any other support that you receive outside this study. While you are in this study, I will tell you any new information that could affect your involvement in the study.
• The risks of participating in this research study are minimal. You might find it uncomfortable to share some of your personal information or views. If you do have any concerns over answering certain questions you can decline from answering them.
• Please note that you will have to spend some of your precious time in participating in this study.

Why is this research being done?
• This study forms the basis of my doctoral degree.
• I will use this study to understand the best policy options to minimize any negative implications of current fertilizer usage patterns on the sustainability of paddy rice farming and the associated livelihoods.
• Please note that the study cannot guarantee actions and interventions by relevant authorities contributing to positive change following the study, as such conduct is beyond my capacity.
The study procedure

- The study involves two information collection rounds, which are different from each other. You may involve in one or more of these phases.

First round: One-on-one in-depth interviews

- In the first round you will be requested to take part in an one-on-one in-depth interview. About 40 people will take part in this round representing farmers, extension officers, scientists and bureaucrats. If you take part in an in-depth interview you will be expected to spend about 45-60 minutes discussing the questions raised by me. The questions may include matters on farming practices, policies and livelihood aspects related to paddy rice farming. This will allow us to discuss the matters in detail and to share any knowledge, experience or view that you think is relevant.

Second round: (a) Group interviews

- In this round you will be requested to take part in a group interview. About 25-30 scientists will take part in the group discussions. If you take part in a group interview you will be expected to spend 1-2 hours discussing questions with a group of 8-10 participants including myself. I will guide and mediate the discussion and ensure that we stay within the focus of this study. Please note that if you take part in a group interview, the confidentiality amongst the participants will be compromised.

(b) Questionnaire survey

- More than 150 paddy rice farmers will take part in this round. If you take part in the questionnaire survey you will be expected to spend 30-40 minutes providing brief answers to a set of questions. I will administer the questionnaire. The questions will probe in to matters involving fertilizer usage in paddy rice farming and related government policies, extension services, health conditions, environmental conditions, livelihoods and life styles. I will provide you with a set of answers and you can choose the best answer that describes you or your opinion.

Will it cost you anything to be in this study?

- Participating in the study will not cost you anything except for your valuable time. You will not receive any financial or material benefits for participating in the study.

What other things should you know about this research study?

- The University of Queensland ethics committee protects the rights and welfare of people taking part in research studies. This study adheres to the guidelines of the ethical review process of The University of Queensland.

- While you are free to discuss your participation in this study with me (contact details are given below), if you would like to speak to an officer of the University not involved in the study, you may contact Dr Chris Jacobson (ph. +61 7 5460 1608 or <c.jacobson@uq.edu.au>) or Dr Bradd Witt (ph. +61 7 5460 1064 or <g.witt@uq.edu.au>).
What do you do if you have questions about the study?
- You can contact me, using any of the following contacts;
- Postal address:
  Dilini Abeygunawardane
  School of Geography, Planning, and Environmental Management
  Level 4, Chamberlain Building (35),
  The University of Queensland,
  St Lucia QLD 4072, Australia
- Telephone:
  Office +61 (0)7 3365 7158
  Mobile +61 (0)4 3005 9376
  Mobile +94 (0)7 1836 5525
- Email:
  d.abeygunawardane@uq.edu.au

Will my information be kept private?
- Study records that identify you will be kept confidential as required by law. Except when required by law, you will not be identified by name, address, telephone number, or any other direct personal identifier in study records. Any personal identifiers in your study records will be kept in confidential files at the University of Queensland or at my personal disposal, to be seen only by study personnel including myself and my three supervisors, Asoc. Prof. Robert J S Beeton (+61 419 714533), Dr. Donald Cameron (+61 7 5460 1327) and Dr. Iean Russel (+61 409193721) of the schools of Geography, Planning, Architecture and Environmental Management (GPEM), and Integrative Systems (SIS), in the University of Queensland. The research material that emerges from these interviews will remain confidential and participants will remain anonymous in any publications associated with this work. The interview transcripts will remain the property of the investigator and will only be used for the purpose of the study. Transcripts will be destroyed upon completion of the work.

What does your signature/thumbprint on this consent form mean?
- You will not give up any legal rights by signing this consent form. Your signature on this form means that:
  o you understand the purpose of this study, the procedures to be followed, and the risks and benefits have been explained to you
  o you have been allowed to ask questions freely and have had all of your questions answered
  o you know who to contact if you have additional questions
  o you agree to join the study and understand that you can withdraw at any time
  o you have been told that you will be given a signed copy of this consent form
THE INFORMED CONSENT

I agree to be involved in the above research project as a respondent. This research study has been explained to me in language I can understand and I have read and/or understood the information contained in this research information sheet and I am aware of the nature of the research and my role in it.

Signature/ thumbprint of Participant for Individuals 18 & over

Date

Signature of Person Obtaining Consent (Must be over 18 years)

Date

NOTE: A COPY OF THE SIGNED, DATED CONSENT FORM MUST BE KEPT BY THE INVESTIGATOR; A COPY MUST BE GIVEN TO THE PARTICIPANT.
Appendix 3 Schedule of the Semi-Structured Interview with Bureaucrats and Researchers

1. What is the role of your institution in the paddy rice sector in Sri Lanka?

2. Can you tell me about your role in this institution?
   - Responsibilities
   - Duties
   - Education
   - Time in this role
   - Previous experience

3. How is the paddy rice sector doing in Sri Lanka?
   - Past/future/present
   - Extent
   - Technology
   - Land/water
   - Yields
   - Exports/imports
   - Seasons of cultivation
   - Contribution to the economy

4. How has the cultivation been recently?
   - Yields
   - Weather
   - Profits

5. Do you know of any particular reason/s for the current situation?

6. What support does the government give to the rice farmers?
   - Cultivation
   - Welfare

7. What is the role of the extension officers?
   - How are they distributed?
   - Are there enough extension officers all across the country?
   - What is the mechanism that keeps their knowledge up to date and current?
   - Are you satisfied with the achievements of the extension officers?
   - What recommendations or changes would you make if you were to improve the service of the extension officers?

8. Are there any specific farming practices that this institution recommend or promote?
   - Why do you promote these practices?
   - What difference do you think these would make in the farm?
   - At what frequency do you recommend these practices?

9. Would you think they are important/relevant?
10. What are the most popular best management practices (BMP) among the farmers?
   • Do you know why they are popular?

11. Are you aware of any BMP that the farmers are hesitant to adopt?
   • Do you know the reasons for this?

12. What problems do you think the farmers are facing in adopting BMP in general?

13. Is there a difference between what you recommend and what the farmers actually practice on farm?

14. Would you see it as a considerable difference?

15. What impacts did the climate have on the paddy cultivation in recent years?

16. Do you see climate change as a serious threat to SL agriculture in general?
   • Would you say the same on paddy rice sector?

17. What are your concerns about climate change considering Sri Lankan agriculture sector?

18. Are you aware of any assessment on agricultural greenhouse gas (GHG) emissions in SL?
   • Do we have figures for different gases by sector (e.g. methane emissions by paddy sector, methane emissions by livestock sector, etc…)
   • What potential do you see in limiting GHG?

19. There is talk in the international arena about introducing some of these measures to the paddy farming, how do you respond?
   • Do you see these being incorporated in to the agriculture policy in Sri Lanka?
   • Why?

20. What would be your concerns in adopting on farm GHG mitigation measures in the paddy sector?

21. Would it be possible to improve the paddy rice sector by adopting on-farm GHG mitigation?
   • Yields
   • Chemical pollution
   • 100% self sufficiency
   • Farmer welfare

22. Would you describe these two goals (GHG mitigation and 100% self sufficiency) as being compatible or as incompatible?

23. How would you describe the pros and cons of adopting on farm GHG mitigation in the paddy sector?

24. How do you think the farmers would respond?

25. What changes would you expect in the climate change regime relating to the agriculture sector following Copenhagen?
Appendix 4 Farmer Questionnaire Survey

1. For how long have you been farming?
   a. Less than 5 years
   b. Between 5 and < 10 years
   c. Between 10 and < 15 years
   d. Between 15 and < 20 years
   e. 20 or more years

2. How did you learn to farm?
   a. On my own
   b. From my father
   c. From a relative
   d. From a friend
   e. Other: ……………………………..

3. What is your main source of income?
   a. Paddy rice farming
   b. Other crops farming
   c. Labour work
   d. Small business
   e. Other: ……………………………..

4. What is the total acreage of your cultivation?
   a. Less than 1/2 acres
   b. ½ - < 1 acres
   c. 1 - < 2 acres
   d. 2 - < 5 acres
   e. 5 acres or more

5. What proportion of the above land (Q4) do you own?
   a. None
   b. Less than ¼ of it
   c. Less than ½ of it
   d. Less than ¾ of it
   e. All of it

6. What is the acreage of your paddy rice cultivation?
   a. Less than ½ acres
   b. ½ - < 1 acres
   c. 1 - < 2 acres
   d. 2 - < 5 acres
   e. 5 acres or more

7. What proportion of above land (Q6) do you own?
   a. None
   b. Less than ¼ of it
   c. Less than ½ of it
   d. Less than ¾ of it
   e. All of it
8. If you do not own some or all of the land you cultivate, under what arrangement have you gained the rights to cultivate the land?
   a. Joint ownership (Havul)
   b. Share cropping (Ande)
   c. Tenancy rotation (Thattumaru)
   d. Benefit rotation (Kattumaru)
   e. Situation sharecropping (Bethma)
   f. Lease system (Badu)
   g. Mortgage system (Ukas)

9. How do you find additional labour for cultivation?
   a. I can manage by myself and do not need additional labour
   b. Within the family
   c. Exchange labour with responsibility (Attam)
   d. Shared labour (Kaiya)
   e. Informal ad-hoc labour
   f. Formal contract labour
   g. Formal hired labour

10. If you receive paid labour, at what rate do you pay?
    a. Rs................ for per day
    b. Rs................ and ................... per day

11. If you receive paid labour, how much does it cost you per season?
    a. Less than Rs. 2000/= 
    b. Less than Rs. 5000/= 
    c. Less than Rs. 10,000/= 
    d. Less than Rs. 15,000/= 
    e. Other: ......................

12. Under which irrigation scheme do you cultivate?
    a. Major irrigation
    b. Minor irrigation
    c. Rain-fed

13. How much did you spend on fertilisers in the last season?
    a. Less than Rs. 750
    b. Between Rs. 750 and < 1500
    c. Between Rs. 1500 and <3000
    d. Between Rs. 3000 and <9000
    e. More than Rs. 9000

14. How much did you spend on insecticides and fungicides in the last season?
    a. Less than Rs. 2000
    b. Between Rs.2000 and < 5000
    c. Between Rs. 5000 and < 10,000
    d. Between Rs. 10,000 and < 15,000
    e. More than 15,000
15. How much did you spend on weedicides in the last season?
   a. Less than Rs. 2000
   b. Between Rs. 2000 and < 5000
   c. Between Rs. 5000 and < 10,000
   d. Between Rs. 10,000 and < 15,000
   e. More than 15,000

16. How much did you spend on seeds in the last season?
   a. Less than Rs. 2000
   b. Between Rs. 2000 and < 5000
   c. Between Rs. 5000 and < 10,000
   d. Between Rs. 10,000 and < 15,000
   e. More than 15,000

17. What amounts of the following fertilizers do you apply for rice cultivation?

<table>
<thead>
<tr>
<th></th>
<th>Paddy-Now</th>
<th>Paddy-5 year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSP</td>
<td></td>
<td></td>
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<tr>
<td>MOP</td>
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<tr>
<td>Urea</td>
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</tbody>
</table>

18. If you have changed the amount of application of any of the above fertilizers, what are the reasons for this change? (choose up to three reasons)
   a. Soil fertility levels have decreased over the time
   b. The cost of fertilizers have decreased over the time
   c. Fertilizers are readily available in the markets than it used to be
   d. All the farmers I know have increased the amount of fertilizer they apply to their fields
   e. Extension officers have recommended us to use increased amounts of fertilizers
   f. Other: .................................

19. How do you compare the amounts of TSP/MOP/Urea you apply with the optimum amounts of TSP for paddy rice?

<table>
<thead>
<tr>
<th></th>
<th>Far below what is necessary</th>
<th>Somewhat below what is necessary</th>
<th>Almost the same as what is necessary</th>
<th>Somewhat above what is necessary</th>
<th>Far above what is necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSP</td>
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<td>MOP</td>
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<td>Urea</td>
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</table>
20. How often do you use straw and organic fertilizer in a cropping season?
   a. Never
   b. Apply rice straw at least once
   c. Apply rice straw and organic fertilizers at least twice
   d. Apply rice straw and organic fertilizers at least three times
   e. More than three times throughout the cycle

21. What are the reasons for the difference in your usage of organic and inorganic fertilizers? (choose up to three reasons)
   a. Inorganic fertilizers are readily available
   b. Inorganic fertilizers are easy to apply
   c. Inorganic fertilizers are more effective in terms of productivity
   d. Inorganic fertilizers are less time consuming to apply
   e. Organic fertilizers are environmentally less harmful
   f. Organic fertilizers are cheaper
   g. Other: ........................................

22. What are the advantages and disadvantages of inorganic fertilizers over organic fertilizers?

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Inorganic fertilizers are an easier alternative</td>
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<td>b. Inorganic fertilizers are more efficient in terms of productivity</td>
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<td>c. Organic fertilizers are environmentally less harmful</td>
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<td>d. Organic fertilizers are cheaper</td>
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<td>e. Organic fertilizers are easy to</td>
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<td>f. Other: ........................................</td>
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23. How was the last year’s paddy cultivation? 
   Yala ..........................  Maha ..........................

24. Cost per acre ..........................  ..........................

25. Earnings per acre ..........................  ..........................

26. How do you compare your last years’ harvests with the harvests about 5 years ago?
   a. Far below the harvests 5 years ago
   b. Somewhat below the harvests 5 years ago
   c. Almost the same as the harvests 5 years ago
   d. Somewhat above the harvests 5 years ago
   e. Far above the harvests 5 years ago
27. If you have noticed any changes to the harvests over the last 5 years, what reasons do you think have caused this change? (choose up to three reasons)

<table>
<thead>
<tr>
<th>Direction of change</th>
<th>Impact of the direction of change on the change of harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ / -</td>
<td>Positive</td>
</tr>
<tr>
<td>a. Changes in the amount of rainfall</td>
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<tr>
<td>b. Changes in the pattern of rainfall variation/ timing of rainfall</td>
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<tr>
<td>c. Changes in the degree of temperature</td>
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<tr>
<td>d. Changes in the pattern of temperature variation</td>
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<td>e. Fertilizer subsidy</td>
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<td>f. Changes in soil fertility</td>
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<tr>
<td>g. Use of new varieties</td>
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<tr>
<td>h. Use of novel planting techniques</td>
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<tr>
<td>i. Use of novel farming equipment</td>
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<tr>
<td>j. Use of pesticides</td>
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<tr>
<td>k. Use of fertiliser</td>
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<td>l. Changes in farming knowledge</td>
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<td>m. Extension services</td>
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<td>n. Irrigation</td>
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<td>o. Credit facilities</td>
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<td>p. …………………………………………</td>
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<td>q. …………………………………………</td>
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<td>r. …………………………………………</td>
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</table>

28. What price did you receive for paddy in the last season?
   a. ………………………………

29. What was the price offered by the government price guarantee scheme for paddy?
   a. ………………………………
30. How satisfied are you about the availability and access to the following agrarian inputs and services?

<table>
<thead>
<tr>
<th></th>
<th>Very satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Dissatisfied</th>
<th>Very dissatisfied</th>
<th>Not relevant</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Water availability-Quantity</td>
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<tr>
<td>b. Water availability-Timing</td>
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<td>c. Water availability-Frequency</td>
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<td>d. Fertilizer availability (subsidized)-Timing</td>
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<td>e. Fertilizer availability (subsidized)-Pricing</td>
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<td>f. Fertilizer availability (subsidized)-distribution</td>
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<td>g. Seed availability-Pricing</td>
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<td>h. Seed availability-Quantity</td>
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<tr>
<td>i. Seed availability-Quality</td>
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<td>j. Extension services- Knowledge of the extension officers</td>
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<td>k. Extension services- Commitment of extension officers</td>
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<td>l. Extension services- Time of interaction with extension officers</td>
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<td>m. Government guaranteed price scheme-Pricing</td>
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<td>n. Government guaranteed price scheme-Quality regulations</td>
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31. Did you spend any of your earnings on the following in the last 5 years?
   a. Savings
   b. Furniture
   c. TV
   d. Radio
   e. Computer
   f. Refrigerator
   g. Tractor
   h. Motor
   i. Generator
   j. House
   k. Extension of house
   l. Property
   m. Extensification of cultivation
   n. Your education
   o. Children’s education
   p. Other: …………………………….
32. How do you compare the current overall wealth of your family to what you had 5 years ago?
   a. Greatly worsened
   b. Somewhat worsened
   c. Remains the same
   d. Somewhat improved
   e. Greatly improved

33. What are the reasons for you answer to the question above (Q34)?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. Credit burdens</td>
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<tr>
<td>35. Additional income:</td>
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<td>.................................................................</td>
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<td>36. Diseases to the family members</td>
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<td>37. Yields and productivity</td>
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<td>38. Living cost</td>
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<td>39. Devoutness in animistic and supernatural forces</td>
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<td>40. Other</td>
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</table>

41. How old are you? ........................................ years old

42. What is the highest level of education you have received?
   a. Primary education
   b. Up to ordinary level class
   c. Completed ordinary level exam
   d. Up to advanced level class
   e. Completed advanced level exam
   f. Tertiary level
Appendix 5 Schedule of the Focus Group Discussion

Welcome and introduction by the moderator

Ethical Assurance

*University of Queensland Rules:*

- Whole project has been evaluated by a University ethics panel
- All interview forms and group interview designs are checked independently
- All work conducted is reported on at completion and any problems about data use resolved
- All stored on two dedicated machines for analysis,
- No names and no identifying commentary will be published or divulged to a third party,
- All reporting is as summary or conclusion,
- Quotes will be used but identifies as informant number xx and checked for anonymity at draft stage by independent person
- In the focus group you have a right to decline to answer
- All raw data is lodged until examination is complete and then either destroyed or if in the opinion of the School ethics committee it should be preserved for longitudinal work it will be secured

House Rules

- Think of this as a conversation around the kitchen table.
- Please do not discuss this interview with other stakeholders (including other scientists and bureaucrats) as I will be talking to them. You can continue to discuss the interview with me (Dilini) for months to come. Should you develop any ideas from this discussion, please discuss them with me. If you do I (Dilini) may need to formally record the information.

A Few Basics

- Cross-questioning is ok, but I moderate.
- It is ok to say things directly.
- When you are disagreeing, don’t be disagreeable.
If you do not understand the terms, concepts or questions please feel free to ask questions and clarify.

Most importantly, be nice to me!

**Timing**

This will take about an hour and a half, but if it goes on longer and you are happy to keep talking, I won’t just cut off the conversation, but I might try to speed things up if we are running out of time.

**Introduction**

This is a conversation about rice cultivation and fertilizer subsidy in Sri Lanka. There are 5 questions to give the session a structure.

My role is to frame the conversation not to direct it.

**Opening Question 1:**

**How significant is the fertilizer subsidy scheme for paddy rice cultivation?**

*Prompts: Initially don’t prompt but use group interaction*

- Interplay of politics
- Nationalistic inspirations
- The history
- Self-sufficiency in rice
- Enthusiasm for farming/of the farmers
- Extension in the land area of rice cultivation
- Replanting of abandoned rice lands
- Cultivating arrangements (land rights)

Note: prompts may not be used in Q2 if Q1 covers the topics

**Follow up to Q1 - Question 2:**
Do you think the fertilizer scheme has been a success? (Alternatively, had there been any failures/problems?)

Prompts

- Productivity
- Self-sufficiency in rice
- Enthusiasm and interest for farming
- Extension in the land area of rice cultivation
- Adequacy of the amounts of fertilizer
- Timing and distribution
- Farming practices
- Attitudes and behaviours regarding best management practices (BMP)
- Chronic renal failure
- Eutrophication
- Soil and water quality
- Ecosystem health
- Abundance and the diversity of fauna and flora
- Potable water

Question 3:

What are your major concerns for the future of the paddy rice cultivation in Sri Lanka?

Prompts

- Cost
- Fertilizer dependence
- Trade
- Entrepreneurship
- Carbon policy
- Fertilizer usage patterns
- Attitudes of the farmers
- Farming practices

Follow up to Q3 - Question 4:
What alternative futures do you suggest to improve the paddy rice cultivation in Sri Lanka?

*Prompts*

- Alternative fertilizers (Organic fertilizers)
- Change in the value of the fertilizer subsidy
- Alternative input subsidies
- Alternative output subsidies
- Policy change
- Education and awareness
- Governance

*Closing Question*

What are the key obstacles to achieving the changes suggested?

*Prompts*

- Attitudes
- Culture
- Governance
- Policy
- Farming culture

*Final Question*

Is there anything else we have missed?

THANK YOU FOR BEING A PART OF THIS STUDY