CHRONIC KIDNEY DISEASE UNIDENTIFIED (CKDu) IN SRI LANKA:

TOWARDS AN INTEGRATED SOLUTION

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Abstract

This study sought to understand how the problem of the Chronic Kidney Disease of Unknown Etiology (CKDu), which has affected the paddy farmers in the North Central Province (NCP) of Sri Lanka is being addressed by the Government of Sri Lanka. The disease was discovered in the NCP in the mid-1990s; and since its discovery, it has found in other neighboring farming areas. The Sri Lankan Government has taken various measures to address the CKDu crisis but the spread of the disease has not been contained. My thesis is that a coordinated and bottom-up approach is the most effective way of addressing the CKDu crisis. Major findings of this study are that there is no coordination of the interventions of the various government ministries involved in combating the CKDu crisis and the contribution of degradation of environment to the problem. Remedial measures are recommended to overcome the shortcomings found.

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CHAPTER 01 - INTRODUCTION

1.1 Introduction

This study seeks to interrogate the government of Sri Lanka's interventions for addressing the problem of the Chronic Kidney Disease of Unknown Etiology (CKDu). In addition to this overarching objective, the study also seeks to understand the contributions of civil society or non-governmental organizations (CSO or NGOs) and the agro chemical companies towards combating the CKDu issue in Sri Lanka. The author's personal experiences, while being a volunteer with a Sri Lankan NGO (that helps poor communities in the Northern Central Province [NCP]) between 2013 and 2014, motivated the need for this study. Indeed, the plight of individual CKDu patients, their families, and communities struggling to coming to terms with the ravages of the disease was shattering and inspired the author to decide to research the problem and make a contribution towards the search for a proper solution.

The study focuses on North Central Province of Sri Lanka and adopts an interdisciplinary approach and thus draws insights from law, the concept of social capital, and corporate social responsibility to understand the scope of the problem and inform analyses that hopefully will provide some viable solution to the problem. The study's central thesis is that an effective solution to the CKDu problem in Sri Lanka can only be found through a comprehensive and integrated approach that allows all different government agencies and other actors and players with a stake in the issue to contribute to

the search for solutions to the problem. This way, all actors, including the poor communities ravaged by the disease, can coordinate their disparate individual efforts and tap into the contributions that each actor could bring to the table to find a durable solution to the CKDu problem.

The Chronic Kidney Disease of Unknown Etiology (CKDu) was discovered by the Ministry of Health in the 1990s among the paddy farmers in the North Central Province (NCP) of Sri Lanka. The CKDu is a new form of chronic kidney disease (CKD). The National Research Program for Kidney Disease in Sri Lanka (2010) states that a patient is said to suffer from chronic kidney disease of unknown etiology (CKDu) if he or she has no history or current treatment for diabetes mellitus and chronic and/or severe hypertension, snakebites, urological disease of known etiology or glomerulonephritis[1]. This rare form of tubulenterstitial disease involves slow, asymptomatic progressive kidney damage over three or more months, making diagnosis and treatment difficult. Nearly 80% of patients experience total kidney failure within two years following diagnosis (Ministry of Healthcare and Nutrition, Epidemiology Unit, Sri Lanka and World Health Organization, 2009). Death becomes inevitable for most patients because of the inadequacy of medical services, costly treatment, such as dialysis and organ transplantation, and the poverty of most victims (Handunnetti and Daniel, 2012).

[1] acute inflammation of the kidney, typically caused by an immune response.

CKDu is not only reported in Sri Lanka (Ramachandran, 1994; World Health Organization, 2013; Jayatilake et al.2013) but also in other parts of the world such as El Salvador, Nicaragua, China, South-Asia (Lunyera et al.2015). In Sri Lanka, the disease has been found in other farming areas since its discovery two decades ago. The Government Medical Officers Association of Sri Lanka (GMOAS) states that more than 40,000 people are affected countrywide (GMOAS, 2013). There were over 20,000 CKDu patients in 2013 undergoing care in the NCP, and the number is increasing since the government introduced and stepped up early detection programs (GMOAS, 2013). It is estimated that 13 people die each day from CKDu in Sri Lanka (GMOAS, 2014). The socio-economic dimensions of CKDu are grave: the illness has a direct impact on patients' daily life, including economic and livelihood activities, domestic tasks, consumption patterns, and their participation in social activities (Bandarage, 2005).

1.2 Response from the government of Sri Lanka

The Sri Lankan Government and its agencies, the Ministries of Health, Agriculture, Environment, and especially Water Supply and Social Services, have taken various measures to address the CKDu crisis. These measures include improvements to the medical facilities and hospitals, provision of clean and safe drinking water, passing of regulations to ban certain agro–chemicals and provision of financial support for families with CKDu patients (Presidential Task Force for CKDu, personal communication July, 2016). Bandarage (2005), claims that Sri Lanka's government authorities are

overwhelmingly concerned with identifying one or more environmental nephrotoxins[2] to eradicate the disease, resulting in delayed action on the immediate health and social needs of patients and families. Different central government institutions carry out their own plans with little integration, that is, to create a holistic and collective action to address the problem and the needs of the target communities. Therefore, the ultimate beneficiaries – the patients and their families – still suffer from the negative impact of the disease and continue to be driven to despair and impoverishment (Bandarage, 2015).

1.3 Causes

Over the past 20 years, several scholars and the World Health Organization (WHO) have undertaken numerous studies to try to understand the causes of the problem of CKDu (e.g., Athuraliya et al. 2003; Athuraliya et.al., 2009; Athuraliya et al.2011; Chandrajith et al., 2011; Jayatileke et al., 2013; Illeperuma, 2009; Bandara et al., 2008; 2010a; Dharmawardene et al., 2013; Wasana et al. 2012; WH0, 2012). These studies, from different disciplines, ranged from hospital cohort and community level studies, water resource studies, assessments of food sources, and studies into possible genetic linkages. Therefore, a body of diverse knowledge about the CKDu problem has been established. From these studies, researchers have found multiple causes of CKDu, but further studies are being undertaken with the sole aim of identifying the exact or specific causes of the disease. In general, however, the prevalence of hardness of water (because

[2] toxic agent/substance that inhibits, damages or destroys the cells and tissues of the kidneys

of calcium and magnesium) and fluoride in the ground water coupled with heavy metals especially cadmium, arsenic, and or lead seeping from the agrochemical runoff from farming are said to be the main causes of the disease. Moreover, the lifestyles of the inhabitants (consumption of alcohol, tobacco, dehydration caused in the farming field, etc.) were found also to accentuate the disease incidence.

1.4 The socio economic and environmental consequences of CKDu

Studies (section 2 of this chapter) show that CKDu seems to have a higher prevalence in male farmers from the NCP of Sri Lanka. Patients are predominantly subsistence farmers and / or agricultural laborers, who are over the age of 40 years. (Center for Science and Environment[CSE], 2012). They live in communities that are poor (with income less than Sri Lanka R. 10,000 per month or USD 80 per month). As such, this disease is associated mostly with the low-income groups of the affected areas and poses adverse impacts on the socio-economic conditions of the affected families as well as on the country. About 5% of the Annual Health Budget is spent on the management of CKD patients (Gunawardena, 2012). Since the real cost of treatment for dialysis is Rs. 10,000 (USD 80) per patient and for a transplant, around Rs. 800,000 (USD 6320), if the patients are to get these services from the private sector, they must bear these costs. Due to lack of funds, however, patients pour into the kidney units of the few public hospitals that provide free kidney dialysis and transplants. The dialysis patients must come several times a week, often traveling great distances. Being too weak to travel alone, they come

with family members. Due to lack of tertiary care provided by the state sector hospitals, terminal patients suffer a lot; for instance, patients and their family members who accompany them to dialysis centers sleep together on the hospital floors until they are fit to travel. When a breadwinner of the family develops kidney disease and can no longer work, the entire family goes into financial ruin and debt. In some cases, children have had to forego attending school to find employment and women have had to engage in prostitution for economic survival (Bandarage, 2005).

1.5 Thesis

The central thesis of this study is that understanding village level local knowledge, and their social capital, as well as integrating the diverse views of various actors and players, including the agro- chemical companies, are prerequisites for solving the CKDu issue in Sri Lanka. It further argues that establishing and allocating responsibility and accountability among different stakeholders such as the Ministries of Health, Agriculture, Water, Environment, Social Services, researchers, village level social and religious organizations, farmers, agro-chemical companies etc. must be an integral part of the solution.

From this author's interactions with kidney patients, doctors, community leaders and government officers providing services to kidney patients in the North Central Province in 2013 and 2014, it became clear that Government interventions to address the CKDu problem had not given due consideration to the unique environment of the NCP, ignored

local knowledge of the suffering communities and their social capital at the village level, and failed to integrate these into the solutions and actions proposed to address the problem. Second, although there is a consensus that pollution from agro-chemicals plays a significant role in the disease onset, the interventions made by the Government have alienated agro-chemical companies by not inviting them to be part of the solution, and at the same time no responsibility or accountability has been placed on them in the interventions made.

Since the problem is complex, interconnected to different domains, and many stakeholders are involved, no single disciplinary approach can provide a comprehensive answer to the problem of CKDu in Sri Lanka. Thus, an interdisciplinary approach has been chosen. The interdisciplinary approach will allow for an integrated solution to the CKDu crisis in Sri Lanka. Therefore, this study has borrowed insights from environmental, social capital (support), legal, and corporate responsibility theories. This approach will provide a synergetic approach that incorporates both a top-down and bottom up approaches to searching for solutions to the CKDu problem. By contrast, to the currently used singular top down approach to the problem, it is a new approach to solving the problem.

1.6 The Main Objectives

This study has three main objectives:

i. To explore and analyze the effectiveness of the processes and measures so far adopted by the Government of Sri Lanka to handle the issue;

ii. To identify the potential of the village level organizations and support groups in developing a solution to the CKDu issue; and

iii. To critically analyze the response of agro-chemical companies to the CKDu crisis in Sri Lanka, the legal environment in which they operate, and how to establish their responsibilities and accountability in the search for solutions to the CKDu crisis.

1.7 Research Questions

To address the above objectives, I formulated the following research questions:

i. What action has the government taken to manage the CKDu Disease?

ii. What is the role of village level actors and processes in the management of CKDu issue?

iii. What is the role of agro-chemical companies, especially their corporate social responsibility (CSR) in managing the CKDu disease?

iv. What is the legal framework available to regulate the various activities that may generate the risk factors of CKDu and its prevention?

1.8 The Context

It is important to know the geographical, agricultural, and socio cultural background of Sri Lanka, especially the unique ecosystem of the North Central Province (NCP), to understand the CKDu issue and how it spread in the NCP and to the other agricultural regions.

Sri Lanka (formerly Ceylon), is an island State in the Indian Ocean, located in the southern tip of India, and covers 65,610 km^2. The total population in 2015 is 22.25 million. 28.4% are employed in agriculture, 25.7% in industry and 45.9% in services. Rice, tea, rubber, coconuts, spices and vegetables are the major agricultural products (Central Bank of Sri Lanka, Annual Report, 2016). The Unidentified Chronic Kidney Disease (CKDu) is highly prevalent in the North Central Province (NCP), which covers about 16% (10,472 km^2) of the country's total land area, and the largest Province of the country (Ministry of Health, 2014). The NCP consists of two districts, Polonnaruwa and Anuradhapura, which were the ancient capitals of the country. Its population is 1.266 million, as per the census of 2012 and more than 65% of people living there depend on basic agriculture and agro-based industries. It has predominantly a rural population (96%), of which 90.9% are Sinhalese, 8% Moor, and 1% Tamil. In addition, 90% of the population are Buddhist, 8% Islamic, 0.8% Hindu, and 1.25% are Roman Catholic and other religions. (Department of Census and Statistics of Sri Lanka, 2016). The NCP is commonly referred to as the "Dry zone" of Sri Lanka and the mean annual rainfall of the region is 1450mm (Bandara et al.,2008). The NCP of Sri Lanka has a unique geographical, agricultural, and socio cultural background and it is described in detail in the literature review.

Table 1- CKDu Patients in the high-risk areas of Sri Lanka

District	Risk - AGA divisions	2014	2015
Ampara	Dehiattakandiya, Maha oya	493	468
Anuradhapura	All divisions	8903	8412
Polonnaruwa	All divisions	3483	5018
Badulla	Rideemaliyadda, Mahiyanganaya	1010	943
Kurunegala	Polpithigama	561	1660
Matale	Wilgamuwa	803	1107
Monaragala	Thanamalwila, Wellawaya, Buttala	246	794
Mullathivu	Welioya	333	486
Vavuniya	Vavuniya South, Cheddikulam	163	1933
Trincomalee	Padavi siripura, Gomarankadawala,	484	426
Hambanthota	Tissamaharama, Lunugamvehera	0	205
Total		16479	21,452

Source: Ministry of Health, Nutrition and Indigenous Medicine, 2016

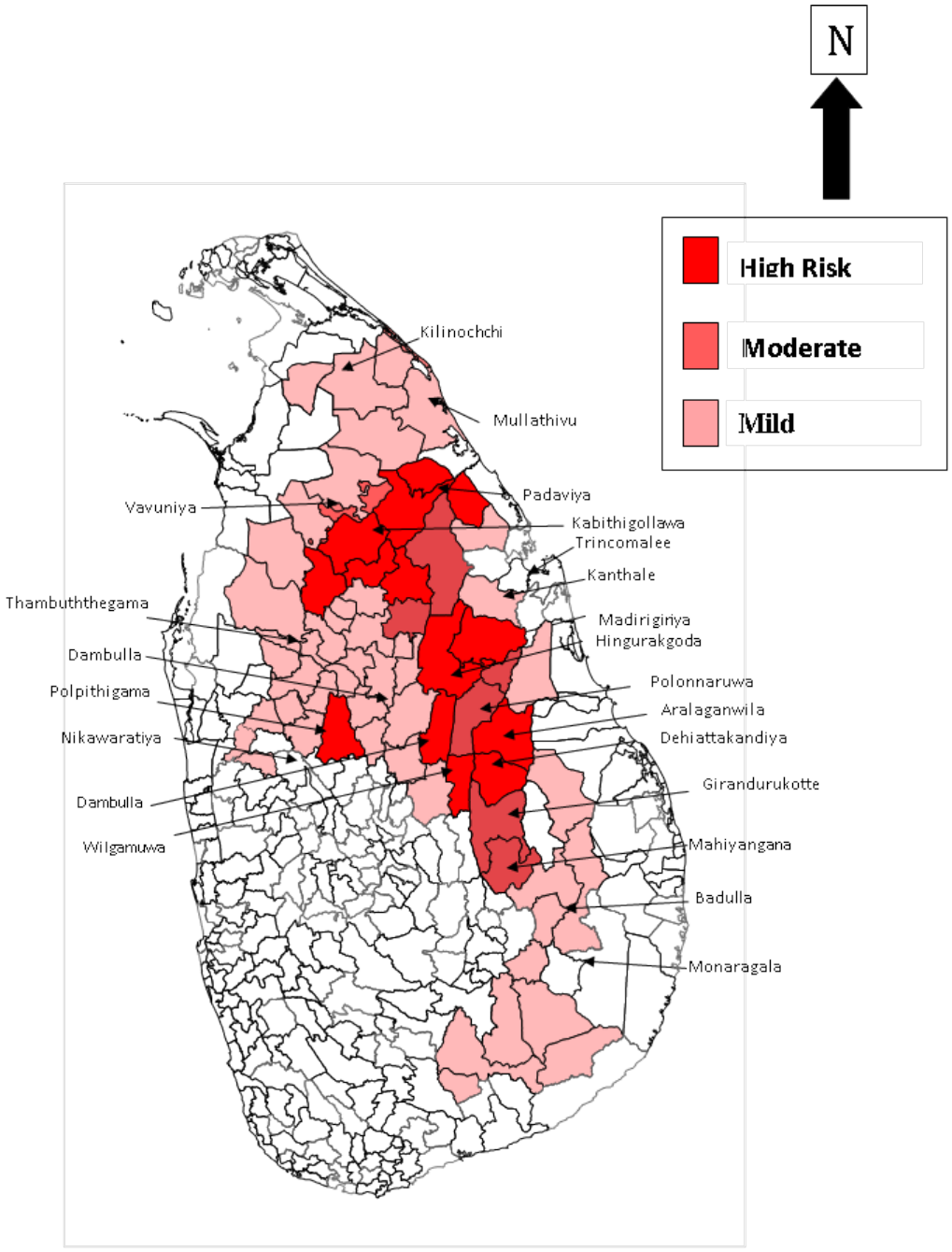

Figure 1 The zoning of the CKDu severity as per Divisional Secretary Administrative District Level

Table 2 Severity of CKDu in Anuradhapura District

No	MOH Name	Population	No of Patient	Prevalence
1	Padavia	22988	786	3.41%
2	Medawachchiya	51430	1552	3.01%
3	Kebithigollewa	25277	580	2.29%
4	Rambewa	40825	6855	1.67%
5	Horowpothana	41831	682	1.63%
6	Kahatagasdigiliya	40339	621	1.56%
7	Nochchiyagama	51191	420	0.82%
8	N.P.C	61223	495	0.80%
9	Palagala	39110	284	0.72%
10	Mihinthale	36734	262	0.71%
11	Kekirawa	48909	325	0.66%
12	Galnewa	38563	249	0.64%
13	Thambuththegama	47556	295	0.62%
14	Rajanganaya	37719	190	0.50%
15	Thalawe	63937	279	0.43%
16	Thirappane	31092	95	0.30%
17	Ipalogama	40302	78	0.19%
18	N.P.E	90733	169	0.18%

Source: Ministry of Health, Nutrition and Indigenous Medicine, 2016

1.9 Theoretical Framework

The CKDu issue is multifaceted and its facets are interconnected. Since the various disciplines have developed precisely to study phenomena from a particular standpoint, interdisciplinary study will allow the integration of the different insights from the different disciplinary standpoints into one whole understanding and knowledge of the CKDu issue. Therefore, this study entails drawing insights from stakeholders belonging to different disciplines across the natural sciences, the social sciences, the humanities, and the applied fields regardless of their epistemological distance from each other. In this study, "Perspectives Taking Theory" is adopted as the conceptual framework throughout the study as a solid theoretical basis for the study.

"Perspectives Taking Theory" involves analyzing a problem from different perspectives of each discipline and identifying the differences and similarities between them to understand the problem. The author uses theories such as environmental justice, stakeholder theory and the concept of social capital in understanding the perspectives of individual disciplines connected to this study.

As described by Repko et al. (2014) adopting "Perspectives Taking Theory" to this study will help to reduce the human tendency to negatively stereotype individuals and groups and move the researcher developmentally from a single discipline's understanding of the problem

to grasping the differences between disciplines and their insights. This will enable the researcher to recognize the distinguishing characteristics of disciplines, especially the kind of questions that they ask and their rules of evidence, which in turn facilitates the researcher's ability to assemble new sets of potential solutions to a given problem, and illuminate the fact that we are biased in the direction of our own knowledge, whether it comes from life experiences or prior academic training. In this way, the researcher can more accurately perceive how others see and understand the world, view a situation broadly from multiple perspectives, perceive the others in more depth and have a fuller understanding of other's perspective. .

When making decisions and policy recommendations on a complex issue such as CKDu in Sri Lanka, bad decisions are likely to be made if important perspectives are overlooked. In this context, the ultimate aim of this study is to make recommendations to the government of Sri Lanka, and "Perspectives Taking Theory" will facilitate making better recommendations because it tries to consider all important perspectives.

1.10 Methods and approaches

This is a qualitative study. I successfully completed a Qualitative Research Methodology Course and the on-line Tri-Council course on Research Ethics, which equipped me with the relevant knowledge and skill set for undertaking successful fieldwork. Thus, I used Qualitative Research Methods as described by Creswell (2008) to conduct my field studies.

The content of the consent forms was explained in Sinhala (the language the interviewees are conversant with) and forwarded to interviewees prior to the interview to obtain their consent. Further, the confidentiality and anonymity of the participants were respected. Except for the ranking sheet forwarded to the agro-chemical companies, which is a closed ended questionnaire, all other interviews conducted to gather data were open-ended question-based interviews. The data obtained was analyzed using the Framework Analysis Method, discussed in the data analysis section of this chapter. In addition, desk research was carried out to study the legal framework relevant to the issue and to compile the literature review. All data from interviews held were digitally recorded and transcribed to a password-protected computer. All written filed notes are kept securely.

1.11 Research sites

My fieldwork was carried out in two sites, Colombo and Padaviya.

The first site, Colombo, is the capital of Sri Lanka, where all head offices of the government ministries, agencies and corporate head offices of the agro-chemical companies, lawyers, and researchers are located. As such, the interviews of senior officers were carried out in Colombo, except for the Senior Officer of the Provincial Health Ministry at NCP, who was interviewed in Anuradhapura.

The second site, Padaviya, is a village located in Anuradhapura District, in the NCP. The author interviewed village level leaders and officers to grasp or understand the status of the CKDu problem.

This village, Padaviya, was selected because it has similar geographic, demographic, agricultural and socio economic factors to the other villages in the NCP region. The total population of Padaviya DS division is 22,998, and there are 786 CKDu patients comprising 3.41% of the population. (Ministry of Health, Nutrition and Indigenous Medicine, 2016). Its ethnic composition is mainly Sinhalese, 22,979, constituting 99% of the population. The dominant religion is Buddhism and 22,724 are Buddhist, i.e., 99% of the population. A smaller number of other religions exist. In terms of sex composition, 11,353 are male, while females are 11,645. Of the total of 6,219 households in this Divisional Secretariat Division, more than 80% are engaged in agriculture – the majority being paddy farmers. The principal drinking water source is well water. 4345 people use well water from either protected or unprotected wells. (Department of Census and Statistics 2012). As such, by the author's judgement, it was selected as a sample of a village in the NCP. (see Appendix VI for CKDu map of Anuradhapura)

1.12 Interviews

Five interviews at village level and thirteen interviews at national level were conducted to collect data. Details of all the interviews including title of the person

interviewed, date and location interviewed are given in a table in appendix I. Names of the interviewees are not divulged to ensure anonymity.

1.13 Data Analysis

The Framework analysis developed by Richie and Spencer (1994) was adopted to analyze the data collected from the fieldwork. Framework analysis is recommended (Srivastava and Thompson, 2009) when the study has specific questions to answer, a limited time frame, a selected sample of participants and when one requires the integration of various integrating views in arriving at a solution. Therefore, the framework analysis fits well with the "Perspectives Taking Theory", the conceptual framework adopted by this study.

After listening to the recorded interviews and reading the field notes, raw data gathered was reduced to meaningful data based on its relevancy to answering the research questions. Then the reduced data was transcribed. After familiarization with the data in the transcripts, they were then coded based on how they might be useful for answering different aspects of the key issues in the research questions. Then the coded content of data was abstracted from transcripts and was placed under relevant categories of research questions to indicate different views made by respondents to the same issue. This is in keeping with "Perspectives Taking Theory", because it allows the integration of different insights on the problem.

In the process of analyzing their views further, by tabulating findings in tables, identifying and coding the ideas stated, two major themes, Disease Prevention and Disease Management

were generated. Then the discussion focused on showing what the research results reveal about the four research questions under each of the two major themes. In this way, it facilitated the integration of different insights as envisaged by the "Perspectives Taking Theory". Then the conclusions were drawn and recommendations were made. This process was undertaken, while keeping in mind the original research objective, "developing an integrated solution to the issue."

1.14 Limitations of the study

This is a qualitative study. One of the disadvantages of a qualitative study is that the researcher's worldview and biases may creep into the study despite every effort to avoid this, even when one adopts a theoretical paradigm that allows one to see the problem in a holistic dimension, such as an interdisciplinary theoretical approach. Thus, as a researcher, I bring my own biases. Despite these biases, however, a researcher's worldview and experiences can actually strengthen the study, and in my case, as a Sri Lankan, I have seen the suffering of the CKDu stricken communities in several visits that I made to help the villagers in the NCP. I am a lawyer and a lecturer in marketing and related subjects but I also have worked as a volunteer with an NGO that supports poor people. The suffering communities I saw during the few visits that I made to the NCP shattered me. I did not understand why a lasting solution to the issue could not be found, despite many interventions by the government. Therefore, when I decided to pursue a master's degree, I selected a course programme that would allow me to conduct research on the CKDu pandemic in Sri Lanka, with a view to

properly understanding it and finding solutions. In this context, my goal for pursuing a master's degree programme is not purely academic, but also designed to help find a practical solution to a burning issue in Sri Lanka, and forwarding the results to the government of Sri Lanka. I remain aware that my understanding of the problem and my analyses are likely to be biased because of my lived experiences, knowledge, academic training, and professional work.

I interviewed many national level government officers and major stakeholders. However, my village level interviews were only with one village in the NCP. Village levels opinions may be subjective and their views may differ from the views of other villages.

Based on my own lived experience in Sri Lanka, I wanted to use a method that could speak to the complex issue of CKDu. I believe that the theoretical methods and qualitative interviewing techniques and objective analysis of data together with published scholarly work used, are sound and rigorous enough for the findings and conclusions made in this study.

1.15 Conclusion

In this introductory chapter, the CKDu crisis in Sri Lanka was explained as a crisis that needs a comprehensive solution. Further, the rationale why it could be researched in an interdisciplinary sense was elaborated given that is a complex issue. The central thesis of this study is that involving and understanding village level local knowledge, and their social

capital, as well as integrating the diverse views of various actors and players, including the agro- chemical companies are prerequisites for solving the CKDu issue in Sri Lanka. The importance of disciplinary areas such as environment, law, social capital should be studied is also highlighted. Further, the context, scope and boundaries of the study are stated. The descriptive research questions articulated the areas to be probed into enlarging the knowledge of CKDu issue in Sri Lanka, in the future. Methods and approaches described the theoretical framework to be used for the study, the research sites, methods of data collection and analysis, the limitation of the study and the structure of the thesis. The next step in this research would be to explore the theories in the disciplines selected and what further scholarly work might be available to obtain a better understanding of the issue before embarking on a new round of fieldwork to locate new kinds of empirical data.

CHAPTER 02 - LITERATURE REVIEW

This literature review is organized into three thematic areas: environment, law and corporate social responsibility, and social capital. In each thematic area, initially a brief review of theoretical knowledge will be presented and then the literature concerning the topic and any scholarly work found in the literature survey as to CKDu issue is discussed.

2.1 Environment

Environment consists of all of the external non-living (abiotic) and living(biotic) factors, conditions and influences that affect the life, development, and survival of an organism or a community (Park, 2008). The environment is anything outside an organism in which the organism lives. It could also refer to geographical region, a certain climatic condition, pollutants or the noise, which surrounds the organism (Collin, 2008). It is a complex system of living and non-living components, which interact with each other and respond to change in order to survive. Each element of this web of life is essential to the functioning of other parts and so destroying, degrading or taking away one part of the environment can also destroy other parts (Environment Foundation, 2009). In this context, it is important to probe into the background of the environment in Sri Lanka to understand the environmental impacts that may have caused CKDu.

2.1.1 Unique environment and local ecological environmental knowledge of villagers in Sri Lanka

Tennakoon (2014) describes the unique ecosystem prevalent in the NCP of Sri Lanka. There had been nearly 18,000 manmade water reservoirs (tanks) in the island, of which 7,260 are still functional today, although the original system has been disturbed. The NCP alone had 3,900 tanks, and about 2000 tanks are still functional. The tanks are used mainly for agriculture, bathing, drinking water, cooking water, and recreational purposes. The environment around the tank systems provides many other ecosystem services and goods. These tanks are interlinked with networks in different water streams (cascades) that lead to a river and their physical, environmental, and cultural elements are inseparably entwined. They were complete self-sustaining ecosystems. A single tank, for example, consists of physical, environmental, economic, and socio-cultural components, which interact symbiotically. As in human anatomy, though different parts are separately identifiable, all or some of them at different times synchronize functions that they perform. (Appendix II describes a graphical illustration of cascading tank systems and the mini-man made ecosystem) There is a high degree of interdependence or a linkage of these components (Tennakoon, 2004). In this self-sustaining ecosystem, no inorganic fertilizer or chemical herbicides were historically used for cultivation in the past (Dalupotha, 2003).

A single tank system has its water area, its paddy cultivation area, highland rainwater fed farm areas, tree girdles, upstream meadows, alkalinity trap zones, irrigation channels, drainage channels, settled highland areas, village forestland, and shrub areas. All forms of local agriculture are conditioned by the volume of water in the tank. All components of the tank system have varying economic values to the village. Fish, firewood, fodder for dairy farming, herbs for medicines, parklands are found in the tank-based system. As such, the tank water is the lifeblood of the villages. The villagers considered water to be the wealth to be protected, managed, respected and used. Therefore, the villages in the past strictly adhered to water protection and management. They imposed fines to violators of the field irrigation laws. People developed collective norms and procedures to manage the tank and its environment. These eventually became customs and practices. For the maintaining of these customs, people sought binding threads such as the religions they follow and even super natural powers that they relied upon. Religio-cultural practices came to stay as rituals in appeasing super natural powers in protecting the system. These rituals strengthened the co-operative spirit of the members of the community, enhanced their courage to do better and succeed, made them fair to others, and above all they ensured sustainability without wasteful use of all environmental resources within the tank ecosystem. The combination of several single tank systems created one cascade system, and several cascade systems created the overall manmade ecosystem and the overall socio-economic system in the NCP area (Tennakoon, 2004).

2.1.2 Mini man-made ecosystem

Tanks, paddy fields, watersheds and canals are integrated and interwoven with the natural environment, which facilitated the evolution of the Tank Cascade System over two millennia (Dharmasena, 2014). The tank was the center of the social system. Sharing resources equally and equity of ownership were the most striking features of the culture of the people of the NCP, which led to the building up of a peaceful and sustainable rural society. The villagers themselves organized the necessary maintenance work of tanks and the surrounding lands. The large tank in the system was considered as a God. In fact, until the colonial government instituted the Irrigation Department in 1860s, the management of village tanks completely remained in the hands of villagers. The development of tank irrigation systems was a crucial element in the social organization and cultural traditions in the dry zone. In addition to cultural and religious factors, historians increasingly see a contribution from the very decentralized and independent nature of the village tanks system towards the culture of free thinking in Sri Lanka (Ausadahami, 1999).

2.1.3 Disruption of the tank system

Multiple invasions from South India into Sri Lanka from 247- 237 BC and finally the capturing of Anuradhapura by the Chola empire of India in 1017, however, were destructive to the survivability of the tank systems. In 1017, the king of Anuradhapura, Mahinda V, was captured and taken to India; the Cholas ransacked the city of Anuradhapura. The Sinhala rulers moved the capital from Anuradhapura to Pollonnaruwa (Siriwera, 2004). During the colonial era, the tank systems were neglected and abandoned. Tank systems were the backbone of the

traditional economy and its destruction has had far-reaching impacts on the farmers and villages (Tennakoon, 2013). Shortly after the independence from British in 1948, the Sri Lankan government started a program to settle farmers in the NCP. These farmers were brought from other provinces of the country. The forest was cleared and tanks were restored to carry water for cultivation. According to Madduma Bandara (2004), the massive conversion of land for the Mahaveli River Development Scheme in the area, (based on the land use planning concepts of that time) required breaching bunds of small tanks and reclaiming or bull-dozing the land in the tank beds and adjacent areas, resulting in a further destruction of the cascading tank system.

Given this environmental background it is worth studying the CKDu specific issues through the published work.

2.1.4 Environmental abuse and CKDu in Sri Lanka

Considerable debate and conjecture over the causal factors contributing to the development of CKDu continues to rage in Sri Lanka. At least two dominant camps have emerged: one camp contends that the causes of CKDu are unknown. The other camp argues that environmental abuse or degradation resulting from use of agro-chemicals in agriculture is directly responsible for the emergence of the disease.

A growing body of evidence suggests that the consumption of water contaminated with certain heavy metals found in agro-chemicals coupled with the inherent hardness of the water could be significant causes of the disease (e.g., Bandara et al. 2008). Nobel et al. (2014),

reviewing various studies on water related issues in the region, suggests that fluoride and other constituents that are present in the water such as Calcium (Ca), Sodium (Na), and possibly Magnesium (Mg) could be potential factors in the development of CKDu in the NCP. Ranasinghe et al. (2016) in a recent study in the Padaviya region of NCP also confirm that water samples analyzed for Cadmium (Cd) and Lead (Pb) showed elevated values compared with the drinking water standards of the Sri Lanka Standards Institution. Chandrajith et al. (2010) attributes CKDu to heavy metals from various forms of fertilizers and agro-chemicals entering the human body through the food chain. He also postulates that high temperatures in the dry zone and the need to consume higher volumes of water to regulate water balance by farmers working long hours may also be a factor in developing CKDu.

A team of scientists from the University of Rajarata, located in the NCP of Sri Lanka, reported that excessive use of agro-chemicals contaminated the water resources of NCP and the high percentage of mercury and arsenic found in water is the main cause for CKDu (Sri Lanka Medical Association [SLMA], 2012). Another study by Kelaniya University in Sri Lanka also found a strong positive correlation between the arsenic content and the hardness of ground water and prevalence of CKDu in affected regions or areas (Sri Lanka Medical Association, 2012).

By contrast, however, a joint study of the CKDu problem, referred to as the National Research Program for Kidney Disease, under the auspices of the Sri Lanka National Science Foundation and the World Health Organization (WHO) found that while 15% of the people in the NCP were affected by CKDu, no single agent or factor is responsible for causing the CKDu

disease (Mendis, 2012). This study, however, identified possible causative factor of CKDu as being low levels of cadmium, which entered the body through the food chains, coupled with deficiency of selenium, concurrent exposure to arsenic, and pesticides. Water was not identified as likely causative factor but the study indicated that improving water quality and supply of water with less hardness could reduce the burden of heavy metals as well as minimize the possible role of fluoride, hardness, calcium and sodium.

It is pertinent to contrast the conversations about environmental abuse and CKDu prevalence in Sri Lanka with other select countries to establish whether any similarities in the causal factors exist. Lunyera et al. (2015) after reviewing titles and abstracts of 1607 articles published on CKDu, and reading the full text of 89 articles reviewed, selected 26 articles for study based on sample size, design region, and quality of the study. Studies of eighteen of them were conducted in known CKDu–endemic countries: Sri Lanka (10) and Central America (8). The remaining eight studies were from India, Japan, Australia, Mexico, Sweden, Tunisia, Tanzania, and the United States. Heavy metals, heat stress, and dietary exposures were reported across all geographic regions. In south Asia, family history, agrochemical use, and heavy metal exposures were reported most frequently, whereas altitude and temperature were reported only in studies from Central America. Across all regions, CKDu was most frequently associated with a family history of CKDu, agricultural occupation, men, middle age, snakebite, and heavy metal exposure. They finally concluded that studies examining etiologies of CKDu have reported many exposures that are heterogeneous and vary by region. Lunyeri et al. (2015) suggested conducting

further research to identify etiologies of CKDu, designing consistent and comparative multisite studies across high-risk populations to help elucidate the importance of region–specific versus global risk factors.

2.1.5 Industrialization of agriculture and CKDu

Carson (1962) warned in *Silent Spring* that for first time in the history of the world, every human being is now subjected to contact with dangerous chemicals from the moment of conception until death. Shiva et al. (2003) describes how multinational corporations, such as Monsanto, have altered the biosphere by introducing hybrid and genetically modified plants, which need lots of inorganic fertilizer, fungicides and herbicides. She documents the impact on farmers as well as public health from the use of agro-chemical based farming. Boyd (2015) explains the complexity of the issue of agro-chemical toxicity, by stating that exposure to pesticides does not necessarily cause health problems, but that a number of factors are involved; including the dose, the toxicity of a particular product, route of exposure, an individual's genetic vulnerability, age at the time of exposure, length of the exposure, general health of the individual, environmental factors, and potential interactions with other chemicals. Scott et al. (2015) in relation to the Canadian context, show how chemicals affect our lives – in the food we eat, air we breathe and the products we consume. They further describe the fact that the distribution of exposure to chemicals tends to vary along familiar social gradients, with disproportionate burdens falling on low income, racialized, and indigenous communities. This

description equally applies to Sri Lanka when CKDu and other diseases caused by environmental toxins are concerned.

2.1.6 Green Revolution

The "Green Revolution" that saw the introduction of "miracle" hybrid varieties of seeds and dependent on extensive use of agro-chemicals including fertilizers, hormones, soil treatments, and pesticides was introduced to Sri Lanka in the 1970s. Agro-chemicals that enhance crops began to be used extensively in Sri Lanka's plantation and traditional agricultural sectors with the introduction of the "Open Economy" and of import liberalization in 1977 (Bandarage, 2015). Shiva et al. (2003) argue that the struggle against toxic chemicals represents a challenge to the dominant model of development and globalization and its emphasis on economic growth and profit over environment sustainability and well-being.

Between 1983 and 1997, the quantities of formulated pesticides, namely insecticides, herbicides, and fungicides, imported increased tenfold (Sim, 1989; Taylor, 1999). While imports leveled off in subsequent years, increasing commoditization and industrialization of agriculture kept pesticide use at high levels. Pesticide use has been particularly heavy in the areas of the Mahaweli Development Program, which was a major river diversion program in dry zone for agriculture and hydro power took place in 1970 to 1995 in the NCP (Udyanganie et al., 2006). Taylor (1999) who conducted a field study of pesticide use in the Mahaweli area in 1999 noted that 89% of paddy-cultivated areas there were chemically weeded. A study carried out by

Chandrajith et al. (2010) reported that paddy soils in areas experiencing rapid economic development are polluted with potentially toxic metals. Their study observed widespread application of phosphate fertilizers containing trace elements chemicals known for their nephrotoxic effects. They further explain that the recommended amount of fertilizer per hectare is 270kg, but over the past few decades, its application has increased by more than a factor of two exceeding the recommended levels. They attribute this massive increase in the fertilizer use to fertilizer subsidies granted by the government and the use of very low quality imported fertilizer due to the unavailability of a proper controlling mechanism.

Bull (1982) demonstrates how the excessive use of chemical pesticides paved the way for new insect varieties to infest Sri Lanka, such as the brown plant hopper; and also shows how farmers are trapped in a 'pesticides treadmill,' that they find difficult to escape because they must continue to buy expensive and stronger types of chemicals to kill different types of pests than what they found in the past. Chemical pesticides, he notes, kill beneficial life forms as well as harmful pests , thereby disturbing the delicate balance of ecosystems, depleting the soil of nutrients, and rendering land unsuitable for cultivation.

Mahatantila (2012) argues that industrial agriculture has put the traditional tank system based economy of NCP under severe and increasing threat. Livelihoods are not only endangered but also the biodiversity is threatened. These threats arise from multiple sources, including upstream water allocation decisions, which marginalize traditional tank systems in favor of seemingly more productive uses such as "modern" large-scale irrigation and agro-chemical

based farming as well as from siltation and sedimentation arising from unsustainable land use practices in upper catchments. Crucially, reservation areas are also being opened for cultivation most of the time. Once the protective vegetation and flora are destroyed, harmful agro-chemicals can now easily reach the waters sources and water reservoirs. Degrading of flora and fauna, loss of fertile lands and destruction of the village ecosystem and increased severity of droughts are the most distinct consequences of large-scale industrialization of agriculture, all of which negatively affect the tank systems in Sri Lanka.

Bandarage (2015) claims that despite the growing awareness of the risks of chemicals and pesticides and possible link to the epidemic kidney disease, farmers in the CKDu affected regions are extremely reluctant to give up the use of agro-chemicals. They have little confidence in themselves and in the organic, traditional agricultural methods of their ancestors. They have been made to believe that the new chemical-industrial approach represents progress and that chemical pesticides are indispensable for their survival. However, they lack the proper equipment and protective gear for safe use or the facilities for safe storage. Thus, occupational and accidental pesticide poisoning is rampant. In the late 1970s, Sri Lanka had the highest rate of pesticide poisoning in the world (Bull, 1982; Chandrajith et al., 2010; Taylor, 1999). The FAO figures in 1997 demonstrated that Sri Lanka ranked "very high in the Asia Pacific Region about pesticide related health hazards" with an annual total number of pesticide accidents around 20,000 (Sumith, 2005) as David Bull noted in his Oxfam sponsored study of pesticides and the Third World.

Peris and Edirisinghe (2016) observe that under the current model of industrialized farming, agro-chemical companies aim to sell more chemicals, while farmers apply larger quantities of chemicals than is necessary to guarantee better yields. They suggest that agro-chemical over-use and abuse can be circumvented by using a system called “chemical leasing”. Chemical leasing is a process where farmers seek an expert service provider in the application of agro-chemicals. They state this model will make the service provider use the minimum amount of agro-chemicals required per acre because more use of chemicals involves more costs. This way, a cost element for the service provider will implicitly result in best practices of using agro-chemicals.

2.2 Legal framework and Corporate Social Responsibility

2.2.1 Legal framework

The discourse and emerging theory of environmental justice could be used as a theoretical framework to look at the general legal framework of Sri Lanka to ascertain whether it delivers environmental justice to the community with special reference to issues like CKDu. According to Environment Protection Agency of USA, “ Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies” (EPA, 2017).

Environment justice can be described in two parts. First, procedural environment justice and the second, substantive or distributive environment justice. Procedural environmental justice highlights the importance of involving all people regardless of their status in the society to have meaningful involvement in decision-making. Substantive or distributive environmental justice describes the contribution that the procedural part makes to environmental justice. According to Schlosberg (2001), historically the environmental justice movement has concentrated on environmental hazards, toxics or pollution and has argued that the distribution of environment burdens is not fair, given that some social groups, notably low income groups and some ethnic groups are more likely to share a heavier burden than other affluent segments of the society. However, he argues that the concept of environmental justice (justice towards humans on environmental issues) has now expanded further to include ecological justice (justice towards natural world on environmental issues).

In this broader theoretical framework, a survey of laws and its processes, including the study of practical application in Sri Lanka, would shed light on how environmental or ecological justice is delivered in the contemporary setting in Sri Lanka. Since it would be a major exercise beyond the scope of this study, the focus of review here would be restricted to the most relevant aspects of the legal framework that may have relevance to the CKDu disease, especially those relating to the protection and conservation of the environment and other natural resources. Sri Lanka has a rich tradition of environmental conservation, which has its origins in Buddhist teachings and in customs and practices followed through millennia. Its modern environmental

laws, however, are molded on the principles of Roman-Dutch law and English law, produced through Parliaments, international treaties, and judicial decisions.

The Constitution of Sri Lanka, contains two references to the environment in Chapter VI, One, under the directive principles of the state policy; the state is required to protect, preserve and improve the environment. Second, under the fundamental duties. It is the duty of every person in Sri Lanka to protect nature and conserve its riches. Therefore, the responsibility to protect the environment is shared between the state and community (Environment Foundation of Sri Lanka, 2009). Gunaratne (2015) shows that there are several cases[3] filed in courts of Sri Lanka, as to environmental issues under the fundamental rights of the constitution. However, she highlights that the fundamental rights action is available only against the state and its agencies, and that these cases have been instituted against government development projects or other state actions, which have potential adverse impacts on communities, or which were perceived as detrimental to the common good. Largely these cases have been filed as public litigation, usually by non-government agencies working in the field of environment (Gunaratne, 2015). However,

[3] Bulankulame v Secretary, Ministry of Industrial Development (2000) 3 Sri LR 65; Environment Foundation Ltd v Urban Development Authority of Sri Lanka(2005)Supreme Court FR Application No 47/2004; Environmental Foundation Ltd v Mahaveli Authority; Heather Therese Mundy v The Central Environment Authority of Sri Lanka and other (2004) Supreme Court Appeal No 58/2003.

no case is filled as to the right to a clean, healthy environment, or CKDu related issue. Gunaratne (2015) argues that there is an urgent need to redraft the fundamental rights chapter of the Constitution of Sri Lanka to include legally enforceable social and economic, as well as environmental and development rights, including such basic rights as those to food, water, shelter, health and education, right to clean and healthy environment, rather than relegating them to "directive principles" for the government, that cannot be enforced in a court of law.

Sri Lanka has more than twenty-five pieces of enforceable legislation[4] concerning environmental protection, agriculture and health. However, out of them, the National Environment Act No 47 of 1980, the Control of Pesticides Act No 33 of 1980, and the Regulation of Fertilizer Act No 68 of 1988 are most the directly relevant to the issue of CKDu. Therefore, those Acts are briefly discussed.

2.2.1.1 The National Environment Act No 47 of 1980 (NEA)

This is the major Act in relation to environment. It is enacted as an umbrella law to address a variety of environmental issues. It establishes the Central Environment Authority (CEA) and defines its powers, functions and duties. It provides overall environmental protection legislation, including licensing procedures, environmental standards and project approvals. The

[4] See Appendix 1 for list of laws

mandate of the CEA is three-fold: Environment protection; Environment assessment and approval of projects; and Environment quality.

The CEA's environment protection mandate involves dealing with the regulation of the discharge, deposit, or emissions of waste from certain prescribed activities. It implements its environment impact assessment by undertaking assessments of a development or an industrial project's real and potential impact on the environment prior to its commencement. This enables impacts to be identified and mitigatory measures to be incorporated into the planning process before the project commences and thus reduce the harm caused to the environment.

The provisions of the NEA that deal with the quality of the environment are contained in Part IV(B) of the Act, which regulate "environment quality" and prohibits any person from carrying out pollution of inland waters, the atmosphere, soil or the surface of any land, making or emitting excessive noise and the disposal of litter. These sets of prohibited acts, however, relate to the discharge or emissions of waste into inland waters by a project or a manufacturing facility that comes under the Act where environment protection license is required and are covered by Section 23G. If an agro-chemical manufacturing factory is discharging water or any materials that contains harmful chemicals, then that could be an offence under this section. But Section 23(H), which is a general section, stipulates that, "No person shall pollute any inland waters of Sri Lanka or cause or permit to cause pollution in the inland waters of Sri Lanka so that the physical, chemical or biological condition of the waters is so changed as to make or reasonably expected to make those waters or any part of those waters unclean, noxious, poisonous, impure,

detrimental to the health, welfare, safety or property of human beings, poisonous or harmful to animals, birds, wildlife, fish, plants or other forms of life or detrimental to any beneficial use made of those waters". However the NEA's scope is specifically related to development or industrial project related environment impacts.

2.2.1.2 The Control of Pesticides Act No 33 of 1980

The Control of Pesticides Act directly relates to the control of pesticides. It provides for the licensing and regulation of the import, packing, labeling, storage, formulation, transportation, sale, and use of pesticides in Sri Lanka. The Registrar of Pesticides (ROP) administers this Act with help of a technical Committee constituted under the Act. The Act makes it an offence to import, manufacture, formulate, package or distribute in Sri Lanka any pesticide that is not registered and for which a license has not been obtained from the Registrar. Section 26 (1) of the Act grants the Minister of Agriculture wide powers to make regulations for the control of pesticides. The Registrar laid down strict regulatory procedures for approving a pesticide.

Pesticides are not manufactured in Sri Lanka. Before the Control of Pesticides Act of 1980, pesticides were freely imported since 1962. In 1963, the Controller of Imports and Exports imposed a ceiling to limit imports. In 1972, the Department of Agriculture consulted FAO to build a national regulatory infrastructure for pesticides. In 1980, the Control of Pesticides Acts was enacted and it was further amended in 1994 to address gaps and meet the need of the day.

(The current regulatory procedure is described in the findings chapter).

2.2.1.3 The Regulation of Fertilizer Act No 68 of 1988

This Act concerns the importation, manufacture, formulation and distribution of fertilizer in Sri Lanka. The importation, manufacture or formulation of fertilizer requires a license issued by the National Fertilizer Secretariat (NSF) (sect. 2). A Fertilizer Advisory Committee is established to advise the Director (sect. 3). The Director shall have the power to inspect any place where fertilizers may be manufactured, formulated, stored or distributed and seize any adulterated fertilizer found to be in contravention of this Act (sect. 12). There are provisions relating to packaging and labeling (sect. 13) and penalties for offences committed under this Act (sect. 22). There is a Schedule listing the terms and conditions of license for the importation and manufacture of fertilizers. No fertilizer can be imported, manufactured, and distributed without the approval of the NSF.

(The current regulatory procedure is described in the findings chapter)

2.2.1.4 Import, distribution and application of agro-chemicals

In Sri Lanka, a handful of local firms such as Hayleys, Harrisons Chemical, Lankem, and CIC Crop Guard and their subsidiaries sell base chemicals and patented products of transnational

corporations, such as Syngenta, Monsanto, DuPont, Bayer, Ciba-Geigy[5], Shell Company, and F.M.C. Corporation (de Alwis, 1989). A study by The Food and Agriculture Organization (FAO) in 2005 reported that more than 1,000 brand pesticide products are registered, marketed, and/or handled by private sector organizations in Sri Lanka (Sumith, 2005).

The spread of pesticides throughout Sri Lanka is the result of extremely effective marketing and distribution strategies involving hundreds, if not thousands, of regional dealers and sub-dealers. Agrochemical firms have large advertising budgets, and they use attractive posters, radio, and television advertisements and films to extol the benefits of agro-chemicals as the modern and practical way to high yields and farmer prosperity (de Alwis, 1989). Long-term relationships between the agrochemical firms and agricultural officials (from the government's Department of Agriculture) working at the field level help give legitimacy to pesticide use. Cultivation of close relationships with farm leaders and local pesticide dealers through economic incentives has also proved to be a successful strategy for agrochemical firms (de Alwis, 1989).

Due to "commercial pressure and competition" between the agrochemical companies, credit facilities for purchase of pesticides are widely available to Sri Lankan farmers (Taylor,

[5] When this article was written in 1989 this company was called Ciba- Geigy. Now the company operates under the name Novartis.

1999). Since the 1980s, synthetic pesticides have been "freely available over the counter with no controls or restrictions on sales" and in rural areas often sold "through general stores alongside food stuffs and household goods." The sales-driven promotional strategies of agrochemical firms seem to pay little attention to farmer education of the toxicity and proper use of pesticides (Taylor, 1999).

Sri Lanka's powerful agrochemical industry disputes the notion that its products are to be blamed for CKDu. The Secretary of Sri Lanka's National Agribusiness Council claims that pesticides produced by many multinational and international companies follow all the WHO and FAO guide- lines and "those are not in harmful levels" (Chavkin, 2012a). After tests revealed contamination with small amounts of arsenic, Sri Lanka's Registrar of Pesticides briefly banned several common pesticides containing the substances glyphosate and carbofuran in June 2011. However, a few months later, the ban was lifted on grounds that "the arsenic levels were too low to pose a serious threat" (Chavkin, 2012b).

Chavkin, an investigative reporter of the international NGO, Public Integrity, points out that the ban was overturned even when WHO's internal progress reports on CKDu in the NCP in June 2011 called for stronger regulation of nephrotoxic agro-chemicals, warning that any delay would cause "further accumulation of toxic agents in the environment resulting in cumulative damage to the health of the people living in these areas" (Chavkin, 2012b). In addition, Dr. Shanthi Mendis, Senior Advisor and Coordinator of the WHO Chronic Disease Management, concluded that, "contamination of the soil appears to be mainly from fertilizer and also from

agro-chemicals" (Mendis, 2012). She recommended that the government strengthen the regulatory framework to improve the quality control of imported agro-chemicals, particularly regarding nephrotoxic agents such as cadmium and arsenic; it could achieve this through amendments to existing legislation, and strengthening the capacity for implementation, and monitoring (Mendis, 2012).

In 2015, glyphosate was banned again in Sri Lanka (Wijedasa, 2015). The argument by agro-chemical companies that glyphosate was not harmful was extensively probed into when the state of California proceeded to label it as carcinogenic in 2016 (Myers et al. 2016). The International Agency for Research on Cancer (IARC), and agency of the WHO, convened a meeting to evaluate the potential carcinogenic risks to humans from several pesticides, including glyphosate, an active ingredient in many popular herbicides, including Roundup brand herbicides (WHO, 2016). The IARC working group consisted of 17 renowned scientists from 11 different countries. They carried out a year-long investigation into possible links between glyphosate and cancer. After studying several major studies done on humans and animals about the link between cancer and glyphosate, the IARC working group concluded that the chemical is "probably carcinogenic to humans" and there was strong evidence of an association between glyphosate exposure and non-Hodgkin's lymphoma, a type of cancer (WHO, 2016). However, Monsanto strongly opposed the IARC report and argued that glyphosate has a long history of safe use, and when used according to the label directions, it does not present an unreasonable risk of adverse effects to humans, wildlife or environment. Further, when the state of California, proceeded to

list glyphosate, the active ingredient in Roundup, as a "chemical known to cause cancer". Monsanto sued the state of California (Monsanto Company v Office of the Health Hazard Assessment, et al. 2016). However the judge ruled against Monsanto and allowed the state of California to require Monsanto to label Roundup (glyphosate) as a possible carcinogen. Myers et al (2016) in a recent study after studying the current published literature describing glyphosate uses, mechanisms of action, toxicity in laboratory animals, and epidemiological studies, concludes among other findings that worldwide, glyphosate often contaminates drinking water sources, precipitation, and air, especially in agricultural regions. They further state that regulatory risk assessments are out-of-date and insufficient to judge the impacts of contemporary glyphosate use and effects. Therefore, the claim of agro-chemical companies that the Sri Lanka government banned glyphosate on non-scientific evidence cannot be accepted in light of the above facts.

Jayasumana, a medical doctor who is engaged in CKDu research once requested the Government Medical Association of Sri Lanka to institute action against agro-chemical companies, seeking compensation for CKDu patients in Sri Lanka (Wijewardene, 2014). Furthermore, the Permanent People's Tribunal (PPT), an international court of opinion, which investigates human rights violations, after three days' deliberations in India in 2011, cited human rights violations by the world's six largest agro-chemical industries: Monsanto, Syngenta, Bayer, Dow Chemical, DuPont and BASF. The PPT's verdicts, however, are not legally binding, as it is a civil society activist initiative and not a court of law constituted with coercive power by an

international organization such as the United Nations, albeit they can create precedent for guiding future legal action and pressure governments and institutions to take appropriate action (Meris, 2011). However, there is no case instituted in a court of law in Sri Lanka against the agro-chemical companies.

A senior environmental lawyer (personal communication, June, 2016) stated that, to successfully litigate cases against agro-chemical companies in Sri Lanka, complainants "need to prove that there is a nexus between the harm (CKDu) and agro-chemicals." If scientific evidence can be found, it is possible to sue the agro-chemical companies. It could be a criminal or civil case. If a farmer gives evidence that he used a specific chemical sold by a company and that chemical has caused an illness to him or any fauna or flora, then there is a chance of litigation. It is not easy, however, to prove that agro-chemicals are responsible for CKDu because no hard evidence is available to demonstrate a link between the CKDu disease and a specific agro-chemical sold by a specific agro-chemical company in Sri Lanka. The situation is compounded by farmers' abuse and over use of agro-chemicals. This provides agro-chemicals companies with a good defense if sued. Scientific evidence and expertise is therefore required if a case is to be made against agro-chemical companies for the CKDu disease. The court procedures in Sri Lanka are cumbersome, time consuming, and expensive. In this context, poor farmers cannot afford to mount a legal action against rich agro-chemical companies. These circumstances have prevented farmers from taking legal action against agro-chemical companies. But if the farmers lack the capacity to take legal action against agro-chemical companies in Sri Lanka, any other person or

civil society organization such as an NGO can sue agro-chemical companies on behalf of the farmers, who do not have the means and knowledge to do so. The lawyer also stated that, the person or NGO suing on behalf of the poor farmers must have a good case supported with cogent evidence.

This section could be concluded by stating that despite a number of laws, Sri Lanka's legal framework and ground realities have failed to a great extent in delivering environmental or ecological justice specifically to poor farming communities, as these farmers bear the brunt of CKDu issue than any other community in the country.

2.2.2 Corporate Social Responsibility

Corporate Social Responsibility (CSR) could provide an alternative route to holding responsible agro-chemical companies for harm that their products cause to both the environment and to enforce their accountability. Without a viable alternative, it may not be possible to compel companies to transform their business models that currently focus on maximizing profits for their shareholder, but ignores the egregious violations of human rights and potentially irreparable damage to the environment and human health.

Carrol (1991) argues that CSR starts with economic responsibilities and continues with legal, ethical, and philanthropic responsibilities according to a pyramidal structure. CSR is generally understood to be the way a company balances the economic, environmental and social aspects of its operation, addressing the expectations of its stakeholders. The concept of CSR has

evolved and expanded to include issues of long-term sustainability of corporations. According to Business for Social Responsibility (2017), an NGO working with 250 countries across the globe in developing sustainability, "CSR is viewed as more than a collection of discrete practices or occasional gestures, or initiatives motivated by marketing, public relations or other business benefits. Rather, it is viewed as a comprehensive set of policies, practices and programs that are integrated throughout business operations, and decision-making processes and are supported and rewarded by top management."

Freeman (1984) argues that corporations have a responsibility in value creation for all other stakeholders such as employees, society, customers and environment. He argues that just as stockholders have the right to demand certain actions by management, so do the other stake holders such as employees, society, customers, and the environment. Freeman attacks managerial capitalism using a legal argument as well as an economic argument. Freeman explains that basic idea of managerial capitalism is that in return for controlling the firm, management vigorously pursues the interest of stockholders and assumes that management can pursue market transactions with suppliers and customers in an uncontrolled manner. In explaining the legal personality of a limited liability firm and its relationship with stockholders, Freeman highlights the fact that directors and other officers of the firm have a fiduciary obligation to stockholders in the sense that the "affairs of the corporation" must be conducted in the interest of the stockholders. He then shows how the law has evolved with many acts in the realm of consumer protection, labor relations, civil rights, environment protection to effectively constrain the pursuit

of stockholders' interest at the expense of other claimants on the firm such as customers, suppliers, local communities and employees. To make an economic argument against managerial capitalism, Freeman posits the problem of the "tragedy of commons" by which he means that no one has an incentive to incur the cost of cleanup or the cost of non-pollution, since the marginal gain of one firm's action is small. Since the industrial revolution, firms have sought to internalize the benefits and externalize the costs of their action. In his stakeholder theory, Freeman explains the interconnection and interdependence of all stakeholders to a firm such as stockholders, management, local communities, suppliers, employees and customers. He demonstrates that the interests of each stakeholder are reciprocal, since each can affect the other in terms of harms and benefits as well as rights and duties. Therefore, he argues that corporations ought to be governed so as to add value to all stakeholders. If laws are not adequate, self-regulation by corporations is advocated in pursuit of the creation of value to all. Since Freeman, there has been a lot of progress in expanding the CSR concept in many different forms.

Porter and Kramer (2011), building on Freeman's ideas, suggest that the companies must take the lead in bringing business and society back together. They propose that a new model of business should emerge, given that the current model lacks an overall framework for guiding these efforts, and most companies remain stuck in a "social responsibility" mind-set in which societal issues are at the periphery, not the core. This model emphasizes "Creating Shared Value" which resets the boundaries of capitalism by better connecting companies' success with societal improvement, opening many ways to new needs, gains in efficiency, creating

differentiation and expanding markets. Commenting on the role of the governments, they say that governments should learn how to regulate in ways that enable shared value creation rather than work against it.

Shrivastava (1995) argues that the corporations should ensure ecological sustainability. However, he acknowledges that corporations are only one of the many wheels of sustainability. Consumers and governments form the other wheels. He stressed that if the goals of sustainability are to be achieved, corporations must be reformed, redesigned and reconstructed to minimize their negative ecological impacts, and organizational and management theories have paid little attention to how this can be done. Among the many barriers to creating sustainable corporations, existing economic systems make many polluting and wasteful goods seem alluringly inexpensive because they do not incorporate the full ecological costs of their production or use. These costs are passed on to future generations, transferred to non-users of products, as taxes or exported to less environmentally regulated countries. Vested interests, financial realities and organizational inertia prevent the radical restructuring of corporations toward sustainability. He recommends that corporate activities must be linked to the fundamental problems of sustainability i.e. the ecological impacts of population, food security, ecosystem preservation, energy use and technological change. And crucially, environmental sustainability must be integrated into the logic of a corporation's effectiveness.

Graham & Woods (2006) suggest that self-regulation by corporations on social and environmental impacts, has been a solution to the lack of regulatory capacity faced by

developing states. They posit that market pressures can provide incentives for firms to implement codes and standards and rely on widely available information about corporate behavior. However, they argue that government action in the North and South remains vital to effective regulation, by setting social goals and upholding the freedom of civil society actors to organize and mobilize. They also suggest that CSR can be a way of matching corporate operations with societal values. As such, ethical behavior is a prerequisite for strategic CSR. Currently laws, regulatory enforcements, global standards, codes of conduct for multinationals and voluntary reporting are being used extensively to encourage and enforce corporate economic, social and environmental responsibility.

FAO and UNIDO make the case for cooperation among companies, governments, and other stakeholders (Da Silva et al., 2009). The Global Reporting Initiative of the UN is being used as a tool for ensuring corporate responsibility. More than 8000 companies all over the world have signed to the UN initiative, Global Compact, where corporations commit on a voluntary basis to protect human rights, the environment, anti-corruption, and labor rights. With a view to supporting the transparency of corporations in their initiatives in balancing the triple bottom line and to communicate clearly and openly about sustainability, the Global Reporting Initiatives has proposed a globally shared framework of concepts in consistent language and metrics. It serves as a generally accepted framework for reporting on an organization's economic, environmental, and social performance. External benefits of sustainable reporting include mitigating or reversing negative environmental, social governance impacts. It also enables external stakeholders to

understand the organization's true value and tangible and intangible assets. (Global Compact, 2016).

However, it is pertinent to probe into the behavioral aspects of companies rather than what is reported in sustainability reports. Waldman et al. (2006) in their studies on the cultural and leadership variables associated with corporate social responsibility values that managers apply to their decision making, reported that CSR appeared to be multidimensional comprising shareholders/owners, stakeholders and the community/state welfare. The emphasis placed on these components varies with national culture level and firm level leadership. Therefore, the implementation of CSR depends heavily on the attitudes of the leadership of corporations. Groves & LaRocca (2011) further emphasize the importance of leadership attitude in implementing the stakeholder views on CSR and suggest that followers of such leaders are more likely to believe that socially responsible actions and engagement of multiple stakeholder groups are critical to effectiveness of business organizations. They suggest that transformation of leadership is needed to look beyond self-interests for the betterment of the organization and community.

2.3 Social Capital (Social Support) and Combating the CKDu Disease

Putnam (2000) defines social capital as connections among individuals, social networks and the norms of reciprocity and trustworthiness that arise from them. Cohen et al. (2007) refers to social capital as the intricate network in which a person may give and receive information and

aid and have emotional needs met. This network includes inter- personal relationships with spouses, family, friends, or other people, as well as participation in religious, occupational, social, and community organizations. They also describe that social capital has been classified into three major types. First, “Cognitive support”, which refers to the support that additional information or knowledge provides to an individual. Second, “Emotional support” refers to an individual conveying his or her concerns and feelings for another person, which can lead to increased perception of social support. Third, “Materials support”, which refers to the provision of particular “goods and services,” and leads to increased social support. Ferlander (2007) suggests that social capital could be of formal or informal connections. The former are exemplified by contacts within voluntary associations, but also between citizens and civil servants; the latter take the form of contacts among friends, family, neighbors and colleagues.

Pretty and Ward (2001) in their studies on social capital and the environment state that as long as people have managed natural resources, they have engaged in collective action. Farming households have collaborated on water management, labor sharing and marketing; pastoralists have co- managed grasslands; fishing families and their communities have jointly managed aquatic resources. Such collaboration has been institutionalized in many forms of local association, through clan or kin groups, traditional leadership, water users' groups, grazing societies, women's self-help groups, youth clubs, farmer experimentation groups, church groups, and labor-exchange societies. However, it has been rare for the importance of such local groups and institutions to be recognized in recent agricultural and rural development. In both developing

and industrialized country contexts, policy and practice has tended to be preoccupied with changing the behavior of individuals rather than of groups or communities. As a result, agriculture has had an increasingly destructive effect on the environment.

Cohen et al. (2007) in their investigations on the impact of social support in Chronic Kidney Disease reported that increased social support has the potential to positively affect outcomes through a number of mechanisms, including decreased levels of depressive affect, increased patient perception of quality of life, increased access to health care, increased patient compliance and survival.

The European Network on Patient Empowerment in a paper presented at a conference in 2012 (Enope Conference, 2012), suggests that the empowerment of citizens and patients is a task that involves and encourages interaction of communities, health care professionals, policy makers and all other civil society actors and players with respect to the health and well-being of individuals. It highlights the importance of providing patients with the opportunities and environment to develop the skills, confidence and knowledge to move from being a passive recipient of care to an active partner in health and care. It further emphasizes that strengthening health literacy, protecting and promoting patients' rights, and ensuring the participation of patients and citizens in decision making process and providing self-management support are important to establish such a situation. The paper also describes the trends in changing the current system from "clinician at the center of the process", i.e., where the patient is expected to comply with the instructions given by health professionals, to a "process of co-production", i.e.,

professionals and patients working jointly together, thereby focusing on solving health problems with the inclusion of wider support networks such as family and support groups. As such, it also advocates provision of support to families and other informal caregivers. It emphasizes the need for the joint action of stakeholders from the public sector, civil society organizations, professional groups, and academia to support advocacy, resource generation, exchange of experiences, encourage participation, building of capacity in communities, to develop positive outcomes. The World Health Report (2006) also highlights the importance of governments, the private sector and civil society working together in finding integrated solutions to health issues.

Liyanage & Jayatileke (2009) have stressed the usefulness of mobilizing social capital in discourse, lay perception, and behavior and coping mechanisms in the Chronic Kidney Disease Unidentified (CKDu) -- this was in an empirical study undertaken in the Padaviya and Madawachchiya DS Divisions in Anuradhapura District in the North Central Province. The study concluded that the family is crucial as the main care provider for CKDu patients and such families need to be assisted by the state and by civil society organizations. There was no indication that the issue of CKDu is being addressed at a community level; instead the focus is on individual coping strengths. The villagers have a keen interest in knowing the causes of the disease and are willing to take any necessary steps for prevention. The study recommended the strengthening of multidisciplinary teamwork to discover the disease's etiology; the adoption of strategies to reduce the gap between the user and the provider perspectives; strengthening family

and community supportive systems and promoting social interventions at individual, group, community and institutional levels to manage the disaster effectively.

2.4 Conclusion

In keeping with the theoretical framework of "Perspectives Taking Theory", selected important literature that provides insights into key disciplinary areas of the study includes: environment, law and corporate social responsibility and social capital. The literature reviewed demonstrated the important variables relevant to the topic, identified the relationship between theories and practices, and the findings reported by scholars and their views on the CKDu issue, and underscored the significance of the problem. Further, it also identified the gaps or paucity of information relevant to specific areas in the literature.

The environmental literature reviewed shows that environment degradation and negligence and the disruption that has taken place on the cascading tank system, as well as industrial agriculture and misuse of agro-chemicals seem to be major factors in the CKDu issue. There are a number of scholarly articles on agro-chemical use and its affects and they claim that there is a relationship between the use of agro-chemicals and CKDu.

The relationship between the CKDu issue and legal framework in Sri Lanka has received scant attention, if at all in the literature. Three major pieces of environmental legislations are relevant to the CKDu issue, but these laws have not been properly used to regulate agro-chemical and pesticides. Further, no legal action of any sort has been taken against the government for

their inaction in the implementation of the laws or against the agro-chemical companies for creating a toxic environment through agro-chemicals. As such, other than a survey of laws available concerning fundamental actions on development and industrial projects as to their impacts on the environment, no specific literature has been found in case law on CKDu.

The literature cited demonstrates very well that corporations should create value not only for their stockholders but also for all other stakeholders such as employees, customers, society and environment. The concept of CSR has evolved and expanded to include the issue of long-term sustainability of corporations. In the absence of a solid legal framework to deal with the behavior of the agro-chemical companies, CSR is seen as an alternate route. However, CSR is only a voluntary mechanism, and in order to motivate corporations to take up the CSR as a core business value, there are many initiatives such as the Global Compact etc. With all such initiatives, there seems to be a change of direction of corporations at least rhetorically, but substantial behavioral aspects are yet to be seen. Further, no scholarly literature connecting agro-chemical companies and their CSR activities in Sri Lanka was found to be discussed in the literature.

The literature cited on social capital shed a lot of light on an area that Sri Lanka was in the dark about as to the handling of the CKDu issue. There is a well established body of literature that demonstrates the importance of social capital in handling issues like CKDu. All the literature cited demonstrates that social capital has the potential to positively effect outcomes of improving quality of life of CKDu patients. An empirical study undertaken in NCP also

stresses the usefulness of mobilizing social capital in handling the CKDu issue. The World Health Organization also highlights the importance of social capital in handling chronic diseases like CKDu. Therefore, the literature review has laid a foundation of available knowledge to see the issue in three different perspectives, so that the subsequent discussion and the analysis of the findings could be carried out on a solid footing.

CHAPTER 03 - FINDINGS

3.1 Introduction

The main question that this study set out to investigate involves the roles played by different government ministries and agencies, law, local actors, and corporate actors in CKDu crisis in Sri Lanka?

To answer these questions, data was collected through interviews with senior officers of government ministries and agencies: Presidential Task Force for Prevention of Kidney Disease Unidentified (PTF for CKDu), Ministry of Health, Ministry of Agriculture, Registrar of Pesticides, National Secretariat of Fertilizer, Ministry of Water Resources, Toxin Free Nation Program, civil society's leaders in a CKDu prevalent village, environmentalists, and the executives of agro-chemical companies in Sri Lanka. As explained in the methods, the interviews were held in village Padaviya and Colombo. Details of the interviews: the title and background of the interviewee, date and locations of the interviews held are given in the Appendix III. The questionnaires used to interview are attached in the Appendix IV. All findings reported were from the questions asked and the information gathered in the interviews. In order to ensure anonymity, the names of the interviewees are not divulged.

The findings are reported under the four research questions of the study. Different key informants' views are stated on thematic areas of the findings in keeping with the theoretical

framework “Perspectives Taking Theory”, to clearly show the views of different key informants. As such, no discussion is made at this section, but is specifically dealt in the Analysis and Discussion.

3.2 Research Question -1

What action has the government taken to manage the CKDu Disease?

The responses from relevant stakeholders to the actions the government of Sri Lanka has taken in this regard and their effectiveness in addressing the issue are shown below:

3.2.1 Presidential Task Forces for CKDu (PTF for CKDu) and its constitution and operations

The PTF for CKDu was established in 2015 to fulfill an election pledge by the President of Sri Lanka to manage and contain the CKDu issue. The main objective of the PTF is to prevent the occurrence of CKDu, guarantee treatment, and ensure the welfare of the affected through a process of coordination. The author visited the PTF office for CKDu in mid July 2016, and found that it is a small office with a total staff of around 12 members. The PTF for CKDu is directly under the President of Sri Lanka. It is manned by a senior additional secretary, a project director (part-time), and an assistant secretary, two project coordinators, three clerks, two drivers and two minor employees.

The senior environmentalist interviewed commented on the PTF for CKDu as follows:

The PTF for CKDu is a good initiative but it is only a small unit under the presidential secretariat. It does not have the expertise or the enough staff to handle the task of coordinating action to address the CKDu issue effectively. The PTF has not invited the civil society organizations, such as environmentalists, to share their experiences, expertise, and provide suggestions for the master plan that it is preparing to address the CKDu issue.

3.2.2 Screening for early detection of CKDu

According to the PTF for CKDu, the screening of individuals and families for early detection of CKDu was considered to be a major intervention. The Health Ministry has so far screened 663734 patients by 2015 in all CKDu affected areas, and established 15 screening centers in addition to mobile screening in remote villages. Further plans to screen 500,000 people per annum are underway for the next three years to cover the whole population in the affected areas. In addition, the Ministry has planned to increase the number of screening centers by building 15 more screening centers attached to local hospitals in the areas affected. The estimated budget for three years from 2016 to 2018 is Rs.2887 million.

The senior officer interviewed at the Provincial Health Ministry (PHM) also confirmed the above status and that they have undertaken major early detection clinics within the province.

3.2.3 Awareness programs and preventive actions

According the PTF for CKDu, creating awareness about the CKDu amongst the population, including children as young as 10 years old, is another intervention the Ministry believes will foster behavioral change. The plan of the government is to have an integrated communication plan together with all the stakeholders to educate children and adults of the country through different media, projects, and activities. In this regard, the government has launched a campaign from 2016, to run for three years, i.e., up to 2019, to inform the public about the benefits of eating inorganic foods, drinking clean water, adequate physical exercises, and better practices of agriculture to initiate an attitudinal change in the population. They are using television advertising, documentaries, radio and TV chat shows and interviews, newspaper and magazine advertisements, posters, leaflets, street dramas, essay competitions, short films etc. to educate the public and create awareness of the prevalence of CKDu and risk factors. The estimated budget for this campaign is for three years, starting from 2016, Rs. 460 million.

All stakeholders interviewed believed that for achieving a long lasting solution to the problem, awareness about CKDu and its implications is very important. One of the senior environmentalists also stated that educating farmers about CKDu and about the prevention and promoting good practices of agriculture should be part of the solution. However, he said that the government should have a coordinated effort and there should be an expert panel that oversees and continuously monitors and evaluates the interventions. A senior officer

interviewed at the National Fertilizer Secretariat endorsed the importance of awareness programs of the government by noting that the misuse of agro-chemicals must be prevented and this calls for more awareness programs and change of attitude amongst farmers.

3.2.4 Treatments for patients

According to the PTF for CKDu, treatment of patients with CKDu was considered a necessary intervention. The government has launched a program to develop physical and human resources to treat CKDu patients, especially building and improving facilities in existing hospitals, laboratories, building a special hospital for kidney transplantation, and dialysis clinics. In addition to the physical facilities, plans are under way to train specialist doctors, paramedics, and nurses. All these are to be achieved within three years. to suit the need of the CKDu patients. There are also plans to improve the existing Ayurveda facilities and to increase Ayurveda treatment centers in the affected areas. The estimated budget for this intervention for three years starting from 2016 is Rs.7211 million.

The above information provided by the PTF for CKDu is also confirmed by the Officer interviewed at the PHM. However, he further indicated that "We have challenges to implementing this intervention: we do not have enough specialist doctors and paramedics to handle the issue and lack key facilities. In addition to treatment, palliative care, i.e., providing tender loving care, counseling, to reduce pain and aches for terminally ill is needed. The main challenge we face is limited capacity to implement this intervention".

The Leader of a Farmer Association stated, "Although Padaviya base hospital now provides treatment for CKDu patients, unlike in the past where they had to travel 50 km for treatment, the facilities there are inadequate. Many people complain about the length of time they must wait to get medication; there are long queues before one can see a doctor. The dialysis unit has limited capacity and cannot cater for all the patients. Moreover, there are complaints that the waiting area is too small; it cannot accommodate many patients and their relatives who often accompany them to the hospital. Many patients have complained of the marked lack of courtesy from hospital staff. All these shortcomings must be addressed as a matter of urgency if patients are to receive quality care".

3.2.5 Welfare and psychosocial support

According to the PTF for CKDu, the government has launched a program to provide economic and psychosocial support to CKDu patients and their families. Almost all the CKDu patients are in the age range of 40 to 70 years and they are the breadwinners of their families. The government has commenced providing a welfare payment to CKDu patients, self-employment support for families who have lost their breadwinners due to CKDu, scholarships for university entry-level students of CKDu families, housing facilities for CKDu families and psychosocial support for patients. The estimated budget for three years starting from 2016 is Rs. 2433 million for this intervention.

However, the village level leaders indicated that the CKDu patient gets only Rs. 3000 (less than CAD 30) per month and that amount is not enough at all to care for the sick. Furthermore the Buddhist monk stated the importance of government support for religious education as follows: “the government should support religious education in schools because community values that ensured care and protection for everyone in the community, which were inculcated through religious education are being rapidly eroded. While technical education is important, there is need to balance the education provided young people so that they grasp the ethical issues that their culture and customs enjoin every member of the community to observe and act in accordance with them. The importance of this aspect is demonstrated by the cases of patients with CKDu who are being looked after by their children because these children still hold their cultural and religious values which emphasis respect and support for one’s parents. Yet, in many cases, young people are losing sense of this valuable ethos of the community. There is no government support for religious education. The temple has over 300 students in the religious classes but only 6 teachers. Teachers are not paid. They are voluntary. They too come from poor families. This is not sustainable. Authorities do not see the importance of religious and spiritual education. We will see the repercussion in many forms in future”.

3.2.6 Provision of clean water

According to the PTF for CKDu, the government and other stakeholders in combating the CKDu crisis have commenced a major project for supplying clean water to affected areas

because contamination of water in affected districts has been found to be a major causal factor of CKDu. The National Water Supply & Drainage Board (Water Board) has initiated short term, medium term, and long-term actions to supply clean water. In the short term, it will supply clean water through water bowsers, establishing reverse osmosis water plants, and rainwater harvesting tanks. For the medium term, it plans to undertake pipeline extensions from the existing water supply schemes. The long-term strategy is the provision of water supply connections by new water supply schemes. In addition, plans are underway to educate people on both drinking water in adequate quantities and using water sparingly. The estimated budget for water supply for the three years commencing 2016 is Rs.10638 million.

The senior engineer interviewed at the Water Board stated that they have initiated short term, medium term and long-term water supply schemes in the NCP to fight the CKDu problem. However, he said that no specific budgetary allocations are made by the government to implement their plans. He further said, “Water Board has given its estimates for the provision of clean water to all the population in the NCP to the Government, which has included this in its plans. But funds are urgently needed to start implementing the clean water projects”. The Water Board engineer also said that they have issues with Reverse Osmosis (RO) water filtering process, noting that the discharge water of RO plants is just poured on to the ground and it may contaminate the water again. The school principal and the Buddhist monk also highlighted the issue of RO water.

3.2.7 Safe food, nutrition and organic farming

According to the PTF for CKDu, the government initiated a major plan to motivate farmers to grow or engage in non-toxic food production (organic farming) as one means to combat the CKDu crisis. It provided and continues to provide farmers with directions, subsidies, technical support, machinery, and other resources for organic farming. In addition, plans are under way to launch a major drive to change the attitudes of the consumers towards organic food. Moreover, the government has taken (what it calls) bold steps to reduce agro-chemical usage, including the banning of herbicides such as glyphosate and some agro-chemicals that are suspected of creating contamination of water and soil; it has introduced stricter controls on the importation of agro-chemicals. The measures or initiatives already in practice include the establishing of organic fertilizer manufacturing facilities, provision of subsidies to farmers that adopt organic farming, training farmers on organic farming, developing integrated pest management systems, re-introducing environment friendly traditional agricultural practices, training farmers on good agricultural practices, and developing channels of distribution for organic farming products. The estimated budget for this intervention for three years, starting from 2016 is Rs. 618 million.

This move was confirmed by the officer interviewed at the Toxin Free Nation Authority. He said that in the forthcoming cropping season, for example, 8000 farmers would be adopting organic farming. However, he highlighted that there are challenges to their project. He further said, “some scientists, especially industry or multinational connected scientists

suggest that it is impossible to rid the contamination caused by toxic agro-chemicals and move to toxin free farming and food production". He further indicated that the government is unfazed by such claims because whenever it attempts to introduce changes it will meet resistance from key interest groups. Sri Lanka is a country that has had a wealth of knowledge about organic agriculture for more than 1000 years and so transitioning from toxic agricultural practices to organic ones is not impossible. In addition, the government developed many other organic farming methods and environmentally friendly methods of farming along the lines of countries such as India, Japan and Korea, and all these will be put into good use. In addition, he also indicated that changing the attitudes of farmers to take up organic farming and motivate consumers to buy organic products are also seen as major challenges.

The officer interviewed at the National Fertilizer Secretariat expressed apprehension however on the move to adopt organic farming countrywide. According to him, "The effects of inorganic fertilizers are both positive and negative. On the positive side, the use of fertilizers and agro-chemicals spurred economic growth and food self-sufficiency in Sri Lanka. Changing from this mode of farming to organic farming will pose challenges to farmers who are already used to the ease and convenience of inorganic fertilizers and agro-chemicals for increasing yields, although their ancestors used organic farming for generations". He further stated that the shift to organic farming is a good move, but it will not be achieved in the immediate short term. It poses challenges, because organic fertilizer is

bulkier in comparison to inorganic fertilizers and this may necessitate increases in storage facilities and logistics. There are also other issues concerning organic fertilizers: it contains certain hard metals at more than the accepted levels and will require new technologies to improve the quality of organic fertilizers and eliminate hard metals.

Favorable views on the adoption of organic farming were expressed by a senior environmentalist who stated that he believes that environment-friendly organic farming will help get rid of the toxicity in the environment, including soil toxicity. It may take at least 3 to 5 years to get rid of chemical toxicity in the environment. However, he highlighted the importance of government support as follows, "Organic fertilizers, such as compost, are expensive and labor intensive and thus may not be affordable by the poor rural farmer. If farmers shift to organic agriculture, they may initially not get the yields and income they were getting from the inorganic agriculture. There is where government intervention to cover the gap is needed. In addition to subsidizing the farmers, government should encourage the developing and introduction of paddy and seed varieties resistant to diseases and pest".

The Leader of the Farmer Association stated that "If organic farming to succeed, farmers must first be trained about organic agriculture and their attitudes changed. One way to bring about change of attitude is introducing pilot projects on organic farming and practical results from these to be shown and shared amongst all village level farms. If farmers do not see for themselves the benefits of organic farming, they will not embrace it. That is the village level reality". He also stated that there is still the challenge of selling organic produce in Sri Lanka.

Already, there are farmers who are undertaking organic farming in their paddy fields but they must sell their produce or harvest at twice the price of non-organically grown rice if they are to earn the same income they earned when using agro-chemicals. Because organically grown rice in paddies is expensive for the average Sri Lankan, the demand for it is low. That raises the problem of a limited market for farmers, and without a ready market in Sri Lanka for organically grown paddy rice, the prospects of organic farming replacing agro-chemical fueled agriculture are dim. Moreover, while the government has put in place a program to develop organic agriculture in Sri Lanka called the "Toxin Free Food", there are no concrete steps taken on the ground to translate it into reality.

Similarly, a principal of a school interviewed, also observed that the lack of markets for organic farming produce will hinder its adoption as a safe way to achieve the toxin free food drive of the government. He stated that, "We have taken initiatives in introducing indigenous rice that could grow without agro-chemicals. Indigenous rice does, not however, reap a big harvest in comparison with the modern varieties that are grown through use of agro-chemicals". And crucially, the prices of indigenous or organic products are expensive. As such, there is a problem of marketing the product. Moreover, applying organic fertilizer to large areas of land is difficult since there is an acute shortage of manual labor.

The Chief Monk of a Buddhist temple opined that, "Organic agriculture is good but a lot of work is involved and yields are low. Although people believe that organic agriculture is good there is no government initiative to roll it out on a large scale. So far, government has

pilot projects whose goal is to demonstrate that organic farming is feasible and show the results to farmers, who, it is hoped, will take up organic farming. For this project to succeed, however, there is need to plan for markets where farmers can sell their organic produce because organically produced foods cost twice the price of products produced through agro-chemical based agriculture".

However, the three executives interviewed in the agro-chemical companies stated that the organic agriculture project of the government is not viable. In their view, agricultural production cannot be developed in Sri Lanka without agro-chemicals because it is a tropical country with high biodiversity, which means that the environment here is replete with insects, weeds, and fungi that are destructive to crops. They contrasted and compared the situation of Sri Lanka with temperate climate countries such as Canada with limited biodiversity and winter seasons that cover the cropping land fields, thereby inhibiting the growth of weeds. By contrast, however, weeds are present all the year round in Sri Lanka and this makes the use of pesticides and herbicides a necessity to protect crops and guarantee yields. One of the executives specifically stated as follows, "Organic farming can only be done to a limited extent because the costs of organic farming are high, which translates to high food prices most ordinary people in Sri Lanka cannot afford. Only about 5% of the population can afford to buy food produced through organic farming. Organic farming will not produce even half of the harvest from agro-chemical based farming and this means more

people will continue to use agro-chemicals in farming. Moreover, organic agriculture will not provide solutions to the CKDu crisis in Sri Lanka because it also has deleterious substances".

3.2.8 Database, surveys and research

There are plans to establish a database for storing all information about the spread of CKDu, a systematic and formal research process to identify the causal factors and develop treatment procedures and other necessary services. A survey and research project is to be initiated, because to date the causal factors of the CKDu have not been identified and isolated although several researchers have undertaken studies on this aspect. Indeed, there is no consensus among researchers as to causal factors. The establishment of the research process is a collaborative project involving national and international actors that will develop scientifically acceptable methodologies. The estimated budget for this project, starting from 2016 and running for three years, is Rs. 3310 million.

The senior professor of the medical School, who is engaged in CKDu research, also highlighted the importance of having a comprehensive database on CKDu research conducted to facilitate designing future research.

3.2.9 Lack of an integrated approach

One of the senior environmentalists who works closely with government stated that all government institutions run separate programs for addressing the CKDu issue. Coordinating the various CKDu related activities by government institutions is a must if the CKDu

problem is to be comprehensively addressed and eradicated. Although the PTF for CKDu was established recently to do this job, it is not evident that there is proper coordination between all government institutions with mandates to address the CKDu problem in Sri Lanka is taking place. The result is non-standardized or haphazard interventions and repetition or duplication of work still taking place. The marked lack of coordination is possibly why it has taken government such a long time to come up with a robust intervention strategy and program of action. The other senior environmentalist also commented on this issue, as follows, "The government should collaborate with NGOs and civil society organizations in searching for solutions to the CKDu issue. Similar sentiments were made by the Buddhist Monk interviewed -- "The government is talking a lot about interventions to address the CKDu issue but doing little in practice. Moreover, different ministries have their own interventions and there is no coordinated strategy".

The government has not addressed the core issue of CKDu, i.e. environment pollution, degradation and disruption of the cascade tank system.

According to one senior environmentalist with experience in teaching and conducting environmental impact assessments (EIAs), the CKDu crisis is 'only the tip of the iceberg of the environmental problems created by us.' Sri Lankans breath polluted air, eat toxic food, drink contaminated water, and face extreme climatic events. Diseases such as CKDu are symptoms of a bigger underlying environmental problem in Sri Lanka. The clearing of forests, draining of wetlands, failure to restore the cascading tank system that provided water

and innumerable other eco-system services, irresponsible disposal of solid wastes with many non-bio degradable products, reckless exploitation of natural resources, degrading bio-diversity, fossil fuel driven industrial economy, and the inaction of the governments in enforcing a plethora of laws protecting the environment are some of the major factors causing environmental problems in Sri Lanka. Yet, there is more focus on climate and environmental change at the global level and a neglect of local environmental issues whose combined effect is creating havoc in the country. Therefore, it is not only CKDu that is afflicting the people but also dengue fever and an increase in respiratory diseases. The other environmentalist interviewed added his views as follows-- "the CKDu problem in Sri Lanka could not be foreseen earlier because, it takes a long time to see the ill effects of environmental degradation. Often, many actors are unconscious about the importance and the interconnectivity of their activities and the environment. Therefore, many undertake activities that pollute or damage the environment, such as unregulated settlements, clearing forests for cultivation, disruptions to the cascade tank system, agricultural malpractices, especially the use of agro-chemicals and chemical fertilizers, without knowing their repercussions.

Commenting on the government interventions to address the CKDu issue, one of the environmentalists stated that government's actions are inadequate, slow, and haphazard because, the government is addressing the symptoms of the problem. A better approach to the CKDu problem is to address the environmental problems, which are at the core of the crisis. A permanent solution to the problem cannot be found if environmental pollution and

degradation are not addressed as a priority. In other words, if the value of the ecosystem services are neglected. The ancient Sri Lankans knew the value of ecosystems better than anyone in the world did. They even created micro ecosystems through the cascading tank systems in Sri Lanka. They managed it well and obtained the maximum benefit whilst protecting and developing it. In the modern day, however, we have degraded the system and have failed to restore it. There is a lot of damage done to the original ecosystem by unplanned agriculture and adopting industrial, agro-chemical-based agriculture blindly". In addition, he also indicated that no major research is needed to understand the causes of the CKDu crisis in Sri Lanka. There is sufficient information and knowledge about environmental pollution and degradation to allow for a discussion of its ill effects or negative consequences. What is needed is action to protect and improve the environment. Although successive governments promised a lot in addressing the environmental degradation problem, they delivered less. A leadership with foresight and the political will to tackle the environmental problems is needed to safeguard the environment. Climate change is real and Sri Lanka needs to wake up to this reality now and implement all the commitments it made to the COP 21[6] and other international environment conferences and forums.

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[6] COP 21 – The 2015 United Nations Climate Change Conference.

Commenting on the failure of the government of Sri Lanka to restore the cascading tank system, the environmentalists stated that the "Cascade reservoir system was a man-made ecosystem, which gave the villages many benefits: clean water to drink, water for cultivation, many plants for human consumption, medicine, and animal fodder. However, this ancient system that provided and sustained the livelihoods of the people was abandoned for centuries for two main reasons. First, is the invasion of the NCP by the Indians in the 9th and 10th centuries, which forced people to flee and abandon the whole NCP. Second, many droughts and famines took place in the past in the NCP. The tanks were, however, restored after the 1950s and people were resettled with the government support to cultivate paddy and other crops. However, the system was not restored to its original status because the tanks were restored in isolation. As a result, people started growing crops even in the watershed areas and planted crops in high ground areas through water obtained from dug wells. These farming activities disrupted the water table in these areas. Therefore, the tanks systems became water reservoirs only and did not provide the rest of the services, such as water filtration, clean water for drinking, and a variety of plants for medicine and fodder, which the original tank system provided. In the past, the tank system was managed and protected by the communities through their many rituals and mythologies deeply embedded in the culture of the people. Today, this is not the case. While farmer organizations are involved in water distribution and management, water management is dominated by technocratic government officials. He also stated, "Now the farmers have also become negligent and use practices that

bring toxicity to the food chain. Such practices of farmers must be regulated by law, which imposes sanctions on farmers who breach the law, especially those that use agro-chemicals in excess or exceeding the minimum required limit set by the law and cultivating in the reservations around the tank systems that easily contaminates water bodies".

3.2.10 Lack of funds

According to the PTF for CKDu, they propose to spend over Sri Lankan Rupees (SLR) 27 billion within a span of three years for CKDu interventions. However, they have not elaborated from where this money will come. The officer at the Toxin Free Nation indicated that major part of funding could be met through the savings that the government is going to make from reduced importation of agro-chemicals because of the organic farming initiative. However, the agro-chemical company executives stated that there will not be savings on organic farming. Further, the environmentalist interviewed also indicated that finding funds for the project is going to be a major issue.

3.3 Research Question- 2

What is the role of village level actors and processors as to management of CKDu issue?

The CKDu disease is most acutely experienced by Sri Lankans living in the villages where paddy farming is the dominant economic activity. Therefore, all the interventions directed at addressing the issue must tap into the knowledge and social capital of the people at the

village level. The leaders of a farmer organization, a principal of a school and chief monk of a Buddhist temple, a doctor in the base hospital, and a village headman were interviewed. The comments of other interviewees also were taken to answer this question where appropriate. Following were the findings:

3.3.1 Mobilizing village level social capital for CKDu awareness programs

The leader of the Farmers Association stated that the government obtained the assistance of Farmers' Associations in mobilizing villages for awareness programs on the CKDu disease; educating farmers on the use of agro-chemicals and best practices of agriculture and through medical camps for screening of the population for CKDu. The chief Buddhist monk also said that they have already conducted awareness programs for their community attached to the temple with the help of government officers. He said that the support given for temples by the government is, however, very limited; they could do more if adequate support is provided. The school principal also confirmed that they have had awareness programs among school children and parents of the school children through the support of resource persons from the Ministry of Health and the Education Ministry. He noted that there is some change of behavior amongst the community with respect to the drinking of water and the use of agro-chemicals because of the awareness programs conducted. Most of the people now drink RO filtered water. Although, the use of safety gear in spraying agro-chemicals is increased from the past, but there are still farmers who do not adhere to safety procedures in

using agro-chemicals. He, however, pointed out that there is no continuation of the awareness programs and no monitoring of the results of such programs.

3.3.2 Use of traditional methods and village based Ayurveda medicine

The village headman stated that the traditional water filtering methods are not used or promoted at all. People in the villages have used different types of herbs and seed-based formulae to purify water in the past. Such knowledge was not taken into consideration when water purification methods were introduced. The school principal observed that many villagers prefer using traditional healing methods and Ayurveda medicine to modern ones. He further indicated that some go for mythological healing methods as well, when doctors say there is no longer any hope. People have found positive as well as negative results from such treatments. In addition, he noted that the problem is that when western treatments fail, people do not blame the professional modern doctors, but when traditional healing methods fail, they directly blame the traditional doctors. Therefore, Ayurveda and other traditional methods are not given prominence by the government in the medical interventions made. He believes that if proper studies of traditional medicine were made, it would be possible to find treatments that are locally available and effective. The village headman further stated that, "Some patients believe dialysis is the end stage of the sickness. They think that when dialysis is recommended to a patient, he is about to die. There is a social stigma about going into dialysis." He said that even if doctors recommend dialysis as treatment, some patients do not go for it; instead, they opt for Ayurveda or alternative traditional medicine. Some patients

say Ayurveda and alternate medicine is better. However, if they do not get cured or conditions get worse from such medication, they come back to western medicine. Especially if the condition gets worse up to the dialysis stage, patients come to western medication, as there is no alternative in Ayurveda or traditional medicine for dialysis.

The doctor at the base hospital stated that some patients prefer traditional medicine and healing methods to modern or western medicine. Although their quality and effectiveness has not been scientifically established, some patients have experienced positive results after taking traditional medicine and therefore it cannot be disregarded totally. The senior professor attached to the Medical College stated that the local communities have different approaches to the CKDu disease. Many patients prefer Ayurveda medicine to western medicine. Therefore, traditional medicine and alternative medicine should be given proper facilities, including funding for research to find local alternative treatments for CKDu patients to western medicine. The senior officer at the Provincial Health Ministry stated that, "Indigenous healers are providing a service whose effectiveness has not yet been scientifically proven." He further observed that spiritual programs are also very important because of their palliative value but their capacity should be improved".

3.3.3 Village level voluntary organizations can play a role in combating CKDu

The village headman stated that village level voluntary organizations are crucial in the fight against the CKDu disease. There is a CKDu Preventive Committee (CPC) at the village

level. It comprises voluntary members from village, a doctor from the hospital, a police officer, the village headman, the school principals, and the chief monks in the village temples and the government agent. The CPC conducts awareness programs to educate the people about CKDu and runs early detection programs with the help of its own and invited experts. Members of the organization have a common objective without any personal agendas and meet bimonthly. Dramas, essay competitions, poems, posters, seminars and discussions are the main media used to creating awareness about the CKDu disease. It, however, lacks capacity to carry out all its planned activities. Organizing regular meetings is not easy; it is difficult to mobilize people because they are pre-occupied with farming and other activities at different times.

The village headman stated that the volunteer groups in the villages should be used but unfortunately, the government is not harnessing this resource. He stated that the villages have fought and won against diseases such as malaria and brain fever and have eradicated them. In addition, the villages volunteered to fight in the civil war and put their lives at stake. The resilience with which they fought the other diseases and the civil war can be translated to fight CKDu; indeed, fighting the CKDu is not as difficult as war. People have the will to fight it but they need proper direction and support from the government. The village headman stressed voluntary organizations could provide financial support to families of CKDu patients by establishing a fund. In addition, they can support preventive, educational, and psychosocial programs. The school principal stated that the government does not have

enough funds to carry out all the initiatives and interventions identified to fight the CKDu disease. In this context, voluntary organizations such as CPC can do a lot. Indeed, there are many people and organizations at national level in the country, willing to help in the fight against CKDu; Sri Lanka is among the top compassionate nations in the world. The government should identify those areas it needs and involve voluntary organizations. Voluntary organizations can provide financial support, psychosocial support, or initiate or support already existing awareness programs, and help identify foster families that can take orphaned children of deceased CKDu patients. In addition, voluntary organizations could provide caregivers to CKDu patients, especially in cases where patients have no one to accompany them to hospital or to attend to them while in hospital. It is therefore necessary that voluntary organizations should be established in villages.

3.3.4 Difficulties in establishing village level voluntary organizations to combat CKDu

There are, however, difficulties in establishing village level voluntary organizations, the village headman noted. There are, "Divisions among villages along political party affiliations, lack of good leaders, and lack of a technical capacity to establish better structured organizations that can last for a long time. In this context, established formal NGOs should play a role in helping to establish properly structured village level voluntary organizations to help fight the CKDu disease."

The introduction of mechanized farming in Sri Lanka, i.e., the use of tractors and combine harvesters, eroded the cooperation that developed and nurtured the relationships among farmers in the past, and has changed the social dynamics of the society. Farmers used to cultivate and harvest crops as a community but with mechanization, the dependence on each other for farming decreased. So, when diseases such as CKDu struck in the villages, the communitarian social networks for support were already weakened and the need to support others for their own survival no longer felt.

3.3.5 Need for village level voluntary organizations to provide psycho- social support for CKDu Patients

The leader of the Farmers' Organization stated that while, "Almost all the farmers with CKDu are hardworking and physically strong people, they deteriorate mentally and physically when diagnosed with the disease." For many it means the end of life and many people in the village do not go for CKDu screening. A village level voluntary organization that could provide psychosocial support to these people would possibly change their attitudes towards the disease and they could come to realize the importance of screening. Furthermore, such an organization should provide alternate employment for CKDu sufferers that do not need hard physical work in the paddy fields. This would boost the confidence of CKDu patients because giving them a chance to continue working will give them a sense or feeling that they are contributing economically and not merely becoming a burden on the family and society.

The chief monk of the Buddhist temple agreed that village level voluntary organizations would provide CKDu patients with much needed psychosocial support. For his part, it would be easy to train monks for such a task because Buddhism is a very realistic religion and Buddhist principles can be used very well to address suffering people. The challenge, though, is scarce resources; they need more monks to train them specifically to handle such situations. So far, there is no government initiative to support the creation of village level voluntary organizations or provide direct support to religious organizations such as his that could provide free psychosocial support to CKDu patients in the villages.

The senior officer at the provincial health ministry stated that volunteers and voluntary organizations "can assume the leadership role, look after the sick, i.e., CKDu patients, and help break the stigma associated with the disease. Some national and international level voluntary organizations may provide financial aid to CKDu patients. The economy of CKDu stricken families is failing and some people have already sold their property. But some of the psychological issues can be improved and the clergy can play a big role in that, especially through religious sermons and rituals. The doctor at the Padaviya hospital stated that the hospital does not have any Palliative care center for CKDu patients. He believes that availability of such a center would help patients cope with the disease well. Pain management and psychosocial support provided by professional caregivers will help a great deal. International NGOs can help in training village level people to provide such a service. Within the villages there are groups that can also provide much needed psychosocial support,

such as Buddhist Monks; they can provide support through religious blessing and counseling. Monks are respected and knowledgeable about life and reality. They are the best psycho-social supporters. Further, the senior doctor at the Medical College believes that voluntary organizations have a greater role to play in providing psychosocial support to CKDu patients. Indeed, families and friends can do a lot; they can provide psycho-social support and financial support. There is need to focus on and use indigenous ways to support CKDu patients instead of simply resorting to forms of official psychosocial support, which is a Western concept, which has specific cultural overtones. Religious people and institutions could provide vital support to CKDu patients, especially on matters such as transport facilities, food supplements, and caring for lonely patients.

3.3.6 Good will and determination amongst the people to combat the CKDu Disease

The leader of the Farmers' Organization stated, "the people have the courage to combat the CKDu problem, people had fought terrorism in Sri Lanka for more than 25 years and eventually won the war. The government gave overwhelming support to fight terrorism and if it provides the people the same support and commitment, we can get rid of this CKDu problem". The village headman also stated that, "the community had fought and won against diseases such as malaria and brain fever and eradicated them. Many members of the community volunteered to fight in the civil war and put their lives at risk. Similarly, people have the will to fight the CKDu disease because it is not a difficult war; what is needed is proper direction and support from the government". The chief monk of the Buddhist temple

endorsed the views of the village headman, and the leader of the Farmer's Association added "that the community has experienced civil war, and defended it against terrorists and overcome terror. The same community power can be deployed to do many things, including fighting the CKDu disease". The monk further said that Buddhist monks have donated their kidneys as an act of "Dhana" (In Buddhism, it is believed donating one's organs is a great meritorious act) to patients who needs kidney transplants and there are many who would do so if there is a proper plan by the government.

3.3.7 Economic impact of CKDu Disease on the communities affected

The leader of the Farmers' Association in Padaviya village stated that the CKDu disease has badly affected the economic status of the villages. Many families with CKDu patients spend a lot of money to maintain the health of patients although they get most of the medication free from the hospital. In addition, some families with CKDu patients have already mortgaged their paddy land or sold some of the agricultural equipment, such as hand tractors to meet the mounting costs of maintaining a CKDu patient. Some families have outstanding debts that they cannot pay in time. Some have given up farming, as paddy farming requires hard work, because CKDu patients can longer manage the rigors of hard manual or mechanical work. There is need for government and other charitable organizations to provide grants or donations to CKDu affected families.

The school principal interviewed stated that the impact of CKDu is also being felt in other sectors such as education. Many affected families are still sending their children to school, albeit with difficulty. Some parents now believe that farming has no future and many want their children to take up other jobs by getting educated. The attitudes of the children have also changed, with many not wishing to follow the footsteps of their parents and become farmers because to them, farmers are generally poor. There is no future for paddy farming; people are shifting from paddy farming to other jobs. Soon, it will be impossible to find people to work in the paddy farms. Indeed, the problem is already here; tractors and combine harvesters, and not manual labor, are now used to prepare the land for cultivation and harvest the crop.

3.4 Research Question -3

What is the role of agro-chemical companies' CSR in managing the CKDu disease?

This research questions focuses on exploring alternative ways of establishing the responsibility and accountability of agro-chemical companies through corporate social responsibility. Two approaches were made to obtain data from agro-chemical companies. Two different ranking sheets were used to determine the importance they place on CSR and on stakeholders in decision making. Then, interviews were held with senior officers to obtain their general views. The ranking sheets were developed after analyzing CSR elements discussed in the existing literature such as Burke, E.M.(2005): Jackson and Nelson (2004): Joseph,E.(2002):Kerr,I.R.(2006) and Prilleltensky,I.(2000). In addition, views of

environmentalist, village level leaders, CKDu researchers were also taken to find out their views about the behavior of agro-chemical companies. The following findings are reported.

3.4.1 Ethical considerations of agro-chemical companies

Agro-chemical Companies consider the ethical aspects of their Corporate Social Responsibility (CSR) to be most important and consider customer (farmers) as most important stakeholder.

The three senior executives of leading agro-chemical companies were asked about what each considers to be the most important elements of their CSR. Their responses were ranked in order of importance, with 1 for the most important and 8 the least important.

The results are shown in table 2 below. Agro-chemical companies consider the ethical dimensions of their CSR as the most important.

Table 3 Ranking of elements considered by agro-chemical companies in their CSR activities

Element of importance	Company 1	Company 2	Company 3
Improved risk management	4	3	4
Response to change	5	5	6
Enhance company image and brand name	7	6	7
Ethical aspects	1	1	1
Adherence to law and regulation	2	2	2
Compliance with Standards like ISO 14000	3	4	3
Cost improvements	8	8	8
Employee motivation	6	5	5

All three senior executives of agro-chemical companies ranked “ethical aspects” as the first important element and the second important element is “adherence to law.” For two

executives, the third important element is “compliance with Standards like ISO 14000. One executive, however, considered “improved risk management” as the third most important thing and compliance with standards taking fourth place. Two executives considered “response to change” as the fifth important element while one indicated that “employee motivation” was the fifth important aspect and “response to change” as sixth important element. Company image and cost improvement were ranked 7th and 8th respectively by the three company executives.

3.4.2 Consideration of farmers by agro-chemical companies

Agro-chemical companies consider their customers (farmers) as the most important stakeholders.

The three executives of agro-chemical companies were asked to rank, in order of importance, the stakeholders they consider most important when making decisions. The ranks from 1 to 9, with 1 for the most important and 9 for the least important.

The results are shown in table 3 below. Agro-chemical companies consider their customers (farmers) the most important stakeholders.

Table 4 Ranking of stakeholders by agro-chemical companies when taking decisions

Important Stakeholder	Company 1	Company 2	Company 3
Suppliers	6	7	7
Pressure groups	9	9	8
Shareholders	3	2	2
Employees	5	5	5
Government	4	4	4
Customers (farmers)	1	1	1
Farmer Association	2	3	3
Environmental groups	7	8	9
Press/media	8	6	6

All three companies' executives indicated that farmers were the most important stakeholder they take into consideration when taking decisions. Two companies indicated

that shareholders were the second most important, while one company considered farmers' associations as the second most important and shareholders as the third most important. All three companies considered government as the fourth most important stakeholder while employees ranked fifth most important for all three companies.

Pressure groups and environmental group groups were ranked least important by all the companies, with two companies ranking pressure groups ninth; one company executive ranked them eighth. All three executives had different rankings on the environmental groups, one ranked them seventh, another eight, and the other ninth. The suppliers also did not rank highly, with two companies ranking them seventh while one ranked them sixth. The press and media were ranked sixth by two companies but one company ranked them eighth.

The executives interviewed stated that the agro-chemicals industry has begun and undertaken much research into developing safer agro-chemicals but the press and media does not give publicity or credit for such efforts. They further indicated that they have become more cautious when introducing new products, marketing, and distributing them following the government's banning of several agro-chemicals linked with the CKDu disease. They claim to strictly adhere to government's rules and regulations aimed at addressing the CKDu disease. In addition, they also claim that their top leaderships (suppliers abroad) have signed into major sustainability initiatives, such as the Global Compact of the United Nations and are taking all the steps to protect the environment, human rights, labor rights, and not engaging in any corrupt practices. As part of the distribution network in the world, their

companies in Sri Lanka also follow the Global Reporting Initiative (GRI) in reporting sustainability. Agro-chemical companies also indicated that their goal is to guarantee prosperity for the farmer, and so they do their best to come up with new products that are safe, environmental friendly, and economically beneficial to the farmers and community at large, despite the popular view at the village level that agro-chemical companies are exploiting the farmers and the communities.

However, community leaders believe that an agro-chemical company's major objective is increasing sales and making profits. Agro-chemical industries care more about profit maximization not health of farmers and communities. According to them, these companies are not interested in developing products that are beneficial to farmers; instead, they have created a system of controlling – the whole chain of supplying seeds, fertilizers, pesticides, fungicides, and herbicides – which allows them to exploit the situation, ignorance, and vulnerability of the farmers and reap maximum results at the expense of farmers and environment.

3.4.3 Support given to combating CKDu by agro-chemical companies

According to the agro-chemical companies, they have supported and contributed to efforts at combating the CKDu disease in Sri Lanka in various forms, including donating water filtering systems to communities and medical equipment to hospitals in CKDu stricken areas. They have restricted the level of support to farmer's communities for fear of being

accused of responding to the harm created by them, i.e., they promote and supply the agro-chemicals that are a possible cause of the CKDu problem. Moreover, higher levels of intervention by the companies to the communities would not be considered as CSR activity. However, the leader of the Farmers Association claimed that agro-chemical companies have not helped them in any substantial manner to face the issues related with CKDu.

3.4.4 Willingness to fund research

One of the executives of an agro-chemical company stated that a company such as Monsanto would even go to the extent of funding independent research to find out the truth about the effect of agro-chemicals on human health, including whether agro-chemicals were the cause of CKDu. If, however, the findings of such a study support the agro-chemical industry viewpoint, critics will not trust the findings regardless of the independence of the company because of possible bias since the study was sponsored by the agro chemical industry. The environmentalists and the senior professor of medicine also did not comment positively in engaging agro-chemical companies for CKDu research. Their view was that research should not involve interested parties.

3.4.5 Provision of training on storage and usage of agro-chemicals

Agro-chemical companies provide training for their dealers and farmers on how to store and use agro-chemicals. The three executives believe that agro-chemical usage or rather agro-chemical over-use and farmers not adhering to the safety guidelines in using agro-

chemicals are partly to blame for the CKDu problem in Sri Lanka. In their words, the problem is not with the agro-chemicals but with how they are used. As such, the agro-chemical companies train their dealers on the proper storage, distribution, and sale of agro-chemicals. They also train them on advising farmers on how to use agro-chemicals safely and efficiently. In addition, in every planting season, their field officers go and meet farmer communities, describe benefits of using their products and the proper way of application, and spraying of agro-chemicals, and have provided safety gear such as face masks free of charge to farmers on many occasions. The environmentalist indicated that agro-chemical companies will train their dealers mainly on marketing their products and they will use dealers to make personal sales, advertising of agro-chemicals is banned in press and electronic media. The Leader of the Farmer Association states that agro-chemical companies will influence agricultural extension officers to advise farmers to use their products through their trained cadres to sell more products.

Further, the senior environmental lawyer stated that agro-chemicals are marketed and promoted in Sri Lanka as a magical panacea to farmers' problems with pests; they are marketed as a solution that performs wonders in farming: easy elimination of pest and reaping a bountiful harvest is the core of the promotion campaigns of agro-chemical companies. Farmers also have taken this idea fully and want agro-chemicals to do everything for them. Agro–chemical companies cannot wash their hands by saying that their products

are safe and problems occurred are due to misuse. They have to be more responsible in marketing their products.

3.4.6 View on media and pressure groups

Agro-chemical companies consider the media and pressure groups to be biased and misrepresent the dangers of agro-chemicals.

Agro-chemical companies' executives interviewed claim that the media is always against them and fails to highlight any positive actions they take to either address the CKDu problem or support farmers to prosper. They claim that the press and media always write negative stories against them based on reported results of research on agro-chemicals without finding out how scientific the study is. Because of this bad publicity, a very negative picture of agro-chemicals has been created in the minds of the public. When the media and pressure groups voice concerns against agro-chemicals, public opinion changes against the agro-chemicals. The agro-chemical industry is not given a proper share in the media or conferences on these issues to explain their views. While agro-chemical companies would like to be part of the stakeholders in finding a solution to CKDu issue, they have been sidelined and their knowledge and expertise in agro-chemicals have not been used. They assert that the issue of agro-chemicals has been politicized, and that partly explain why the government banned the herbicide glyphosate (Roundup) based on a few questionable research studies and not on a proper scientific study. The officer interviewed at the Registrar of Pesticides also subscribed

to the position of the agro-chemical companies. He stated that the media has spread misinformation about the negative aspects of pesticides, including publication in the media of "unscientific findings" or studies based on questionable methodologies. Such misinformation creates the wrong impression in the mind of the public about agro-chemicals. Moreover, the anti-agro-chemical lobby in Sri Lanka is strong and succeeded in convincing government, particularly the President of Sri Lanka, to ban the herbicide glyphosate. Yet, there is no acceptable scientific evidence to prove that glyphosate was responsible for CKDu or creating any other disease.

However, the environmentalist assert that the government did not ban glyphosate on non scientific findings or to the pressure from the anti agro-chemical lobby, but by following a report by the International Agency for Research on Cancer (IARC) an agency of the World Health Organization.

3.5 Research Question -4

What is the legal framework available to regulate environmental implications in relation to the prevention of CKDu?

From the literature review, there are two major pieces of legislation that directly deal with the control of agro-chemicals in Sri Lanka: the Control of Pesticides Act No 33 of 1980 and the Regulation of Fertilizer Act No 68 of 1988. Two senior officers working with the authorities mandated to implement these two Acts, namely the Registrar of Pesticides (ROP)

and the National Secretariat of Fertilizer (NSF) were interviewed to find out how these two pieces of legislation are implemented. In addition, an environmentalist and a senior environmental lawyer were also interviewed. As they commented on both of these regulatory Acts in common, their views are stated after stating the views of the officers of the ROP and NSF. The findings are reported as follows:

3.5.1 Regulatory legal regime of agro-chemicals and fertilizers

There is a comprehensive regulatory legal regime for the importation and use of agro-chemicals, including fertilizers, in Sri Lanka.

3.5.1.1 Regulation of pesticides and herbicides

From the two senior government officials interviewed, Sri Lanka, since 1980, has had a comprehensive regulatory legal regime for the importation and use of agro-chemicals. The senior officer at the office of the Registrar of Pesticides (ROP) stated that under the Control of Pesticides Act of 1980, for example, no one could import any pesticide into Sri Lanka if such a pesticide is not registered in Sri Lanka. The first step in the process for anyone intending to import a pesticide is to obtain a testing approval from the ROP. To get the testing approval, a dossier of documents containing detailed information about the pesticide, together with the registration certificate of the product in the country of origin, must be provided to the ROP. In addition, the prospective importer must provide a toxicology report of the product obtained from an internationally accredited laboratory. The toxicology report should contain the short term and long term effects of toxicity levels of the product to

humans, possible impacts on the food chain, water, soil, and the environment generally. Specifically, it must show how long the chemical will stay in the soil, water, environment, and possible impacts on earthworms and other "friendly" insects. Furthermore, the applicant must make an economic justification as to why the agro-chemical should be used in Sri Lanka.

The ROP ascertains the safety of agro-chemicals by applying standards set by World Health Organization (WHO) and various other international standards institutions. If the ROP is satisfied with the information provided, testing approval will be given. No testing approval is given for a product that has not been registered in any other country. Furthermore, there is a long list of banned pesticides and such pesticides cannot be imported to the country.

The applicant must import a sample identical to the one submitted for testing once the testing approval of the ROP is obtained. A scientist attached to a government agricultural authority will conduct further tests and study the imported sample in a research station. If the imported sample tested and studied in a government research station passes the initial tests, then the scientists will test the products in a pilot project under farmer-managed field level conditions. After testing the product at the field level for two cropping seasons, the scientist will decide whether it could be used in Sri Lanka safely and effectively.

After the government scientist's approval, the applicant must submit a registration data package to the ROP for technical evaluation. The ROP, after evaluation, forwards a

recommendation to the Pesticides Evaluation Technical Advisory Committee (PETAC). The Technical Committee comprises a medical doctor, with a post-graduate degree in toxicology, and directors of different agriculture agricultural authorities such as paddy, tea, rubber and coconut, the Government Analyst, a Senior officer from the Sri Lanka Standards Institute, a Senior officer from Central Environment Authority, and five other persons who are experienced in the use of pesticides, pest control and related scientific disciplines who have no vested interest in agro-chemical companies. Agro-chemicals can be imported only after the approval of PETAC.

In addition to the rigorous process for importing pesticides into Sri Lanka, there are specific rules regarding their labeling and packaging. Every package must provide directions on usage, storage, and toxicity level in the two main local languages, Sinhala and Tamil. The three senior executives of the agro-chemical companies interviewed confirmed that this is the regulatory environment of pesticides in Sri Lanka and the total process takes about three or more years to approve a pesticide to be imported and distributed in Sri Lanka.

Before 1980, i.e., before the enactment of the Pesticides Act, Sri Lanka did not have such a stringent regulatory regime for pesticides. Even some developed countries did not have stringent procedures for pesticide use. However, developed countries later discovered that certain pesticides, such as DDT, had long-term toxicity dangerous to human health and life and adopted legislative measures to safeguard the environment, farmers, and the public. The discovery of the CKDu disease in Sri Lanka compelled government to come up with an

even stricter regulatory regime to ensure that no agro-chemical with harmful substance is imported to the country. The ROP has banned the importation of several pesticides, although some people smuggle in small quantities from India and use them in their farmlands. If the ROP finds smuggled agro-chemicals on the market, the ROP will ban them and prosecute the illegal importer. So far, smuggled pesticides are not available on a large scale on the Sri Lankan market.

In the past, the ROP had issued sales licenses for dealers in pesticides only after a one-day training workshop. Since 2016, however, the ROP has started a six-month comprehensive training program for pesticides dealers. Without having such training and certification, no dealer or his or her employee can sell pesticides in Sri Lanka. With this training, ROP now believes that knowledgeable sales persons and dealers will be developed and those trained will provide farmers with proper advice on the correct amount of pesticides to use and best practices. Further, the ROP has printed leaflets on best practices in using pesticides and encouraging alternative methods of pest control systems.

On whether there is a connection between pesticides and CKDu, the ROP stated that, if there is a connection, it could be because of misuse and bad practices in application of pesticides. He also said that pesticides should be used as the last resort. There are many practices that one can use to prevent pests. He also blamed the agro-chemical companies for their promotion of agro-chemicals and said that changing the attitude of the profit oriented agro-chemical companies is very important.

3.5.1.2 Regulation of Fertilizers

The senior officer for the National Fertilizer Secretariat (NSF) stated that there is a rigorous regime, under the Regulation of Fertilizer Act, No. 68 of 1998, for controlling the importation of fertilizers into Sri Lanka. A company that intends to import fertilizer must submit to the NSF technical reports from the manufacturer and an internationally accredited laboratory about the chemical content of the fertilizer to be imported. The NSF will specifically check whether it is suitable for Sri Lanka's crops and environment. In addition, arsenic, cadmium, lead, and mercury levels are checked to establish whether they are within acceptable limits and if they meet the minimum safety standards of Sri Lanka. Then, the NSF will approve the product for importation. One of the conditions in the license to import fertilizers into Sri Lanka is that, if the imported fertilizer fails to meet the acceptable standards, it must be re-exported to the country from where it was imported. Once the product is imported, NSF will draw a sample and check its quality through an internationally accredited laboratory in Sri Lanka. If the product meets NSF criteria, then NSF will approve it to be imported and to be distributed in the country. The NSF follows the FAO, the WHO and the SLI standards in evaluating the efficacy and safety of fertilizers. The same procedure for controlling the quality of imported fertilizers is used to control the quality of fertilizers produced in Sri Lanka.

Under the current regulatory regime, the NSF will not permit substandard fertilizers or fertilizers with deleterious elements to be imported or manufactured and distributed. Triple

Super Phosphate (TSP), a type of phosphorus fertilizers, for example, is known all over the world to contain trace elements such as arsenic, cadmium and lead. The NSF banned the importation of TSP. The NSF has rigorously implemented the law on the importation, local manufacture, and distribution of fertilizers in Sri Lanka following the discovery of the CKDu disease. Through its work, the NSF has decreased the levels of certain hard metals in the content of fertilizers used in the country when the CKDu problem was discovered.

3.5.2 The loopholes in the regulatory legal regime

The regulatory legal regime for agro-chemicals in Sri Lanka has loopholes.

These views were expressed by the senior environmentalists and the senior lawyer interviewed.

The environmentalists interviewed believe that the legal framework for regulating agro-chemicals in Sri Lanka is not as comprehensive and robust as the ROP and the NSF claim. One environmentalist had issues with the way the ROP implements its mandate. In the first place, while the ROP has power to control and regulate the importation, distribution, and use of the agro-chemicals in the country, in practice, it does not carry out that mandate properly. Secondly, there are loopholes in the system: the ROP can control the importation of pesticides and herbicides but it has no control over locally improvised pesticides made from a combination of the active ingredients of legally imported pesticides. Dealers in agro-chemicals mix ingredients from one pesticide with ingredients from another pesticide and

create very portent products, which is then marketed in Sri Lanka. Sadly, the ROP does not have a mechanism for regularly checking whether the pesticides sold in the market are the ones it has approved or there are dangerous counterfeits. They do not have enough facilities to check samples. There are some products sold in Sri Lanka that are banned in other countries. He further added that some farmers in Sri Lanka have improvised their own formula for weed control even when agro-chemicals containing substances such as glyphosate are banned in the country. Farmers mix monosodium glutamate (a flavor enhancer for processed foods) with other chemicals, such as kerosene to formulate a stronger agro-chemical than glyphosate, which is used all over the country.

A senior environmental lawyer interviewed stated that:

> The substantive environmental law available in Sri Lanka is adequate to deal with the problem of agro-chemicals in Sri Lanka. It is based on three basic principles: no nuisance should be caused so waste should be disposed of in a proper and controlled manner; biological resources ought to be protected and conserved; and living and non-living resources should be utilized and controlled in a sustainable manner. The normative basis for three principles is Article 27 (14) of the Constitution of Sri Lanka, which is the fundamental law of the country.

Specific legislation such as the National Environment Act, Pesticides Control Act, the Fertilizer Control Act, and the Food Act are sufficient to deal with the agro-chemical

contamination of the environment and water resources. There is not any need for new laws. What is needed, however, are more regulations on the use and distribution of agro-chemicals. There is, for example, no regulation on how much agro-chemical residues should be there in food under the Foods Act. Such a regulation, setting the minimum allowable levels of harmful chemical residues in food, would allow the ROP to conduct random checking of food samples on the market to ensure food items found to contain deleterious substances are destroyed and the seller or dealers are penalized. Then farmers will not resort to abuse of agro-chemicals, since traders will not be able to purchase their products because they will be punished for selling contaminated food. Thus, we have enough laws but we need certain specific regulations under these laws and proper institutional mechanism to implement and monitor regulations. Further, there are problems as to proving a case against agro-chemical companies for contamination as hard evidence is needed to establish a connection with CKDu and agro-chemicals. Further, our court procedures are cumbersome and expensive for the poor farmers to sue rich agro-chemical companies.

He also stated that there are two sides to this issue. Farmers are one of the parties responsible. They have to adhere to standards. They cannot abuse or over use agro-chemicals in any circumstance. There should be penalties. If not, our people will not change. They do not take responsibility for their own action and try to put the blame always on others. That is part of our culture. We need to change the attitudes of farmers in addition to changing attitudes of the agro-chemical companies."

3.6 Conclusion

The perspectives of different stakeholders to the CKDu issue were obtained through four research questions. The majority of the findings relate to the government' action or inaction. In keeping with the theoretical framework of "Perspectives Taking Theory", it is important to find out whether the research questions were adequately answered by these findings towards obtaining a holistic view of the issue. The government officers related to different ministries that have a stake in CKDu have provided information about government initiatives in detail. In particular, the CKDu coordinating body of the government, the PTF for CKDu, has provided the actions so far taken by the government and have publicly outlined details of an extensive plan of the government to implement within 3 years in the broad areas of disease prevention and diseases management. The other stakeholders have expressed their views on areas that the government has not performed well and the areas that government has ignored. Further, they have been critical of the actions the government has taken, such as to provide medical facilities, social support, control agro-chemicals, caring for the environment and mobilizing the social capital to handle the CKDu. The agro-chemical companies state that their products are not responsible for the CKDu issue. However, the environmentalists and the village level leaders have been critical of the agro-chemical companies and the government regulatory procedures as to agro-chemicals. Therefore, these findings provide a good foundation for a discussion on different perspectives to find commonalities, to fill gaps

in knowledge and to integrate perspectives when compared and contrasted with the theoretical perspectives stated in the literature review.

CHAPTER 04 - ANALYSIS AND DISCUSSION

4.1 Introduction

This study seeks to interrogate the interventions made mainly by the government of Sri Lanka, and the contributions made by civil society and the agro chemical companies in addressing the problem of the Chronic Kidney Disease of Unknown Etiology (CKDu). This study draws insights from environment, social capital, law, and corporate social responsibility in finding a solution to the problem. The literature relating to these disciplinary areas was reviewed in chapter 2 and the findings were reported in chapter 3. Guided by the theoretical framework, "Perspectives Taking Theory", it is time to reflect on how these findings and literature review has enlarged the understanding of the CKDu issue.

To find out the relationships among results reported, the overall findings reported were tabulated, coded and analyzed. This analysis found that the perspectives given by different key informants could be categorized into two major thematic areas, disease prevention and disease management. The themes were interconnected and cross cutting factors included environment, social capital, legal and regulatory framework, and corporate social responsibility. Therefore, this analysis and discussion will be presented on these two themes in terms of the four research questions of this study.

Each discipline has its own epistemology or way of knowing, that it collects, organizes and forms opinions in a certain way inherent to it. Therefore, there is a tendency in every discipline for omitting some facts, given that specific disciplines are interested in certain kinds of questions and collect data to answer those questions without consciously realizing that they may be excluding other data that would if included modify or even contradict its own findings or opinions. The purpose of adopting "Perspectives Taking Theory" is to view the issue in different lenses, to identify the commonalities and integrate them, find gaps if any, in different disciplinary views and fill those gaps with the views found in other disciplines to expand the existing knowledge. In the evaluation of different views expressed by different disciplinarians, credible criteria such as scientific evidence; theories and scholarly work cited in the literature review, technical feasibility and ground level realities were used to rely on them or exclude them in understanding the issue.

4.2 Theme 1: Disease Prevention

4.2.1 What action has the government taken to manage the CKDu Disease?

The government has taken a number of steps in the prevention and management of the CKDu issue in Sri Lanka. Although some steps fall into both categories of prevention and management, awareness programs about the disease, water supply, and safe food and nutrition are considered specifically as preventive measures in this analysis and are discussed.

The Presidential Task Force (PTF) on the Prevention of the CKDu Disease estimated that it required Rs. 27.62 Billion for all preventive and management measures, for three years, starting in 2016. 42.40% or Rs.11.71 Billion of this amount will be devoted to meeting the costs of activities and programs identified for preventing the CKDu disease.

The Rural Health Information Hub (RHI Hub, 2017) has highlighted the importance of focusing on prevention strategies to reduce the risk of developing chronic diseases and other morbidities. It states that health promotion and disease prevention programs often address social determinants of health, which influence modifiable risk behaviors. The social determinants of health are the economic, social, cultural, and political conditions in which people are born, grow, and live. The RHI Hub further describes typical activities for health promotion and disease prevention programs such as public service announcements, health fairs, mass media campaigns, newsletters, making behavioral changes through increased knowledge.

The PTF indicated that the Government has conducted numerous awareness programs to educate the public about the CKDu disease and how to prevent the risk of developing it. The senior officer at the Provincial Ministry of Health and village level leaders confirmed this. They also confirmed that the awareness programs conducted by the government were successful, largely because people are now aware of the disease, and are taking precautionary actions, such as drinking clean and filtered water and taking precautions in using agro-chemicals. Plantinga et al. (2008) highlight the importance of awareness programs in a study

of CKDu awareness levels in the USA and demonstrate that most of the persons with CKDu, especially those with early stages of the disease, may be unaware of it. They argue that better management of kidney disease can slow the progression of the disease, prevent complications, and reduce cardiovascular related outcomes.

Alibiosu & Oyedle (2005) conclude in their study that that a comprehensive health education campaigns and screening of the general populace is needed for early detection of chronic kidney disease; it will ensure appropriate and timely institution of proven measures to halt or reduce the progression of CKD. Levy et al. (1998) and Kinchen et al. (2002) have reached similar conclusions on the importance of creating awareness about CKDu among the population as a way of preventing it. The National Kidney Disease Education Program (2007) and National Institute of Diabetes, Digestive and Kidney Diseases (2007) articulate the importance of awareness on kidney disease and what actions the government should take to educate the public. Therefore, awareness programs are an important preventive measure that the government should continue to conduct to prevent the spread of the disease.

However, the Buddhist monk in the village, commenting on the nature and content of the awareness programs, claims that the government's awareness programs are short sighted and not integrated. He stated that the government conducts programs on CKDu only and they do not address all other underlying factors. He also stated that families and relatives look after most of the CKDu patients. This caring attitude has been inculcated by the religious education that the temples have imparted, and the cultural and social norms of the village

level society. Despite the positive impact of a religious based social ethos that contributes to ameliorating the condition of CKDu sufferers and their families, the government has not supported temple based or religious education. The School Principal observed that there is no follow up on awareness programs and the effectiveness of the programs is not monitored. The WHO (2005), in its global report on preventing chronic kidney disease describes the importance of having a holistic approach in awareness programs and the importance of follow up and monitoring to get the maximum outcomes from the awareness programs.

Preventive measures must also address the root causes of the CKDu disease. All stakeholders interviewed agree that the use or overuse of the inorganic chemicals, i.e., pesticides and fertilizers, contributes to the development of the CKDu disease. The consensus among the participants interviewed is that water in the area is contaminated with agro-chemicals. The villagers in Padaviya believe that drinking clean water will have a greater role in preventing the disease. Indeed, some studies conducted in CKDu affected areas, such as the NCP, also support the contaminated water thesis as a possible causative factor in the development of the CKDu disease (e.g., Bandara et al. 2008; Nobel et al. 2014; Jayasumana et al. 2013; and Ranasinghe and Fernando, 2016). In response, the government has planned to enhance the existing surface water schemes as well as planned for new ones. Therefore, supplying clean water is one of the most important preventive measures that the government should continue to undertake to prevent the spread of the disease.

Maintaining a clean environment is an important preventive measure. Some participants interviewed for this study, particularly environmentalists, strongly believe that the CKDu disease is primarily an environmental issue; it is only the tip of the iceberg of man-made environmental problems. They claim that many people are now compelled to breath polluted air, eat toxic food, drink contaminated water, and face extreme climatic changes and events because of the pursuit of profit maximization within an unsustainable economic development paradigm. The clearing of forests, draining of wetlands, the production and reckless dumping of solid waste with many non-bio-degradable products, the reckless and greedy exploitation of natural resources at alarming rates, the loss of biodiversity, the over dependence on fossil fuels characterize this neo-liberal capitalist economic model and are the major reasons for many health problems, including the CKDu disease. They reiterated the importance of addressing the root causes of the environmental issues as the best preventive measure and a permanent solution to the CKDu disease in Sri Lanka. The environmentalists believe that it is possible to restore the environment; and draw inspiration from the cascade reservoir system, which was a man-made ecosystem that gave the villages many benefits: clean water to drink, water for cultivation, many plants for human consumption and medicine etc.

Indeed, Dalupotha (2003); Tennakoon (2004); Ausadahami (1999); FAO (2006); and Mahatantila, (2012) all share in the perspectives expressed by the environmentalists on the need to restore the environment as the best preventive measure for tackling the CKDu disease. The government seems to be responding to the challenge. It developed a master plan

for forestry (Forestry Master Plan, 1996) and has taken various measures to protect and conserve forest and related resources. However, the government has not taken any specific action in restoring the cascade tank system in their preventive initiatives for combating the CKDu disease.

Organic farming is another important preventive measure. All stakeholders, except for agro-chemical companies, interviewed believe that agro-chemical based agriculture is one of the major sources of water and soil contamination in Sri Lanka and the CKDu affected areas. In their studies Chandrajith et al. (2010); SLMA (2012); and the WHO (2012) confirm that soil contamination in areas studied is due to agro-chemicals. In this context, environmentalists and other civil society leaders propose that every effort must be made to transition from agro-chemical based (inorganic) farming to organic farming. In response, the government has launched, as an overall preventive measure, a major initiative to reduce agro-chemical toxicity by transforming agriculture to organic agriculture. The government has set up the "Toxin Free Nation" authority to develop and popularize organic agriculture. Through this authority, organic fertilizer manufacturing facilities, subsidies for farmers who adopt organic farming, training farmers on organic farming and good agricultural practices, developing integrated pest management systems, reintroducing environment friendly traditional agricultural practices, and developing channels of distribution for organic farming products have already begun.

Not everyone is going to automatically embrace organic farming at once. Indeed, the Chief Buddhist monk interviewed, observed that most farmers still use inorganic inputs such as fertilizers and pesticides for farming, although some and their families were affected by CKDu. This is because these farmers fear that if they do not apply agro-chemicals, their harvest will be negatively affected; they have not yet seen the yields from organic farming since there are not any pilot organic farming projects in their villages. In addition, there are no special marketing arrangements for them to sell the organic produce in the village and they cannot compete with the cheaper inorganic alternatives on the market. The School Principal also stressed on the need to have a good network of marketing to promote organic farming at the village level.

Organic farming is a direct threat to agro-chemical based farming and it is not surprising that agro-chemical company executives do not see it as feasible preventive measure for addressing the CKDu disease in Sri Lanka. The three agro-chemical company executives interviewed for this study do not believe that agriculture can be developed without using agro-chemicals. They argue that Sri Lanka is a tropical country with high biodiversity and has a very high weed infestation, and therefore, it cannot do without agro-chemicals because it is very difficult to manage weed infestation. And crucially, they argue that organic fertilizers have toxins and are not monitored well, at least as much as the inorganic fertilizers are monitored. While the Toxin Free Nation Authority confirmed that there is some toxicity in organic fertilizers, it clarified that level of toxins contained in organic fertilizers cannot be

compared to the level in inorganic fertilizers. The authority is, however, developing standards to control the toxicity levels in organic fertilizers.

It is not only agro-chemical company executives that have expressed their doubts about the potential of organic farming as a preventive measure for combating the CKDu disease in Sri Lanka. The senior officer at National Fertilizer Secretariat, for example, doubts that organic farming could be a successful preventive measure. He claimed that the shortage of manpower, the attitudes of the farmers, and the lack of viable alternatives to fertilizers and pesticides make it difficult for most farmers to embrace organic farming. This is because farmers were used to the yields and profits they generated using agro-chemicals in their farming practices. Stinner (2007) in an extensive study on agro-chemical based farming shows that the advantages or benefits from this type of farming are only short-term benefits; in the longer term, agro-chemical farming compacts and erodes the soil, reduces overall soil fertility, and makes toxic chemicals enter the food chain with far reaching unknown health consequences.

Despite the concerns by those who do not believe in the potential of organic farming as a preventive measure for the CKDu disease, the emerging scientific evidence suggests that organic farming is a potential solution to the many man-made health hazards such as the CKDu disease. For a start, Danielle et al. (2015) define organic farming as a proactive, ecological management strategy that maintains and enhance soil fertility, prevents soil erosion, promotes and enhances biological diversity, and minimizes risk to human and

animal health and natural resources. This type of farming does not use synthetic pesticides, antibiotics, synthetic fertilizers, genetically modified organisms, and growth hormones.

Kirchman and Bergstrom (2008); Stinner (2007); Paull (2011b and 2011d); Chamling (2010); Smil (2001) and Dharmawardene (2016) all show in their scientific research that the organic farming has both advantages and disadvantages. Some of the main advantages of organic farming include: higher nutritional value, lack of harmful chemicals, longer shelf life, better taste, protection of biodiversity, low inputs and sustainability. The disadvantages of organic farming include: the high costs of organic fertilizers, time consuming pest control systems, longer period for harvest, need for skilled labour, need of larger area of land for cultivation, smaller yields and marketing issues. Kirchman and Bergstrom (2000), after analyzing various scientific studies of both organic and inorganic farming methods, conclude that organic agriculture cannot feed the world, because there is substantial scientific evidence that crop yields are considerably lower in organic systems. The long-term yield reduction could be anything between 40% -50% as against conventional farming methods. Therefore, they posit that significantly more land would be needed to obtain equivalent yields in organic systems.

Dharmawardene (2016) argues that organic fertilizers are not free of toxic materials. Organic fertilizers or "manure", he contends, is made by composting plant matter, animal matter, kitchen and farm waste, river sludge, etc. all of which will contain whatever toxins are found in the soil, in plant, and animal matter. Moreover, even perfectly "virgin"

soils naturally contain small amounts of metal toxins like Arsenic, Cadmium, Mercury and Lead. He argues that the problems of "organic farming" are not well known because organic farming is still marginal. When it becomes capable of feeding even 1/5 of the world population, it will show itself to be another monster; that is when society will have realized that it simply jumped from the frying pan into the fire by embracing organic farming (ibid.).

In the final analysis, a major transformation from agro-chemical based farming to organic farming may not be feasible in Sri Lanka in the light of increasing population and limited land available for cultivation. The government may have to consider a hybrid approach that integrates the positive aspects from both conventional and organic farming.

4.2.2 What is the role of village level actors and processors as to management of CKDu issue?

Any interventions to combat the CKDu disease in Sri Lanka must include the ideas and institutions of the local or village communities. A top-down approach is likely to fail. Indeed, one of the key findings from the fieldwork is that village community leaders believe that village level knowledge and social capital were important to addressing the CKDu disease. While government had mobilized communities in its efforts to create awareness about the disease, it took a top-down approach: programs are designed and delivered by the government without considering the village level knowledge and social capital. This

approach ignores the critical roles that village knowledge and institutions, such as the village level temples, play in not only molding the behaviors of villagers towards embracing and caring for CKDu patients and their families, but also creating an environment where community based palliative care can thrive.

The government has mobilized the existing village level organizations for its CKDu awareness programs but it has not taken any steps to develop the capacity of these organizations or to promote new village level organizations, especially to handle the issue of CKDu. Strengthening the capacity of village level organizations was a major concern for participants interviewed for this study. The principal of the village school, the Ayurvedic doctor, and the village headman believe that village level organizations can play a significant role in both preventive action for and the management of the CKDu disease.

As discussed in the literature review chapter, scholars have interrogated the importance of social capital at various levels, including village level social capital. Cohen et al. (2007); Pretty and Ward (2001); Liyanage and Jayatileke (2009); Ferlander (2007); and Enope Conference (2012) have all articulated the importance of social capital in handling an issue such as the CKDu disease. Cohen et al. (2007) in their study in relation to kidney disease, state that cognitive, emotional, and material support can be provided to patients and communities through social networks such as religious, occupational, social, and community organizations. The authors specifically state that increased social support in chronic kidney disease has the potential to positively affect outcomes through a number of mechanisms, including decreased levels of

depressive effect, increased patient perception of quality of life, increased access to health care, and increased patient compliance. Pretty and Ward (2001) highlight the capacity of collective action of farming communities in handling village level issues through local associations, clan or kin groups, traditional leadership, church help groups etc. Liyanage and Jayatileke (2009) in their study on CKDu issue in Padaviya village, the village selected for this study, stressed the importance of strengthening family and community supportive systems among other interventions to manage the issue effectively. Therefore, village level social capital is considered as an important part in prevention and management of an issue like CKDu.

4.2.3 What is the role of agro-chemical companies' CSR in managing the CKDu disease?

Agro-chemical company executives interviewed for this study argued that there is no scientific evidence to show that the agro-chemicals, especially fertilizers and pesticides, they sell cause the CKDu disease in Sri Lanka. It is difficult to see how such companies can adopt ethical initiatives and practices in the business of manufacturing and selling fertilizers and pesticides in Sri Lanka, let alone adopting measures for preventing the CKDu disease.

While the agro-chemical companies ranked ethical aspects as the most important in the spectrum of CSR activities, the customer was the most important stakeholder when business decisions are being made. The customer in this case is the farmer who buys the agro-chemical companies' products. The community, the environment, and even the CKDu disease are marginal issues. The only community members of interest to them are the

farmers' associations, whom they considered the second most important stakeholder when business decisions are being made. Moreover, although the companies claimed that adherence to the rules and regulations relating to their business ranked second when business decisions are being contemplated, their main concern in doing business is the customer and the customer's welfare. The companies are also concerned about bad publicity, especially by the media and social activist groups, such as environmentalists, who ranked poorly amongst all the executives of the agro-chemical companies interviewed for this study.

Therefore, the CSR activities that agro-chemical companies undertake at the village level, such as establishing water filtering systems, donation of medical equipment to hospitals, training farmers in the proper use of agro-chemicals, training their dealers and distributers on proper storage, distribution, and sale of agro-chemicals, and issuing free safety gear for selected farmer organizations ultimately serve only one purpose: promoting their business interests and warding off negative publicity, especially the type of publicity that suggests a link between the CKDu disease and agro-chemicals.

Indeed, the village level leaders and environmentalists interviewed for this study believe that profit maximization is the primary objective of agro-chemical companies. In their view, agro-chemical companies control the whole supply chain of agricultural inputs such as seeds, fertilizers, fungicides, and herbicides for their own benefit and not the benefit of the farmers. While the other stakeholders believe that there is a relationship between the CKDu disease and contamination of water sources, soil, and food with harmful metals and compounds from

agro-chemicals, agro-chemical companies contest any attempt to show that their products might be the cause of the CKDu disease.

Agro-chemical companies claim that some of their CSR activities at the village level help address the concerns of the community and farmers with respect to the CKDu disease. The village leaders interviewed for this study, however, claimed that they have not received any substantial help from the agro-chemical companies to deal with issues related with CKDu disease. The leader of the Farmer Association, for example, stated that agro-chemical companies stood by and did nothing when ill-informed farmers were using agro-chemicals excessively. The excessive use of agro-chemicals is good business for the agro-chemicals and they looked the other way until the negative aspects began to be reported by the media and environmentalist. One of the environmentalist claimed that agro-chemical companies marketed agro-chemicals irresponsibly, especially before the ban on print and electronic media advertising of agro-chemicals in 2013. This raises a fundamental question about the claim by agro-chemical companies of adhering to ethical standards in conducting business. In addition, the senior professor at the Medical College of Colombo also stated that agro-chemical companies adopted irresponsible modes of promoting their products to farmers.

However, agro-chemical companies contest any attempt to suggest that their products cause the CKDu disease. But village leaders and environmentalists believe there is a connection between the CKDu disease and contamination of water, soil, and food by agro-chemicals. To reconcile these two competing positions, this study draws insights from

scholarly works. Some recent studies, however, demonstrate that there is a connection between water and soil contamination and the CKDu disease (e.g., Chandrajith et al. 2010; Jayasumana et al. 2011; Lunyera et al. 2015; Mahatantila, 2012; Bandarage, 2014; Ranasinghe and Fernando, 2016; Wasana et al. 2012; and Dharmawardene et al. 2013). While these studies do not single out which agro-chemical or agro-chemicals cause the CKDu disease and in what ways, there is, however, some consensus that agro-chemicals have a part to play in the contamination of water and soils and food. Crucially, the agro-chemical companies did not produce any scientific study, whether by them or third parties to support their claim that agro-chemicals are not the cause of or connected in any way with the CKDu disease. Thus, the claims by village level leaders and environmentalists that there is a connection between the CKDu disease and agro-chemicals cannot be summarily dismissed in the light of these studies.

Agro-chemical companies interviewed for this study take a narrow view of CSR in the light of, for instance, Carrol's three broad elements of CSR comprising economic responsibility, legal responsibility, and ethical and philanthropic responsibility (Carrol, 1991). Of the five CSR activities, the companies claim to perform, three, namely donation of medical equipment for hospitals in CKDu affected communities, the issuing of free safety gear for selected farmer groups, and establishing water filtering systems could be said to fall on the philanthropic end of the CSR continuum. The training of farmers in the proper use of agro-chemicals and training of their dealers and distributers on proper storage, distribution

and sale of agro-chemicals could fall under the legal element if the regulatory regime in Sri Lanka makes this a mandatory requirement on agro-chemical companies.

None of the agro-chemical executives interviewed for this study saw CSR as imposing on them a responsibility to create value for all the stakeholders as argued by Freeman (1984). Indeed, from the interviews, they considered the customer, i.e., the farmer who uses their products, as the most important when business decisions are being made. This implies that they do not consider interventions to address the CKDu disease in Sri Lanka a core CSR value. This study argues with Freedman that a core aspect of CSR should require companies (corporations) to create value for all other stakeholders such as employees, customers, society and environment. Agro-chemical companies' main concern is value for the shareholders; they do not consider shared value creation, as advocated by Porter and Kramer (2011), as a core element of CSR. This study argues with Porter and Kramer that agro-chemical companies should consider the creation of "shared value" as a core aspect of CRS. Doing so will transform corporations from being properties of shareholders to vehicles for societal improvement (ibid.).

Agro-chemical companies exhibited a hostile attitude towards environmentalists and other pressure groups, including the press and media. From this, it may be argued that agro-chemical companies do not consider ecological health and sustainability a core CSR value as proposed by Shrivastava (1995). This study argues with Shrivastava (1995) that ecological sustainability must become a core CSR value if the CKDu problem is to be properly

addressed. Shrivastava's submission that corporate activities must be linked to the fundamental problem of sustainability i.e., their ecological impacts on populations, food security, and ecosystem preservation is relevant to the CKDu issue in Sri Lanka.

Therefore, agro-chemical companies are stuck in the narrower understanding of CSR. For companies, and especially agro-chemical companies, to embrace some of the suggested elements of CSR that emphasize a holistic model of business organization that goes beyond the shareholders and integrates all actors in the society, a radical transformation of mindsets is required from top executives down through the corporate entity (e.g., Waldman et al., 2006 and Groves & Larocca, 2011). This transformation in attitude and business model is urgently needed for agro-chemicals companies in Sri Lanka if a lasting solution to the CKDu issue is to be found.

4.2.4 What is the legal framework available to regulate environmental implications in relation to the prevention of CKDu?

While the Constitution of Sri Lanka (1978) contains general provisions on the protection of the environment, the control and regulation of agro-chemicals in Sri Lanka falls directly under two Acts, The Control of Pesticides Act No 33 of 1980 and The Regulation of Fertilizers Act No 68 of 1988. From the interviews with officials of the Registrar of Pesticides (ROP) and the National Secretariat of Fertilizer (NSF), the government has put in place a stringent regulatory regime to ensure that agro-chemicals imported or manufactured

in Sri Lanka and distributed to farmers, e.g., fertilizers and pesticides, do not contain harmful substances. Agro-chemicals are tested for toxicity to humans and other forms of life in collaboration with internationally accredited laboratories and field level studies.

However, beneath this elaborate regulatory regime, two critical questions emerge. In the first place, whether agro-chemicals with deleterious substances were imported or manufactured, and distributed before the CKDu issue came into the limelight? In the second place, whether under this stringent regulatory regime it is still possible that agro-chemicals with deleterious substances have been imported or manufactured and distributed in the country. From the interviews, the senior officials of the ROP, NSF, and Agro-chemical companies conceded that several agro-chemicals have been banned in the past decade or so due to their ill effects. Although the banning of glyphosate generated criticism from agro-chemical companies, the banning of other agro-chemicals such as DDT, Propanil, Carbaryl, Cholopyrifos and Carbofuran etc. did not draw criticism from agro-chemical companies. Therefore, it is safe to conclude that the regulatory regime contains some loopholes that allowed the importation or manufacture and distribution of agro-chemicals with deleterious substances.

It could also be the case that in the past agro-chemicals were not tested for toxicity to humans and other forms of life as they are now. Moreover, laboratories in the past did not possess the kind of technology to test various toxicological aspects. This loophole in the system allowed agro-chemical companies to purposefully deceive authorities; corruption

within the regulatory watchdogs, the ROP and NSF or other officials involved, also allowed agro-chemicals with deleterious substances to be imported or manufactured and distributed in the country. Some studies show that large quantities of agro-chemicals have been imported to the country in the past when regulations were not so stringent (Sim, 1989; Taylor, 1997). Indeed, Sri Lanka, in the 1970s was reported to have the highest rates of pesticide poisoning (e.g., Bull, 1982). In addition, synthetic pesticides have been freely available over the counter with no control or restriction on sales since the 1980s (e.g., Taylor, 1999). Moreover, agro-chemical products were sold though general stores alongside foodstuffs and household goods (ibid.).

To compound the situation, agro-chemical companies had large advertising budgets, they used attractive posters, radio, television, and films to promote benefits of their products as they are selling general consumer products (e.g., de Alwis, 1989). The government has banned the advertising of agro-chemicals in the print and electronic media since 2013. Additionally, government now requires agro-chemical companies to include and make visible the generic name of the product in all other permitted advertisements of agro-chemicals such as in hoardings and leaflets.

The excessive use or application of agro-chemicals and not adhering to best practices in the use of these produces, including wearing of protective gear, are some of the aspects that the regulatory regime failed to capture. All the stakeholders interviewed, including senior officials of the agro-chemical companies, conceded that farmers excessively use agro-

chemicals and do not adhere to best practices in application of agro-chemicals. The village level leaders specifically said that many farmers do not wear safety gear as required when spraying agro-chemicals. The environmental lawyers also highlighted this issue and suggested that farmers indulging in abusive practices should be penalized. The leader of the Farmers' Association and the village headman, however, stated that penal sanction might be difficult to implement at village level because the farmers are well known to the regulators and officers and this might create unnecessary conflict among them.

The distribution of agro-chemicals at the village levels remains problematic. Agro-chemicals are sold through retail outlets that sell an assortment of other merchandise that the farmer needs. Anyone can sell agro-chemicals and all that is needed to sell agro-chemicals is to attend a one-day workshop conducted by the ROP to get license. This licensing system has been severely criticized and the ROP has proposed a six-month training program before it issues a license. The course will cover theory and practical work. Through this program, the ROP hopes to produce dealers that are knowledgeable about agro-chemicals and can advise farmers about proper usage, storage, application, and best practices. While this initiative has received the support of the village level leaders and the environmentalist interviewed, the environmental lawyers were skeptical about its implementation.

Thus, having laws on the statute books is one thing, but implementing them is another. Whether the laws and proposals to introduce an intensive training of dealers of agro-chemicals will succeed depends largely on the extent to which the villagers who will be

affected understand the law and regulations. Bojic et al. (2017) suggest that in a rural setting, legal empowerment, as a process for reform, requires action not only at the levels of policymaking and legal institutional framework, but also at the level of the people. In other words, whatever protective and enabling legal and policy frameworks exist, the effectiveness of legal empowerment will depend on the knowledge and capacities of those responsible for their interpretation and implementation. Therefore, the government must consider the village level realities when contemplating legal reforms or introducing new regulations and the challenges of enforcing or implementing them.

4.3 Theme 2 - Disease Management

4.3.1 What action the government has taken to manage the CKDu Disease?

The government has taken several steps or measures to prevent and manage the CKDu disease in Sri Lanka. Although some steps have both prevention and management features, this section considers: treatment of patients, welfare and psychosocial support, developing a database of information, surveys and research, a coordinated approach and budgets as initiatives relating to management.

The WHO (2005) called on governments to take robust action to manage chronic diseases. The Sri Lankan government responded to this call by allocating an estimated Rs. 27.46 billion for the prevention and management of the CKDu crisis in the country. This amount is to cover interventions for three years, beginning in 2016. Of the Rs. 27.46 billion,

Rs.15.9 billion or 57.59 % is to cover activities or interventions identified as management of CKDu disease in this section.

The government has a very ambitious plan for early detection of potential CKDu patients. It had screened about 25% of the target population by 2015 and the remaining 75% of the target population in the affected areas is to be screened within the next three years. To screen such many people with limited human and other resources demonstrates the government's commitment to combating the CKDu disease in Sri Lanka. Although the village level leaders confirmed and appreciated the efforts that the government is taking to detect CKDu patients, they were unhappy with the speed of screening programs. They also observed one challenge that the government will encounter in its plan to screen everybody in the next three years: some villagers are reluctant to be tested for the CKDu disease.

The PTF for CKDu has a comprehensive draft master plan for developing physical and human resources to treat CKDu patients: increasing hospital and laboratory facilities, special hospitals for kidney transplanting, dialysis clinics, training of specialist doctors, paramedics, and nurses. These activities are to be achieved within three years to meet the urgent needs of CKDu patients. The existing Ayurveda facilities will be improved and Ayurvedic treatment centers will be increased in the affected areas. While the village level leaders acknowledged that the treatment processes have improved, they complained about the poor facilities, patient care, long waiting periods, and time wasted in hospitals by patients and their relatives. Crucially, all village level leaders were gravelly concerned about the government's

reluctance to recognize Ayurvedic medicine even when CKDu patients demand for this form of treatment has increased.

Ayurvedic medicine as an alternative medicine for addressing the ravages of the CKDu disease is being increasingly recognized. The senior professor of Medicine at the Colombo Medical School stated that Ayurveda medicine is an alternative medicine for CKD and it should be given the proper place in the management of CKDu. Numerous peer reviewed journal articles have explored the effectiveness of Ayurvedic medicine for treatment of kidney disease. Patel et al. (2011), in a recent review of a study in India on the use of Ayurvedic medicine, reported that all the patients have shown more than 50% relief in all the signs and symptoms of the CKDu disease.

The PTF for CKDu further stated that they have launched a program to provide welfare and financial support to CKDu patients and their families. Every CKDu patient receives Rs. 3000 (less than CAD 30) per month and university entrance level students of CKDu families receive Rs. 1000 (less than CAD 10) per month. In addition, the government gives preference to family members of deceased CKDu patients, when recruiting for public jobs if such family members have the requisite qualifications for the vacant positions. The village level leaders, however, stated that these financial and social welfare services are inadequate. Moreover, government has no psychosocial support for CKDu patients. Indeed, the senior medical office at the NCP Health Ministry also expressed his concerns about the marked lack of

psychosocial support. All participants interviewed agreed that the village temple could be the center of psychosocial support for CKDu patients and their families in the village.

The significance of psychosocial programs was emphasized by all the participants interviewed in the Padaviya village. They believe that psychosocial support could help address the problem of the stigma associated with the CKDu disease, which has become a hindrance to effective screening for the CKDu disease; many people are reluctant to attend CKDu screening clinics. In addition, patient empowerment programs that can help them manage their own disease could be given through psychological support. Moreover, various other programs, such as financial support, connecting orphans with foster families, and donor and NGO help could be channeled through such a community based psychosocial center.

The importance of psychosocial support to CKDu patients and families is discussed in the literature. Most studies agree that psychosocial support to patients and their families has a positive outcome or impact and could be used as a preventive and management intervention (e.g., Pretty and Ward, 2001; Cohen et al., 2007; Liyanage and Jayatileke, 2009). In addition, the Enope Conference (2012) argues that psychosocial systems can help reduce the burden of the CKDu disease on both patients and communities. The WHO (2006) also endorses psychosocial support for patients as an important measure of managing the disease.

In addition to developing a comprehensive database on the CKDu disease in Sri Lanka, the government has identified the need for systematic research processes that will identify

and isolate the exact cause or causes of the CKDu disease. In this context, the government is encouraging international collaboration on research using scientifically accepted research methods and tools to ensure the credibility of research findings. Indeed, the government has already worked in collaboration with the WHO, when in 2008 they undertook a joint study of the disease. It believes that further research is needed to fill the gaps in knowledge about the CKDu disease.

But some participants interviewed for this study believe that further research is unnecessary. One environmentalist, for example, claims that further research is a waste of time and money because the issue lies with environmental contamination from agro-chemicals. The money intended for research should instead be spent on environmental protection in the affected areas. Not all other participants, however, agree; one other environmentalist, the senior professor at the Medical School, and the executives of the agro-chemical companies reject the idea that researching the causes of the CKDu disease is a waste of time and money. And they are supported by emerging studies. Lunyera et al. (2015) in their meta-analysis of 1651 research papers on CKDu, for example, recommends that further research is needed to establish the exact causal factor or factors of the CKDu disease because this would make the prevention and management of the disease easier.

At face value, the government's plans for preventing and managing the CKDu disease look impressive. The PTF for CKDu has, for example, stated that an estimated budget of Rs. 27.62 billion was to be allocated to fund CKDu initiatives for the period 2016 to 2018. The

problem, however, is that the government's master plan does not articulate how this huge amount of money, considering the strength of the Sri Lankan economy, shall be obtained. One possible source might be the annual national budget. The interview with the PTF for CKDu was conducted in mid-2016 but by then several planned initiatives had not started due to financial constraints. One senior environmentalist doubted how the funding for the master plan would be obtained from the annual national budget when the national government runs a huge deficit. Ehelepola, in a 2015 study sheds more light on the challenges that government will encounter in raising the monies for funding major projects. Ehelepola points out that the government's debt to GDP ratio and the government's debt service ratio are both very high and those must be brought down considerably. In these budgetary constraints, the government may not be able raise the money needed for its planned CKDu interventions. But one official at the Toxin Free Nation (TFN) office while conceding the problem, noted that a good part of the funding could come from the savings that the government will make from the switch to organic farming. This source of funding is, however, tenuous because of the inherent problems associated with organic farming discussed under theme 1 of this chapter. Therefore, the government will face challenges in funding its comprehensive CKDu initiatives unless donor agencies, foreign countries, and NGOs come forward in sharing part of the cost. The government, however, has not indicated that it is seeking support from such sources for CKDu initiatives.

One of the Senior Environmentalists, who had worked closely with the government, stated that PTF for CKDu is only a small unit under the Presidential Secretariat. It does not have the expertise or enough staff to handle the issue well. Although they are going to coordinate and monitor a massive plan as to CKDu, they do not have enough facilities to do so. Further, there is no proper mechanism to monitor the activities of PTF for CKDu. In addition, they would be handling different ministries such as health, environment and water activities of which are technical in nature, and the PTF for CKDu does not have an expert unit or advisory body to advise them as and when it is required. It was also observed during this research that indeed, the PTF for CKDu is a small office, the project director is working on a part time basis as he is heading another government authority on a fulltime basis, two retired former private sector executives are working as the project officers on a contract basis and they are not conversant about the operations of government ministries. None of the members of the staff has qualifications on project management or experience handling a project of this magnitude. There is no proper action plan, performance indicators, monitoring and evaluation built into the project operations. Any textbook on fundamentals of management such as Drucker, (1993) or a textbook on project management such as Craig (2012) describe the importance of basic functions of any project: planning, organizing, staffing, implementing, control and monitoring aspects. However, PTF for CKDu is not formulated on taking those basic functions seriously into consideration.

4.3.2 What is the role of village level actors and processors as to management of CKDu issue?

The village level leaders have formed a CKDu Prevention Committee. In addition to preventive work, such as holding awareness programs, they actively organize and help the government to conduct screening programs for early detection of the CKDu disease, which could be categorized as a part of the disease management process. They inform villages about the dates and places where the screening programs are held, motivate villagers to attend such programs and provide transport facilities on personal basis.

The village level leaders identify the problems in the community and forward their grievances concerning, for example, the limited facilities and poor quality of the health services and water supply to government authorities and receive support from the government. The facilities in hospitals have improved, water filters and RO water plants have been provided and installed at schools and temples for villagers to get clean water. They have identified the need for psychosocial support but believe that this can be provided through a locally set up voluntary organization. However, no initiative been taken by either the village level leaders or the government to set up one.

Traditional and religious values and ethos could be harnessed to manage the CKDu problem in Sri Lanka. Buddhist monks have visited patients and have conducted various religious rituals for patients. In addition, village level leaders have organized and conducted traditional healing ceremonies with village shamans to bestow God's blessings on the sick

for early recovery. Although the government has ignored this form of solution, treating it as merely a mythology, these traditional religious rituals are part of the village culture.

However, it seems this form of alternative medicine and traditional healing is drawing the attention of scholars and researchers. Kirmayer (2013), in his paper titled, 'The Cultural Diversity of Healing: Meaning, Metaphor and Mechanism', discusses studies conducted by Eisenberg et al. (1998); Kleinman and Berkley (1980); Laderman et al. (1996); and McFarland et al. (2002) on alternate medicine and traditional healing and concludes that disentangling the different levels of efficacy in healing practices, may allow researchers to identify specific mechanisms, and evaluate outcomes. Therefore, instead of disregarding traditional healing systems and labeling them "mythological", the government should, recognizing the diversity of healing practices, encourage recognized doctors in practice to inquire about patients' use of alternative sources of help. Ultimately, it may inspire government-recognized doctors to undertake collaborations with other healers or develop their own hybrid approaches to address the CKDu issue, in a pluralistic health care system.

The village level organizations such as the CKDu Prevention Committee in the Padaviya village also face a host of challenges. In the first place, the villagers underutilize the Committee; few members have used it to present their proposals for managing the CKDu issue to the government.

The village headman pointed out that the CKDu Prevention Committee does not have resources to conduct desired activities, including organizing regular meetings. It has been difficult to mobilize farmers for meetings because most are engaged with farming and other activities. Divisions amongst the villagers can undermine their ability to establish village level organizations and work together. The School Principal observed that divisions amongst the villagers exist along political party lines, and it is one of the major factors that hindered villagers from establishing effective village level organizations. The situation is compounded by the marked lack of good leaders at the village level. He further noted that in the past cooperation amongst the villagers was strong when farming depended on traditional labor-intensive methods. But with the introduction and growing popularity of mechanized farming, the need for cultivating and harvesting crops in cooperation has decreased or is dwindling at a faster rate because machinery now handles most activities from cultivation to harvesting and processing.

Some scholars have noted the rapid transformations from traditional farming methods to mechanized farming and its impacts on the poor and weaker in the community. Chamala and Mortis (1990), for example, have noted this change in the villages and suggest that village extension workers must learn the principles of community-organizing and group management skills to help the community, especially the poor or weaker members of the community, to organize itself for development. Currently, however, village level agricultural extension workers have made no attempts at mobilizing the villagers to establish village

organizations to address some of the health problems, such as the CKDu disease. But some participants, for example, the village headman, remain optimistic that it is possible for the villages to pull together and establish community-based organizations. He draws from the experiences of the civil war (1983 – 2009) and the fight against diseases such as malaria and brain fever when villagers mobilized and formed volunteer organizations to combat these common threats to their lives and livelihoods. In the past, the government, however, initiated and supported such moves and it should do the same with the CKDu disease.

4.3.3 What is the role of agro-chemical companies' CSR in managing the CKDu disease?

Agro-chemical companies claim that they have become more cautious in introducing new agro-chemical products and marketing them in Sri Lanka following the wide publicity of the CKDu problem. They admit that pesticides are chemicals meant to destroy pests and should be used cautiously in accordance with the directions for use. Moreover, their industry is a highly regulated business in Sri Lanka, they have adhered to new regulations of advertising, and have completely stopped advertising their products directly or indirectly in the press, radio and television.

As a further demonstration of what they consider to be taking the CSR seriously, they have adopted more responsible methods of marketing their products. Now, through their technical sales persons, they meet the farmers in person, especially at the beginning of each cultivation season, unlike in the past where they used every form of advertisement to

promote and sell their agro-chemicals. These teams are trained in advising farmers about usage of their products. Thus, the farmers can directly get their concerns clarified from the technical teams from the agro-chemical companies, unlike in the past.

In addition, agro-chemical companies stated that providing clear instructions on how to use their products is a priority area of concern for them. Therefore, they strenuously follow government regulations and rules that require them to clearly label agro-chemicals, indicating the level of toxicity, directions for use, and precaution for safety, and how to obtain first aid in case of accidental ingestion in all two local languages. Moreover, they stringently followed the rules on importing agro-chemicals into Sri Lanka and have not concocted other potent mixtures after importing the product, contrary to the claims by the anti-agro-chemical lobby.

Agro-chemical companies complained that their CSR efforts are undermined by negative publicity and misinformation. They have not been successful in countering what they consider to be misinformation about their products by the anti agro-chemical lobby. They claim that the media have been very hostile to them and their views are not presented to the public by the media. The media (according to them) have succeeded in creating a hostile attitude among the public about agro-chemicals, and thus, the government banned glyphosate without a scientific investigation of the product. Agro-chemical companies have stated that they are interested in cooperating with the government in conducting research to establish the

exact causes of the CKDu disease, and to support education and CKDu intervention programs if they are invited to do so.

Agro-chemical companies claim that there is a symbiotic relationship between them and the farmers. The farmers are their customers; they will prosper only if the farmers do well. Therefore, in the long-term, agro-chemical companies will not survive if farmers are adversely affected by their products.

But as the discussion under theme 1 of this chapter demonstrated, not all participants interviewed for this study are convinced of the good intentions of agro-chemical companies. That discussion will not be repeated here but it will suffice to point out that in the context of Sri Lanka, the agro-chemical companies have in fact significantly changed their behavior and attitudes to the CKDu issue in comparison with the past. One possible explanation for this change of behaviour is the stringent regulations in place on importation, manufacturing, and distribution of agro-chemicals in Sri Lanka and the voluntary compliance to standards by agro-chemical companies. Even the anti-agro-chemical lobby concedes that the regulatory regime is stringent enough. In addition, no one has complained that agro-chemical companies in Sri Lanka are currently engaged in corrupt practices. However, this study highlights the argument of Graham and Woods (2006) on the importance of information, transparency, and disclosure – pre-requisites for holding corporations to account for their pledges of self-restraint or voluntary compliance. Moreover, the ill effects of the agro-chemicals are experienced mainly because they were not properly tested for toxicity to humans and other

forms of life, soil, and water in the past. Furthermore, the use and misuse of agro-chemicals were rampant in the past because the agro-chemicals were not yet reined in and failed to guide farmers in the correct use of their products. In addition, proper monitoring of the effects of agro-chemicals after use in the field was not done.

In the final analysis, having the relevant laws in place and a consistent enforcement of the laws, monitoring them and relevant procedures will not only reduce the potential ill effects of agro-chemicals in future but also influence further behavioral change in agro-chemicals and farmers.

4.3.4 What is the Role of legislation and law relating to management of the issue of CKDu

All participants interviewed for this study agree that Sri Lanka has now in place a stringent regulatory environment for the control of pesticides and fertilizers. There is, however, one problem that this stringent regulatory regime is not adequately tackling, namely the alleged reformulation of imported agro-chemicals so as to create stronger variants of agro-chemicals when specific agro-chemicals are banned. This point was particularly raised by the environmentalist and the ROP believes that it could not take place, given that the agro-chemical companies will complain about such actions if any of their competitors resort to such actions, given that the competitive rivalry between agro-chemical companies is very high. Further, agro-chemical companies deny such claims of reformulations in their industry. The ROP, however, believes that farmers may resort to reformulations of agro-chemicals on

their own, but this is the exception and not the trend, because the farmers lack the expertise to carry this out on large scale and as a long-term venture. The media has reported a few incidents of such attempts. The ROP cautioned against relying on the media for cases of alleged 'reverse engineering' of agro-chemicals because the media is biased and slanted towards the anti-agro-chemical lobby. The participants at the village level interviewed for this study did not confirm allegations that reformulated agro-chemicals or farmer mixed agro-chemicals were being sold in the market. In this context, the claims of the environmentalist may be considered anecdotal and call for further research.

Suing agro-chemical companies in Sri Lanka for their role in contributing to the causes of the CKDu disease is difficult despite there being a robust legal framework in Sri Lanka dealing with the importation, manufacturing, and distribution of agro-chemicals. The difficulty, according to one senior environmentalist, lies in obtaining credible scientific evidence that will clearly establish a causal link between a specific agro-chemical and CKDu. If one cannot establish a nexus between the harm and agro-chemicals directly, they do not stand a chance of winning in court. The alternative to directly suing the agro-chemicals for causing CKDu is for government to diligently enforce existing laws and regulations on agro-chemicals. Through rigorous enforcement, agro-chemical companies can be held responsible for breach of such regulations and it will also force them to change their behavior. Graham & Woods (2006) suggest that self-regulation by corporations on social and environmental impacts, has been a solution to the lack of regulatory capacity faced by developing states. As

corporate self-regulation is discussed in CSR sections of this study, this discussion will be focused on existing laws and regulations.

The current legal framework does have some loopholes, especially the absence of subsidiary legislation on limits of residual levels of agro-chemicals in food. The senior environmental lawyer suggested that new regulations under the existing laws are needed to prescribe limits of residue levels of agro-chemicals in food. If this were done, farmers could not resort to over use of agro-chemicals, because they now know that their products will be rejected on the market if inspectors find out that the foods exceed the minimum residue levels considered safe for human consumption. While this is a valid observation that the government needs to consider seriously, it may be impractical to implement minimum residue levels in food and monitor them in Sri Lanka because of a marked lack of testing facilities and a poor administrative setup. Moreover, in cases where wrong methods are used to ascertain residue levels in food and the foods are not approved for sale on the market, farmers would be negatively affected.

In addition, it was suggested by the senior environmental lawyer that farmers should be penalized when they do not follow the regulations, especially over use of chemicals and when minimum residual levels in food are exceeded. But the Farmers' Association leader as well as the village headman, however, believe that to implement such a regulation would not be easy because farmer communities have close links and relations with officers implementing such regulations. In the final analysis, however, some kind of penalization or

reprimand should be enforced on farmers for abuse of agro-chemicals, because almost all participants point out that misuse and abuse of agro-chemicals is rampant.

4.4 Conclusion

This analysis and discussion has shed more light on the complex issue of CKDu in Sri Lanka. It demonstrates that the issue is interconnected with multiple disciplinary areas. The CKDu issue is a public health issue and handling it well is the responsibility of the government. The CKDu issue has been there for more than 20 years and the action taken by the government is slow, inadequate and not coordinated. The government has come out with a comprehensive plan but it is not backed up by funds. Further, the coordinating body, PTF for CKDu, is not formed well and is ill equipped to handle a large-scale project like CKDu. No monitoring mechanism or supervisory body is established to oversee the activities of PTF for CKDu. There is strong evidence that agro-chemicals play a major role in the creation of contamination of water and soil. The environmentalists' claim of negligence in caring for the environment, the non-restoration of the cascading tank system and industrial agriculture is supported by scholarly work and by the literature cited. The importance of mobilizing and strengthening the social capital to handle issues like CKDu is demonstrated by the views of the stakeholders and is supported with the scholarly work reported. The legal system lacks regulations and mechanisms to regulate abuse or punish the polluters. The denial by the agro-chemical companies that their products are not responsible is challenged with scholarly work and reports issued by the World Health Organization on the ill effects of agro-chemicals. The

alternate route of establishing responsibility and accountability by the agro-chemical companies through CSR seems to have not been realized although there are certain positive behavioral changes that have taken place. This enlarged knowledge through different perspectives helps lay the foundation for arriving at conclusions that would help to develop a viable set of recommendations.

CHAPTER 05 - CONCLUSION AND RECOMMENDATIONS

In this concluding chapter, the central purpose of the study, the major findings and contributions of this research will be restated briefly. Then the conclusions based on the findings are made. Finally, a viable set of recommendations to the government of Sri Lanka to handle the CKDu is prescribed, as it is the outcome of this study.

The purpose of this is study is to interrogate the interventions made mainly by the government of Sri Lanka, and the contributions made by the civil society and the agro chemical companies in addressing the problem of the Chronic Kidney Disease of Unknown Etiology (CKDu). The central thesis of this study is that an effective solution to the CKDu problem can only be found through a comprehensively integrated approach, which allows all different government agencies and other actors, and players who have a stake in the issue to work in a coordinated way.

Despite the fact that numerous studies had been conducted on CKDu, most of them were confined to single fields and especially focused on human health issues alone. This is probably the first interdisciplinary research study conducted to address the issue in the related perspectives of environment, legal and corporate social responsibility, the concept of social capital, and perspectives using a multi-stakeholder survey approach. The study focused primarily on four research questions; the consensus of the stakeholders on the effectiveness of the actions taken by the Government to manage the disease, including disease prevention

and management, to what extent the village social capitol was utilized in the above process, the effectiveness of the existing legal instruments in this context, and finally the role of the corporate sector (including the agrochemical companies) in prevention and management of the disease. The gaps in each of the above were identified using a Perspective-Taking theoretical approach using data gathered through key informant interviews supplemented by published scholarly work.

The findings of this study fall in line with the thesis of this study described in the introductory chapter. Among the major findings were that the government has taken a number of intervention to handle the issue, but they are not coordinated and not adequate. The coordinating body, PTF for CKDu, was not formed appropriately and is ill equipped to handle a large-scale project like CKDu. There is strong evidence that agro-chemicals play a major role in the creation of contamination of water and soil, although the agro-chemical companies deny that their products are responsible. The environmentalists' claim of negligence in caring for the environment, including the non-restoration of the cascading tank system, and industrial agriculture are the major reasons for the CKDu issue. The importance of mobilizing and strengthening the social capital to handle issues like CKDu is demonstrated by the views of the stakeholders. The legal system lacks regulations and mechanisms to regulate abuse or punish the polluters. The alternate route of establishing responsibility and accountability by the agro-chemical companies through CSR seems to have not been realized.

5.1 Conclusions

The interdisciplinary theoretical framework, "Perspectives Taking Theory" indicates that what is required is a logical outgrowth of the analysis and discussion section in arriving at conclusions. In this process, the disciplinary insights obtained from environmental, law and corporate responsibility and social capital theories needs to be integrated in forming a better understanding of the issue and finding a new set of potential solutions to the CKDu issue. Guided by the above theoretical framework, the following conclusions and recommendations are made.

No specific factor or factors have been identified as the cause of CKDu, despite numerous studies on its causes. Several factors, however, are associated with it: pollution of drinking water sources with heavy metals, especially cadmium, arsenic and lead that seep from agro-chemicals into water sources and reservoirs; prevalence of hardness and fluoride in the ground water; consumption of alcohol and tobacco; and dehydration caused while working in the farming fields. These factors, apart from alcohol and tobacco, are associated with environmental degradation, which is considered by many to be the root cause of CKDu. The degradation of the environment stems from unplanned agriculture and blind embracing of industrial agriculture, which disrupted the cascade tank system and created an imbalance

in the ecosystem services that had for millennia provided clean water for drinking and agriculture purposes.

The Government's CKDu prevention and management interventions are not well coordinated but in 2015 steps were taken to create a dedicated office, The President's Task Force (PTF) for CKDu, to coordinate all the disparate CKDu programs of the different ministries involved in addressing the issue. According to the PTF for CKDu, a master plan has been drafted, and over Rs. 27 billion is to be spent within three years to contain the issue the CKDu issue. This initiative shows that the government has finally understood the gravity of the issue and an importance of a coordinated plan. The PTF for CKDu, however, is ill equipped, under-staffed, and has no proper mechanism of operation and monitoring and evaluation of its own actions.

Creating awareness and early detection was identified by all stakeholders as the most important part of addressing the CKDu issue. The awareness programs carried out by the Government are commendable but should be improved to be more effective.

Providing safe drinking water is considered by all stakeholders to be the most feasible solution to preventing the onset of CKDu. The government has provided clean water to villages in different ways and has a plan to provide water to all affected areas.

The agro-chemical companies deny that their products cause CKDu. However, when the perspectives of other stakeholders are integrated, the consensus among them is that the

CKDu problem is the result of the abuse of agro-chemicals. The abuse of agro-chemicals is the result of aggressive marketing campaigns by the agro-chemical companies and the fertilizer subsidy granted by the Government up to 2015. A combination of these two factors influenced farmers to use more fertilizer beyond the recommended levels. Government subsidies have been withdrawn and it is anticipated that the excessive use of fertilizers in farming will drastically fall.

Disruption of the cascade tank system, shortsighted improvements of the irrigation systems, forest degradation and negligence in caring for the environment, and blindly embracing the industrial agriculture are seen as the underlining issues to CKDu and many other morbidities.

A transition to organic farming has been identified as a major long-term solution for the CKDu problem in Sri Lanka. However, when this idea is integrated with the views of all stakeholders, consensus amongst the different stakeholders is lacking because organic farming is beset with challenges, such as low harvests, inadequate fertilizers, marketing problems, and the current attitudes of the farmers. Despite these shortcomings, organic farming could help reduce the overuse of and dependence on agro-chemicals that are already destroying the environment. Therefore, a hybrid solution, comprising organic farming and

properly controlled agro-chemical-based farming could reduce the CKDu problem in Sri Lanka.

The legal framework and regulatory regime on environmental protection and control of pesticides in Sri Lanka is robust: there are statutes that control the importation, manufacture, and distribution of agro-chemicals in Sri Lanka but are not properly enforced. It is unlikely, however, that agro-chemical companies can be sued within the existing legal framework primarily because of lack of scientific evidence establishing the nexus between the CKDu problem and agro-chemicals. Therefore, an alternative route or way to establish responsibility and accountability of agro-chemical companies is through voluntary mechanisms, such as the mechanism of Corporate Social Responsibility (CSR). However, the current CSR activities of the agro-chemical companies are directed at promoting their business interests and warding off negative publicity. Therefore, the CSR mechanism should be used effectively in combination with international mechanisms such as the Global Reporting Initiative to establish responsibility and accountability for the actions of agro-chemical companies. Moreover, civil society has to be assertive in forcing agro-chemical companies to change their actual behavior to add value to all stakeholders of the agro-chemical companies, such as customers and environment.

The existing village level social capital, including religious bodies, civil society organizations, and other resources can be mobilized effectively to address the CKDu problem at village level. In the past, this resource has not been fully exploited but can be deployed to

provide psychosocial support programs and undertake awareness and other prevention measures.

Most of the interventions are directed at village level improvements. Therefore, the government has to consider the village level realities, in their interventions and in implementing them.

5.2 Recommendations

A comprehensive set of recommendations was sent to the PTF for CKDu for their feedback. It contained recommendations on the constitution and strengthening of PTF for CKDu, protection of environment, increasing awareness, establishing reliable maps with GPS for CKDu areas, reduction of agro-chemical usage, developing organic farming, establishing the responsibility of the agro-chemical companies, improving the supply of clean water, early detection and treatment of patients, developing hospital and other related facilities, community level participation, social services, political support and finding funds for CKDu initiatives. (See Appendix IV). The PTF for CKDu replied and commented that the overall recommendations are acceptable to them. They proposed no critique or addition. They have specifically stated that most of the recommendations such as awareness, early detection, patient care, and water and infrastructure development are being carried out. They have also commented that they need to start a dialogue with the agro-chemical companies, as they believe transforming conventional agro-chemical based agriculture to 100% organic

agriculture is not possible. Further, they have stated that in the environment protection aspect, agro-chemical regulations etc. are enforced by specific authorities. However, they have indicated that the government has not yet established an apex institution to monitor the activities of PTF for CKDu or to establish an advisory body for the PTF for CKDu.

In this section, the author will not dwell on the areas in which the government has already taken positive steps, but focus recommendations only on the major areas that emerged in the study that the government needs to give priority to, and the areas that are not addressed well by the government. As such, recommendations as to strengthening the PTF for CKDu, environment protection, reducing agro-chemical usage, establishing the responsibility of agro-chemical companies and obtaining community participation will be discussed in this next section.

5.2.1 Establish a National Coordination Committee on CKDu. (NCCC)

One of the main findings of this study was the marked lack of coordination of government interventions to address the CKDu problem in Sri Lanka. Even the PTF for CKDu is beset with several shortcomings. Therefore, an NCCC would be an apex level policymaking and monitoring committee that provides oversight on all interventions for the prevention and management of the CKDu problem.

5.2.1.1 Composition

The NCC should comprise the Office of the President and all the relevant ministries and departments involved in the CKDu problem, as well as village level civilian representatives from affected areas, representatives from NGOs working with the CKDu issue, representation from doctors working in the CKDu affected areas, and representation from the agro-chemical industry. In addition, it should have a subcommittee of experts from medicine, agriculture, environment, toxicology and water to provide expert advice.

5.2.1.2 Meetings

The NCCC should meet periodically and the President should chair all its meetings. Where other national duties require, the President may delegate line Ministers to chair the meetings.

5.2.1.3 Decisions

Before any decisions pertaining to an intervention, whether for preventing or managing the CKDu problem is made, the NCCC should widely consult all stakeholders, including village level stakeholders. The NCCC should establish a mechanism that allows easy access to village level stakeholders and civil society organizations to provide suggestions and feedback related to the CKDu problem. Indeed, other bodies, such as the PTF for CKDu and line ministries should also have similar mechanisms.

5.2.1.4 Progress Reports

The PTF for CKDu, which currently holds the coordination portfolio should provide the NCCC with progress reports on the various works and interventions to prevent and manage the CKDu problem.

5.2.1.5 Formal Structure

The NCC and PTF for CKDu should have clear management structure that connects with other players and actors in a format as follows:

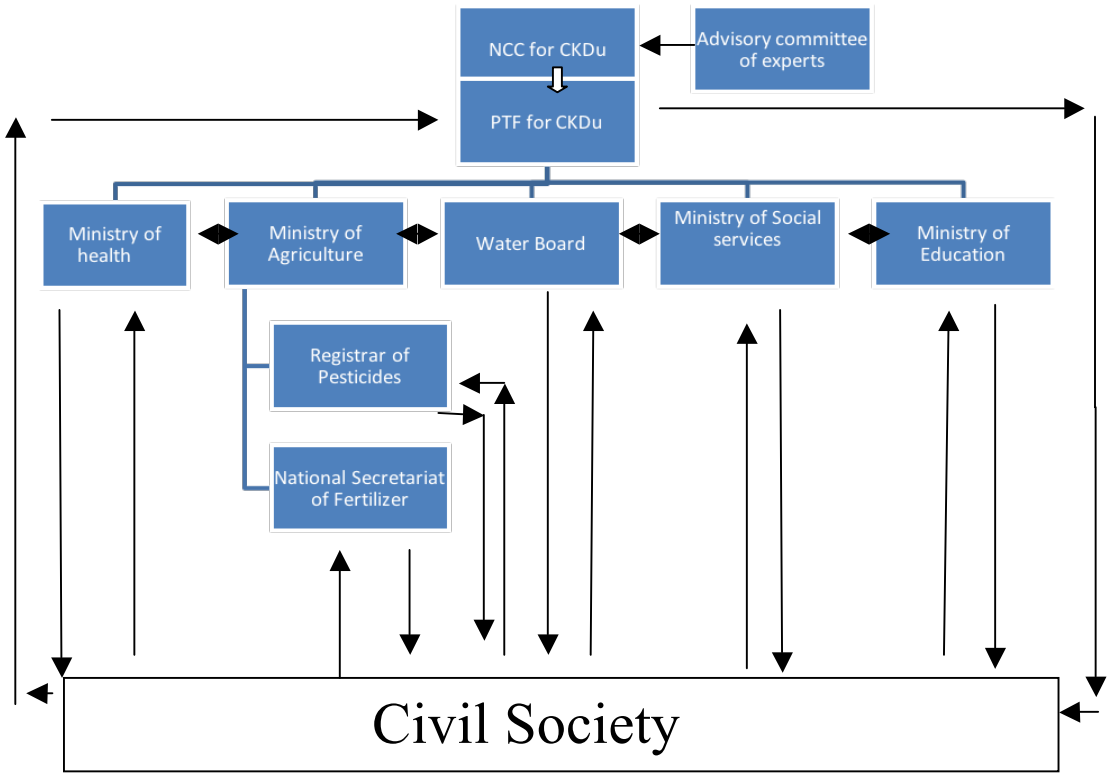

Figure 2 A diagrammatic representation of the NCCC and relationship with other actors

5.2.1.6 Establish an Independent NGO

In addition to the above government mechanism, there should be a strong organization, such as an NGO in the civil society to represent civil society independently of the associations connected with the government mechanism. The rational for having such an organization is that even if the NCCC is formed with civil society representation, their views may not be considered seriously, even though the government might argue that the views of all stakeholders are taken into consideration in their decisions. Establishing an independent NGO would be a counterpoint to such an argument.

5.2.2 Strengthen the PTF for CKDu

Another finding of this study was that there were weaknesses within the PTF for CKDu that undermined its effectiveness as a coordinating body; indeed, coordination was, at the time of the fieldwork, still in not organized well. Therefore, it should be strengthened, especially through provision of adequate staffing and facilities, since its plays such a crucial role in coordinating the governments project on the CKDu problem. There should be a proper coordination mechanism that can monitor how interventions of the different ministries and other organizations involved in the CKDu problem are actually working. In addition, the PTF should establish a mechanism at community level to get their feedback directly on the interventions made. This could be done through farmer organizations and other civil society organizations at village level.

5.2.3 Protect the Environment

Protect the environment now, as a matter of urgency. Almost all participants, save the executives of agro-chemical companies, saw a direct correlation between environmental degradation and the CKDu problem. The following measures should be pursued to protect the environment:

5.2.3.1 Restore the Tank System

Concerted efforts must be made to protect the existing water tanks and develop and restore the ecosystem around the cascading tank system. This initiative would be a sustainable long term solution to CKDu and many other diseases and morbidities.

5.2.3.2 Reforestation

Every effort must be taken to reduce deforestation and loss of biodiversity through proactive reforestation programs, especially in the areas that are opened and neglected within the affected areas. In addition, authorities should immediately ban cultivation in the reservations around the tank system and rivers to stop agro-chemical contamination of the water bodies. Planting of indigenous trees and shrubs, that filtered water within the tank system should be encouraged.

5.2.3.3 Involve Villages

Involve the villages and seek their cooperation in all programs for conserving and protecting the environment. Because most of the village communities are poor, pay attention to their development needs and integrate this through a bottom-up approach.

5.2.4 Reduce and monitor agro-chemical usage

5.2.4.1 Establish joint Monitoring System for Agriculture Ministry and Farmers' Association

A joint monitoring system for the Agriculture Ministry and Farmer Association should be established to monitor how agro-chemicals are used in the village. This will allow the government to know how much of agro-chemicals are used in different parts of the affected areas. In addition, it will also allow government to know whether the best practices of agro-chemical use are being followed by the farmers when applying agro-chemicals. The Village headmen could be the contact person for the ministry in the village, but steps will have to be taken into enhance their capacities to be able to meet the demands of the additional workload they get.

5.2.4.2 Train Farmers on Best Practices of Farming and Introduce Sanctions

Provide training to all farmers on best practices of farming or agriculture in general. In addition, introduce penal sanctions on farmers that refuse to use best practices, such as wearing safety gear, using agro-chemicals contrary to given instructions and directions of use, etc.

5.2.4.3 Limiting sale of agro-chemicals to license holders

Ensure that no dealer or distributor of agro-chemicals be allowed to sell agro-chemicals through persons not licensed to do so. The ROP should expedite rolling out its mandatory six-month training for agro-chemical sales persons on how to handle agro-chemicals and advice farmers on their proper use.

5.2.4.4 Introduce Agro-chemical Leasing

Agro-chemical leasing should be introduced as one method of controlling the excessive use of agro-chemicals. Because this system uses a service provider who must bear costs in providing the service, they are not prone to misuse or overuse or under use of agro-chemicals.

5.2.4.5 Introduce Randomized Testing of Soil and Water

Develop a randomized system for testing samples of water and soil at the field level. This random testing should be done at least once every three months in the affected areas. This will allow the government to detect any unacceptable levels of contamination at the ground level. As such, immediate action could be taken to take remedial action if needed.

5.2.5 Relevant Agencies must play their roles

The ROP and the NFS are the two main agencies with the mandate to ensure that any agro-chemicals imported, manufactured, and distributed in Sri Lanka are safe for human beings and other biological forms of life. Therefore, they should put in place effective and efficient processes for approving chemical formulas to be imported and distributed for agricultural use in Sri Lanka. They should rigorously scrutinize all documents presented to them in support of permits to import or manufacture agro-chemicals in the country.

In addition, the ROP and NSF should regularly monitor field level water and soil conditions to take proactive measures as and when it is needed in controlling the use of agro-

chemicals and they should be watchful of any product that they have not approved that are in distribution or use.

5.2.6 Develop Organic Farming

Several participants for this study agreed in principle that organic farming has the potential to reduce the amount of man-made chemicals that are used in modern industrialized agriculture and causing so much damage to the environment. In this respect, the following measures are recommended to develop organic farming and gradually wean farmers from agro-chemicals.

5.2.6.1 Develop a National Level Plan for Promoting Organic Farming

Strengthen the Toxin Free Nation Authority to promote and popularize organic farming among farmers. Tap into traditional knowledge on farming, which was essentially organic farming and train farmers in indigenous as well as new integrated pest control methods. Immediately start organic farming pilot projects to demonstrate its potential and benefits and use the evidence from such pilot projects to educate farmers. This may help address any prejudices farmers and certain policy makers might have had against organic farming.

5.2.6.2 Conduct Research and Maintain Standards

Some participants believe that there is not sufficient knowledge on organic farming and fertilizers. Therefore, conduct research on organic fertilizers, pest control methods, and organic farming methods. Seek and borrow experiences from far and wide on organic

agriculture, including neighboring countries such as India that have well-established systems of organic farming. Translate research on organic fertilizers to manufacturing of organic fertilizers, maintain standards, and put in place a system to certify that the produce are organic and safe for human consumption.

5.2.6.3 Develop Markets for Organic Produce

One finding from the fieldwork was that there was no market for organic produce because the prices of organically produced foods are higher than the foods produced through agro-chemical based farming. Develop local markets for organic farming through interventions for farmers that will reduce the price of organic produce to affordable levels. The government for many years provided subsidies for agro-chemicals, including fertilizers, it could do the same for organic farming. In addition, government should introduce and conduct programs aimed at changing attitudes of farmers to adopt organic farming and the attitudes of consumers to buy products organically cultivated.

5.2.7 Hold Agro-chemical companies accountable for contributing to the CKDu Problem

This study found that agro-chemical companies were part of the CKDu problem in Sri Lanka, especially their behavior and attitudes towards the problem. In addition, most of the participants agreed that agro-chemical companies were profit driven and cared less about social and environmental issues. Yet, it was clear that individuals might not successfully use

the legal framework to sue them for the harm suffered. Thus, the government should at least use the following tools to extract compliance from the companies.

5.2.7.1 Use of CSR

The government should use the CSR framework to engage with agro-chemical companies and remind them of their responsibility as both corporate actors and citizens to ensure that they should shift towards the 'shared value' paradigm of corporate organization.

Adopting a 'shared value' element of CSR will allow government to enjoin agro-chemical companies to accept the responsibility to educate farmers about best practices of agro-chemicals, including informing farmers of the potential risks of agro-chemicals.

5.2.7.2 Use International Voluntary Standards

Government and its agencies should take time to learn more about international voluntary standards for companies, such as the Global Compact, and use this to negotiate with agro-chemical companies' compliance with environmental protection and human rights standards in their business operations.

5.2.7.3 Strictly Enforce the Laws

Where persuasion using CSR and other international standards fails to elicit behavioral change from the agro-chemical companies, especially in the area of marketing agro-chemicals, the government should rigorously enforce existing laws and not be fooled by

assertions by agro-chemical companies that their operations conform to the law or other internationally accepted standards.

5.2.8 Strengthen Community Based Leaderships and Organizations

Collaborate with NGOs in organizing and developing community level leaders and organizations and religious institutions, such as Temples. For example, develop a CKDu awareness and advisory unit in each temple. Develop the capacity of Buddhist monks and or other religious leaders, where available, in counseling and providing psychosocial support through religious practices. Provide more financial support for the religious education units of the temples as religious education in children and adults will also lead to instill a caring attitude towards environment and sick and needy of the society

Develop community care centers near hospitals for overnight stay for patients and their relatives. Identify and develop community level groups that could support CKDu patients and their families in different ways. Organize socio- cultural and religious events and other (mythological) rituals that the communities believe in protection of environment, water and communities at large.

5.2.9 Further research or action?

The recommendations made to the government have already been accepted. Then what is next? Will it be used to fill the gaps in government plans and interventions or will it be left in another file to collect dust? The author's main suggestion for further research would be not

another study of CKDu, but a study on how to push and force the government to take concerted efforts on issues of national importance like CKDu. Implementation of any project needs commitment and political will. The author would like to end this piece of work with a quotation from Nelson Mandela: “It always seems impossible until it is done”.

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APPENDIX A

IMPORTANT ENFORCEABLE LAWS THAT RELATE TO ENVIRONMENT IN SRI LANKA

- National Environment Act No 47 of 1980
- Fauna and Flora Protection Ordinance No 2 of 1937
- Forest Ordinance No 16 of 1907
- Mahaweli Authority of Sri Lanka Act No 23 of 1979
- State lands Ordinance No 8 of 1947
- Mines and Minerals Act No 33 of 1992
- Irrigation Ordinance No 32 of 1946
- Water Resources Board Act No 29 of 1964
- Coast Conservation Act No 57 of 1981
- Marine Pollution prevention Act No 35 of 2008
- Fisheries and Aquatic Resources Act No 2 of 1996
- National Heritage Wilderness Areas Act No 3 of 1988
- Soil Conservation Act No 25 of 1951
- Plant Protection Act No 25 of 1999
- Flood Protection Ordinance No 4 of 1924
- Water Hyacinth Ordinance No 4 of 1909
- Control of Pesticides Act No 33 of 1980
- Atomic Energy Act No 19 of 1969
- Health Services Act No 12 of 1952
- Municipal Councils Ordinance No 29 of 1947
- Pradeshiya Saba Act No 15 of 1987
- Urban Development Authority Law No 41 of 1978
- Sri Lanka Land reclamation and development Act No 15 of 1968
- Sri Lanka Sustainable Energy Authority Act No 35 of 2007
- Code of criminal Procedure Act No 15 of 1979
- Nuisance Ordinance No 15 of 1862
- Regulation of fertilizer Act No 68 of 1988

APPENDIX B

CASCADING TANK SYSTEM IN THE NORTH CENTRAL PROVINCE OF SRI LANKA.

First map shows the components of a single tank and the 2nd map shows how several of such tanks are constructed as a cascading tank system on a water stream or river. Then the third map shows how several of cascading tanks systems are linked together in to a cluster of tanks that creates a mini man made ecosystem.

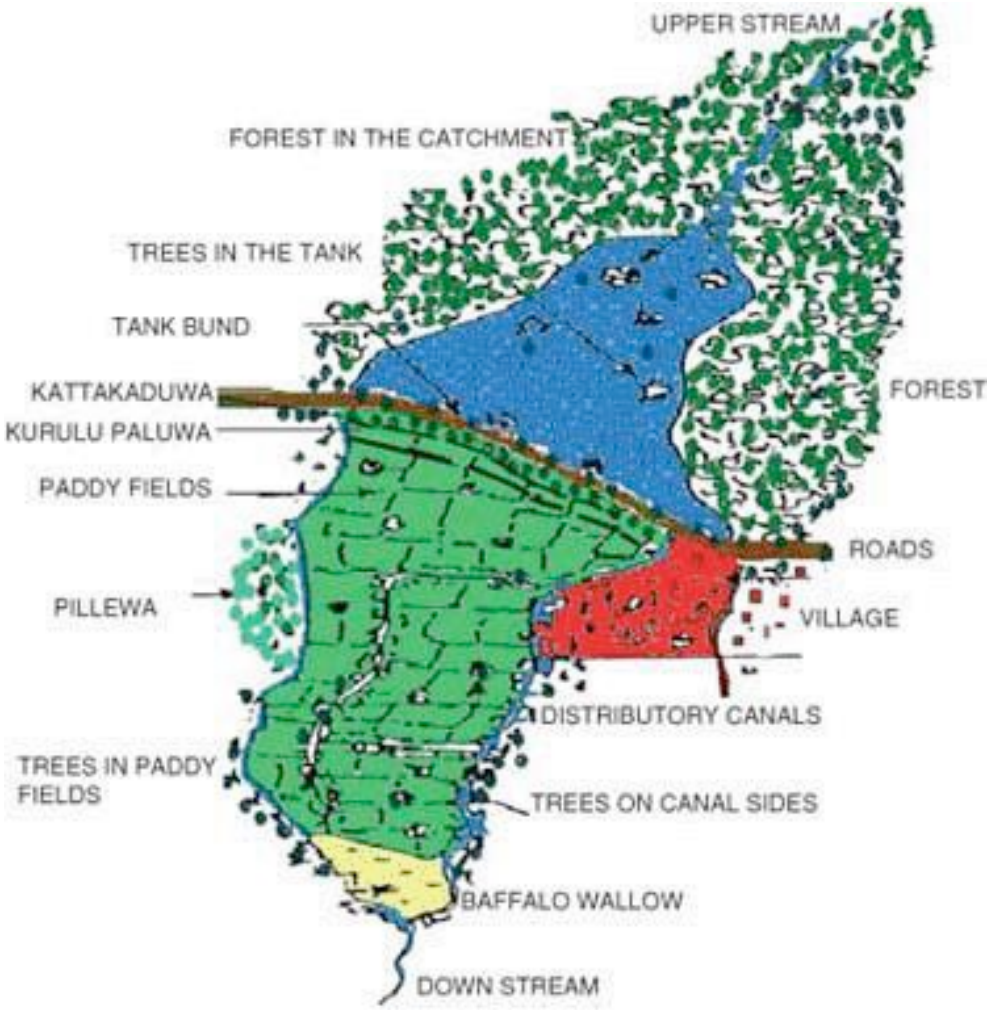

Figure 3 h A single tank system and its component

Source: Paranavithana (2017)

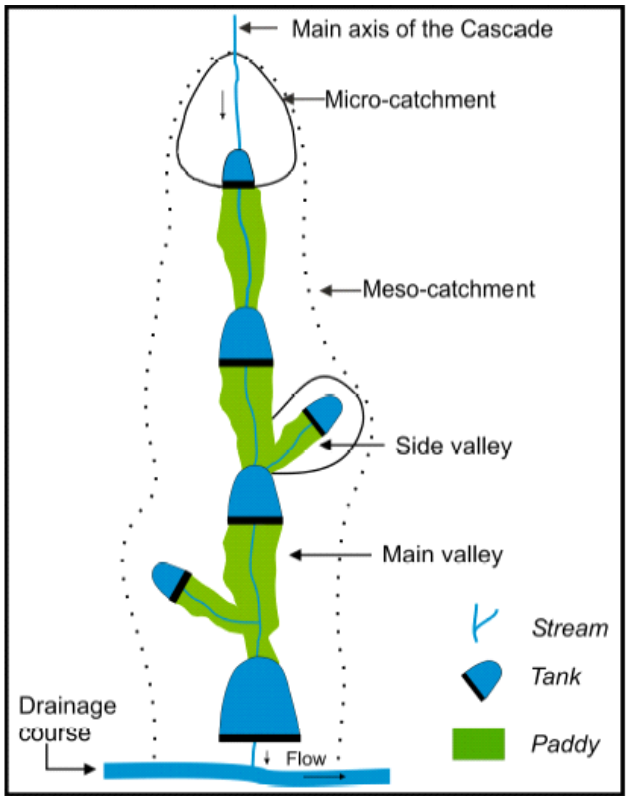

Figure 4 A cascading tank system

Source: Mahatantila (2010)

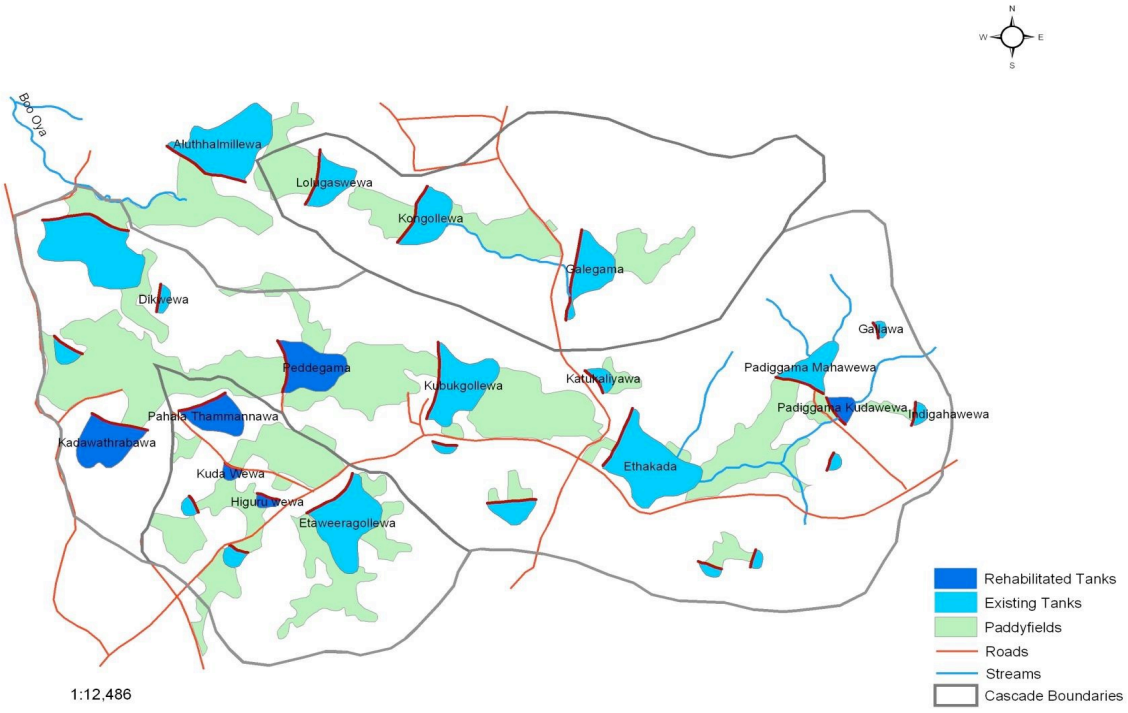

Figure 5 A Combination of several cascading tank systems

Source: Paranavithana (2017)

APPENDIX C

LIST OF INTERVIEWS

List of interviewees at Village Padaviya of Anuradhapura District

Chief Buddhist Monk - Date Interviewed 23rd June 2016
Village Headman- Date interviewed 24th June 2016
Leader of a Farmers' Association- Date interviewed 26th June 2016
Ayurveda Doctor - Date interviewed 27th June 2016
Allopathic Doctor- Date interviewed 29th June 2016

List of interviewees at North Central Province and National Level

Senior Medical Officer at Provincial Health Ministry of District of Anuradhapura Date interviewed 18th July 2016. Place interviewed - Anuradhapura
Senior officer of the Registrar of Pesticides (ROP) Date Interviewed 10 the August 2016. Place interviewed: Colombo
Senior Officer of the National Fertilizer Secretariat (NFS) Date interviewed: September 20th 2016 Place interviewed: Colombo
Senior Officer of the Presidential Task Force for CKDu (PTF for CKDu) Date interviewed: July 12th July 2016 Place interviewed : Colombo
Senior officer of the Toxin Free Nation Authority(TFNA) Date interviewed: 22nd July 2015 Place: Colombo Toxin Free Nation Authority is set up by the government in 2015 to develop and popularize organic

farming. He was interviewed to find out what initiatives taken by government to popularize organic farming, other methods of non-agro-chemical intensive farming practices, and the challenges they face.
Senior Environmental Lawyer Senior Environmental Lawyer Date interviewed : 15th September 2016 Place interviewed : Colombo
Senior Environmentalist- 1 Date interviewed : 25th September 2016 Place interviewed: Colombo
Senior Environmentalist – 2 Date interviewed : 28th September 2016 Place interviewed: Colombo
Senior Officer -1 (Agro-Chemical Company) Date interviewed : 2nd December 2016 Place interviewed: Colombo
Senior Officer – 2 (Agro- Chemical Company) Date interviewed : January 5th 2016 Place interviewed : Colombo
Senior Officer – 3 (Agro- Chemical Company) Date interviewed : January 5th 2016 Place interviewed : Colombo
Senior engineer of the Water Board in NCP Date interviewed: 15th July 2016 Place interviewed; Colombo
Senior Professor of Medicine Date interviewed: 10th December 2016 Place interviewed: Colombo

Evaluation of Corporate Social Responsibility of Agro Chemical Companies

Questionnaire

1. Name of the company Established year:
   Officer interviewed : Position:
   Date:
   (above will not be divulged in my report)

2. What are the agro-chemicals that you manufacture or import and distribute?
3. Who are the principals (foreign suppliers) of such agro-chemicals
4. What is your market share in Sri Lanka?
5. What is your market share in North Central Province?
6. Which compliance standards do your organization use/ are accredited to?

   ISO 26000 ISO 14000 AA 1000

   Any other

7. Are you a signatory to Global Compact?
8. Do you publish a Separate Sustainability Report? If yes on what guidelines (such as GRI Sustainability Reporting or your own or any other)
9. If not, do you have a separate section that covers sustainability in your Annual Reports, which contains the Financial Statements?
10. If yes, what aspects do you report in sustainability section?
    (does it cover product related environment impacts and initiative that you have taken)
11. What type of dialogue do you have with stakeholders?
12. What are your major focus areas of CSR activities

    Health and safety
    Environment
    Social impact
    Other

13. What is your opinion about the claims made by researchers and environmental groups that the major reason for Kidney disease is the use of agro-chemicals?

14. What changes you have made in agro-chemicals to make them friendlier to environment?
15. What changes you have done in educating your distributors of agro-chemicals?
16. What changes you have done in educating farmers and farmer organization of safe use of agro-chemicals?

17. Do you have your own division of randomly taking samples of agri products, water or soil etc from the field and carry out test to monitor about your products ?
18. Whatever the cause for Kidney disease, the farmers in villages who are one of your major stakeholders is suffering, what action you have taken in supporting them?
19. Do you think that kidney disease is an issue that you must participate to find a solution?
20. What are your suggestions to solve the issue?
21. If yes, in what manner that you would like to participate in short term and long term?
22. Describe the advantages of your becoming a part of the solution
23. Describe the disadvantage of your becoming a part of the solution
24. Do you think that others in you work within the industry will participate in solving this issue ?
25. Any other comment

Questionnaire to interview the Ayur Medical Officer

1. There are many causal factors reported by researchers for CKDu. Currently what are the factors that the ayur medical community has come to a consensus if any for the CKDu crisis?
2. What are the high prevalence areas of the disease?
3. Can Ayur doctors detect the disease early?
4. If so how?
5. Do you categorise the patients to stages depending on the severity of the disease ?
6. What remedies are available for CKDu from Ayur medicine ?
7. How many Ayur clinics are available in high prevalent areas of CKDu?
8. Are there any new clinics and facilities opened during the last decade?
9. Can the disease be managed well through Ayur medicine ?
10. Can the Ayur medicine prevent progressing of the disease to dialysis level?
11. Can Ayur medicine treat patients at dialysis level without dialyzing?
12. Is there a demand from patients for Ayur medicine
13. What are the limitations you have any in providing Ayur treatement for CKDu patients ?
14. Have you got enough doctors trained in treating CKDu patients ?
15. Do you have the required Ayur medicine available in the country to treat CKDu patients ?
16. What are the preventive actions that the public should take not to attract CKDu?
17. What role can the civil society organizations like farmer organizations, temples, churches, kovils NGOs and other welfare societies can village level can do as regards CKDu crisis?
18. What is the current contribution of those societies to the CKDu crisis?
19. In your opinion what should the Health Ministry do in the short term and long term to arrest the situation
20. In your opinion what are the limitations or barriers that the health ministry is having putting out a comprehensive plan to treat patients and take preventive action
21. Any other comments

Questionnaire to interview Senior Engineer / Officer at Water Resource Board

Date: Place:

1. It is reported that status of drinking and cooking water is a major reason as to CKDu in endemic areas, what is your opinion about it?

2. What are the actions you have taken in providing clean water in the affected areas?
3. What percentages of villages get clean water from you for drinking and cooking purposes?
4. Is that enough to meet the needs of the villages?
5. What are the sources currently used by people to obtain drinking and cooking where your services are not available?
6. Have you prescribed any filtering process of well water or surface water to affected villages?
7. Do people use the filtering processes?
8. How effective are the filtering processors that you have recommended?
9. Have you prescribed any alternative ways of finding water for drinking and cooking purposes such as rainwater harvesting?
10. Do you have enough facilities to check quality of water in villages at different levels?
11. How often do you check quality of water?
12. Is it enough to ensure the safety of water?
13. What support can be provided by religious and social organizations as to water issue?
14. What are your future plans to meet the total demand of clean water?
15. Will you be able to get funding to implement the future plans ?
16. Is there any other limitation or barriers if any in implementing a plan to fulfill the need of clean water for the affected areas?
17. Any other comments

Questionnaire to interview the Chief Medical Officer of the CKDu unit of the Ministry of Health of Sri Lanka

Date: **Place:**

1. There are many causal factors reported by researchers for CKDu. Currently what are the factors that the medical community has come to a consensus if any for the CKDu crisis?
2. According to your Ministry findings, how many CKD u patients are there in Sri Lanka?
3. Do you have a district wise categorization of patients?
4. Have you categorized patients as per the severity of patients?
5. How many are there ate the renal replacement level where dialysis is needed?
6. What are the high prevalence areas of the disease?
7. As per the published reports, it was initially reported in NCP and now it has spread to other Districts as well? Is it true?
8. What are the actions Health Ministry has taken so far to treat patients?
9. Can early detection help cure or manage the disease?
10. What are the actions you have taken for early detection?
11. What are the preventive actions that the public should take not to attract CKDu?
12. Have you conducted any educational programs?
13. What role can the civil society organizations like farmer organizations, temples, churches, kovils NGOs and other welfare societies can village level can do as regards CKDu crisis?
14. What is the current contribution of those societies to the CKDu crisis?
15. In your opinion, what should the agro chemical companies do to help suffering communities?
16. In your opinion what should the Health Ministry do in the short term and long term to arrest the situation
17. In your opinion what are the limitations or barriers that the health ministry is having putting out a comprehensive plan to treat patients and take preventive action
18. Any other comments

Questionnaire to interview the Coordinating Secretary of the Presidential TaskForce (PTF) on Chronic Kidney Disease prevention

Date: Place:

1. When did the government establish PTF?
2. What is the main objective of establishing PTF ?
3. Who heads the PTF?
4. How is your management structure formed?
5. Do you have an advisory committee to take advise for technical issues
6. How many members are there in your staff ?
7. Do you have enough facilities and staff to operate the PTF?
8. What are the activities you have done up to now?
9. Do you have a good idea about different interventions made by other government agencies such as Ministries of Health, Environment, Water, Social Services etc.?
10. Do each other of these ministries know what others are doing?
11. Have you devised a coordinated plan to handle the CKDu issue?
12. Can you briefly describe it?
13. What parties you consulted in developing your plan?
14. Is there a role for the village level societies to play in your plan?
15. Is there a role for the agro-chemical companies to play in your plan?
16. Have you estimated the cost of the whole operation/project ?
17. What is the total budget?
18. Have you been able to mobiles funds towards the budget?
19. If not what is the deficit?
20. What are your plans to find fund to fill the deficit?
21. How do you monitor activities among different ministries?
22. How often do you have meetings to evaluate the progress of activities?
23. What are the challenges you have in implementing your plans?
24. Can the CKDu issue be solved in Sri Lanka?

Questionnaire for the interview with the Environmental lawyers

Date : Place:

1. What is the legal framework in order to protect the environment and provide the nation to have a cleaner environment to live?
2. What specific laws are available to address issues like agro chemical contamination of environment?
3. What government agencies are empowered to implement law? Agriculture Ministry Pesticides and Fertilizer), Fisheries Ministry, Central Environment Authority, Wild life department
4. Do they implement the law as desired?
5. Using the current legal framework can the agro-chemicals companies be sued in a court of law for contamination?
6. If it is not adequate, what additional law is required?
7. Who could take action against polluters? anybody
8. In absence of knowledge and capacity among villages to sue companies or authorities, can civil society organizations or NGOs take action on behalf of them?
9. If agro chemical companies to be sued, do you think that hard evidence can be found to prove in a court of law?
10. If the current laws are adequate to handle the legal issues relating CKDu, why it is not implemented?
11. What are the legal responsibilities of farmers in handling, using and disposing of agro-chemicals ?
12. In your opinion, what should be done in the areas of CKDu ?
13. Any other comments ?

Questionnaire to interview National Fertilizer Secretariat in the Ministry of Agriculture

Date: **Place:**

1. What are your department's tasks? Regulate the import, manufacture and distribution of fertilizer in the country
2. What are the laws and regulations in Sri Lanka for manufacturing, importing and distributing fertilizer?
3. Who gets power by virtue of legal enactments to implement the law
4. What powers vested in you?
5. How many fertilizer manufacturers are there in Sri Lanka?
6. How many fertilizer importers are there in Sri Lanka
7. What type of dialogue you have with them? (Meetings/ seminars/workshops or any other communications
8. If a company or any other entity intends manufacturing or importing fertilizer, do they have to get license?
9. If yes, how do you issue license?
10. Do you prescribe the formula containing specific chemicals that can be manufactured?
11. If an importer wants to import a certain type of fertilizer, how does that importer get license?
12. Do you check a sample of each shipment before it is allowed to clear from the harbor?
13. Do you check samples from local manufacturers before they distribute to the market?
14. What criteria that you used to test the safety and efficacy of fertilizer?
15. Was this criteria adopted recently ?
16. Have there been any approaches to influence you to issue license or to grant any other favor by agro-chemicals companies or any interested party?
17. Is there a list of banned or controlled fertilizers?
18. How do you take a decision to ban a specific type of fertilizer?
19. Is there any fertilizer specifically banned as a chemical suspected of causing kidney disease?
20. If yes, when was it banned?
21. Is that list available for public to inspect?
22. What standards are used when an fertilizerl is controlled or banned?
23. Do you have testing facilities to check any fertilizer chemical?
24. Do you have enough technically qualified scientists to conduct testing in your organization?
25. If not how do you get reliable testing reports?
26. Do you conduct any field studies to ascertain the effect of any agro chemical?
27. Have you specified labeling and directions of use in packages of agro- chemicals?

28. If so, how do you monitor the compliance?
29. Have you specified any guidelines for farmers to use protective gear when using agro-chemicals
30. If not is there any authority under your Ministry or any other Ministry as per your knowledge who does so?
31. Is there a penalty on farmers for not adhering the usage procedures of fertilizer?
32. Do you think that you are being treated fairly in the media ?
33. Any other comment

Questionnaire - Leader of a Farmer Association- Padaviya

Date: **Place:**

1. How many members are there in your Association?
2. What do you do?
3. How do you get funds to operate?
4. How often do you have meetings?
5. Do agro chemical dealers have meetings with you?
6. Do they persuade you to use certain agro-chemicals?
7. Do they ask you to use products use more agro-chemicals than prescribed by the extension officers of Agriculture department.
8. Do they educate you about the proper use?
9. Do they provide you anything free?
10. How many CKDu patients are there in your farmer association?
11. Do they still work in the paddy fields?
12. What do farmers say about the disease?
13. Why do they say so?
14. What do you think about the water?
15. Do you see a difference when you drink filtered water?
16. What is the economic status of the farmers who have attracted the disease?
17. If so what would happen to future paddy farming?
18. Do farmers use agro chemical as per the guidelines/
19. Do farmers plant crops in reservations ?
20. What can you do to make them adhere to rules ?
21. Do you think that penalty for misuse will help ?
22. Where do the farmers with CKDu go for treatment?
23. Do you think that ayurveda facilities should be improved?
24. What type of help your association give it to CKDu patients?
25. Do CKDu patients get any support from the temple?
26. Can temples do a better service to CKDu Patients?
27. Do children go to Sunday religious classes?
28. What do you think about organic agriculture?
29. Do farmers get support from NGOs
30. Can NGOs play a good role?
31. What do you think that we should do to eradicate CKDu
32. What do you think about the government initiatives in handling this issue?
33. Can you as a community handle this issue?

Questionnaire to interview an Officer Registrar of Pesticides in the Ministry of Agriculture

Date: **Place:**

1. What are your departments tasks?
2. What are the laws and regulations in Sri Lanka for manufacturing, importing and distributing agro-chemicals?
3. Who gets power by virtue of legal enactments to implement the law?
4. What powers vested in you?
5. How many agro- chemical manufacturers are there in Sri Lanka?
6. How many agro chemical importers are there in Sri Lanka?
7. What type of dialogue you have with them? (Meetings/ seminars/workshops or any other communications?)
8. If a company or any other entity intends manufacturing or importing agro-chemicals, do they have to get license?
9. If yes, how do you issue license?
10. Do you prescribe the formula containing specific chemicals that can be manufactured?
11. If an importer wants to import a certain type of agro chemical, how does that importer get license?
12. Do you check a sample of each shipment before it is allowed to clear from the harbor?
13. Have there been any approaches to influence you to issue license or to grant any other favor by agro-chemicals companies or any interested party?
14. Is there a list of banned or controlled agro-chemicals?
15. How do you take a decision to ban a specific type of agro chemical?
16. Is there any agro- chemical specifically banned as a chemical suspected of causing kidney disease?
17. If yes, when was it banned?
18. Is that list available for public to inspect?
19. What standards are used when an agro chemical is controlled or banned?
20. Do you have testing facilities to check any agro chemical?
21. Do you have enough technically qualified scientists to conduct testing in your organization?
22. If not how do you get reliable testing reports?

23. Do you conduct any field studies to ascertain the effect of any agro chemical?
24. Have you specified labeling and directions of use in packages of agro- chemicals?
25. If so, how do you monitor the compliance?
26. Have you specified any guidelines for farmers to use protective gear when using agro-chemicals
27. If not is there any authority under your Ministry or any other Ministry as per your knowledge who does so?
28. Is there a penalty on farmers for not adhering the usage procedures of agro-chemicals?
29. Do you think that you are being treated fairly in the media ?
30. Any other comment

APPENDIX D

RECOMMENDATIONS TO THE PRESIDENTIAL TASK FORCE FOR CKDU IN SRI LANKA

Chronic Kidney Disease Unidentified (CKDu) in Sri Lanka: Towards an integrated solution.

In the mid-1990s, Chronic Kidney Disease of Unknown Etiology (CKDu) was discovered by the Ministry of Health among the paddy farmers in the North Central Province of Sri Lanka. In the two decades since its discovery, the disease has spread rapidly to other farming areas. Over the past 20 years, Individuals and institutions in relation to the problem of CKDu have undertaken numerous studies. As per the studies, there are multiple causes for this disease incidence and the quest to identify the exact causes is still underway. The Sri Lankan Government has taken various measures to address the CKDu crisis. My view is that the interventions made by the government are not integrated and they are essentially top down approaches. The government has not given due consideration to the unique environment of the NCP, nor included the local knowledge of the suffering communities and their social capital at the village level well in the responses made. Further, the government has alienated the agro-chemical companies by not inviting them to be part of the solution and no

responsibility or accountability have been placed on them in the interventions made. There had not been proper coordination among the government ministries especially before the PTF for CKDu was established. I am of the view that CKDu issue in Sri Lanka is complex, inter connected to different domains and many stakeholders are involved; important insights into the problems are offered by more than one discipline and no single disciplinary approach can address the problem comprehensively. I believe that understanding village level local knowledge and their social capital, breaking down the single disciplinary silos, integrating the diverse views of various actors and players including the agro- chemical companies are prerequisite to solving the issue. I further state that establishing responsibility and accountability among different stakeholders, such as Ministries of Health, Agriculture, Water, Environment, researchers, village level social and religious organizations, farmers, agro-chemical companies, as an integral part of the solution would be the best approach. In strengthening my argument, I emphasize that each of these stakeholder groups has a right not to be treated as a means to some end, and therefore must participate in determining the future direction of the solution to this burning issue in which they have a stake. It would bring a synergetic approach of both top-down and bottom up approaches to the current top down approach in forming and implementing a solution, and will be a radically new approach to solve the problem.

I embarked on an interdisciplinary research to develop an integrated solution through reviewing what has taken place and obtaining the views of different stakeholders to the issue,

from village level to top government officers. This study was done under the title "Chronic Kidney Disease Unidentified (CKDu) in Sri Lanka: Towards an integrated solution" as a partial fulfillment of a Masters Degree in Interdisciplinary Studies at the York University of Canada. It took about 8 months to complete my fieldwork in Sri Lanka. I have studied the existing legal framework, social capital within the villages, and the view points of village level leaders such as the Chief Monk of a Buddhist temple, Principal attached to a school, a village headman, the leader of a farmer association and a doctor attached to the base hospital by selecting village Padaviya as a representative sample of the North Central Province. Then, the viewpoints of two environmentalists, an environmental lawyer, a senior officer working at the Registrar of Pesticides, a senior officer working at the Nationals Fertilizer Secretariat, an officer in the PTF for CKDu, an officer at the Water Board, Ayurveda doctor, Allopathic doctor attached to the NCP Ministry of Health, a senior professor attached to the Medical College of Colombo who is involved in CKDu research and senior executives of three leading agro chemical companies were obtained.

The views expressed by them are compared and contrasted with each other where relevant and an enlarged knowledge pool on CKDu in Sri Lanka was developed by broadly categorizing the findings into two themes namely prevention and management of the disease. The recommendations given below are based on the analyzed findings and conclusions made.

Establish a National Coordinating Committee on CKDu. (NCCC)

One of the main findings of this study was the marked lack of coordination of government interventions to address the CKDu problem in Sri Lanka. Even the PTF for CKDu is beset with several shortcomings. Therefore, an NCCC would be an apex level policymaking and monitoring committee that provides oversight on all interventions for the prevention and management of the CKDu problem.

1. Composition

The NCC should comprise the Office of the President and all the relevant ministries and departments involved in the CKDu problem, village level civilian representatives from affected areas, representatives from NGOs working with the CKDu issue, representation from doctors working in the CKDu affected areas, representation from the agro-chemical industry. In addition, it should have a subcommittee of experts from medicine, agriculture, environment, toxicology and water to provide expert advice.

2. Meetings

The NCC should meet periodically and the President should chair all its meetings. Where other national duties require, the President may delegate line Ministers to chair the meetings.

3. Decisions

Before any decisions pertaining to an intervention, whether for preventing or managing the CKDu problem is made, the NCC should widely consult all stakeholders, including village

level stakeholders. NCC should establish a mechanism that allows easy access to village level stakeholders and civil society organizations to provide suggestions and feedback related to the CKDu problem. Indeed, other bodies, such as the PTF for CKDu and line ministries should also have similar mechanisms to minimize the top down approaches so far made and to have a dialogue with other ministries and institutions involved in providing solutions to CKDu issue.

4. Progress Reports

The PTF for CKDu, which currents holds the coordination portfolio should provide the NCC with progress reports on the various works and interventions to prevent and manage the CKDu problem.

5. Formal Structure

The PTF for CKDu should have clear management structure that connects with other players and actors in a format as follows to minimize the top down approaches and to synergize both top down and bottom up approaches:

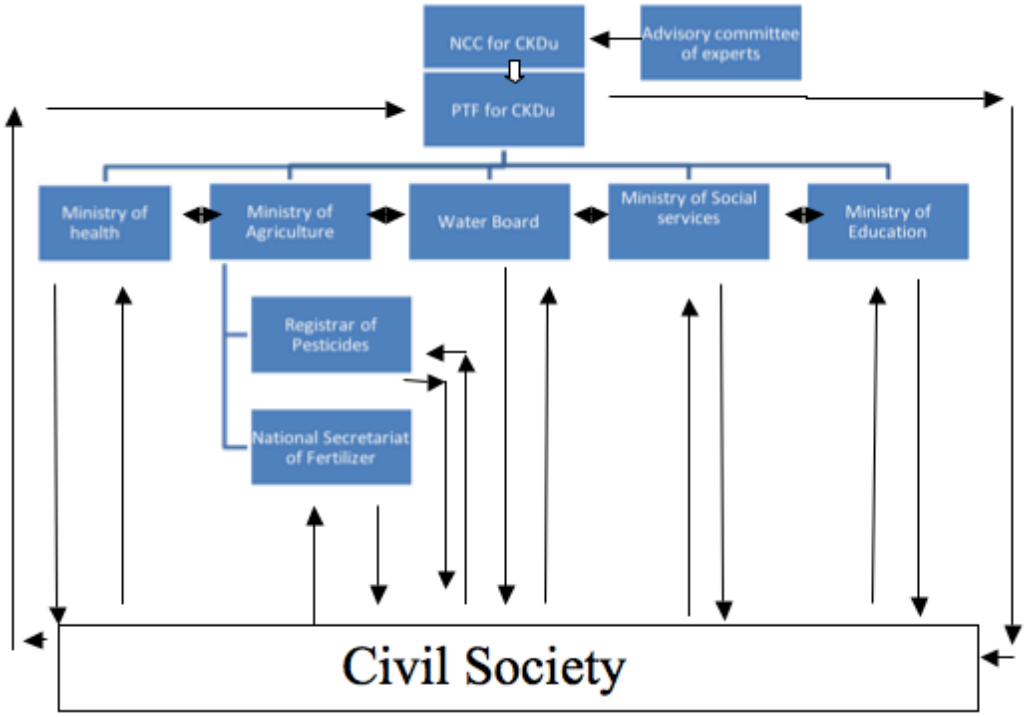

Figure 6 Diagrammatic Representation of the NCC and relationships with other actors

Strengthen the PTF for CKDu

Another finding of this study was that there were weaknesses within the PTF for CKDu that undermined its effectiveness as a coordinating body; indeed, coordination was, at the time of the fieldwork, still in chaos. Therefore, it should be strengthened, especially through provision of adequate staffing and facilities, training and development, since it plays such a

crucial role in coordinating the governments project on the CKDu problem. Establish a proper coordination mechanism that can monitor how interventions of the different ministries and other organizations involved in the CKDu problem are actually working.

In addition, the PTF should establish a mechanism at community level to get their feedback directly on the interventions made. This could be done through farmer organizations and other civil society organizations at village level.

Protect the Environment

Protect the environment now, as a matter of urgency. Almost all participants, save the executives of agro chemical companies, saw a direct correlation between environmental degradation and the CKDu problem. The following measures should be pursued to protect the environment:

1. Rigorously Enforce Existing Laws

The current legal framework and regulatory regime adequately provides for the protection of the environment and regulation of pesticides and fertilizers. Simply rigorously enforce the law, without favour.

2. Restore the Tank System

Concerted efforts must be made to protect the existing water tanks and develop and restore the ecosystem around the cascading tank system.

3. Reforestation

Every effort must be taken to reduce deforestation and loss of bio diversity through proactive reforestation programs, especially in the areas that are opened and neglected within the affected areas. In addition, immediately ban cultivation in the reservations around the tank systems to stop agro chemical contamination of the water bodies. Planting of indigenous trees and shrubs, that filtered water within the tank system should be encouraged.

4. Involve Villages

Involve the villages and seek their cooperation in all programs for conserving and protecting the environment. Because most of the village communities are poor, pay attention to their development needs and integrate this through a bottom-up approach.

5. Increase Awareness Programs for Attitudinal Change

One of the finding s of this study was the marked lack of awareness and misconceptions about the CKDu and stigma attached to it, which hampered efforts at preventing and managing the disease, especially at the village level. In addition, farmers were so used to

agro-chemicals that they were not prepared to switch to organic farming, which in the long-term would reduce the amount of man-made toxic chemicals in the soils, atmosphere and water and thus reduce the prevalence of the CKDu.

School, Community, and National Level Awareness Programs

The government should continue and intensify school, community, and national level awareness programs. It should use a variety of means to achieve this, e.g., through posters, leaflets, essay competitions, teledramas, debates, newspapers, radio and television advertisements already adopted. Moreover, while these media are already being used, there should be a built-in evaluation system into all such awareness programs to determine their effectiveness.

1. Curriculum Reform

Basic knowledge about CKDu and similar diseases should be taught in schools. Educating young people at an earlier stage in their lives of the diseases that causes terminal illnesses can help tackle the attitudinal problems encountered when calls for change are made. Thus, some reforms of the school curriculum should be undertaken to include this aspect of education, if not done so already.

2. Use mobile phone technology

Since almost everyone in Sri Lanka has access to mobile phones, the Government and the private sector should work in collaboration to develop a mobile application that operates in the local languages to inform the public regularly about CKDu. Members of the public could also use the app to communicate their concerns or complaints or suggestions. Where technical feasible, a CKDu hotline also could be integrated into this mobile app.

3. Involve NGOs

Most NGOs and many other civil society organizations have grassroots networks; they should be encouraged to conduct, in collaboration with the various government agencies on the CKDu issue, awareness programs.

4. Involve the Press and Media

One of the findings of this study was the concerns of agro chemical executives and some government agencies about biased reporting by the press and media of CKDu related issues. Some participants believe that some media houses were ignorant of the facts about CKDu and rely on unscientific evidence. Therefore, the government and other stakeholders should include the press and media as major partners in the fight against CKDu. They should provide a special training program about CKDu to the press and media. It is recommended that impartial independent scientists should be identified to provide such training.

5. Develop a reliable system to map the geographical distribution of CKDu

This study found that the government had no grasp of the geographical distribution of the CKDu disease in Sri Lanka. This raises several challenges in developing prevention and management measures. Therefore, the government should develop a reliable system to map the distribution of CKDu in the country. This has two main benefits. First, it will allow government to take timely decisions on providing various services connected in handling the CKDu issue. Second, the government will have a clear grasp of how the disease has spread and the current trend in the spread of the disease. This can be done with the available information and the information that would be generated from new studies and reports.

Reduce and monitor agro chemical usage

1. Establish joint Monitoring System for Agriculture Ministry and Farmers' Association

A joint monitoring system for the Agriculture Ministry and Farmer Association to monitor how agro-chemicals are used in the village will allow the government to know how much agro- chemicals are used in different parts of the affected areas. In addition, it will also allow government to know whether the best practices of agro-chemical use are being followed by the farmers when applying agro-chemicals. The Village headmen could be the contact

persons for the ministry in the village but steps will have to be take to enhance their capacities to be able to meet the demands of the additional workload they get.

2. Train Farmers on Best Practices of Farming and Introduce Sanctions

Provide training to all farmers on best practices of farming or agriculture in general. In addition, introduce penal sanctions on farmers that refuse to use best practices, such as wearing safety gear, using agro-chemicals contrary to given instructions and directions of use, etc.

3. Only Licensed Persons Should Sell Agro-chemicals

Ensure that no dealer or distributor of agro-chemicals should be allowed to sell agro-chemicals through persons not licensed to do so. The ROP should expedite rolling out its mandatory six-month training for agro chemical sales persons on how to handle agro-chemicals and advice farmers on their proper use.

4. Introduce Agro Chemical Leasing

Agro chemical leasing should be introduced as one method of controlling the excessive use of agro-chemicals. Because this system uses a service provider who must bear costs in providing the service, they are not prone to misuse or overuse or under use of agro-chemicals.

5. Introduce Randomized Testing of Soil and Water

Develop a randomized system for testing samples of water and soil at the field level. This random testing should be done at least ones in three months in the affected areas. This will allow the government to detect any unacceptable levels of contamination at the ground level. As such, immediate action could be taken to take remedial action if needed.

6. Adopt an Integrated Pest Control System

Alternative ways to control pests should be explored and found if farmers are to reduce their dependence on agro-chemicals. An integrated pest control system should be developed.

Relevant Agencies must play their roles

The ROP and the NFS are the two main agencies with the mandate to ensure that any agro-chemicals imported, manufactured, and distributed in Sri Lanka are safe for human beings and other biological forms of life. Therefore, they should put in place effective and efficient processes for approving chemical formulas to be imported and distributed for agricultural use in Sri Lanka. They should rigorously scrutinize all documents presented to them in support of permits to import or manufacture agro-chemicals in the country.

In addition, the ROP and NSF should regularly monitor field level water and soil conditions to take proactive measures as and when it is needed in controlling the use of agro-chemicals

and they should be watchful of any product that they have not approved that are in distribution or use.

Strengthen the Toxin Free Nation Authority to promote and popularize organic farming among farmers. Tap into traditional knowledge on farming, which was essential to organic farming and train farmers in indigenous as well as new integrated pest control methods. Immediately start organic farming pilot projects to demonstrate its potential and benefits and use the evidence from such pilot projects to educate farmers. This may help address any prejudices farmers and certain policy makers might have had against organic farming.

Conduct Research and Maintain Standards

Some participants believe that there is not sufficient knowledge on organic farming and fertilizers. Therefore, conduct research on organic fertilizers, pest control methods, and organic farming methods. Seek and borrow experiences from far and wide on organic agriculture, including neighboring countries such as India that have well-established systems of organic farming. Translate research on organic fertilizers to manufacturing of organic fertilizers, maintain standards, and put in place a system to certify that the produce are organic and safe for human consumption.

Develop Markets for Organic Produce

One finding from the fieldwork was that there was no market for organic produce because the prices of organically produced foods are higher than the foods produced through agro chemical based farming. Develop local markets for organic farming through interventions for farmers that will reduce the price of organic produce to affordable levels. The government for many years provided subsidies for agro-chemicals, including fertilizers, it could do the same for organic farming. In addition, government should introduce and conduct programs aimed at changing attitudes of farmers to adopt organic farming and the attitudes of consumers to buy products organically cultivated.

1. Hold Agro Chemical companies accountable for contributing to the CKDu Problem

This study found that agro chemical companies were part of the CKDu problem in Sri Lanka, especially their behavior and attitudes towards the problem. In addition, most of the participants agreed that agro-chemicals were profit driven and cared less about social and environmental issues. Yet, it was clear that individuals might not successfully use the legal framework to sue them for the harm suffered because of their businesses. Thus, the government should at least use the following tools to extract compliance from the companies.

2. Use of CSR

The government should uses the CSR framework to engage with agro chemical companies and remind them of their responsibility both as corporate actors and citizens to ensure that they should shift towards the ‘shared value’ paradigm of corporate organization.

Adopting a ‘shared value’ element of CSR will allow government to enjoin agro chemical companies to accept the responsibility to educate farmers about best practices of agro-chemicals, including informing farmers of the potential risks of agro-chemicals.

3. Use International Voluntary Standards

Government and its agencies should take time to learn more about international voluntary standards for companies, such as the Global Compact, and use this to negotiate with agro chemical companies’ to ensure compliance with environmental protection and human rights standards in their business operations.

4. Strictly Enforce the Laws

Where persuasion using CRS and other international standards fail to elicit behavioral change from the agro chemical companies, especially in the area of marketing agro-chemicals, the government should rigorously enforce existing laws and not be fooled by assertions by agro chemical companies that that their operations conform to the law or other internationally accepted standards.

Supply Clean Water

1. Clean Drinking Water for All

The government should take immediate steps to provide clean drinking water to all in the CKDu affected areas that have no access to clean water. Communities should be encouraged to use clean water for drinking and cooking always. Institute regular field level testing of the quality of water in CKDu areas; the areas water sources are contaminated should be identified and mapped.

2. Control Wastewater Contamination

Effects of RO plant wastewater should to be checked and necessary action should be taken to mitigate the soil contamination on RO discharge water.

Early Detection and Treatment of CKDu Patients

1. Increase early CKDu detection facilities and service

The government's relevant ministry should conduct and increase clinics in hospitals and village level mobile units for early detection of CKDu; it should also motivate people to attend early detection clinics. In addition, it should provide more facilities, para medics, and doctors for screening operations. Also, proper advice should be provided to CKDu patients about the treatments and management of the disease so that they will resort to seeking unscientific treatments.

2. Increase early prevention of contracting CKDu

The government, through its relevant ministries should provide information about factors that may increase a person's vulnerability to developing CKDu, such as alcohol and smoking and those that decrease the likelihood of developing the disease such as the importance of eating a balance diet and drinking adequate amount of water.

Establish a system to monitor those having a history of CKDu in their families or genetic disposition so that remedial action may be taken in time. Provide required drugs and other facilities to hospitals and clinics.

3. Produce drugs and materials for CKDu treatment locally

Develop drugs and other materials required to treat CKDu patients locally to reduce the cost on imports and the savings invested in further research into the disease and other forms of terminal illnesses.

Develop hospitals, increase the number of doctors and health care workers for the management of the disease.

Increase medical personnel

Train more specialist doctors, especially nephrologists, para medics, and other health care workers to increase the number of medical personnel required in the hospitals.

4. Recognize Ayurvedic Medicine

Recognize the services rendered by Ayurvedic medical doctors. Train and develop the capacity of Ayurveda doctors. Establish small-scale Ayurveda as well as Allopathic hospitals in village level to treat CKDu patients.

5. Palliative Care and Dialysis Units

Develop palliative care units in the affected areas. Improve the capacity of dialysis units within the hospitals. Develop mobile units for community health care workers so that they could visit villages regularly.

Enhance Community Level Participation

1. Strengthen Community Based Leaderships and Organizations

Collaborate with NGOs in organizing and developing community level leaders and organizations and religious institutions, such as Temples. For example, develop a CKDu awareness and advisory unit in each temple. Develop the capacity of Buddhist monks and or other religious leaders, where available, in counseling and providing psychosocial support through religious practices.

Develop community care centers near hospitals for overnight stay for patients and their relatives. Identify and develop community level groups that could support CKDu patients and their families in different ways.

Organize socio- cultural and religious events and other (mythological) rituals that the communities believe in protection of environment, water and communities at large.

Financial Support for religious education

Provide more financial support for the religious education units of the temples as religious education in children and adults will also lead to instilling a caring attitude towards environment and sick and needy of the society

Social services for CKDu patients and families

Increase the amount financial support

The current stipend of Rs. 3000 per CKDu patient is inadequate; increase the amount to all CKDu patients and their families depending on the needs of each individual family. In addition, the educational scholarship that is already being provided to some students from CKDu affected families should be rolled out for all students in the CKDu stricken families. For CKDu patients able to work, provide non-strenuous alternative job opportunities.

2. Community centers

Establish community centers and recreational facilities for CKDu patients. In addition, establish teams of psychosocial support providers at community level. The community centers established can provide office space of the team of psychosocial support. Develop community centers for the CKDu patients to gather and have recreation facilities

3. Foster Family Care

Establish a foster family care system or schemes with select families of reputable family values and charitable works, especially if they are rich families, in other districts to support children of CKDu stricken families.

Funding for CKDu Interventions

1. Establish a CKDu Fund

Establish a special fund for combating the CKDu problem in Sri Lanka. The Fund, when established, should adhere to strict financial regulations and be transparently monitored and audited by independent auditors. Contributions to the Fund should come from special events and activities purposely developed to raise funds. Another source of funds for the Fund could be special lottery that is sold worldwide. In addition, the corporate sector, including the agro chemical companies, should be encouraged to contribute to the Fund.

2. Timely appropriations through the Annual National Budget

Timely and proper funding proposals should be made to the Parliament through the relevant ministries before the annual national budget is read and funds allocated for various portfolio.

3. Donor Countries

Foreign governments and donor agencies should be invited to fund specific areas such as developing of hospital facilities, training medical personnel and other services connected with CKDu

Mobilizing Political support

1. Develop common ground and build consensus

Mobilize political support for the CKDu problem amongst all political parties in the country. Indeed, it is imperative that government creates an enabling environment where common ground and consensus building on chronic diseases such as CKDu can thrive and receive the support and commitment of every politician needed to pass key budgetary allocations.

2. Engage with other Politicians

Special tours should be arranged for politicians to visit affected areas and inspect the facilities, meet patients and families stricken with CKDu as most of them do not have hands on experience on the suffering of CKDu affected families and the conditions that prevail in affected areas.

Research

1. Prioritize Research

Identify priority areas for research and share these with the research community. There should be a database of all the research done and the current research in progress. This will help researchers to know what is already done and avoid duplication.

2. Research Methods

The research should be conducted on internationally accepted scientific methods so that other researchers may replicate the study in different contexts to continue reviewing and scrutinizing the validity of the results.

3. Ethical Issues

Adherence to Research ethics should be emphasized, as any result that is publicized will have repercussions on many stakeholders such as the public, farmers or the agro-chemical companies.

APPENDIX E

ANURADHAPURA DISTRICT MAP OF CKDU (VILLAGE PADAVIYA IS ON TOP OF THE MAP)