

# Advantages of traditional farming practices, the evolution to reductionist agriculture and the problems therein

## 1.1.1. Change in food production practices – The overarching timeline

While a detailed history of the agrarian practices of the country are not relevant to this report, a general idea of the lead up to the present is in order since components of this intervention are based on traditional knowledge and a general idea of those with respect to societal norms, governance and food production is not going to be amiss.

Considering that journey, three distinct eras are observed. These are the era of the kings, the transit across colonization and the post green revolution era.

### 1.1.1.1. The era of the Kings:

Food production culture was based on three non-negotiables:

1. Food was nature's gift and therefore the human-environment interface had to be harmonized
2. All citizens had to be able to eat whatever they want whenever they want (Food Sovereignty)
3. Consumption of social, economic and natural resources had to be need based only (Conservation)

In order to achieve the above, the older (feudal) social systems were based on ensuring the continuity of water and whoever secured the water was made the area leader (Wel Vidane) or the king (Raja)<sup>1</sup>. While the administration and governance was from a central capital (such as Anuradhapura), the majority of citizens lived removed from this location within micro-geographies that were largely self-sufficient. Such an area typically consisted of a still water body (wewa - tank), a place of congregation for discussion (a pansala - building roofed with thatching), a settlement (gama - village), a place for reflection (a dagoba - relic chamber centered environment or alternatively a panchavata - a sparsely vegetated area planted with five types of trees and shrubs, namely, bo, beli, nuga, kohomba and thulasi).



Photograph 10: Model of a traditional village in Sri Lanka  
(Model and Photographs GMSL)

During the time of the low country kingdoms, the central hills were kept pristine with the rulers and citizens understanding that it was the source of almost all of their river water. It was only with the shifting of the kingdom from Kotte to Kandy that any sort of anthropogenic activity occurred in those areas. However, these were strictly limited to the river valleys and basins with the kingdom itself established within the Kandy valley.

In all of these, food was largely produced and consumed within the micro-geographies making the production system both efficient and waste free while balancing the three factors of social stability, economic stability and environmental stability.

<sup>1</sup> Banda Mama, Personal Interview with Jayantha Wijesinghe, June 2020

**The cultivation tradition:** The country had a grain tradition that included a wide variety of rice as well as millets. The selection of the specific rice varieties to be cultivated was based on the environment, weather and water availability of specific areas with over two thousand rice varieties(Thilakasiri, 2019) known to have been cultivated during that period. During both the low country kingdoms and the Kandyan Kingdoms, fruit, vegetables and medicines were cultivated through methods that mimicked the way in which nature grew plants<sup>2</sup>. In the former, this was through chena cultivation while in the later it was through the Kandyan Home Gardens. Additionally, a significant proportion of foods were uncultivated and either harvested from the area of the settlements, the nearby forests or from plants that grew within homesteads or cultivation plots spontaneously such as some medicinal plants, leaf and root vegetables and even fruit such as mango and jak. The system ensured that there was minimal invasion of natural systems and most importantly, were methods that recognized that nature dominated all and that anything that was done against nature would fail over the distance.



**Photograph 11: Model of a Kandyan home garden** (Model and Photographs GMSL)



**Photograph 12: Drawing of Chena Cultivation** (Source: Dimah Conservation)

**Key point to be noted:** Both chena cultivation and Kandyan home gardens mimicked the way in which nature grew things and were therefore minimally invasive.

<sup>2</sup> Kunaratunga, N., Personal Interview, 31<sup>st</sup> April, 2021.

### 1.1.1.2. The transition through colonization:

The approximately 400-year history of colonial rule in Sri Lanka changed the very idea of how its citizens approached life but also affected its agrarian practices. This was most seen during the time of British Rule when the central hills were commandeered for growing crops for export including tea, rubber and coffee. Their twofold approach, typical of all colonists throughout history was a) control of the land, and b) resource exploitation. Using the alien legal system of Roman-Dutch law, it saw the first time use of commons was removed from citizens and the ownership of land in individuals. Additionally, the hitherto comparatively sacrosanct terrain of the central hills was wiped nearly clean of forest cover and planted over with tea become one of the root causes for both terrestrial topographic decline as well as reduction in the overall availability of water. Additionally, the period saw the first introduction of agricultural labor to a country where farming practices were through sharing of labor (human and animal) and resources (material and natural). Additionally, there was a serious confusion in the minds of people with respect to the governance systems of the earlier era based on “sirith” and that of the colonists based on laws. The upshot of it all was a confused citizenry who were conflicted in the divergence of agriculture for the primary motive of profit over farming for the primary motive of living and wellbeing as well as the two divergent governance cosmologies.



**Photograph 13: Colonial tea plantation in Sri Lanka**  
(Source: Sri Lanka expeditions)

### 1.1.1.3. Green Revolution to the present day

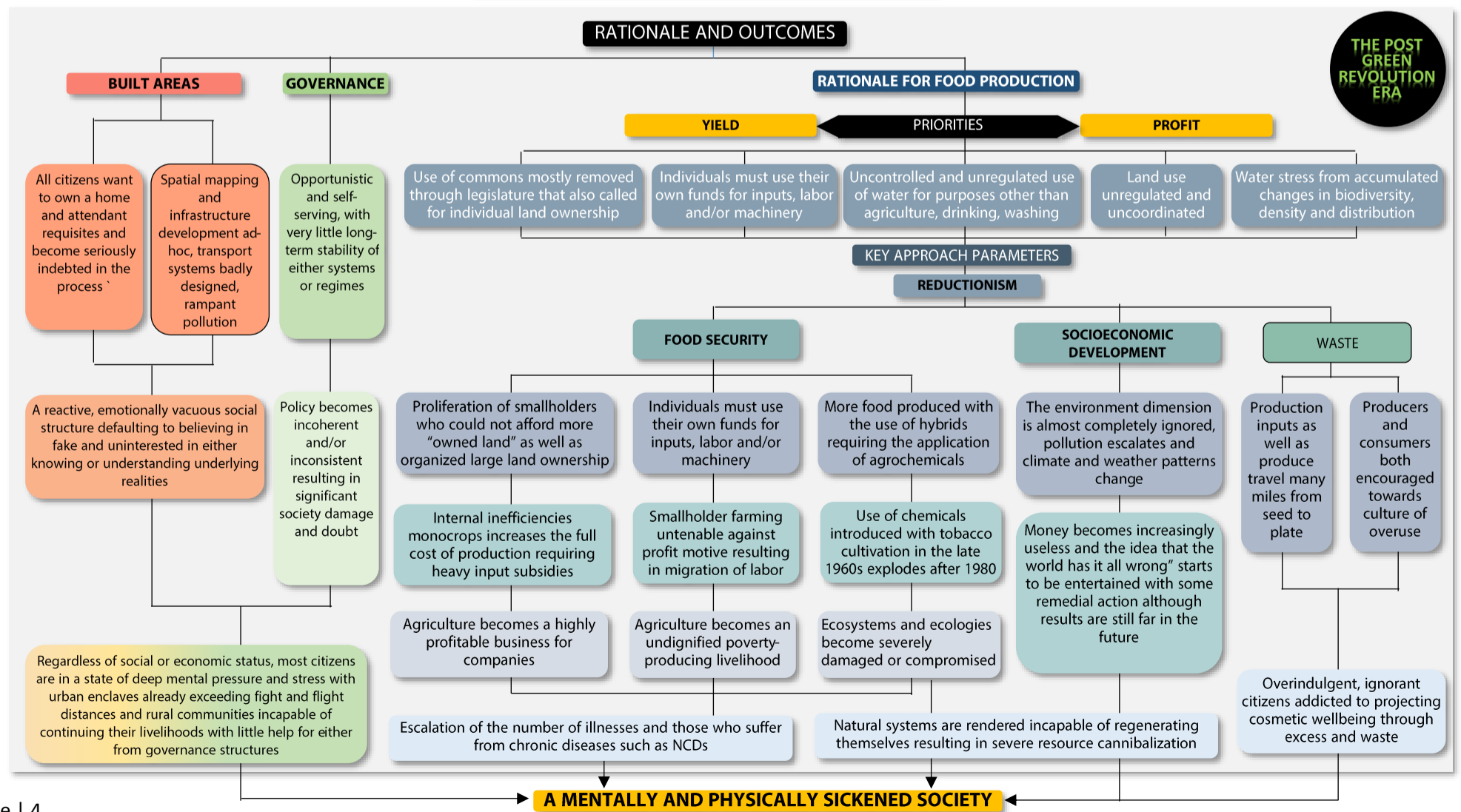
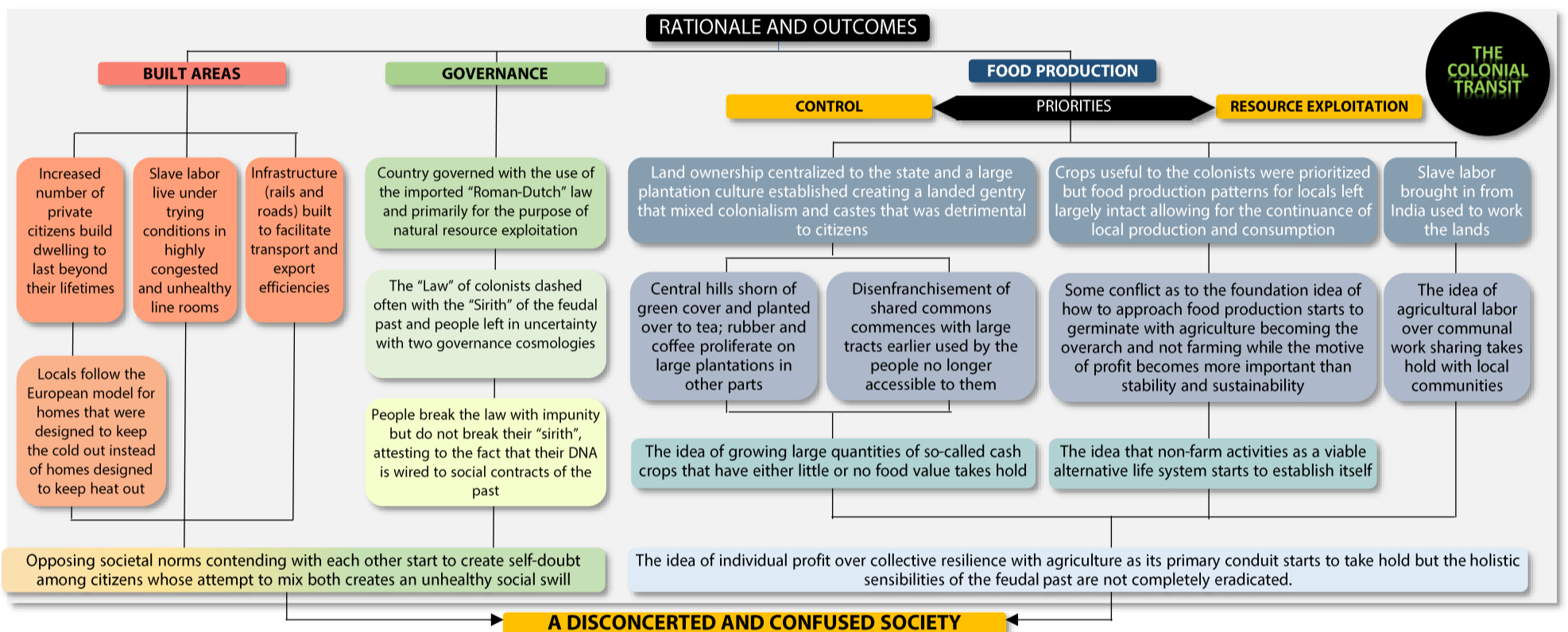
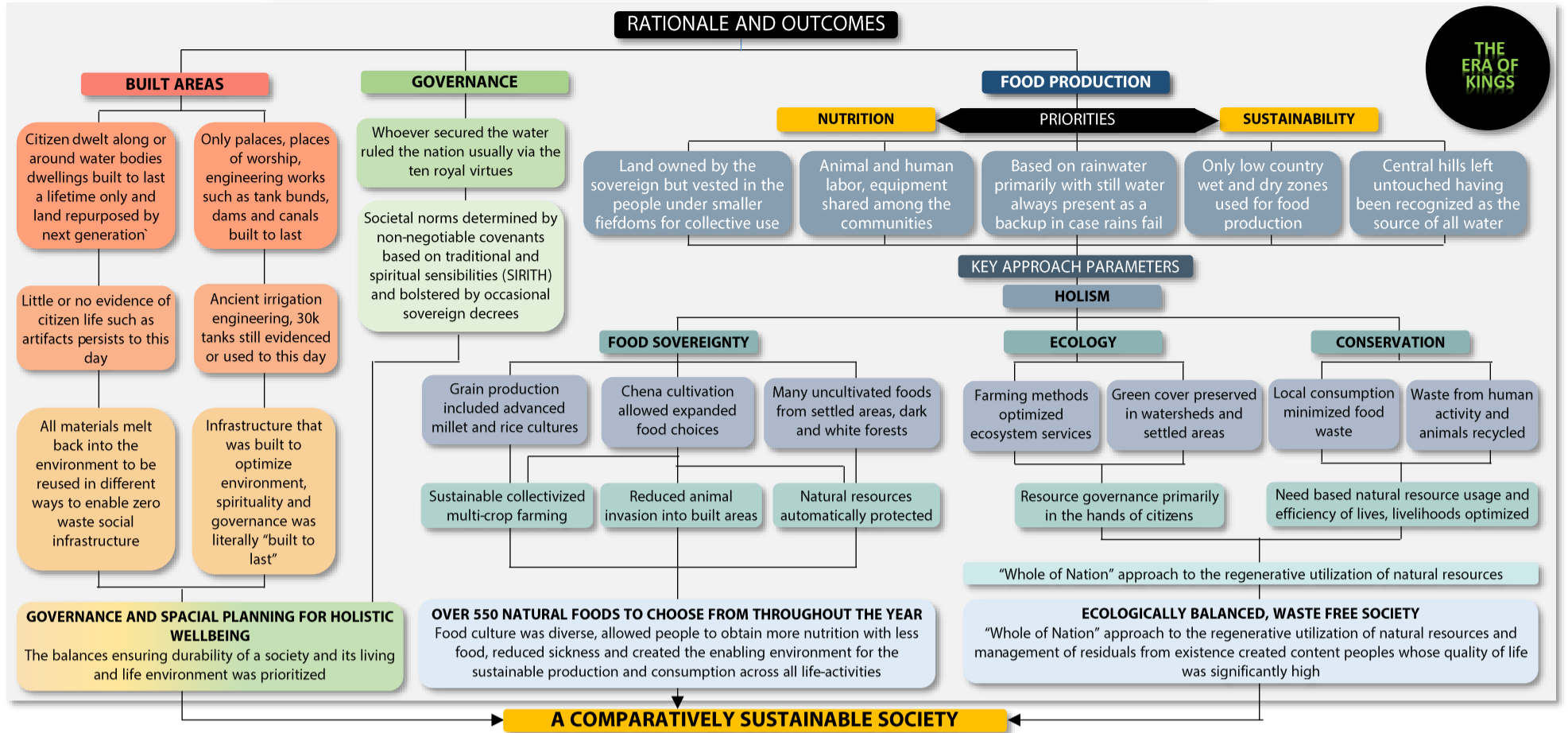
The era saw the introduction of agrochemicals through the introduction of tobacco cultivation in the early 1970s (SCOREHARD-TO/HG/HO, PHI Chandana, KPI-HO06). However, it was after the 1980s that agrochemical use became widespread with the opening of the economy in 1977 and the increased commandeering of commons, especially water, through the building of dams through the accelerated Mahaweli program. The entire process also created a new idea of environment engagement where the earlier, more sustainable mechanism of conservation by reducing waste leading to minimizing damage to the environment was replaced by the reactive method of protectionism mislabeled as conservation. This



**Photograph 14: Himbilyakada: Farmers forced into reductionist agriculture**  
(Photograph: GMSL)

This created “enforced no-go zones” that further disenfranchised people from making use of commons, forced them onto smaller and smaller land parcels and as mentioned above, aggressively forced to use agrochemicals in order to grow anything at all. The most important problem with this era was that nutrition density was replaced by yield density where the primary focus was on food security and not food sovereignty resulting in widespread incidence of malnutrition, NCDs and mental health problems. The processes of this history are provided in chart x below:

**DIAGRAM 02: THE EVOLUTION OF HOLISTIC FARMING INTO REDUCTIONIST AGRICULTURE**



## 1.2. Underlying issues in agriculture

Before going into detail on the specifics of community agricultural practices in and around the KCF, it is important to understand the underlying issues that affect all of agriculture since they will, in almost their entirety, affect the KCF as well. Therefore, a brief on these under-arches is in order.

### 1.2.1. Underlying Rationale: Need for an empowering, smallholder centric, organic approach to agriculture:

Sri Lanka is a small island nation comprising of just 65,610 square kilometers. Since the so-called green revolution, it has been estimated that over 30 million metric tons of agrochemicals (fertilizers, pesticides and herbicides combined) have been applied to this land (Weerakoon, 2016)<sup>3</sup>. This translates into an eye-popping 457 metric tons of fertilizer per square kilometer or 4.57 metric tons per hectare! To say that the land has been poisoned is an understatement. With soil and water polluted, agriculture has suffered, input costs have increased and abandonment of this most crucial sector by small-scale farmers and internal migration to urban centers is increasing rapidly. Entire villages have been either compromised or abandoned, village level culture has deteriorated and frequent uprisings and protests by farmers observed. Collateral fallout can be seen in massive spikes in NCDs and epidemics, the proliferation of hospitals, loss of biodiversity, and reduction in overall per capita nutrition that is costing the nation in terms of productivity, economy and social stability.

As Dr. Vandana Shiva states *“the ecological costs and natural resource conflicts associated with Green Revolution were rooted in the replacement of cropping systems based on diversity and internal inputs with systems based on uniformity and external inputs. .... It also changed the structure of social and political relationships, from those based on mutual obligation within village to relations of each cultivator directly with banks, seeds and fertilizer agencies, food procurement agencies, electricity and irrigation organizations. Further since all externally supplied inputs were scarce; it set up conflicts and competition over scarce resources, between classes, and between regions. Atomized and fragmented cultivators related directly to the state and market. This generated on the one hand, an erosion of cultural norms and practices and on the other hand, it sowed seeds of violence and conflicts”*<sup>4</sup>.

With the SDGs, the growing concern that Green Revolution-style farming is not ecologically, socially and economically sustainable has been recognized. It is also clearly noted that humanity needs an alternative form of agricultural development paradigm that is economically stable and sound, ecologically resilient and bio diverse, and socially just. It must be a production system that sustains the productivity-profit motive and balance, reduces the total amount of external inputs, leverages innovative and/or emerging technology, increases crop diversity, avoids or completely excludes agro-toxins and builds in environment health and regeneration as a key component of the entire process, shifting away from the idea of reductionist agriculture and moving towards holistic farming. **Here, it should be noted that investment in farming should not be about how much, but, rather, on how.**

In that respect, The International Assessment of Agricultural Knowledge Technology for Development (IAASTD) Global Report, and Report on The Right to Food by the UNHRC Special Rapporteur, Dr. Olivier De Schutter to UN, based on broad consultations with over 400 scientists all over the world and extensive literature reviews recommend for a fundamental shift towards small-scale farmer centric, ecosystem driven agro-ecology as a way to boost food production and improve the situation of the poorest. With the current dearth of human and farm resources required for a successful and sustainable small-scale farming practice, it is observed that a model that utilizes a mix of technology and agro-ecology is essential to help our currently debilitated farmers to pull themselves up by their bootstraps.

### 1.2.2. Primary problem: Breakdown of communal system, market economics and cash crops:

The reasons for the present crisis are manifold. Through community discussions, observations and personal experience, the various issues at the general level were identified by the GMSL agronomist. While some of these

<sup>3</sup> Weerakoon, R, 2016, ‘Use of Agrottoxins in Sri Lanka’ [Powerpoint Presentation], Strategic Enterprise Management Agency

<sup>4</sup> Shiva, V., 1991. Third World Network, The Violence of the Green Revolution, Chapter 5, “Political and Cultural Costs of the Green Revolution”

have been covered within other sections, they are reproduced here to highlight the intrinsic interconnect between all of the areas considered:

- Large scale growing of tea and coffee during the time of the British colonialists.
- Increased population centered on irrigation systems.
- The introduction of agrochemicals through the introduction of tobacco plantations in the sixties (this was the first introduction of non-food crops and some level of change in farmers towards the use of chemicals in farming)
- Commencement of waged labor agriculture
- The accelerated planting policy introduced by the government in the seventies
- Encouraging farmers towards high yield varieties that required high inputs of agro-toxins in the seventies
- With the advent of birth control, families that traditionally held 10-12 members was culled in the next generation seriously reducing the amount of labor available for farming efforts
- The small-scale illegal distilling of spirits and the use of villagers for that and other illegal anthropogenic activities was the start of the breakup of community cohesion.
- In the eighties, the Mahaweli Authority propagated the massive betrayal by introducing cash crops such as gherkins, baby corn, hybrid maize, hybrid melon that resulted in the application of massive doses of agro-toxins, the reduction of nutrition density, the disease of the entire country, the impoverishment the entire farming community and the debilitation of the agrarian sector of the nation.
- Hastening the complete breakdown of the sovereignty based agro-culture, heirloom varieties that kept the nation health were forced out of the planting culture and in their stead, so-called “dirty vegetables” or vegetables that carried significant levels of body-diseasing agro-toxins such as beans, hybrid bitter gourd, hybrid luffa/fence gourd, various types of pumpkin, long beans, chillie, brinjal varieties, cabbage, tomato, potato etc. was introduced.
- Those who had hitherto established their own stocks of heirloom seeds were forced to now purchase their seeds from commercial establishments destroying seed sovereignty and resulted in the uncontrolled application of agrochemicals, large-scale debt and extreme poverty and loss of dignity among the farming community. The problem was exacerbated by intermediaries taking over the supply chain who determined the price to primary producer.
- The ultimate upshot of it was that the people lost their food stocks and seed stocks and were irrevocably bound to the market for their very survival – a survival that was compromised by the level to which governments, officials, bad agricultural practices, market economics curbed their ability to live stable, hopeful, dignified lives.

### **1.2.3. Primary problem: Prevention of chena cultivation**

In the late eighties chena cultivation was banned and traditional farmlands were designated as no-go zones and instead of the collectivized communal mechanism, the government forced the people to abandon sustainable, regenerative, sovereignty based farming practices, corralled them on to small parcels of “owned land”, introduced high-yield varieties that forced the application of agrochemicals and forced farmers to cultivate according to a timetable designated by state officials. In these moves, it was erroneously stated that chena cultivation was “slash

and burn” cultivation. This is far from the truth. While those practices in Africa in particular were damaging to the environment, the practice of chena was one of the most sustainable food production mechanisms of the world and either solved or prevented a number of problems that are besetting food production in Sri Lanka. (The full explanation of chena cultivation is provided in annex 03).

#### **1.2.4. Primary problem: Reductionist agricultural practices:**

- Hybrids and agrochemicals were introduced from the early seventies onwards and spread across the island primarily via settlements ranged along the 103 rivers causing the following issues:
- The application of herbicides to paddy lands caused the destruction of medicinal plants that used to grow adjacent to them reducing the prevalence and in some cases, causing the local extinction of such plants
- With the prevention of chena cultivation the prevalence of medicinal plants that used to grow within and around them was reduced and in some cases, became locally extinct
- These caused the debilitation of free, centuries old medical systems that treated practically every type of ailment imaginable
- Lack of soil conservation, ill preparation of land, massive application of agrochemicals precipitated soil damage and caused increased erosion as well as small-scale local land slides
- With these factors, the total amount of organic matter reduced and coupled with monoculture and ill conditioned land use patterns rapidly reduced overall soil health and in a vicious cycle forced farmers towards chronic fertilizer application
- The discontinuation in the eighties of agrarian services and the introduction of agricultural advisory services broke the link that existed between the farmer and agriculture department and destroyed the trust that the farmers had that the department would provide sound advice
- The control that had existed to some extent in the sale of agro-toxins is weakened and the sale vested exclusively on the retail marketers and large companies
- Toxins that may have been comparatively safely used in remote land tracts intruded into home gardens poisoning people living in these areas
- While some soil conservation was visible in upper areas where the terraced schema was used, that same conservation is no longer present in lower lying areas

#### **1.2.5. Primary problem: Loss of labor force due to internal/external migration:**

1. The knock-on effect of the rapid drop in the ability of agriculture to support rural livelihoods was that women were forced to sell themselves on the international cheap labor / local sweatshop market and the loss of mother’s mentorship for children, alcoholism among males, adults forced into low-level, skilled/unskilled employment in urban centers, increase of vulnerability of abuse/ exploitation of girl-children and the destruction of communities and rural stabilities resulted.
2. Those who left, comparing erroneously, the surface “good lives” of urbanites and their schools/ hospitals/ roads/water /electricity etc., believed their villages lacked the basic infrastructure and moved permanently away from their traditional villages, selling their lands to various businesses, tourism interests etc. whose excessive use of natural resources (Especially land and water) created additional problems for the eco-balance and for those who still remained in their villages.
3. With the advent of the nineties, people abandoned ecofriendly raw materials for the construction of “lifetime only dwellings” and went in for permanent housing. Instead of utilizing water from wells, streams, waterways etc. they replaced these sources with piped water that allowed for uncontrolled, excessive use of the resource and a reduction of overall water availability to the rest of the people – especially – downstream communities. The problem was exacerbated by the uncontrolled drilling/digging of tube wells and agro-wells.
4. These problems were compounded by slow-onset events such as drought and soil depletion that precipitated climate-migration (SLYCAN:2020).

### **1.2.6. Exacerbating factor: Climate pressure significantly impacts sustainable agrarian livelihoods:**

Sri Lanka is slated to have a slightly lower increase in temperatures than the global average but impact on food production could occur in a myriad of ways from direct effects such as CO<sub>2</sub> availability, precipitation and temperatures and indirectly through water availability, seasonality, soil organic matter transformation, soil erosion, changes in pest and disease profiles, the arrival of invasive species, and decline in arable areas due to the submergence of coastal lands and desertification (World Bank:2020). Very broadly, over the last decade or so, the change brought about by global warming have resulted in the wet-zone of Sri Lanka becoming wetter and the dry-zone drier (Seneviratne:2017).

Wet-zone cultivation has become seriously compromised not simply due to climate stress but also due to development activities such as the Southern Transport Development Project (Southern Highway) compromising the five river basins in the western province across which it is traced. A rainfall spike of 180% YoY was observed between 2018 and 2019 in the wet-zone while precipitation data for Colombo (as an example) has seen a massive fivefold increase from 1,076.69 mm to 5,694.80 mm during the period 2012-2019. Similar trends may be seen at all of the key weather stations in the western province (World Weather Online). This indicates that agriculture as it existed can no longer be practiced in the same way in these climes. The Intermediate zone seems to have largely disappeared with only three pocket to be seen in Kurunegala, Matale and Monaragala.

### **1.2.7. Contributory factor: Agro-ecological awareness among farmers poor:**

As the world collectively moves towards sustainability, there has been a gradual increase in awareness of the ill effects of agrochemical-based methodologies. In this respect, however, the degree of awareness on the hazardous levels of pesticides was minimal, but their perceptions on the impacts of the pesticides on the environment, humans, animals and on food items sold was high (Sivarajah:2019). However, despite the fact that Sri Lanka had enjoyed a very strong natural agro-culture before the introduction of these methods, most of that knowledge has been allowed to first stagnate and then be rejected. Over the last seventy years or so, that gradual waning has resulted in few farmers practicing these techniques now. Although the toxin-free nation program did increase awareness of these issues to some extent during the previous regime, the comparative failure of that exercise to yield lasting and beneficial results has further distanced farming communities from these practices.

Overall, organic farming requires not only in-plot techniques but a much broader treatment of the agro-ecology. A treatment that needs to be done not as individual farmers within their own livelihood motives but rather, as a collective that can ensure a stronger, more diverse ecological scape that can yield the type of ecosystems services that are mandatory to assure farmers of a workable and durable practice methodology. At present, both awareness of these requirements as well as knowledge of how significant collective eco action is in ensuring strong individual bottom lines is still some distance away. This overarching problem was created through individualistic livelihood action and input based reductionist methods is one of the chief causes for the comparative lack of success as a nation in moving towards sustainable agrarian practices.

### **1.2.8. Contributory factor: Awareness of standards for organic and/or natural farming practices low:**

While there have been some farmers that have engaged in small-scale organic farming, these seems to be very little awareness of the actual standards that must be met to qualify their products to be organic or natural or sustainable either for the local market or for the export market. While self-certification and trust-based certification have been tried in the past with limited success, even a less rigorous certification such from international certifiers like Friends of Earth (FoE) and Friends of the Sea (FoS) have had limited acceptance in Sri Lanka. While strong efforts were made during the years 2016-2018 to obtain government backing for such certification, these efforts were not successful at the level where they would be mandated for any such organic/natural cultivation efforts.

Additionally, even those who were export-oriented Certified Organic (CO) small-scale farmers did not seem all that knowledgeable about the very standards that they had adopted, the third-party certification body, internal control system, Fairtrade certification, and conditions of contracts with coordinating organizations. Whilst most of those



farmers were out-grow groups managed via a coordinating organization, all CO farmers are unaware of the adopted organic standards. The majority were unaware of the third-party certification body (83%), and the internal control system (81.7%). Perhaps this was due to their exclusion in managing certification related aspects and submissive decision-making behavior. However, many of them were aware of Fairtrade certification (56.4%) as it provides a wide spectrum of additional benefits covering production, marketing, and farmers' welfare. Farmers are also aware of their contracts (verbal or written) with coordinating firms (62.2%) but hardly conscious of their conditions. In some contracts, conditions are unfairly distributed among stakeholders (Karalliyadda and Kusanari, 2018). The 2018 study recommends enhancing small-scale farmers' knowledge not only the production aspects but also certification, quality assurance, administration, and marketing as well. Meanwhile, mediating the partnership among stakeholders by a government body is also recommended to avoid power abuses among stakeholders.

#### **1.2.9. Contributory factor: Inequitable agricultural value chain dynamics create significant stress:**

Most of the approximately 12 million individuals whose livelihood is agriculture work very small plots of land with over 90% producing on less than 5 acres and 42% on less than 1 acre. The escalation of the application of inputs to maintain yields as well as the dominance of the produce transportation system by a few traders with strong political alliances have gradually dwindled the profit of the primary producer resulting in a socioeconomic crisis among rural agrarian families which constitutes over 2/3<sup>rd</sup> of the population of Sri Lanka. That crisis has created large scale migration of youth to urban centers to work either in the garment trade (women) or in auto-rickshaws (men) or migration overseas for blue-collar work (mostly women but a significant number of men as well). This in turn has reduced the agrarian labor force and increased its cost or forced farmers to resort to comparatively pricey automation increasing the cost of production. A collateral effect is that the more labor intense organic / natural agricultural practices are even less likely to be espoused by farmers unless the dynamics of the value chain are significantly shifted to make the entire process more equitable for the producer.

#### **1.2.10. Contributory factor: Postharvest losses significant due to lack of awareness and negligence:**

Despite the fact that the agricultural production of Sri Lanka is dominated by the small-scale farmer, there is very little knowledge or use of pre- or post- harvest technologies primarily because of the prohibitive initial costs of implementing such technologies. At present, it is estimated that between 20% and 44% of fruit and vegetable harvests are lost due to the lack of technology for postharvest handling (Faqeerzada, Rahman et al, 2018). The percentage losses are alarming to say the least and have a domino effect downstream reducing availability, security and nutrition while the primary producer ends up growing more and selling less making the entire agricultural livelihood untenable. In most cases there seems to be little knowledge among most of the stakeholders including farmers, state officials, Non-Governmental Organization (NGO) workers and traders who are part of the traditional supply chain.

In many cases a basic lack of tools can cause bruising of fruit and vegetables reducing their quality and shelf-life significantly. Further, insufficient attention to packing for transportation is also a substantive contributor to overall loss. In Sri Lanka, the mode of transporting fruit and vegetables is by packing as much produce as possible into jute gunnies and loading them willy-nilly into comparatively smaller trucks that are usually loaded to the hilt, crushing and damaging the produce. The use of good packing materials was tried at various points but was deemed prohibitive cost-wise by farmers and the status-quo has remained to the overall detriment of both the primary producer as well as the final consumer. Problems are compounded due to damage not being immediately apparent. For example, bananas are harvested in Sri Lanka at the mature green stage when damage due to harvesting and handling is not readily visible but once it is brought to market and ripens, the damage becomes apparent and looks visually poor (Sarananda,2000). Further, there are problems observed in the value chain in the use of ripening agents that have been in many instances tied to significant health hazards and reducing the quality of produce overall.

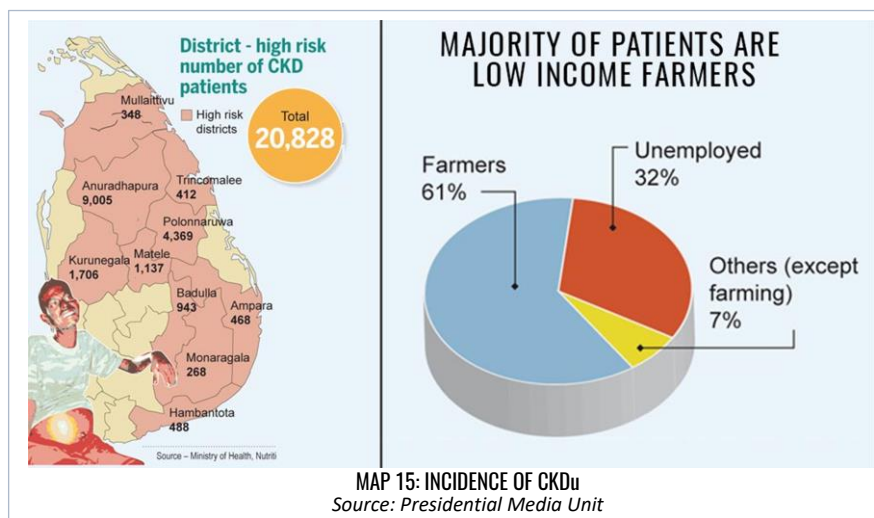
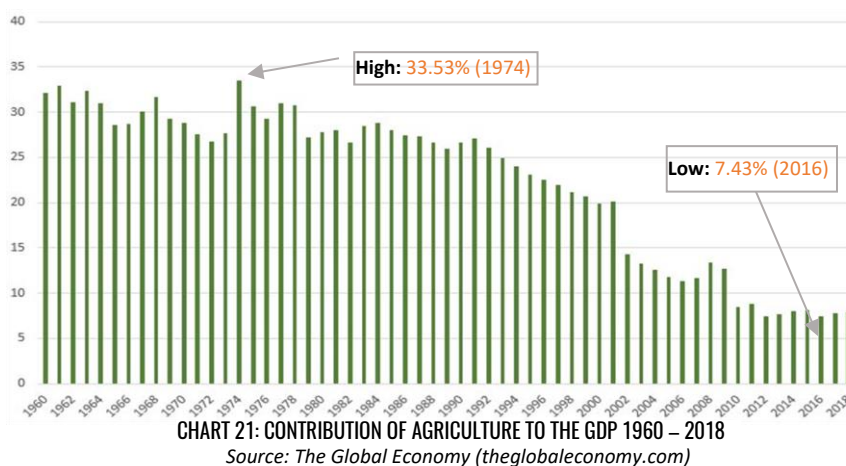
These issues point to policy gaps on one side and bad habits and the continuance of traditional practices that are good for produce that has fewer food miles but are terrible with those that travel any kind of distance before they get to the consumer and finally the plate.

**1.2.11. Contributory factor: Single point collection and transport costs erode profits of small-scale farmers:**

At present, much of the produce of small-scale farmers is brought to a single point of collection at Dambulla. This practice wastes time, consumes transport resources and contributes to postharvest losses. In addition, the high cost of road transport has also resulted in traders paying minimal prices to primary producers further reducing their profits. As mentioned in 2.1.6. the transport cost translates into bad packing practices where traders attempt to force as much produce into a unit space of transport as possible increasing damage to produce, lessened shelf-life and ultimately, an increase in postharvest losses.

**1.2.12. Contributory factor: Land deterioration negatively impacts production, social stability and health:**

Reductionist practices that include high levels of toxic inputs have gradually destroyed soil health. In addition, water bodies have become polluted. The upshot is that increasingly high amounts of inputs were required to maintain yields. However, over the last few years, there has been a tapering down of yields due to various types of plant disease especially in vegetables creating a situation where farmers are unable to pay off their debts creating impossible socioeconomic situations that have in turn spiked the incidence of suicides and farmer protests. Additionally, and more dangerously, farmers have become sickened due to the ingestion of agro-toxins with a serious increase in chronic kidney disease (CKD) as well as other Non-Communicable Diseases (NCDs). The issue became so serious that in some areas of the



North Central Province, entire villages have been abandoned (SEMA, 2016). This type of mass abandonment of agrarian livelihoods have created a situation that can very well degenerate to an extent where the food production of the country is compromised to such an extent that recovery may become impossible.

Chart 07 above shows the alarming drop of the contribution of the agricultural sector to the GDP and with most of the agriculture being done by the rural communities. It is also a clear indicator of the level of economic downturn and the reciprocal rationale for rural communities to abandon their primary livelihood. Additionally, map 07 shows the escalation of CKD and the fact that it is chiefly prevalent among rural, smallholder farming poor giving even greater urgency to the need to move away from symptomatic treatment and solve the problem in the rural agricultural sector at the paradigm and practice level.

### 1.2.13. Exacerbating factor: Human-Animal conflicts have resulted in loss of crops, life and property:

The human-primate (Cabraal et al, 2018) and human-elephant (Anuradha et al, 2019) conflicts have been increasing over the last decade due to loss of habitat through either human activities (clearing of habitat) or climate change (loss of species, flood and droughts etc.). The issues need blanket responses where communities work closely with the forest and wildlife officials to establish mechanisms of addressing these issues at both the micro-level of each GN as well as the macro-level of responding to problems with larger geographic footprints.

### 1.2.14. Contributing factor: Usage to Awareness ratio of organic foods low on the demand side:

Since 2015 when the world deterministically agreed to move towards a better idea of development that was more equitable to the world's people through a) The Sustainable Development Goals (SDGs of the 2030 agenda for sustainable development at the UN summit), b) the Paris Agreement on Climate Change (PA, of UNFCCC COP 21) and c) the Sendai Framework for Disaster Risk Reduction (SFDRR, Sendai Conference of 2015), there has been heightened awareness of what constitutes sustainable production and consumption across the planet.

Sri Lanka is no different in that respect. However, over the last four years (2015-2020) there has been comparatively little espousal of such practices despite strong messaging by the government, the consumer networks and other interest groups. The comparatively smaller percentage of guilt-free foods available, their higher cost and the reluctance of consumers to drop bad but convenient purchase and consumption practices are all seen as contributors (National Consumer Network of Sri Lanka NCNSL 2019). While for a time there was support for the shift in consumption practices these were subsequently marginalized at the policy level. Yet, with the new government, the mandate is strong on ecology, sustainability and wise consumer choices although at present, despite awareness, practice of that knowledge is weak (low usage to awareness ratio).

In that respect, one of the key problems identified is in the nutritional quality of the produced food. For example, heirloom varieties pack more nutrition into smaller containers than the hybrid varieties. At most fresh agricultural produce outlets these days, the shelves contain bloated biomass that passes for vegetables. They are cosmetically nice but nutritionally deficient. Therefore consumers must buy more of a fresh food to obtain the needed amount of nutrition. For example, one needs 5 portions of a modern apple to obtain the nutrition content of one portion of heirloom fruit. Therefore, consumers are actually paying more for less. Thus, yield fallaciously overriding nutrition on both sides of the market has compounded the problem with farmers growing more food that has less actual food value and the public eating more food necessitated by its low food value. Therefore, it is important to note that the food crisis cannot be solved purely through supply side interventions but requires equally strong demand side action as well.

## 1.3. Considerations related to the KCF

### 1.3.1. A mixed agrarian history:

The Villagers in the Peripheries of Forests (VPFs) in and around the KCF has perennially enjoyed a mixed agrarian culture with both cultivated and uncultivated foods constituting a significant component of their economies and their diets. In a large percentage of cases, the approach was their exclusive means for life. With the arrival of the "Culture of Protectionism" (CUP), three things occurred:

1. The food culture was lost and the sustainable management of forests was severely compromised,
2. The people were forced into a plethora of alternative activities to make ends meet of which the most damaging was reductionist agriculture, uncontrolled tourism and the newly illegalized activities related to access and utilization of forest resources including uncultivated foods and medicines,
3. Traditional knowledge of the use of biodiversity, especially in naturally growing medicinal plants was either vastly reduced or significantly lost.

As the FAO suggests, such knowledge, culture and consumption patterns are critically important while the economic benefits of non-timber forest uses (food and medicine) the earnings of VPF from those was substantial (Pushmakumara et al, 2011).

### 1.3.2. An untenable agricultural inheritance:

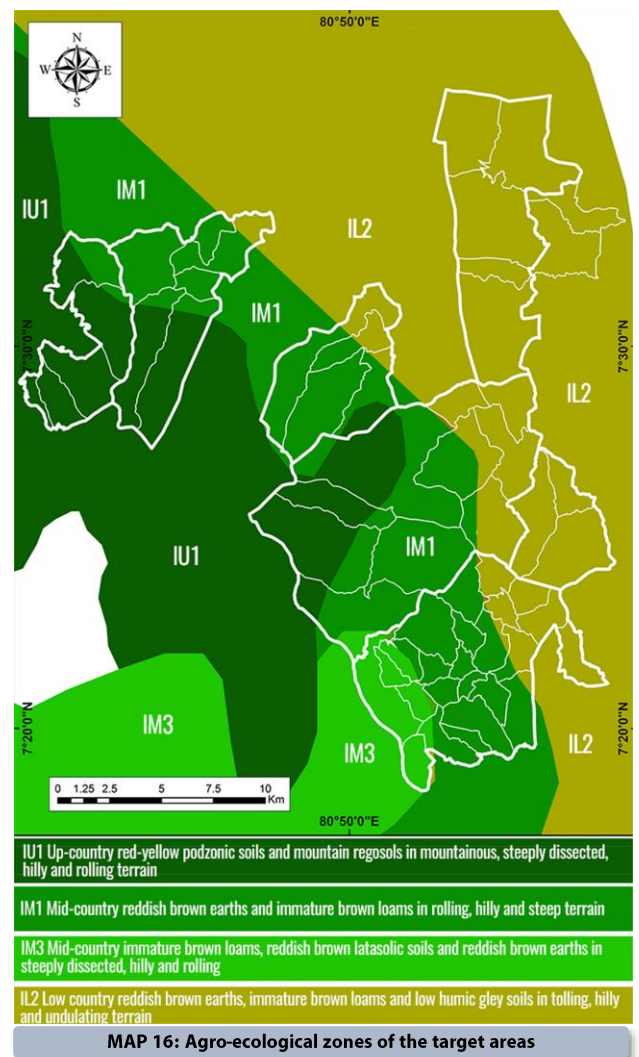
The advent of agrochemicals through the introduction of tobacco in the early 70s and the various CUP related laws and ordinances that arrived around the same time forced farmers onto smaller land parcels and the increased use of hybrid seeds and chemical inputs to somehow make the agro-economy viable at the smallholder level. These failed as seen in diagram 02 above. As seen in the heat maps (07 and 08) above, the impacts of prolonged use of agrochemicals has sent all of the areas into orange or red zones with respect to toxins and pollution. Additionally, it has resulted in a cultivation culture that is limited to a few vegetables and fruits and paddy (Table 22 below).

The cultivation of millets, once a staple growing under low-water conditions (IRDC, 2011) and critical part of the socioeconomics of the considered river basins has all but disappeared. Among the new planting options available to the people, pepper seems to be the least damaging and most economically viable option from an agricultural perspective but many vines are old with little use of science to optimize their yields or profits (ADO Bandara, KPI-HO08). However, the reductionist approach is visible here as well and the resultant is that the rich agro-biodiversity of Kandyan home gardens has all but disappeared from the area.

While the hydrology has been covered in some detail in chapter 03, it should be mentioned here that water scarcity and (in some instances), the commandeering of waterbodies such as small tanks by vested interests have compounded the agricultural livelihood problems for the people and, as Krunaratne of Udattawa stated “our water has been taken by one or two people who bought hundreds of acres here. They claim ownership of the water in those areas that we have used for many years. If that water were not shared, we would have no option but to go into the jungles (i.e. engage in upper level illegal chena cultivation)”<sup>5</sup>.

A fact that often goes unnoticed is that the chronic application of agrochemicals have significantly damaged the richest, most bioactive and mission critical layer of the soil – the 4”-9” layer of top soil. In areas of high chemical application, it was seen that the soil had become powdery. The GMSL observed that this factor was a common across the terrain regardless of the specific soil type that has been mapped as prevalent in that specific area indicating that whatever soil conditions exist below the topsoil of an area, every area is now working the land for food production in the same type of soil. The similarity is simply because it is dead across the terrain in agro-zones and requires a gradual escalation of chemical application to grow anything at all. Therefore, restoring soil health back to its original condition in order to grow crops that are optimized for those soil types (map below) is mandatory.

Further tragedy is seen in this changed environment with the people in those areas becoming sick with agro-toxins and having to use their meagre agricultural earning simply to buy themselves medicines to survive. This terrible state of affairs was attested to by a farmer from Udattawa and another from Himbiliyakada who both stated that



<sup>5</sup> Karunaratne, PI, March 2021

their effort in the field were merely for the purpose of survival, living out twilight existences with gross loss of productivity because of the clutch of NCDs they have to contend with.

Considering all of those factors, agrarian practice in these areas is now either untenable or rapidly becoming so.



Photograph 15: Options available for planting cardamoms on non-protected, degraded tea land such as Woodside estate (bottom picture) or Hare Park (top picture) (Photographs GMSL)

The cultivation and yields in the areas as seen at present is summarized in table 22 below. It is clear that just 8-10 vegetables are cultivated across the region while the fruit is sparse and other grains almost nonexistent compared to rice.

RIVER BASIN	GNDs	EXPORT CROP VOLUMES						COMMERCIAL CROP VOLUMES						LOCAL MARKET VEGETABLES – NO AREA OR YIELD VOLUMES AVAILABLE			
		Pepper		Cardamoms		Nutmeg	Tea	Paddy		Grains		Sparse fruits	Melon		Banana		
		Acres	(Kg / year)	Acres	Kg/ acre	Acres	Acres	Maha (Acres)	Yala (Acres)	Bushels	Acres	Kg / year	acres		Acres	Kg / year	acres
Heen Ganga	Meemure	144	32200	1		-	-	135	98	69.5	12	9600	1	-	-	1/2.	Beans, Chilies
	Karambaketiya	42	12600	-		-	-	-	-	69.5	-		1/2.	-	-	1/2.	Beans, Lima, Tomatoes, Chilies
	Pussella	138	41400	-		-	-	161	118	69.5	3	2400	1	-	-	1/2.	Beans, Tomatoes, Brinjals
	Kumbukgolla	110	33000	-		-	-	137	109	69.5	8	6400	1/2.	-	-	1/2.	Beans, Tomatoes, Lady's Fingers, Lima, Chilies, Brinjals
	Kaikawala	51	15300	-		-	-	53	38	69.5	12	9600	1/2.	-	-	1/2.	Beans, Tomatoes
	Sulugune	-		-		-	-	77	35	69.5	45	36000	1	-	-	1,1/2	Gherkins, Beans, Chilies
	Dungolla	97	29100	-		-	-	72	45	69.5	12	9600	1	-	-	1	Gherkins, Beans, Chilies
	Udagaladebokka	45	13500	-		-	-	46	32	69.5	6	4800	1/2.	-	-	1/2.	Beans, Brinjals, Chilies
Galamuduna	38	11400	-		-	-	45	28	69.5	5	4000	1/2.	-	-	1/2.	Chilies, Beans, Lima, Lady's Fingers	
Barawardhana Oya	Udattawa	155	46500	-		-	-	320	170	69.5	20	16000	2	-	-	1,1/2	Beans, Lima, Tomatoes, Chilies
	Udattawa North	140	42000	-		-	-	165	98	69.5	14	11200	2,1/2	-	-	1,1/2	Beans, Lima, Tomatoes, Chilies
	Pallegaladebokka	120	36000	-		-	-	115	63	69.5	13	10400	1,1/2	-	-	1	Beans, Lima, Tomatoes, Chilies
Kalu Ganga	Halminiya	102	102000	1/2.	600	-	-	180	90	69.5	25	20000	2	-	-	1	Brinjals, Tomatoes, Pumpkin, Capsicums
	Ranamuregama	150	150000	1/2.	600	-	-	186	95	69.5	20	16000	2	-	-	1,1/2	Winged beans, Tomatoes, Chilies, Brinjals
	Lakegala	170	170000	2	2400	-	-	35	10	69.5	5	4000	2	-	-	1,1/2	Tomatoes, Brinjals, Capsicums, Pumpkin

	Narangamuwa	160	160000	1/2.	600	-	-	70	30	69.5	30	24000	2	-		1,1/2	Luffa, Chilies, Tomatoes, Brinjals
Namini Oya	Moragahaulpatha	-		-	-	-	-	715	685	69.5	70	56000	2	30	480000	2	Lima, Winged beans, Brinjals, Chilies
	Hettipola	-		-	-	-	-	339	300	69.5	55	44000	1	40	640000	1/2.	Tomatoes, Chilies, Brinjals, Lima, Winged beans
	Nagolla	-		-	-	-	-	125	95	69.5	60	48000	1			1	Pumpkin, Chilies, Capsicums, Tomatoes
	Himbiliyakada	-		-	-	-	-	142	220	69.5	40	32000	1	75	1E+06	1	Luffa, Brinjals, Lady's Fingers, Tomatoes
	Veheragala	-		-	-	-	-	563	230	69.5	45	36000	1	60	960000	1,1/2	Chilies, Capsicums, Luffa, Pumpkin, Brinjals
Thelgamu Oya	Pitawala	30	30000	1	1200	-	-	142	77	65	2	1600	1/2.	-		1/2.	Luffa, Brinjals, Chilies, Beans
	Rathninda	25	25000			-	-	118	63	65	8	64000	1	-		1/2.	Pumpkin, Tomatoes, Chilies
	Etanwala	8	8000			-	-	150	75	69	5	4000	1	-		1/2.	Beans, Lima, Chilies, Capsicums
	Meda Ela	8	8000			-	-	73	31	63	15	12000	1	-		1/2.	Brinjals, Chilies, Pumpkin, Luffa
	Mahalakotuwa	60	Table 32: Crop patterns and harvests of the target areas (Source: Statistical Handbooks, Kand, Matale, 2020)														Capsicums, Beans, Lima, Tomatoes
	Ilukkumbura	1	1000			-	-	62	30	65.5	5	4000	1,1/2	-		1/2.	Lima, Chilies, Capsicums, Winged beans
Sudu Ganga	Bambarakiriella	10	10000	6		1/2.	25			-	-		2	-		1/2.	Tomatoes, Chilies, Lima
	Horagolla	10	10000	8		3/4.	25	15	15	-	1	800	1	-		1/2.	Tomatoes, Pumpkin
	Welangahawatta					-	-	58	36	66.5	2	1600	1	-		1	Pumpkin, Capsicums, Lima
	Medawatta	2	2000	100	120000	1	1800	4	4	64.5	-		1	-		-	
	Dambagolla	15	15000	8		1/2.	25	15.5	15.36	63	1	800	1	-		1/2.	Luffa, Brinjals, Tomatoes
Hasalaka Oya	Kirigankumbura	145	43500	-		-	-	73	55	69.5	9	7200	1	-		1	Beans, Chilies, Tomatoes, Brinjals
	Gedaramada	105	31500	-		-	-	65	32	69.5	12	9600	1	-		1	Beans, Chilies, Lady's Fingers
	Thalagune	140	42000	-		-	-	195	88	69.5	23	18400	2	-		1	Tomatoes, Beans, Brinjals, Lima, Chilies
	Dambagahapitiya	155	46500	-		-	-	27	18	50	8	6400	1,1/2	-		1/2.	Brinjals, Beans
	Kobonila	111	33300	-		-	-	3	3	69.5	7	5600	1	-		1/2.	Beans, Lima, Chilies
	Pallekanda	87	26100	-		-	-	99	62	69.5	12	9600	1/2.	-		1/2.	Brinjals, Beans
	Wadawalakanda	139	41700	-		-	-	103	70	50	6	4800	1	-		1/2.	Beans
	Kandegama	137	41100	-		-	-	65	24	69.5	-		1	-		1/2.	Beans, Brinjals, Lady's Fingers
	Udawela	128	38400	-		-	-	192	87	69.5	12	9600	1,1/2	-		1,1/2	Beans, Chilies, Lady's Fingers
	Hanwella	117	35100	-		-	-	190	125	69.5	12	9600	1/2.	-		2	Beans, Lima
	Andideniya	137	41100	-		-	-	69	38	69.5	16	12800	1,1/2	-		3/4.	Beans, Lady's Fingers, Tomatoes
	Moonamalpelessa	130	39000	-		-	-	68	30	69.5	12	9600	1	-		1,1/2	Beans, Winged beans, Chilies
	Geradigala	135	40500	-		-	-	128	88	69.5	12	9600	1	-		1	Tomatoes, Lima, Chilies, Beans
	Pallewela	158	47400	-		-	-	167	92	69.5	12	9600	1	-		1	Beans, Chilies, Winged beans
	Kalu Gala	125	37500	-		-	-	112	68	69.5	9	7200	1	-		1	Beans, Lima, Winged beans
	Udailuka	125	37500	-		-	-	75	44	69.5	4	3200	1	-		1/2.	Beans
	Dumbaragama	130	39000	-		-	-	60	28	69.5	11	8800	2	-		1,1/2	Beans, Tomatoes, Lady's Fingers
	Padupola	97	2910	-		-	-	56	29	69.5	8	6400	2,1/2	-		-	Beans, Chilies, Lady's Fingers
	Kalugaloya	113	33900	-		-	-	116	66	69.5	5	4000	1,1/2	-		1	Beans, Winged beans, Tomatoes
	Udakumbura	116	34800	-		-	-	53	30	69.5	15	12000	1	-		1	Beans, Tomatoes, Lady's Fingers, Lima, Chilies, Brinjals
poppitiya	139	41700	-		-	-	128	72	69.5	20	16000	2	-		1,1/2	Beans, Tomatoes, Lady's Fingers, Lima, Chilies, Brinjals	
Oyathenna	125	37500	-		-	-	80	65	69.5	15	12000	1,1/2	-		1	Beans, Tomatoes, Lady's Fingers, Lima, Chilies, Brinjals	
Rathella	135	40500	-		-	-	160	160	69.5	24	19200	2,1/2	-		2	Beans, Lima, Tomatoes, Chilies	

## The destruction of forest cover and the intrusion of wildlife into farmlands:

### The mechanics of the problem

While there are those who consider these two factors to be treated separately, they are obviously interconnected although they are not the only parameters that influences the issue. While this problem is present across the country, it has become relevant to the KCF at a significant level only in the recent past. The mechanism through which the problem actually happened is given below:

- With the banning of chena cultivation, the enrichment that allowed wildlife to live either in the dark forests or peripheries was removed creating the conditions for them to intrude into human habitats,
- The chena lands that were taken over by state agencies was allowed to go fallow and forest cover was severely mismanaged,
- Large-scale cultivation of flora that could not be used by any fauna as food such as eucalyptus, pines, acacia were grown in terrain above villages,
- Large tracts of land that had been taken over by the forest department remained as fallow land overrun by such invasive plants as guinea grass,
- With the spread of these invasive species into farmland, there was a proliferation of rats and mice (Dr. Dissanayake, KPI-HO05) and pests such as peafowl, porcupines, giant squirrels and torque macaques (Rev. Chandrajothi, KPI-HO04 et al),
- Hunters as well as area residents set fire to these lands every year, and, these fires spread into protected forest areas causing hundreds of acres of pristine forest destruction each year,
- The fires destroyed the humus layer of the dark forest bed killing off the seeds required for the regeneration of the forests over the next generation,
- With the underbrush potency damaged, these were in turn re-invaded by guinea grass resulting in the breakup of the integrity of the dark forest ecosystem and gradually turning it into open forest or white forest that does not have the same capacity to provide ecosystem services as dark forests,
- This destruction was also followed by the death of many faunal species while such species as snakes and other poisonous creatures that were in many ways helpful in controlling the numbers of other species lost their habitats and invaded settlements,
- The construction of large and small water bodies within these protected areas disrupted weather and climate patterns impacting agriculture and wild animal habitat stability,
- The destruction of forest cover resulted in large-scale erosion while springs dried up creating water pressure on both upstream and downstream communities while simultaneously causing high levels of downstream siltation of both static and moving water bodies,



**Photograph 16: Lush chenas turned into scrub** (Photograph: GMSL)



**Photograph 17: Pepper @ Meemure.** (Photograph: GMSL)

- The construction of large reservoirs resulted in wild animals becoming pests, moving into settlements and destroying farmland crops.

The dynamics of these problems are quite complex and in some instances near impossible to solve with the problem reducing to that of how to manage increasing populations, bad land use policy, terrible environment policy and practice, questionable environmental activism and the perennial issue of development.

