AGRO REGIONAL PLAN

CONNECTED, CULTURED & CIRCULATED LAND IN THE NORTHWEST OF SRI LANKA

Agro Regional Planning and Design Studio 2025
Department of Town & Country Planning, University of Moratuwa

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EXECUTIVE SUMMERY

Sri Lanka possesses a rich and diverse agricultural landscape. As of 2022, approximately 45.46% of the country's land area is devoted to agriculture. This sector remains vital, employing a significant share of the population and making a substantial contribution to the national economy. In this context, evaluating and optimizing the utilization of agro-regions is essential to strengthening food security, promoting sustainable agricultural practices, and supporting equitable socio-economic development.

The Agro-Regional Planning and Design Studio of the *Bachelor of Science Honours in Urban Informatics and Planning* degree programme is designed to equip students with the knowledge and skills required for effective agro-regional planning. The studio emphasizes the integration of agricultural productivity, environmental sustainability, socio-economic development, and spatial planning.

This report presents the outcomes of an agro-regional planning project focused on Sri Lanka's Northwestern Region, an area of significant agricultural and socio-economic importance. The study adopts a problem-driven approach, identifying the erosion of agricultural resilience as the central issue. This challenge is closely linked to structural land ownership patterns, which fragment farming decisions and hinder coordinated development.

To address this issue, an Agro-Efficiency Index (AEI) was developed to spatially evaluate agricultural performance across four key dimensions: Inputs, Infrastructure, Inhabitants, and Institutions. The AEI serves as a diagnostic tool to guide evidence-based interventions and prioritize resource allocation (The full analysis report can be provided upon request).

Building on these insights, five strategic directions were formulated:

1. The collaborative model proposes implementing Land Pooling and Consolidation for Collaborative Farming and Sustainable Land Management
2. Establishment of a circular agriculture system through improved waste management and resource recycling.
3. Integration of information systems and extension services to enhance market intelligence and support informed farmer decision-making.
4. Promoting Agri-culture tourism

Among these strategies, the first and thrid are presented in this volume, together with their associated spatial strategies (Other volumes can be provided upon request). Collectively, the proposed strategies aim to foster a connected, cultured, and circulated spatial structure. While the project focuses on the Northwestern Region, the conceptual strategies developed here hold relevance for the entire island, provided that relevant authorities undertake further study, analysis, and policy formulation for implementation.

සංක්ෂිප්තය

විවිධත්වයකින් යුතු කෘෂිකාර්මික පද්ධතියකින් ශ්‍රී ලංකාව පෝසත්ය. 2022 වසරේ දත්ත පෙන්වා දෙන පරිදි ශ්‍රී ලංකාවේ මුළු ඉඩම් ප්‍රමාණයෙන් 45.46% කෘෂිකර්මාන්තය සඳහා ප්‍රයෝජනයට ගනී. ශ්‍රී ලාංකිකයන් වැඩි ප්‍රතිශතයකගේ ජීවන වෘත්තිය හා බැඳී පවතින කෘෂිකර්මාන්තය ජාතික ආර්ථිකයට ද දැනට සැලකිය යුතු දායකත්වයක් ලබා දෙන අතර තවදුරටත් වැඩි දායකත්වයක් ලබාදීමට විභවතාවයන්ගෙන්ද යුතුය. මෙම සන්දර්භය තුළ, ආහාර සුරක්ෂිතතාවයට, තිරසර සංවර්ධනයට සහ සමාජ ආර්ථික සංවර්ධනයට කෘෂිකර්මාන්තය මත පදනම් වූ කලාපයන් හඳුනාගෙන සංවර්ධනය කිරීම අත්‍යවශ්‍ය වේ.

මෙබැවින් නාගරික තොරතුරුකරණය සහ සැලසුම්කරණය පිළිබඳව විද්‍යාවේ දී ගෞරව උපාධි වැඩසටහනේ එක් ව්‍යාපෘතියක් ලෙස ඵලදායී කෘෂිකර්මාන්තය මත පදනම් වූ කලාපීය සැලසුම්කරණය හඳුන්වා දී ඇත. කෘෂිකාර්මික ඵලදායිතාවය, පාරිසරික තිරසරභාවය, සමාජ-ආර්ථික සංවර්ධනය සහ නාගරික සැලසුම් ඒකාබද්ධ කිරීමේ අවශ්‍යතාවය මෙම ව්‍යාපෘතියෙන් අවධාරණය කරයි.

මෙම අරමුණ සාක්ෂාත් කරගැනීම සඳහා දීප ව්‍යාප්ත ව්‍යාපෘතියක ඇති අභියෝගය නිසා ශ්‍රී ලංකාවේ කෘෂිකාර්මික දළ ජාතික නිෂ්පාදිතයට වැඩිදායකත්වයක් සපයන උතුරු මැද, වයඹ හා මධ්‍යම පළාත්වලට අයත් භූමි ප්‍රදේශයක් මෙම ව්‍යාපෘතියට සලකන ලදී. කේන්ද්‍රීය ගැටලුව හඳුනා ගැනීමට වැඩි අවධානයක් යොමු කරන ලදුව ඉඩම් හිමිකාරීත්වයට හා සබැඳුණු තනි ගොවියන්ගේ තනි තීරණ, තනි කුඩා ඉඩම් අස්වැදීමේ සිට බෙදාහැරීම දක්වා විහිදෙන දුර්වල තීරණ ගැනීමේ රාමුව කේන්ද්‍රීය ගැටළුව ලෙස හඳුනා ගන්නා ලදී. මෙම ගැටළුව සමාජයේ සහ භෞතිකව කොතරම් විහිදී ඇත්දැයි විශ්ලේෂණයක් කෘෂි-කාර්යක්ෂමතා දර්ශකයක් තුළින් සිදුකරන ලද්දේ ක්ෂේත්‍ර අධ්‍යයනයන්, පාර්ශ්වකරුවන්ගේ දැනුම, දත්ත හා විද්‍යාත්මක ක්‍රමවේදයකට අනුවය.

විධිමත් විශ්ලේෂණයකින් පසු උපායමාර්ගික දිශානතීන් පහක් යෝජනා කරන ලදී.

1. තිරසර ලෙස ඉඩම් කළමනාකරණය හා සංචිත ඇතිකිරීම තුළින් ඒකාබද්ධ තීරණ ගැනීමේ සහයෝගී යාන්ත්‍රණයක් ඇති කිරීම (Collaborative model).

2. චක්‍රීය කෘෂිකර්ම පද්ධතියක් ස්ථාපිත කිරීම (Circular agriculture system).

3. සහයෝගිතා පද්ධතිය ඇතුළු කෘෂිකර්මාන්ත පද්ධතියේ කාර්යක්ෂමතාවය සඳහා තොරතුරු තාක්ෂණය යොදා ගැනීම (Information systems).

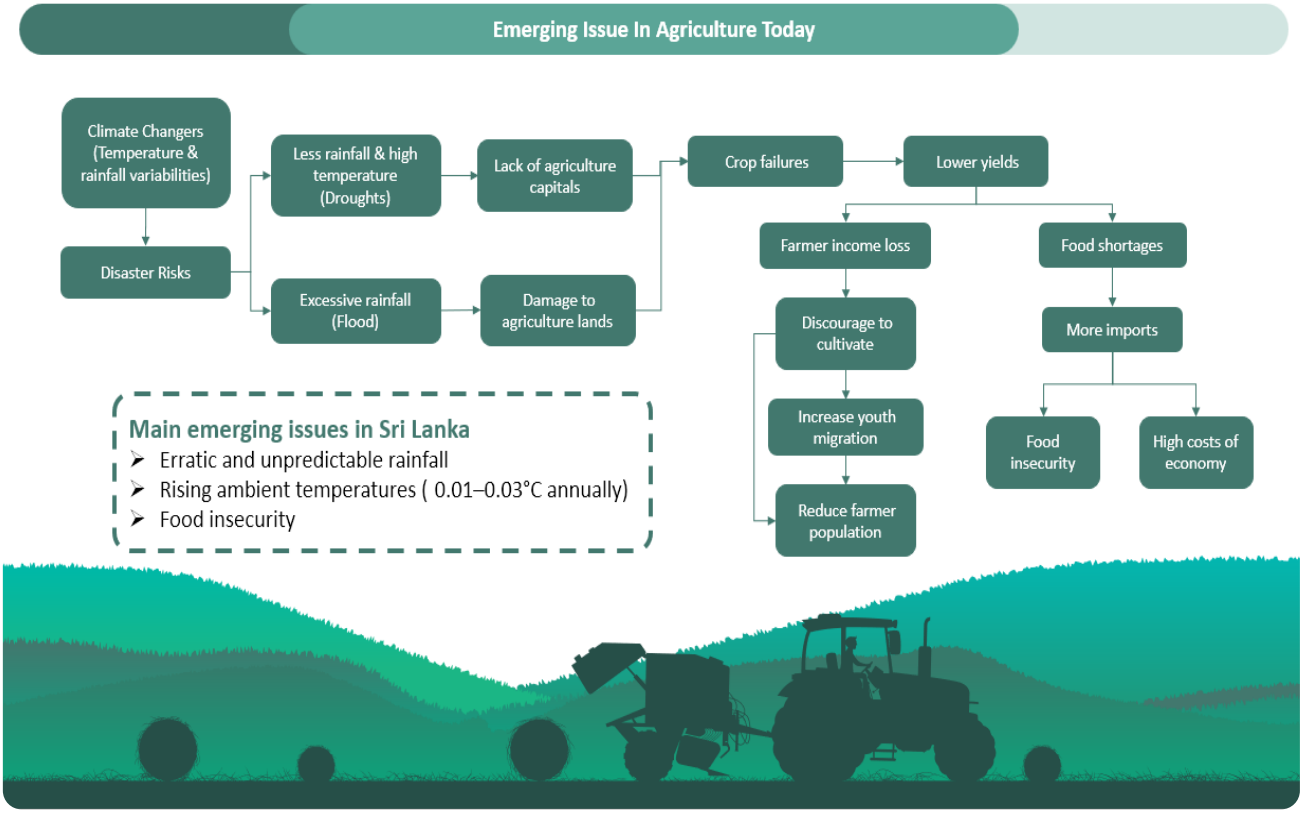
4. කෘෂි-සංස්කෘතිය හා බැඳුණු සංචාරක කර්මාන්තය ප්‍රවර්ධනය කිරීම (Agri-culture tourism).

මෙම උපායන් අතරින් පළමු හා තෙවැනි උපායන් විස්තරාත්මකව මෙම වෙළුමෙන් ප්‍රකාශිතය (අනෙකුත් වෙළුම් අවශ්‍යතාවය මත පළ කරමු). සාමූහිකව සංස්කෘතිය හා සබැඳුණු ක්‍රමවත්ව සම්පත් සංසරණය වන ජනාවාස ව්‍යුහයක් ස්ථාපනය කිරීම මෙම සැලසුමේ අරමුණයි. ව්‍යාපෘතිය දිවයිනේ එක් කලාපයකට වුවද, අදාල බලධාරීන්ගේ සහයෝගීතාවයෙන් සිදුකරන තවත් අධ්‍යයනයන්, විශ්ලේෂණයන් හා ක්‍රියාත්මක කිරීමට හැකි ප්‍රතිපත්ති සම්පාදනයන්, මෙම සංකල්පීය උපායමාර්ග මුළු දිවයිනේම ආර්ථික, සමාජීය හා භෞතික සංවර්ධනයට ඉඩ ප්‍රස්ථා සලසනු ඇත.

CONTENT

INTRODUCTION

Agriculture today stands at a critical crossroads, confronted by an unprecedented set of emerging threats. At the heart of this crisis is climate change, which is no longer a future concern but a present reality. This slide deck will detail how increased climate variability and disaster risks are directly leading to lower yields and farmer bankruptcies. Using Sri Lanka as a case study, we will examine the cascading effects from economic strain and increased imports to youth migration and national food insecurity that threaten the very foundation of our agricultural systems and food supply.



1.1 The Method of Study

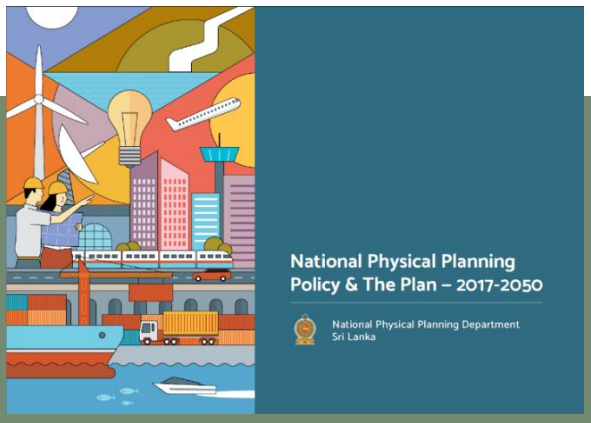
Secondary data review & understanding the context

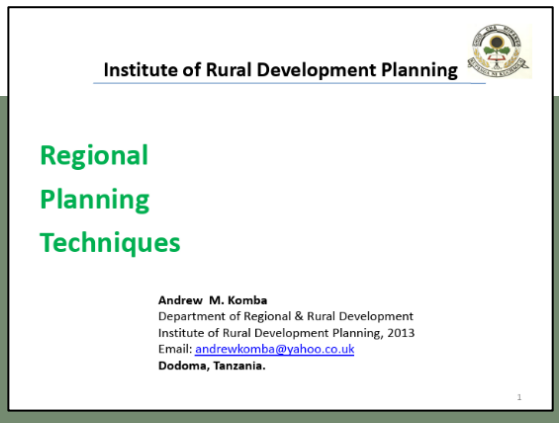
To build a strong analytical foundation, we conducted an extensive review of secondary data that went beyond spatial datasets and policy documents. This included the 2024 Agro-Regional Plan prepared by our seniors, Global Agro-Regional Planning Approaches, National Development Policies, and Political Manifestos. Key institutional reports such as the Central Bank Report, the National Physical Planning Policy, and sectoral assessments provided crucial insights into

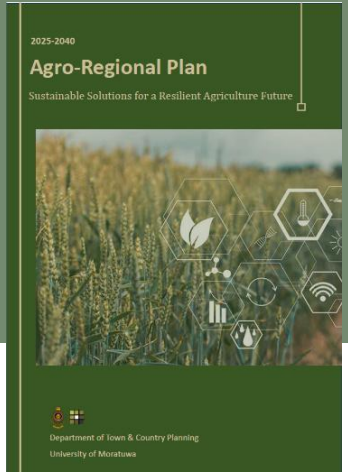
macroeconomic trends, demographic transitions, and structural shifts influencing the agriculture sector.

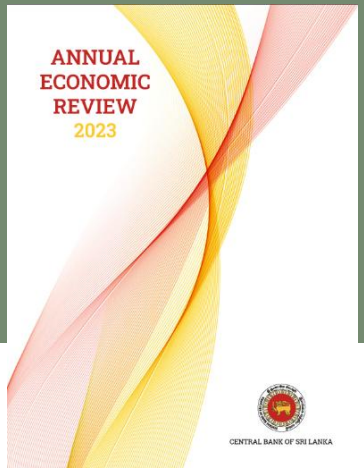
A significant focus of the secondary review was understanding the growing challenge of youth migration, particularly the movement of young people away from rural areas into urban centers or overseas employment. This trend has accelerated due to limited profitability in farming, declining access to land, and the attractiveness of non-agricultural careers. As a result, the agricultural labour force is aging, creating a demographic imbalance that threatens long-term sectoral sustainability. Related to this the deduction of farmer population, reflected in shrinking household-level participation in farming and an increasing dependence on hired or migrant labour. Many villages show declining cultivation intensity due to labour scarcity, which directly affects productivity, cropping diversity, and the management of shared systems such as tank cascades.

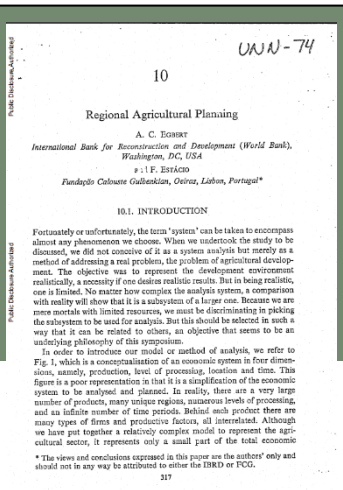
Our review also examined sectoral transformation, particularly the shift from agriculture toward industry and services. While this structural change is expected in developing economies, the rapid pace of transformation in Sri Lanka has reduced the resilience of the agricultural sector. Investment has increasingly moved toward non-agricultural sectors, weakening support systems such as extension services, farmer organizations, cooperative networks, and rural market infrastructure. These systemic changes have made agriculture more vulnerable to climate shocks, economic fluctuations, and input price volatility.







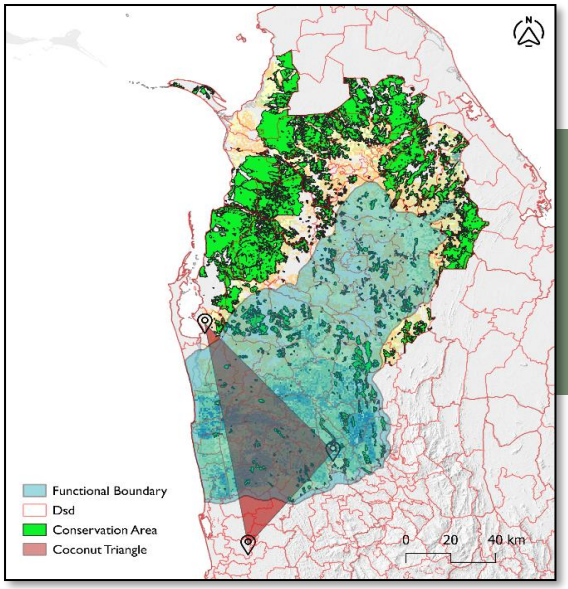


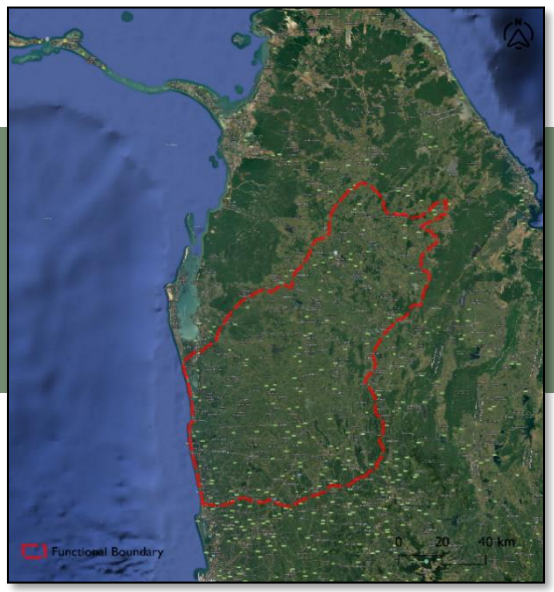


Here are some snapshots, which are taken from various social media contents, highlighting ground-level issues in the agricultural sector of the Northwestern Region.

Before the field visit, this secondary data informed a GIS-based boundary delineation process. We collected spatial datasets, reclassified them into suitability zones, assigned weights using expert judgment, and combined layers to identify agriculturally functional areas. Fragmented patches were adjusted, digitized, and validated through satellite imagery to create a preliminary boundary later tested and refined through field verification.

Selected boundary delineation map before field visit

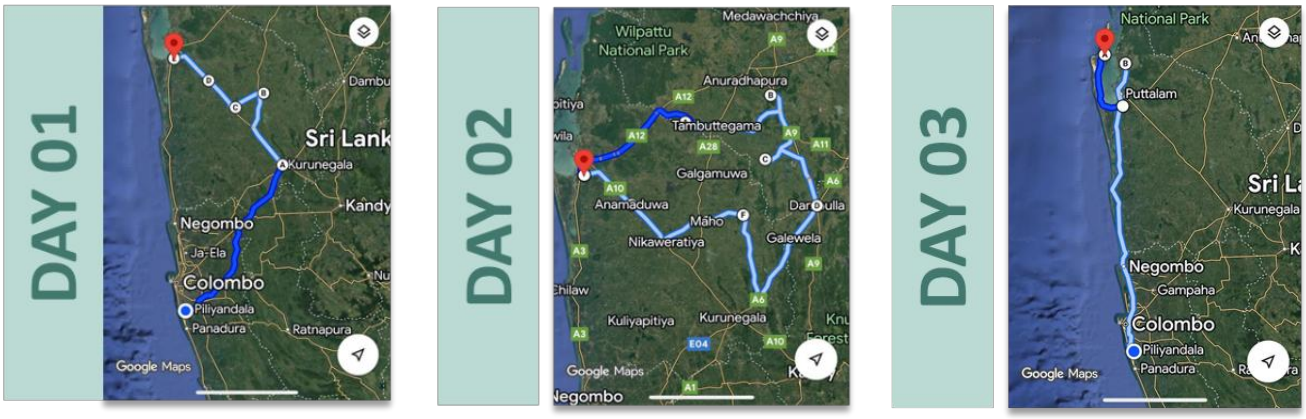




1.2 Field Visit

A three-day field visit was conducted to validate findings and gather ground-level insights. The team engaged with a wide range of stakeholders, including officials from the Departments of Agriculture, Irrigation, and the Coconut Development Authority, as well as the Central Environmental Authority. Most importantly, focus group discussions were held with farmers, market sellers, and consumers. Visits to locations like Norochcholai and Maho provided direct observation of agricultural practices and challenges, from production to market.

Day	Type	Description	Start Time	End Time
Day 01	Travel	UOM to Kurunegala	4:30 AM	8:00 AM
	Lunch	Breakfast	8:00 AM	8:30 AM
	Site Visits	Stake Holders Meeting	9:00 AM	12:30 PM
	Lunch	Lunch	12:30 PM	1:30 PM
	Travel	Travel to Ibbagamuwa	1:30 PM	2:00 PM
	Site Visits	Ibbagamuwa	2:00 PM	3:00 PM
	Travel	Travel to Maho	3:00 PM	4:30 PM
	Site Visits	Maho Visit	4:30 PM	5:30 PM
	Travel	Maho to Nikaweratiya	5:30 PM	6:00 PM
	Travel	Nikaweratiya to Puttalam	6:00 PM	7:15 PM
Day 02	Travel	Puttalam to Anuradhapura	6:00 AM	7:30 AM
	Travel	Anuradhapura to Nachchaduwa	7:30 AM	8:00 AM
	Site Visits	Nachchaduwa	8:00 AM	8:30 AM
	Lunch	Breakfast	8:30 AM	9:00 AM
	Travel	Nachchaduwa to Maradankadawala	9:00 AM	9:30 AM
	Site Visits	Maradankdawala	9:30 AM	10:00 AM
	Travel	Maradankdawala -kekirawa - Ipalogama	10:00 AM	10:30 AM
	Site Visits	Ipalogama	10:30 AM	10:45 AM
	Travel	Ipalogama to Balaluwewa	10:45 AM	11:15 AM
	Site Visits	Balaluwewa	11:15 AM	11:30 AM
	Travel	Balaluwewa to Madatugama	11:30 AM	12:00 PM
	Site Visits	Madatugama to Dambulla	12:00 PM	12:15 PM
	Travel	Dambulla	12:15 PM	1:30 PM
	Lunch	Lunch	1:30 PM	2:00 PM
	Travel	Dambulla to Ibbagamuwa	2:00 PM	3:00 PM
	Travel	Ibbagamuwa to Saliyagama	3:00 PM	3:50 PM
	Travel	Saliyagama to Ehetuwewa	3:50 PM	4:10 PM
	Site Visits	Ehetuwewa	4:10 PM	4:40 PM
	Travel	Ehetuwewa - Galgamuwa - Thambuttegama	4:40 PM	5:20 PM
	Site Visits	Thambuttegama	5:20 PM	6:00 PM
	Travel	Rajanganaya - Kala Oya - Puttalam	6:00 PM	7:30 PM



During our field visit, we organized a stakeholder meeting at the Provincial Agriculture Department in Kurunegala in order to validate our findings, capture ground-level perspectives, and ensure the plan truly reflects stakeholder needs and priorities. As part of the stakeholder meeting, we held focus group discussions making sure the voices, perceptions, and ideas of different stakeholders were heard and integrated into the process.

Beyond formal meetings, we stepped into the fields, markets, and irrigation systems - talking to farmers of at various scales, sellers, and consumers.

1.3 Boundary Delineation

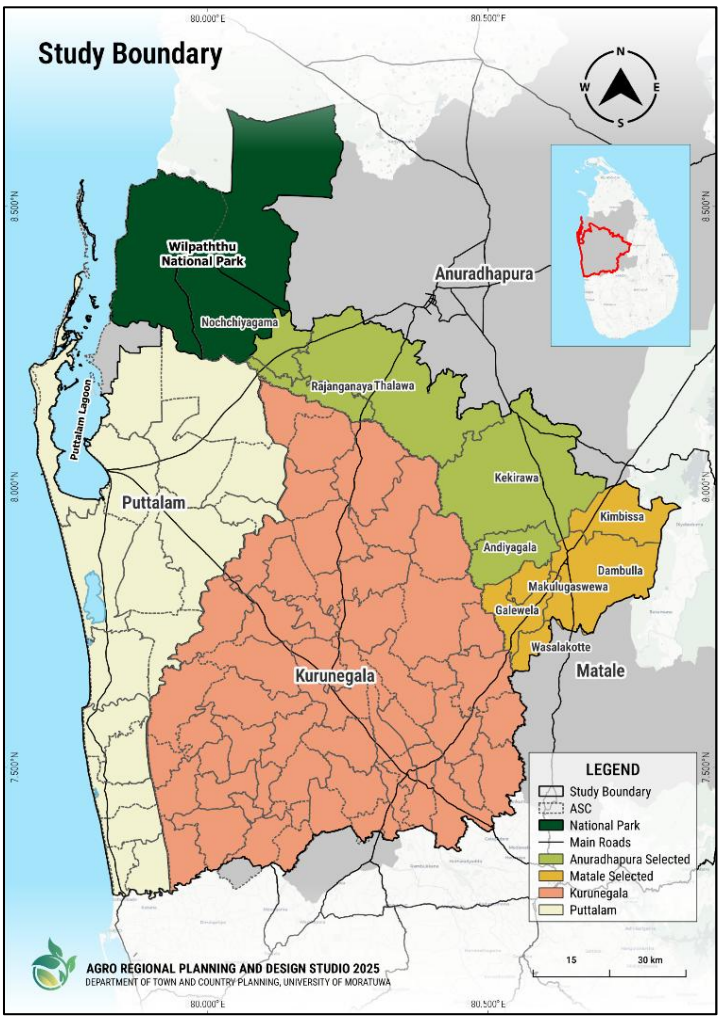
Boundary delineation aimed to create a functional agricultural region reflecting real farming systems rather than administrative borders. By integrating field observations with GIS analysis, the process captured how land, water, services, and markets operate as interconnected networks. This ensured a scientifically grounded boundary aligned with actual agricultural practices.

Methodology

Primary Data (Field validation)

Field visits and validation provided essential ground-level insight into the region's agricultural realities. Direct observations of cropping patterns, irrigation practices, and farmer behavior, along with discussions with farmers, traders, and consumers, revealed how agricultural systems function spatially. Walking through farms and tracing supply routes confirmed the accuracy of mapped service centers, tank cascades, and market flows. Farmers and traders validated the same networks and boundaries identified through GIS, demonstrating strong alignment between

mapped data and lived experience. This field-based verification grounded the study in local practice, ensuring the functional boundary accurately represents the real geography in which people farm, trade, and operate.



Secondary Data

The secondary data analysis integrated multiple spatial and thematic layers to define a functional agricultural boundary. Ecological integrity was ensured by excluding protected forests such as Wilpattu while incorporating surrounding buffer zones to balance conservation and agroforestry. Crop distribution data revealed strong dominance of paddy and coconut, supported by irrigation, with vegetables and export crops contributing to diversified livelihoods. Water resource mapping highlighted the dense ancient tank cascade system, a core determinant of agricultural productivity in the Dry Zone. Market connectivity, especially the role of the Dambulla DEC, demonstrated the region's integration into national supply chains. Agrarian Service Centers provided the functional framework, reflecting real farmer service zones. Development potential was assessed through alignment with the National Physical Plan and infrastructure corridors, ensuring future growth compatibility. Historical influences from ancient settlements to colonial canals and modern irrigation schemes explained enduring spatial patterns that continue to shape agriculture and regional connectivity today.

1.4 Stakeholder input analysis

The stakeholder analysis revealed a complex set of challenges grouped into five broad categories. Land and resource issues, particularly fragmented ownership, were frequently highlighted as barriers to efficiency and long-term investment. Farmers also reported soil degradation and increasing competition over water. In terms of production and technology, limited mechanization and weak adoption of modern methods were attributed to high input costs and inadequate extension services. Governance weaknesses emerged as another critical issue, with stakeholders noting poor coordination among agencies and ineffective policy implementation. Market-related constraints were also significant, including low bargaining power, unstable prices, and high post-harvest losses due to inadequate storage and processing. Finally, socio-economic and cultural pressures, such as rural poverty, youth outmigration, and an aging farming population added further stress to the system. Collectively, these issues show that the region's agricultural problems are not isolated but interconnected, requiring coordinated interventions across multiple domains.

These interconnected challenges are summarized in the stakeholder analysis table below, which organizes them into five main categories for clarity and comparison.

Land & Resource Challenges	▪ Fragmented land holdings, insecure tenure, and land-use conversions ▪ Excessive/improper use of water, fertilizers, and agrochemicals ▪ Water scarcity during low rainfall periods and lack of forecasting tools ▪ Conflicts over water allocation and weak institutional coordination
Agricultural Production & Technology	▪ Dependence on traditional farming methods; reluctance to adopt modern technologies ▪ Limited availability of quality seeds, fertilizers, pesticides, and machinery ▪ Significant post-harvest losses due to pests, inadequate storage, and poor market access
Governance & Institutional Weaknesses	▪ Weak collaboration among agencies and poor enforcement of regulations ▪ Limited success of community forestry and participatory conservation programs

	▪ High costs of maintaining irrigation and tourism-related infrastructure; insufficient facilities
Market & Value Chain Constraints	▪ Market dominance by intermediaries, price instability, and lack of market knowledge ▪ Minimal value addition and limited access to international markets
Socio-Economic & Cultural Factors	▪ Farmers' lack of financial/business skills; difficulty accessing loans and insurance ▪ Cultural attachment to traditional food habits ▪ Youth migration, aging agricultural workforce, and scarcity of local economic opportunities

Revised Problem Framing

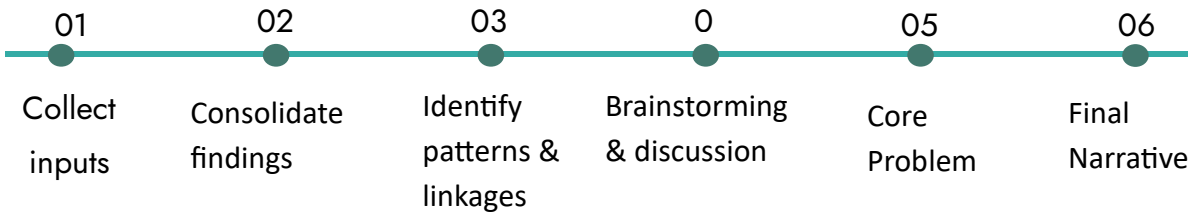


Figure: Process of Revised Problem Framing

The process of refining the problem framing followed a structured set of steps, illustrated in the figure. This framework began with the collection of inputs and progressed through consolidation, pattern identification, and collaborative brainstorming, ultimately leading to the definition of the core problem and the final narrative.

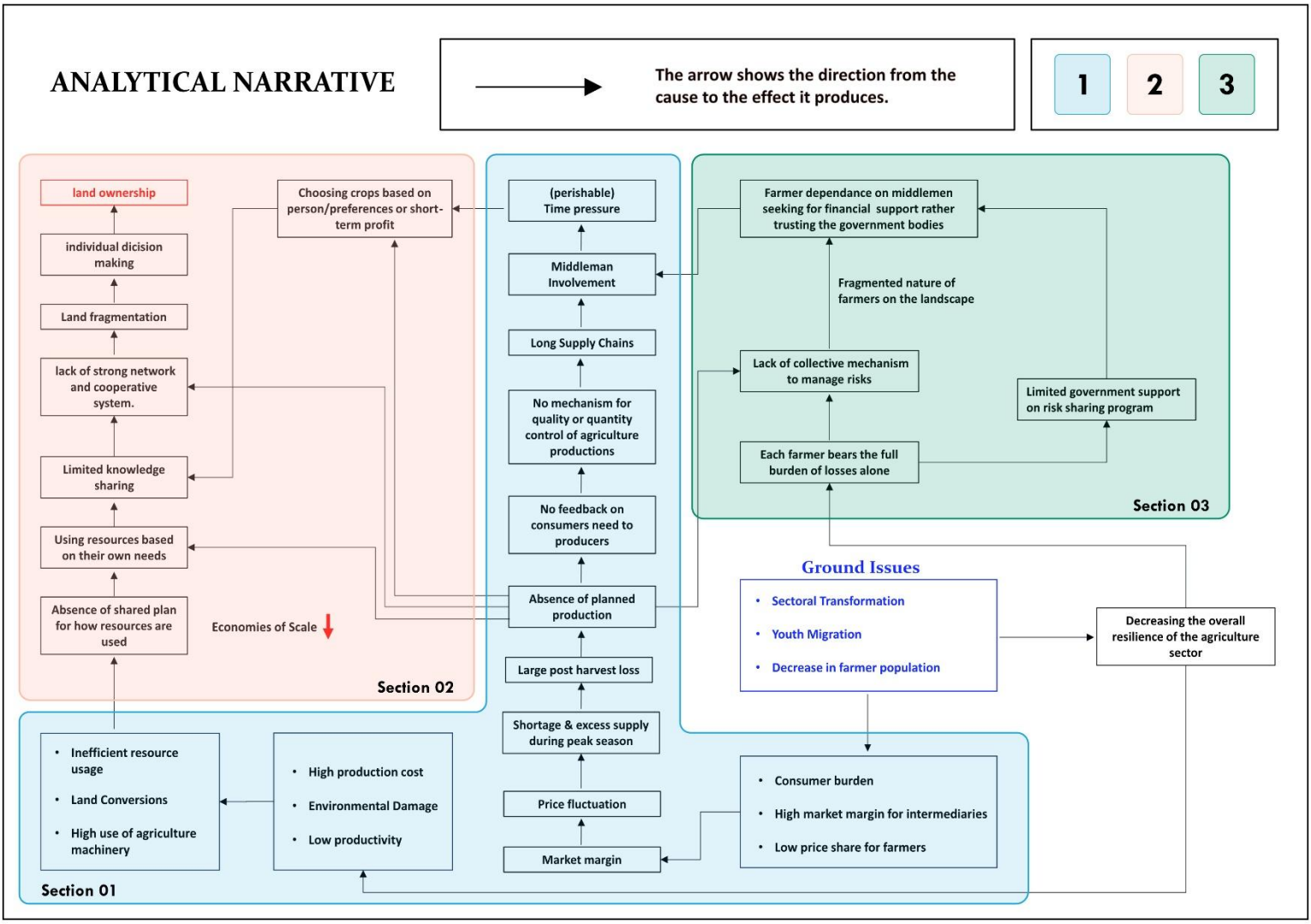
The problem framing process was refined through an iterative approach. Stakeholder feedback, field observations, and analytical findings were consolidated, and patterns were identified through collaborative discussions. Brainstorming sessions facilitated the linking of issues, moving the analysis from a fragmented set of problems toward a coherent narrative. For example, water scarcity was linked with governance gaps in irrigation management, while market challenges were tied to weak institutional support and fragmented land holdings. By connecting these layers, a sharper understanding of the region's systemic vulnerabilities emerged. The framing evolved into a narrative that reflects both empirical data and lived realities, ensuring a comprehensive understanding of the region's challenges.

Through this process, the initially scattered issues raised by stakeholders were consolidated into a coherent problem framing. This structured approach ensured that both field-based observations and stakeholder perspectives were systematically captured and connected. However, identifying the steps of framing alone was not sufficient, the relationships between these issues also needed to be explored in greater depth. This led to the development of the analytical narrative, which translates the refined framing into a connected storyline of problems.

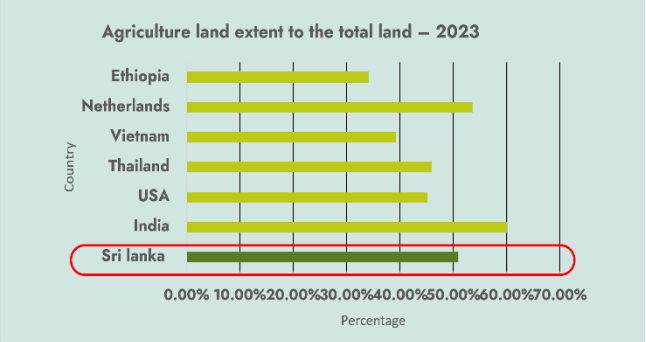
2. DETAIL ANALYSIS & FINDINGS

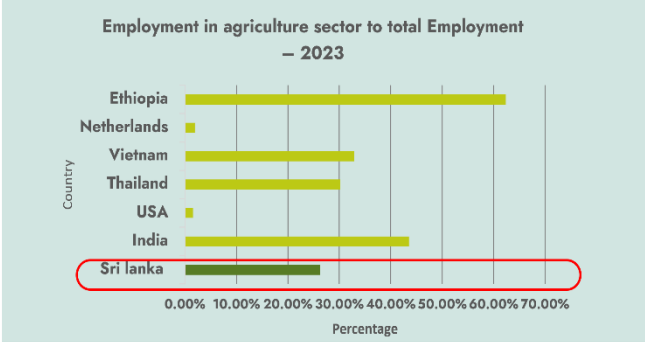
2.1 Background

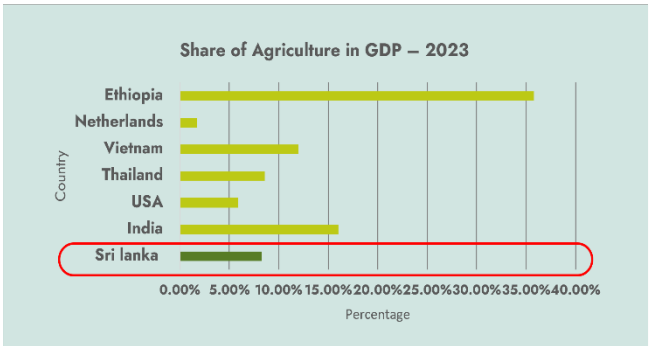
Sri Lanka's agricultural sector stands today at a crossroads shaped by a century of policy shifts, institutional transformations, and evolving economic pressures. To understand the roots of current challenges, one must step back and trace the story from the global stage down to the smallest patch of farmland. What emerges is not a tale of scarcity, but one of structural inefficiencies, missed opportunities, and a gradual erosion of collective systems that once held rural livelihoods together.

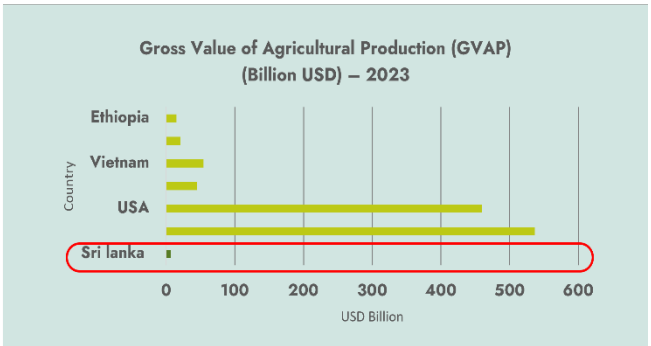


Global Benchmarking: Sri Lanka in the World







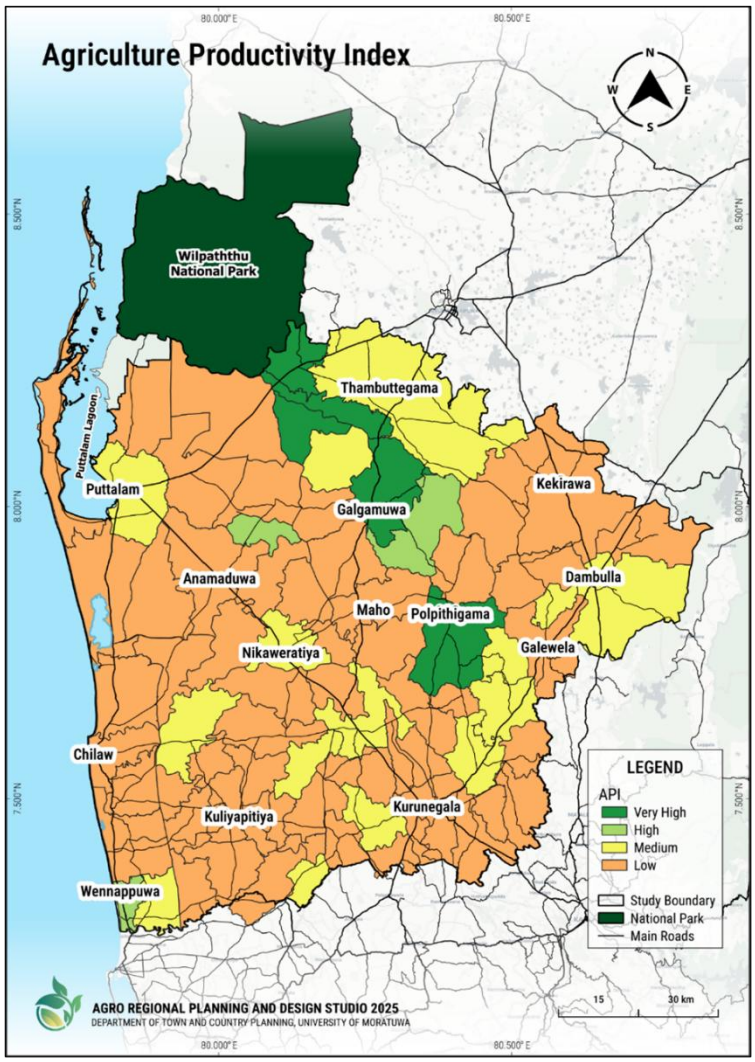


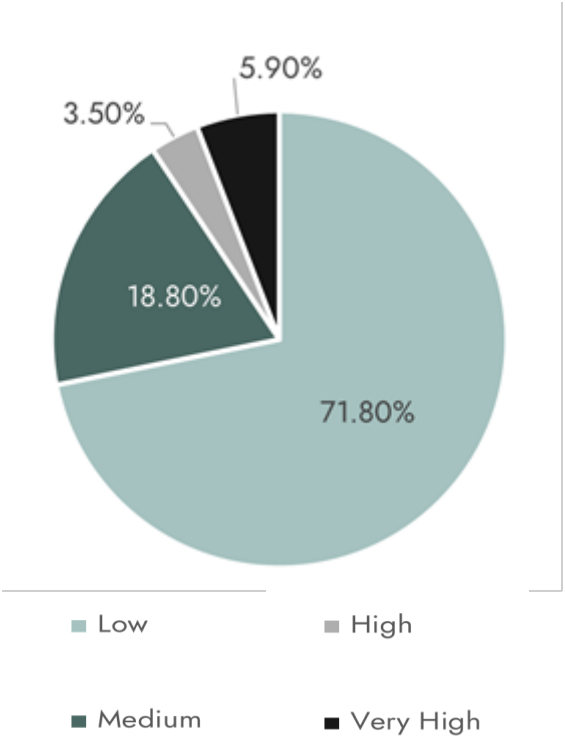
The story begins with a moment of self-reflection. Sri Lanka's agricultural performance was benchmarked against Ethiopia, India, Vietnam, Thailand, the Netherlands, and the United States to understand its global position. These countries represent a wide range of agricultural systems—from Ethiopia's agrarian foundation and India's labour-intensive model to Vietnam's high output from limited land, Thailand's export-driven success, the Netherlands' highly mechanized agro-industry, and the U.S.'s technology-led innovation. Four key indicators guided the comparison

- Agricultural land share
- Agricultural employment
- Contribution to GDP
- The gross value of agricultural production

Findings show that Sri Lanka holds a solid base in land availability and labor force participation. However, its economic returns fall far behind, especially when compared to Vietnam and Thailand, which achieve far greater value addition with similar resource conditions. Overall, the benchmarking reveals that Sri Lanka's challenge is not in its natural or human resources but in improving efficiency, value creation, and modernization within its agricultural system.

Local Productivity Mapping: API Reveals Underperformance





Shifting from the global stage to the local landscape, the Agriculture Productivity Index (API) provides a fine-grained picture of how productivity varies across regions. Despite favourable resources such as fertile soil, accessible labour, and sufficient capital-most Agrarian Service Centers fall into low and very-low productivity categories, raising a crucial question:

If the ingredients for success exist, why is the output still so low?

The answer lies not in the resources themselves, but in how they are used, coordinated, and supported by institutions and markets. Therefore, the API map becomes the first signal that structural inefficiencies—not natural limitations that are holding back agricultural performance.

2.2 Section 1

TIME BECOMES THE ENEMY

When concentrating on the crop distribution of the study area, it reveals that paddy and coconut dominate the region's agriculture, reflecting long-standing farmer traditions, natural suitability, and strong market demand. Vast stretches of paddy fields highlight rice as a staple livelihood, while widespread coconut belts reveal its deep economic and cultural importance.

When comparing storage durations of major crops, a critical challenge becomes clear. While paddy, potatoes, and onions can be stored for longer periods, fresh fruits and vegetables have a very short shelf life, making them far more vulnerable to spoilage. This creates intense pressure on farmers who rely on perishable crops, as even small delays in transport or handling can lead to major financial losses.

Because agricultural produce is inherently time-sensitive, every hour matters. These risks raise important questions about farmers' resilience and the strategies they use to cope.

So, RISK SHARING???

Risk-sharing mechanisms such as crop insurance should, in theory, help farmers navigate this uncertainty. Although Sri Lanka has formal insurance structures, including compulsory schemes initiated in recent years, participation remains low. Farmers view insurance premiums as unnecessary expenses rather than protection.

This distrust did not arise overnight. It is the result of decades of weak institutional outreach, inconsistent policies, and missed opportunities. Farmers have seen too many promises broken, too many programs poorly implemented. The erosion of trust has become a defining feature of the rural experience.

FROM STATE-LED SUPPORT TO FRAGMENTED MARKETS

To understand this distrust, one must revisit the mid-20th century, when Sri Lanka's agricultural sector functioned under a strong state-led model. Cooperative societies acted as collective safety nets, the Paddy Marketing Board guaranteed purchases, and the CWE stabilized food prices. Farmers were connected to predictable, short supply chains backed by government support.

But the liberalization reforms of the late 1970s reshaped this landscape dramatically. Price controls disappeared, the role of the PMB declined, and private traders began to dominate the market. Over the next decades, state involvement weakened, leaving farmers exposed to fragmented supply chains and unpredictable markets.

This shift-from coordinated public support to liberalized market dependency-defines much of the instability farmers face today.

THE NEW POWER CENTERS

With the state stepping back, intermediaries (collectors, assemblers, brokers, and traders) stepped in, becoming the new central actors in agricultural supply chains. Their rise was not accidental but a response to the vacuum created through declining state involvement.

Collectors provide immediate cash, rapid transport, and essential aggregation services, helping farmers to move perishable goods quickly before spoilage. In many areas, collectors are the only reliable link between rural fields and urban markets.

But their dominance also creates long and complex supply chains, where each additional layer adds logistical costs and price markups, gradually distancing the farmer from the consumer.

HIGH CONSUMER PRICES & LOW FARMER RETURNS

These long supply chains paved the way to the creation of a paradox where consumers pay more while farmers earn less. Through this paradox, market margins widen across fruits and vegetables, as post-harvest losses accumulate at every stage and are passed onto consumers through higher prices. The farmer's share of the final price remains stagnant—even though the consumer's price rises sharply.

This inefficiency benefits intermediaries but punishes the two actors most critical to the system, which are the farmer and the consumer. It becomes evident that the structure of the market—not the productivity of the farmer—is at the heart of this value loss.

HOW HIGH MARKET MARGIN WILL AFFECT THE FARMER???

At the same time, farmers now face a growing squeeze between rising production costs and stagnant earnings. Each season feels like walking a tightrope, where even a small slip (can be a bad harvest, a slow buyer, or an unexpected price dip) can tip them into financial hardships.

Despite working tirelessly and producing well, their profits remain fragile where they can be easily shaken by forces beyond their control. What once felt secure now feels uncertain, leaving farmers caught between effort and outcome, struggling to hold their ground.

HOW ARE THE RESOURCES USED ON THE CURRENT SITUATION???

Beneath rising costs, there lies another deeper challenge, which is fragmented, individual-driven decisions that strain the environment. Forests shrink, water is unevenly shared, and human–wildlife tensions intensify as elephant paths are disrupted by scattered development and uncoordinated farming.

While some areas thrive with generous irrigation, others-especially along the coastal stretch from Chilaw to Puttalam-face drought and creeping salinity where this imbalance between water supply and agricultural needs adds pressure to an already fragile system. Combined with wildlife incursions and weakened soil fertility, these conditions erode productivity and make the entire sector more vulnerable and less resilient.

If these water surpluses that are available on abundant areas could be strategically redistributed through improved storage, inter-basin transfers, or better allocation planning, it could dramatically ease these scarcities.

2.3 Section 2

IF THE SOLUTIONS SEEM SO CLEAR ON THE MAP, WHY ARE THEY SO DIFFICULT TO IMPLEMENT IN TODAY'S CONTEXT???

To seek answers to this pressing question, we turned to the past through conducting a historical review to trace how similar challenges were addressed over time. This exploration allowed us to see not only the solutions once adopted, but also how those mechanisms have evolved, adapted, or even disappeared as circumstances changed.

Earlier, Sri Lanka's agricultural extension network functioned with clear structure which is called as T&V system where trained village-level KVS officers worked closely with farmers, ensuring steady knowledge flow and coordinated decision-making. But the decentralization reforms of the 1990s disrupted this system, stretching responsibilities across fewer officers and leaving thousands of farming families underserved.

As these institutional links thinned, farmers became increasingly isolated, lacking reliable guidance and collective problem-solving opportunities. This erosion in extension services is reflected in production patterns as yields improved with new technologies, the pace of growth slowed sharply. Without timely advice, resource use became inefficient, irrigation suffered, and decisions became scattered. Ultimately, the weakening of governance structures—not the lack of technology—has played a major role in limiting agricultural productivity and resilience.

2.4 Section 3

HOW DID THIS SYSTEM EVOLVE FROM THE TRADITIONAL KVS MODEL (WHERE A SINGLE OFFICER MANAGED JUST 750 FAMILIES) TO TODAY'S MODERN AGRICULTURAL EXTENSION STRUCTURE, WHERE ONE AGRICULTURAL INSTRUCTOR IS RESPONSIBLE FOR UP TO 7,000 FAMILIES???

One of the most damaging long-term trends is land fragmentation. Over generations, agricultural plots have been divided into smaller pieces due to inheritance and informal land conversions. Small, scattered plots undermine economies of scale, weaken cooperative farming, and raise per-unit production costs, deepening social isolation among farmers. As farms become smaller and more individualized, shared resource management—whether of canals, storage, or transport—becomes more difficult.

LAND OWNERSHIP EVOLUTION AS THE ROOT CAUSE

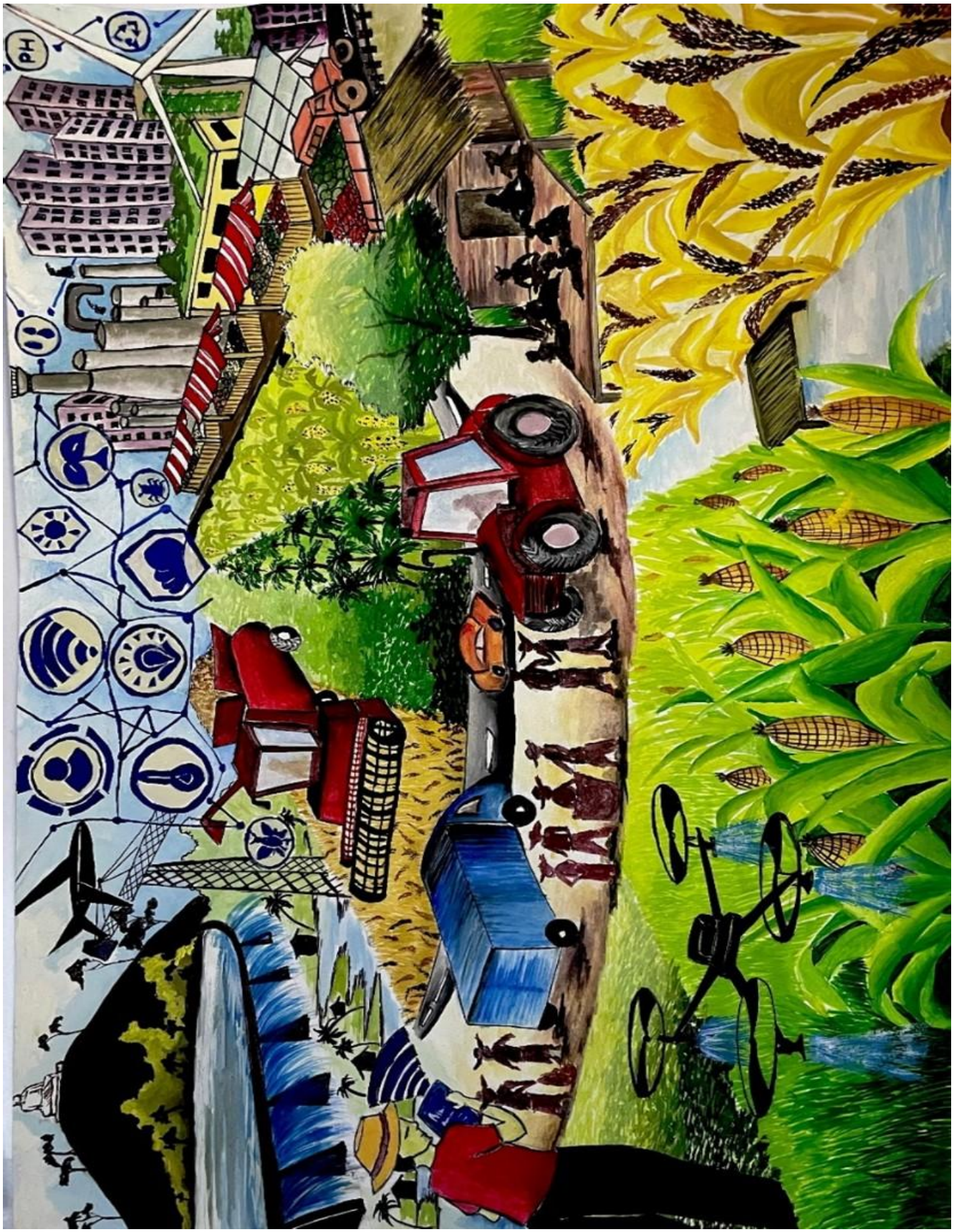
To understand why fragmentation persists, one must look at the evolution of land ownership in Sri Lanka. Over time, state land was gradually privatized through reforms such as Swarnabhoomi, Jayabhoomi, and later the Agrarian Development Act.

While these policies expanded property rights and secured farmer tenure, they also shifted agriculture from a collective, state-managed framework toward individualized decision-making. The result was a system where the dominant mindset became "my land, my decision," regardless of broader agricultural or environmental impacts.

This transition to freehold ownership is deeply tied to the erosion of cooperative farming structures and the rise of fragmented, isolated agricultural decision-making.

3. VISION FORMULATION

Proposes the guiding vision, goals, objectives, and strategies for achieving sustainable agro-regional development.



3.1 Conceptualization

This sketch captures the elements of our dream for the Northwestern Province in 2040—a future built on both tradition and progress. At the heart of this vision is the protection of culture and heritage, especially the unique cascade irrigation system that has nourished the land and people for centuries. These traditional systems will continue to provide life to farming, while being strengthened with modern methods. Farming will become more efficient through mechanized practices, smart technologies, and digital tools that help farmers plan and manage their crops wisely. Drones, sensors, and machines will work together with farmer knowledge to ensure better harvests, greater sustainability, and resilience against future challenges.

Crop diversification will add richness to the farming landscape, with rice, maize, vegetables, and other produce filling the fields. This diversity will not only improve food security but also create opportunities for export and value-added products. Beyond the farm, a strong supply chain will connect agro-villages with agro-towns and agro-cities. These links will form a rich network of markets, processing centers, and storage facilities, reduce waste and strengthen both local and global connections.

In this future, the North Western Province will stand as a balanced region—honoring its cultural roots while embracing innovation. Farmers will be seen as entrepreneurs, villages as hubs of opportunity, and cities as centers of agro-based growth. This vision is not only about modern farming but about building a vibrant, connected, and sustainable future where heritage and progress grow together.

"Together, we can transform this dream sketch into reality-step by step-shaping a North Western Province of 2040 where heritage thrives hand in hand with innovation. Let us journey forward, side by side, into our shared vision for 2040, and witness how this dream can blossom into life."

3.2 The Vision Statement

"Agro Cascadia **Connected**,
Cultured and **Circulated** land
in the Northwest of Sri Lanka"

AGRO CASCADIA

Agro Cascadia is a holistic system modeled after a cascade, where each element supports the next in a continuous, life-sustaining flow. Centered on Connectivity, Culture, and Circularity, it links people and resources, roots agriculture in identity and tradition, and renews materials through sustainable cycles. Together, these pillars create a resilient, balanced model that encourages collaboration, innovation, and long-term harmony. Agro Cascadia envisions agriculture as a thriving, self-sustaining system that benefits both communities and the environment.

CONNECTED

Connectivity in Agro Cascadia is the flowing current that links people, resources, and knowledge. Strong connections spread ideas, expand opportunities, and support shared growth. When links weaken, progress suffers and inequality rises. Connectivity turns individual efforts into collective strength, ensuring all parts of the system grow through collaboration and continuous exchange

CULTURED

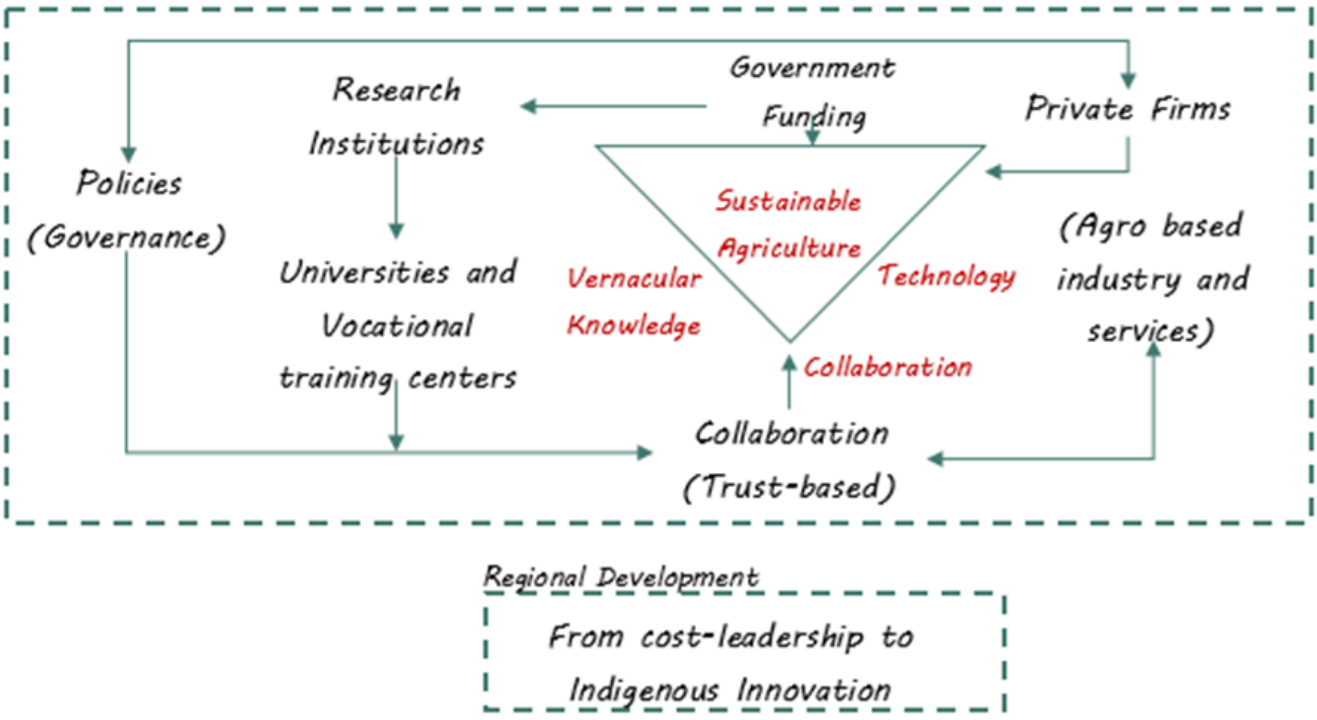
Culture is Agro Cascadia's fertile foundation, rooted in heritage, identity, and shared wisdom. It blends tradition with innovation, shaping how resources are valued and used. A thriving culture strengthens communities, builds resilience, and inspires unity and stewardship. It provides meaning and direction, enabling the entire system to grow with purpose and connection.

CIRCULATED

Circularity in Agro Cascadia functions like a constant river, renewing and reusing resources to prevent waste. This regenerative cycle boosts efficiency, creativity, and environmental health. By turning waste into value and reducing dependency, it builds resilience and adaptability, ensuring sustainable growth and keeping the system balanced, vibrant, and future ready.

"Our vision takes shape through guiding principles that serve as our compass, where steering every idea, action, and partnership toward a future of resilience and inclusive growth."

Pathway for the Resilient Vision



This framework illustrates how multiple stakeholders can collectively contribute to building a resilient and sustainable agricultural system that supports regional development. At its core lies sustainable agriculture, driven by the integration of vernacular knowledge, modern technology, and collaborative practices. Governance and policy provide the overall direction, while government funding strengthens research institutions, universities, and vocational training centers, enabling the transfer of knowledge into practice. Private firms and agro-based industries further reinforce this system by introducing innovation and services, thereby bridging the gap between traditional farming knowledge and scientific knowledge. Trust-based collaboration ensures effective linkages among farmers, researchers, businesses, and policymakers, fostering mutual growth. Ultimately, the framework envisions a strategic transformation of regional development - from a reliance on cost-leadership toward indigenous innovation, where local strengths and creativity serve as the foundation for sustainable progress.

"Rooted in our broader vision for regional development, these principles-collaboration, vernacular wisdom, and technology, find their true expression in agriculture, shaping systems that are practical, resilient, and future-ready."

Collaboration

Collaboration helps us address challenges such as fragmented lands, high costs, and production risks. By working together, farmers and communities can share resources, connect their lands, and develop collective farming systems. This shared approach not only reduces individual burdens but also strengthens the entire agricultural network.

Vernacular knowledge

Vernacular knowledge bridges the gap between traditional wisdom and modern scientific methods. It guides planned production by ensuring that what is grown meets actual demand, reducing waste and aligning supply with the needs of markets and communities. By valuing local practices, we create solutions that are practical, trusted, and sustainable.

Technology acts as a powerful enabler. Digital monitoring tools allow better oversight of crops, reduce resource exploitation, and lower costs. Innovations in machinery and cultivation techniques drive efficiency and productivity, while supporting environmentally responsible practices.

Technology

When combined, these three principles transform agriculture from an inefficient, fragmented system into one that is resilient, efficient, and future-ready. Collaboration, traditional knowledge, and technology do not work in isolation-they reinforce each other, creating a dynamic system capable of adapting to challenges and opportunities alike. This integrated approach lays the foundation for long-term agricultural sustainability and growth.

"Vision defines the destination, while goals map the journey. To bring this vision to life, we must illuminate the path ahead with clear and purposeful goals."

GOALS

Goal 1 - Strengthening Collaborative Agro-Networks

This focuses on building strong agro-networks where farmers, cooperatives, businesses, and institutions work hand in hand. By fostering trust and cooperation, they can share resources, negotiate better, and face challenges together. This collective effort strengthens resilience and ensures that everyone in the agricultural community thrives together.

Goal 2 - Blending Vernacular and Scientific Knowledge

This focuses on combining traditional farming knowledge with modern scientific research. By blending these approaches, farmers can preserve cultural practices, adopt more adaptable techniques, and prepare younger generations to carry forward sustainable agriculture. This integration strengthens both heritage and innovation for a resilient agricultural future.

Goal 3 - Advancing Technology and Innovation for Circular Growth

This focuses to use modern technology and innovation to create a circular, sustainable agricultural system. By encouraging research-industry partnerships, farmers can increase productivity, reduce waste, and recycle resources efficiently. This approach builds resilient value chains that benefit the environment, the community, and the economy over the long term.

3.5.1 STRATERGY 01 - THE COLLABORATION MODEL

For generations, farmers in our area have been cultivating their own small plots of land for generations. They are proud owners but often struggle with the constraints of land fragmentation. A farmer owns a few acres here, another a few acres there, and they all work alone while dealing with the same challenges such as low profit earning due to high production costs, limited access to modern machinery, and weak bargaining power in the market.

Just imagine, what will happen if these scattered lands are brought together without taking away the land ownership where farmers will still own their fields and join hands to form clusters which are stronger, larger, and more resourceful, rather than being isolated farmers? Together, they may share resources and knowledge, they may have better access to finance and markets with greater confidence, while ensuring a fair distribution of benefits.

This proposed Collaborative Model is the heart of our vision for the Northwestern Region, which is the cornerstone of the Agro Regional Plan as well. Through a well-established and voluntary land pooling and consolidation system, supported by contemporary resources such as the Land Bank and Digital Cadaster, we try to build a farming community that thrives on sustainability, equity, and transparency. Once this model is adapted to the ground, agriculture will transform from a fragmented and isolated effort into a collective journey of growth and resilience where once, farmers had been struggling lonely to defend their livelihoods.

Policy

Implementing Land Pooling and Consolidation for Collaborative Farming and Sustainable Land Management

Strategic Action

Establish a voluntary land pooling and consolidation mechanism that transforms fragmented land parcels into farmer clusters, while safeguarding ownership rights and enabling collaborative farming.

LITERATURE REVIEWS

- Allow voluntary pooling of fragmented lands by landowners into consolidated operational units
- Enable shared infrastructure, mechanization, and resource management within farmer clusters
- Strengthen farmers' access to markets, subsidies, and credit facilities through cluster-based incentive distribution
- Provide a framework for equitable benefit-sharing among participating landowners
- Integrate with the Land Bank and Digital Cadaster systems for transparent record-keeping and dispute resolution

CASE STUDIES

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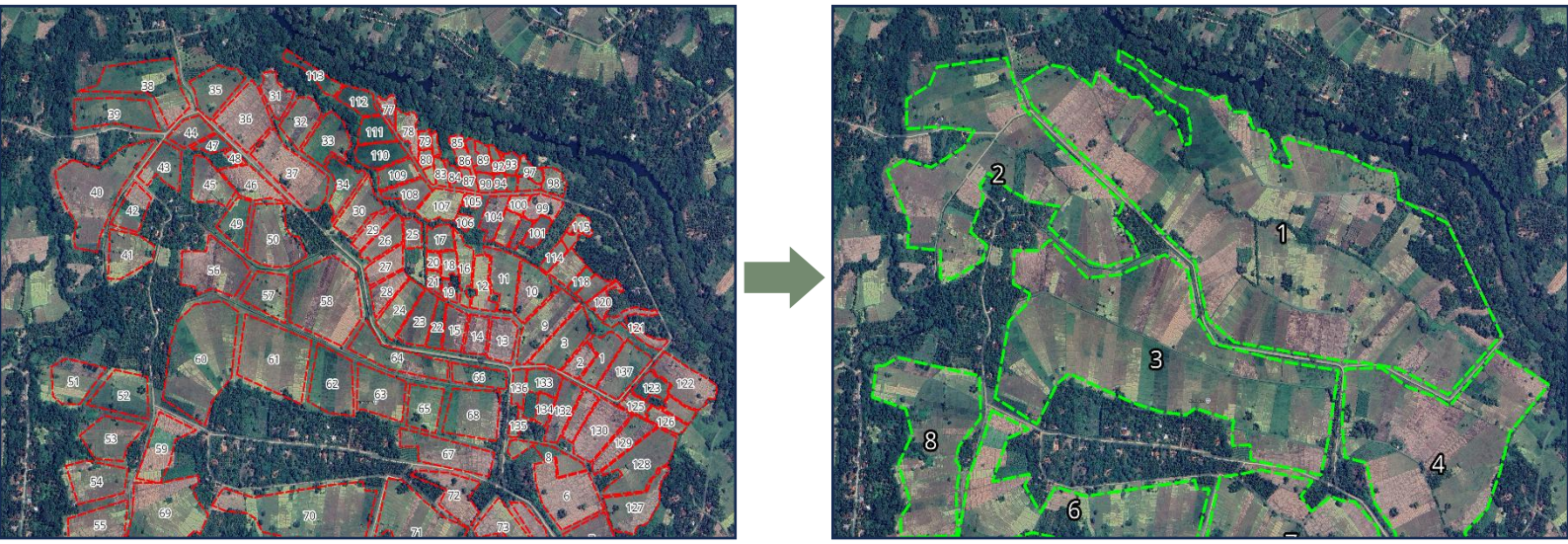
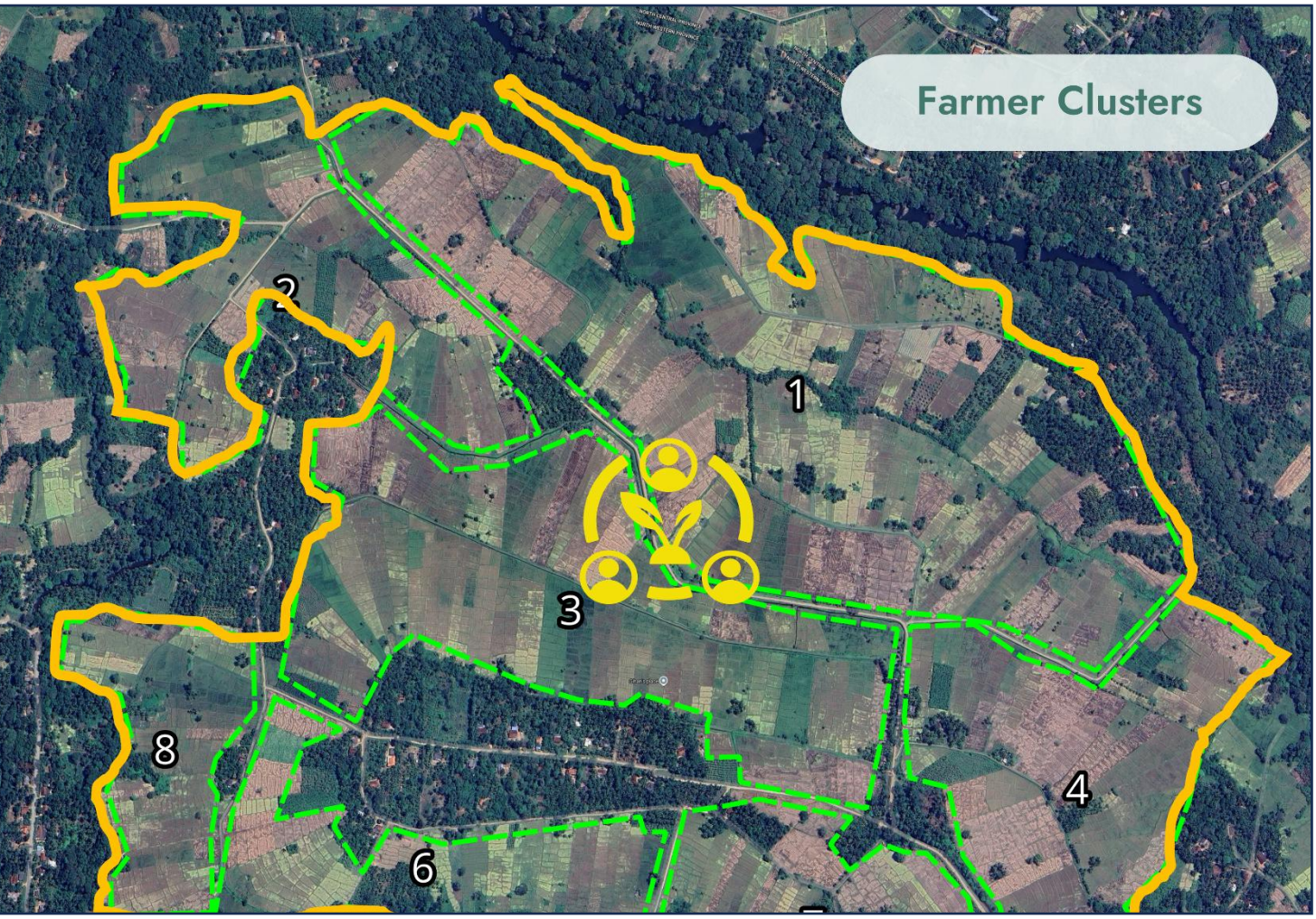
A voluntary land pooling and consolidation mechanism that aims to maximize farmers' combined potential while protecting their land ownership rights is at the core of the Collaborative Model. Small and fragmented land parcels are guaranteed to be converted into cohesive operational units by this framework, where cooperation serves as the catalyst for sustainability and productivity. The policy is guided through the following key principles.

- Voluntary Participation – Farmers can freely choose to pool their lands, ensuring trust and inclusivity.
- Transparency & Security – Integration with the Land Bank and Digital Cadaster systems guarantees clear ownership records, transparent transactions, and swift dispute resolution.
- Equitable Benefit Sharing – A structured framework ensures profits, incentives, and resources are distributed fairly among all participants.
- Sustainability & Resilience – Shared infrastructure, mechanization, and knowledge platforms reduce costs, enhance productivity, and build resilience against market and climate challenges.

In short, this policy framework reshapes agriculture into a collaborative ecosystem, where individual ownership is respected, but collective strength drives long-term prosperity.

Farmer Clusters



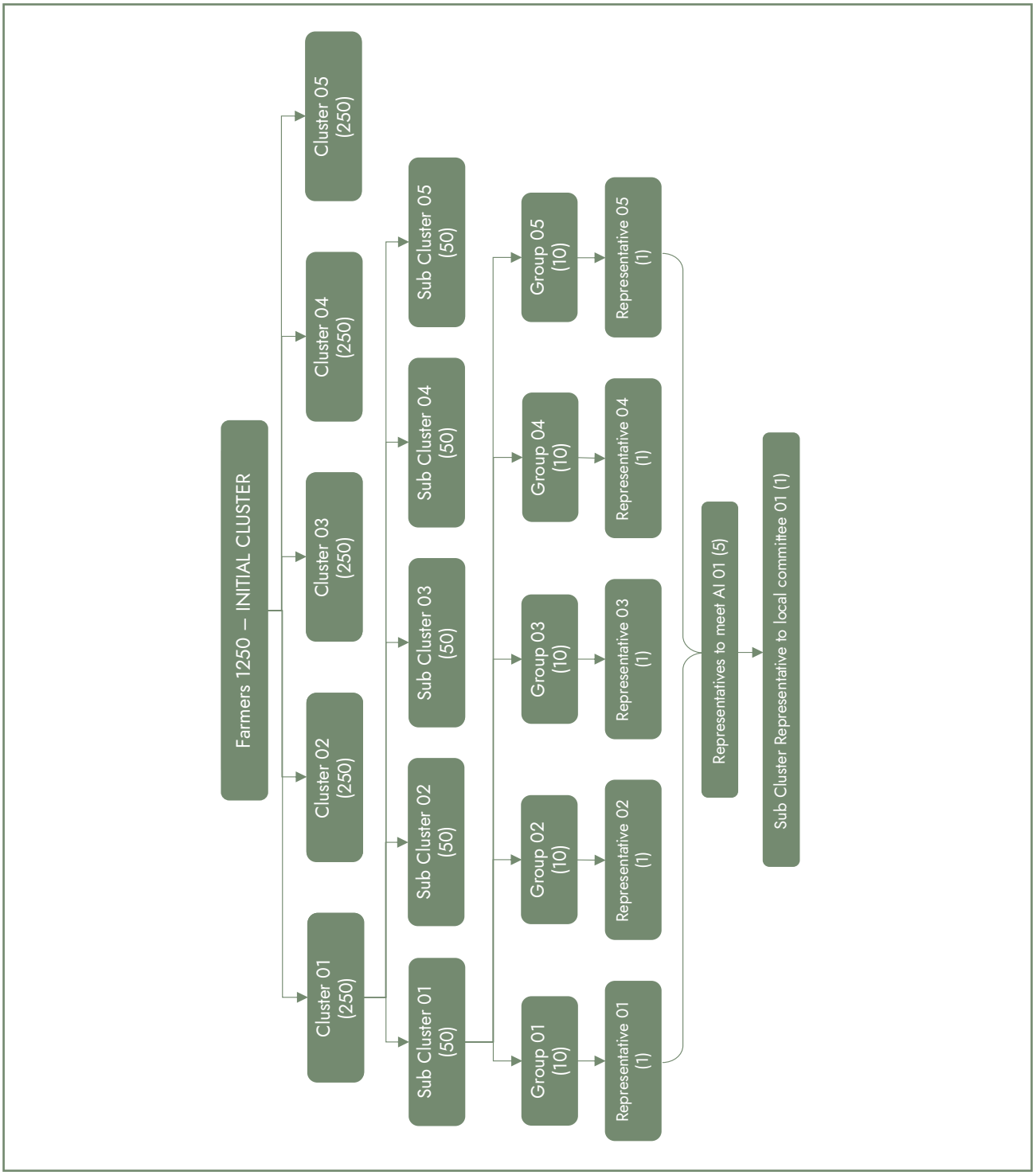


At the foundation of the Collaborative Model lies the farmer cluster, which is the smallest but most vital unit of collective farming. These clusters are born when individual landowners voluntarily pool and consolidate their fragmented plots into a larger, unified operational units. The number of farmers in each cluster (cluster size) is based on the capacity of the Local Committee to effectively guide, monitor, and support farmers.

Management Role

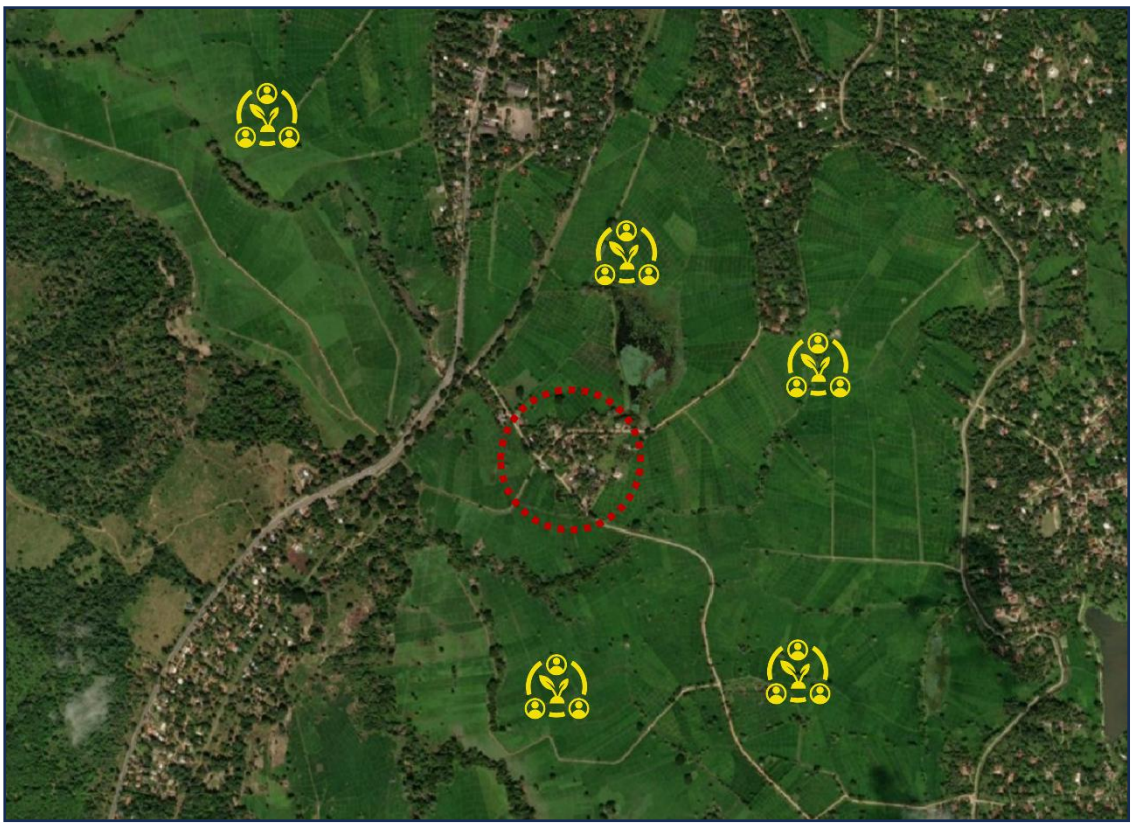
At the farmer cluster level, management functions are like the heartbeat of collaboration, keeping the smallest unit of the model active, responsive, and productive. The role of management here is to provide unit-level leadership and ensure micro-level functionality, where farmers collectively plan, share resources, and make decisions that directly affect their daily operations. This includes coordinating the use of water, machinery, and inputs, resolving small-scale issues quickly, and fostering trust among members.

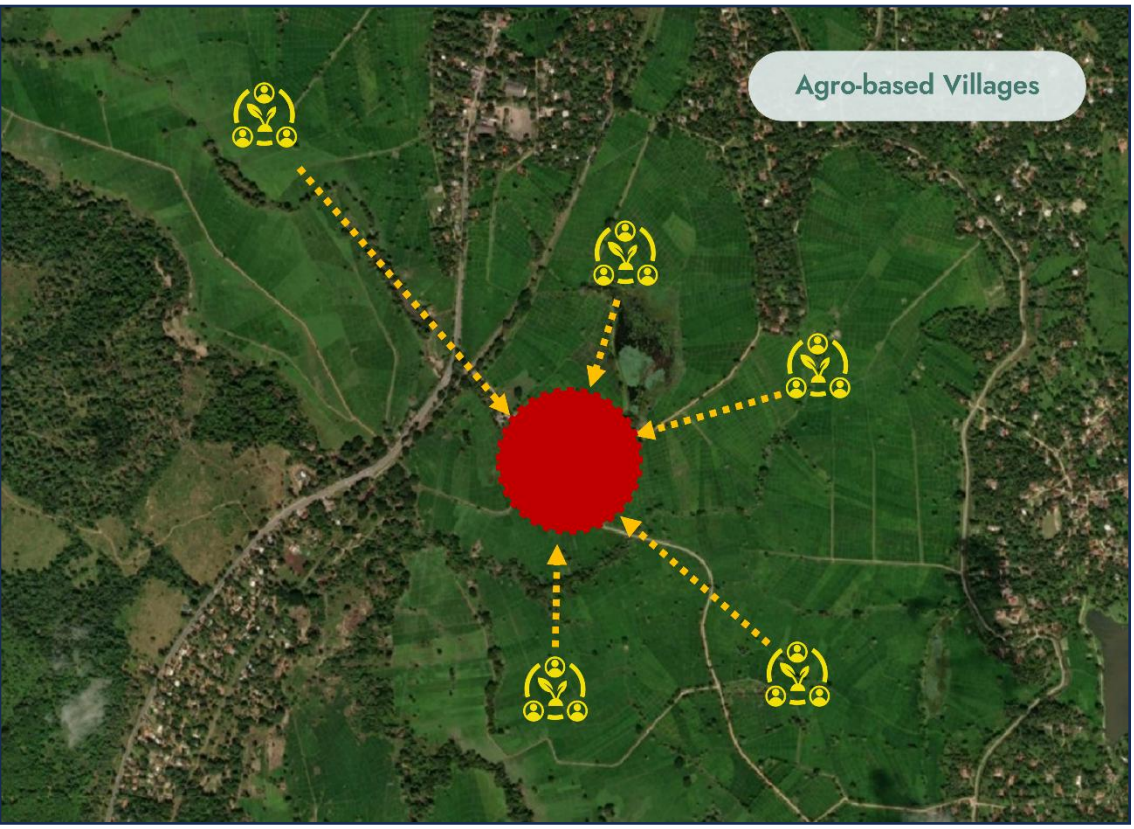
The stakeholders are primarily the farmers themselves, supported by representatives elected from each cluster. These representatives serve as the connecting bridge between individual groups and higher governance levels, ensuring that every farmer's voice is heard. Together, the farmers and their representatives form the backbone of the cluster, where collaboration transforms individual efforts into collective strength.



The formation of a farmer cluster begins with an initial pool of 1,250 farmers, which is divided into five main clusters of 250 farmers each. To ensure manageability, each cluster is further broken down into five sub-clusters of 50 farmers, and each sub-cluster is organized into smaller groups of 10 farmers. From every group, one representative is elected to voice the concerns and decisions of their members. These group representatives meet with the Agriculture Instructor (AI) for coordination, while a sub-cluster representative is selected to connect with the local committee. This tiered structure ensures that every farmer has a voice, decisions are made collectively yet efficiently, and the entire system remains inclusive, transparent, and scalable.

Agro-based Villages





Management Role

At the Agro-based Village level, management takes on the role of a coordinator and facilitator, where weaving together the strengths of multiple farmer clusters into one unified system. The management ensures that resources such as water, machinery, and storage are shared efficiently, while also guiding farmers through capacity building, training, and technical support. Its role is not just administrative but transformational, to turn clusters of farmers into a vibrant, self-sustaining community of collaboration.

The stakeholders in this Primary Collaboration are diverse, reflecting the mix of local knowledge and institutional support needed for success including,

- Farmer Representatives from each cluster, ensuring grassroots voices shape decisions.
- Agriculture Instructor (Field Officer, Irrigation) to provide technical and advisory guidance.
- Development Officer to align farming with broader development initiatives.
- Grama Niladari to connect with local governance structures.
- Govi Niyamaka to ensure farmer welfare and fair practices.
- Technical Officers to provide specialized expertise.
- Local Coordinators to keep day-to-day operations running smoothly.

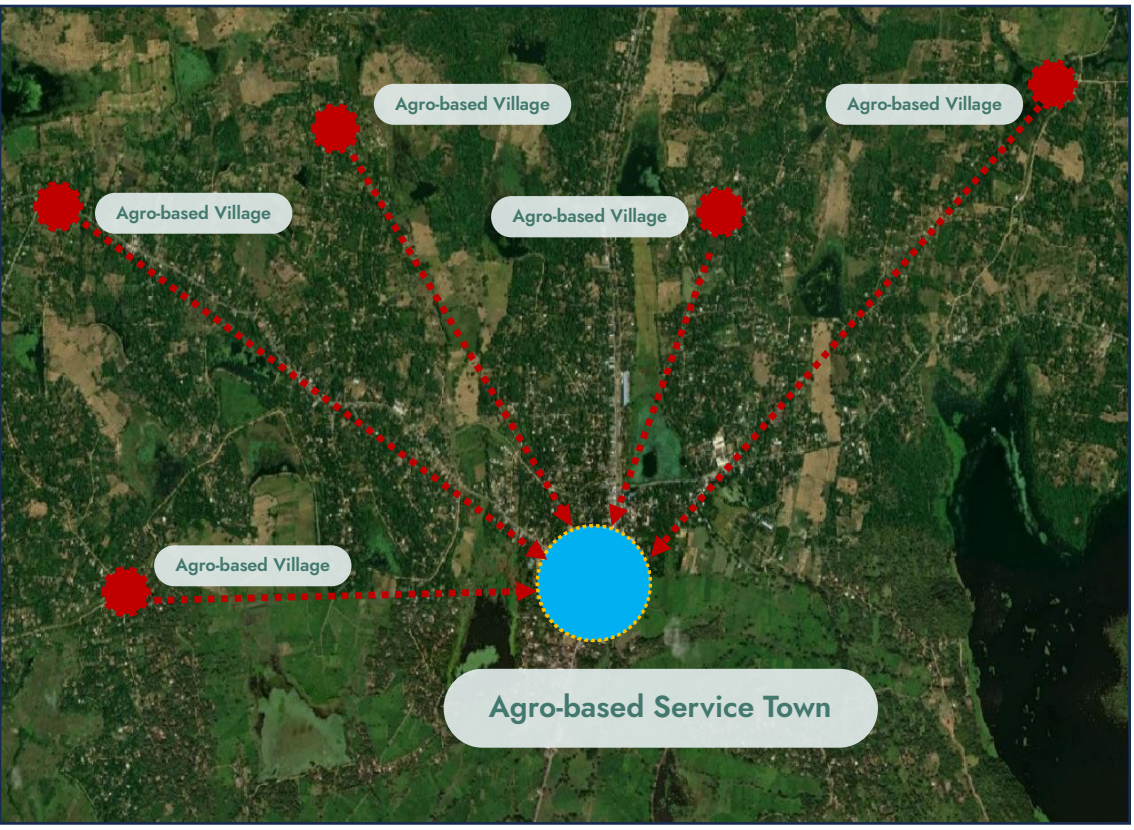
Key Components

The strength of an Agro-based Village lies in the integration of several key components which are,

1. Collecting Centers
    - These centers act as the first node of the supply chain, where buying and gathering harvests from all farmer clusters within the village.
    - Equipped with quality and quantity control, they ensure that only standardized, market-ready produce enters the supply chain, reducing losses and strengthening farmer credibility.

2. Shared Machinery Hubs
    - Centralized hubs provide access to essential machinery and tools that would be costly for individual farmers to own.
    - By sharing equipment, farmers lower production costs and improve efficiency, while also ensuring equal access to modern technology.

Agro-based Service Towns



When several Agro-based Villages are brought together, they form the next tier of collaboration, the Agro-based Service Town. If villages are the roots of the system, service towns are the trunks that connect those roots to wider opportunities.

An Agro-based Service Town acts as a central hub for a cluster of villages, providing services and infrastructure that go beyond what a single village can support. While villages focus on production and primary collection, service towns expand the system by strengthening supply chains, reducing post-harvest losses, and supporting agro-processing activities along with strengthening governance and collaboration across multiple villages.

Management Role

Agro-based Service Towns serve as the next tier of governance, created to manage the growing complexity that arises when multiple villages and their primary collaboration units come together. While primary collaboration units coordinate farmer clusters within villages, the Local Committee established at the service town level ensures that these village-level collaborations are governed, supported, and harmonized under one system.

Stakeholders of the Local Committee are,

- A representative of the farmer representatives
- A representative of agriculture representative of instructor field officer (irrigation)
- A representative of development officer
- A representative of technical officer
- A representative of local coordinator
- Relevant government bodies to ensure policy alignment, transparency, and resource distribution.

Together, these stakeholders transform the Agro-based Service Town into a local command center, a place where farmers' voices from villages converge with professional and governmental expertise, ensuring that local collaboration scales up into a well-coordinated regional network.

Key Components

Agro-based Service Towns act as the local hubs of the collaborative model, connecting village-level production with wider markets and ensuring that agricultural produce is efficiently processed, packaged, and distributed. Their strength lies in a set of specialized components that directly support and strengthen the agricultural sector.

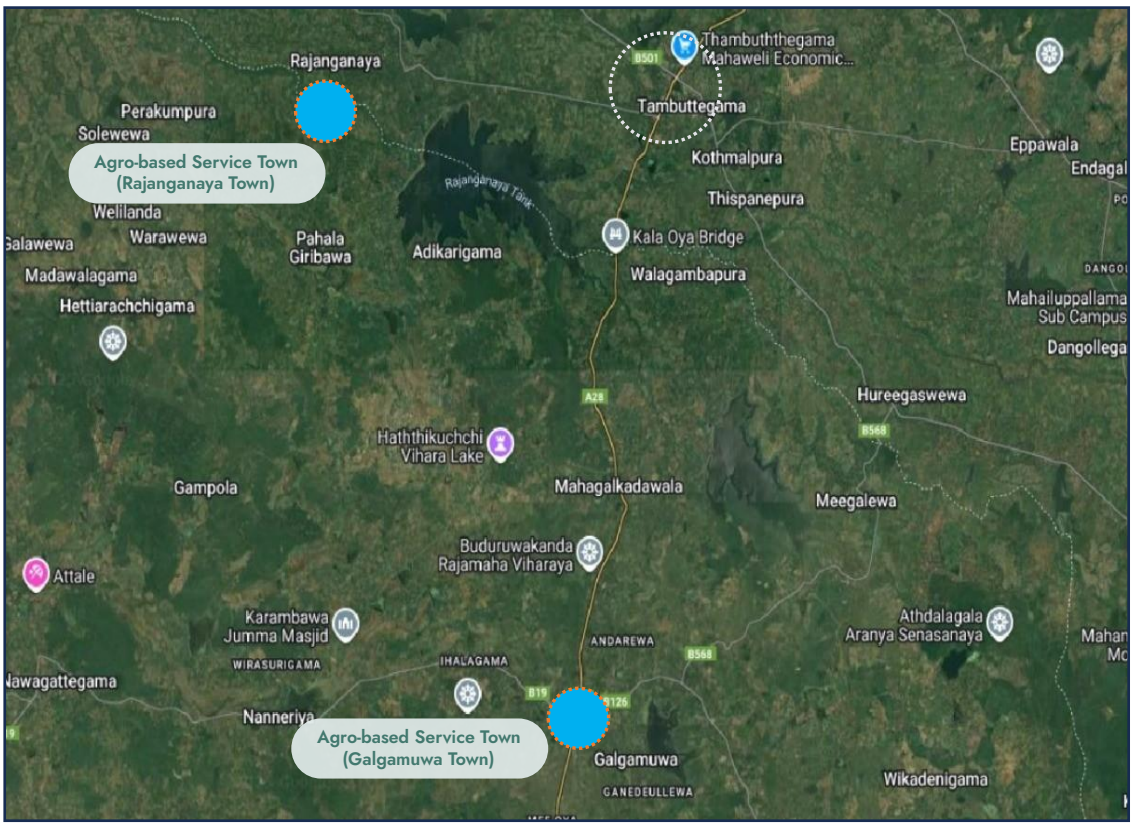
1. Processing Centers
    - These centers receive harvests from village-level collecting centers.
    - The produce is washed, sorted, and cleanly packaged with strict quality and quantity control mechanisms, ensuring that only market-ready goods move forward.
    - By improving hygiene and consistency, processing centers enhance the value of local produce and strengthen farmers' competitiveness in both wholesale and retail markets.

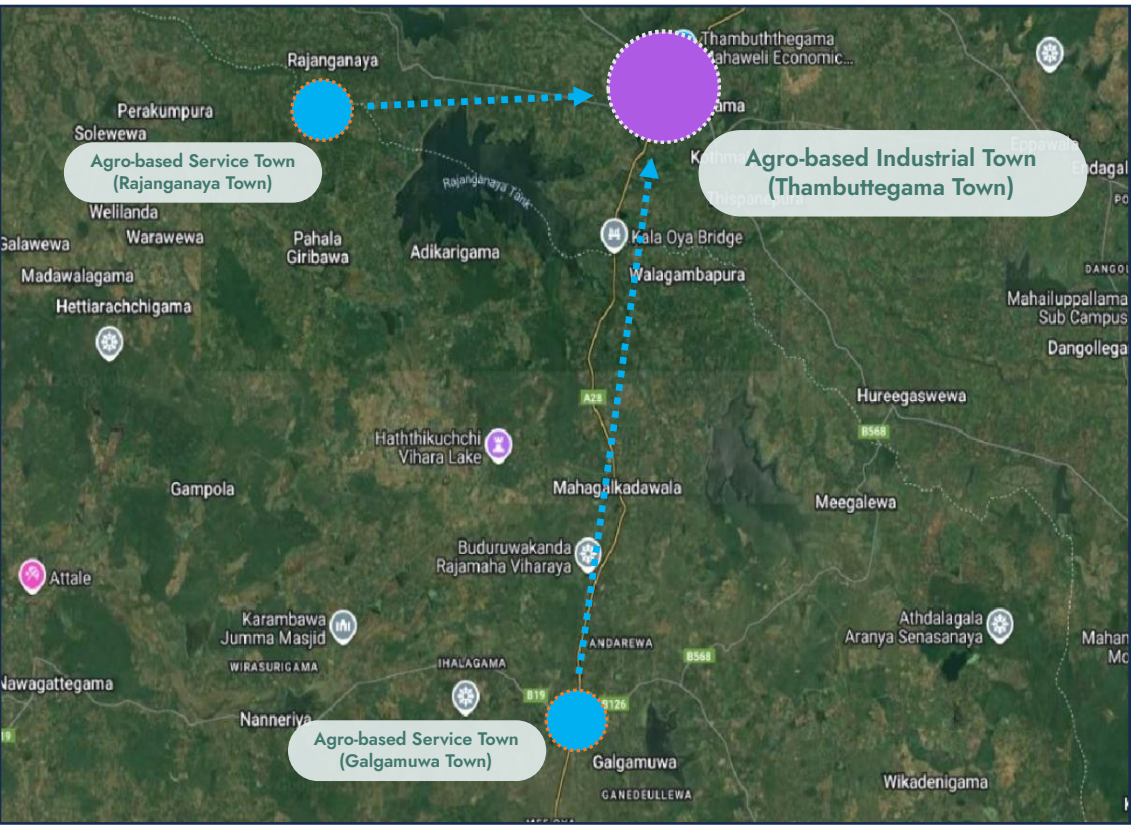
2. Distribution Centers
    - Once packaged, the produce is moved to distribution hubs, which serve as the link between production and trade.
    - These centers supply wholesale and retail sellers, ensuring that farmers' harvests quickly reach markets with minimal delays.
    - Efficient distribution reduces post-harvest losses and stabilizes supply chains, ultimately improving farmer incomes.

3. Machinery Leasing Services
    - Service towns house dedicated hubs where farmers can lease modern agricultural machinery that may be too costly to own individually.
    - This allows farmers to adopt mechanized farming practices, reduce labor costs, and boost productivity, contributing to more sustainable agricultural operations.

4. Retail Shops for Agricultural Inputs
    - Strategically located shops provide farmers with convenient access to seeds, fertilizers, pesticides, and other essential inputs.
    - These retail points reduce travel costs and ensure timely availability of agricultural products, which directly supports continuous and efficient farming cycles.

Agro-based Industrial Towns





While Agro-based Service Towns connect villages to regional markets, the next leap in the collaborative model comes with the Agro-based Industrial Town — the level where agriculture meets industry. These towns emerge through the integration of multiple Agro-based Service Towns, pooling together their outputs, resources, and networks into a larger, more advanced system of agro-industrial development.

At the level of the Agro-based Industrial Town, management evolves into a regional coordination system, where agriculture and industry are integrated to support large-scale efficiency. Here, the Regional Committee serves as the governing body, providing oversight and strategic direction across multiple service towns.

Management Role

- Land Bank & Cadaster Oversight – The committee ensures efficient land management by maintaining and updating the Land Bank and Digital Cadaster system, with support from local committees, so that data on agricultural lands remains transparent, reliable, and accessible and ensuring that land pooling & land consolidation mechanism is effectively initiated at the village-level.
- Balancing Demand & Supply – Its most crucial role is to match supply and demand across the region, ensuring that harvest surpluses are absorbed through value addition and re-distribution while shortages are met by reallocating processed production efficiently. This minimizes wastage and stabilizes market flows.
- Infrastructure & Industrial Growth – The committee plans and supports infrastructure development, enabling the smooth flow of produce to wholesale markets, processing centers, and agro-industrial hubs.
- Regional Governance & Dispute Resolution – By coordinating inputs from service towns, the committee provides a unified decision-making platform, ensuring equity, transparency, and accountability.

Stakeholders of this Regional Committee are,

- Irrigation Engineer – Oversees irrigation systems and water management
- Welfare Officers – Safeguard the well-being of farming communities
- Regional Coordinators – Ensure smooth collaboration between villages, service towns, and industrial hubs
- Assurance Officers – Monitor standards, compliance, and benefit-sharing
- Technicians – Provide technical expertise in agro-processing and infrastructure.
- Economist – Guides pricing strategies, market linkages, and economic sustainability
- Lawyer – Ensures legal compliance, dispute resolution, and protection of land rights
- Representatives from Local Committees – Carry grassroots voices from villages and service towns into regional-level decision-making.

Together, these stakeholders make the Agro-based Industrial Town a regional powerhouse of governance and innovation, ensuring that agriculture is not only productive but also equitable, efficient, and future-ready.

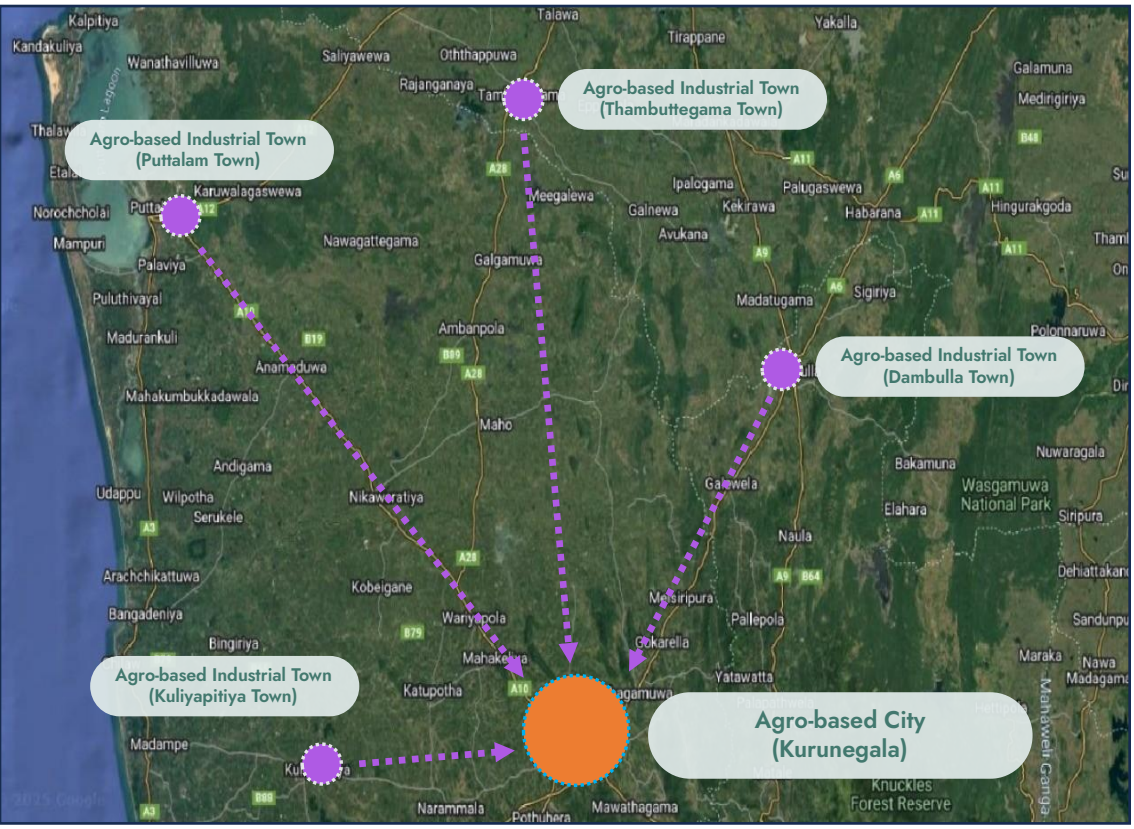
Key Components

Agro-based Industrial Towns act as the regional powerhouses of the collaborative model, transforming agricultural output from surrounding service towns into higher-value products and building long-term resilience in the sector. Their strength lies in specialized components that connect agriculture sector with industry, education, and innovation.

1. Value Adding Industries (Agro-based Industries)
    - These industries process surplus harvests into packaged and refined products, equipped with strict quantity and quality control systems.
    - By converting raw produce into value-added goods, they increase farmers' incomes, reduce waste, and make agricultural products competitive in both local and export markets.
2. Vocational Training Centers
    - Dedicated centers provide farmers and youth with skills in modern farming, processing, and management.
    - By creating a skilled labor force, these centers enhance productivity, promote the adoption of technology, and ensure the sustainability of agro-industrial growth.
3. Universities & Research Institutes
    - Institutions such as universities and agricultural research centers play a pivotal role in bridging traditional knowledge with scientific innovation.
    - They conduct experiments on topics like post-harvest loss handling mechanisms, develop climate-smart practices, and share knowledge with farmers, ensuring that vernacular farming wisdom is enriched through integrating traditional farming knowledge with scientific knowledge.
4. Private Firms & Innovators
    - Agro-based Industrial Towns attract private sector firms that design, test, and distribute new farming machinery, tools, and digital solutions.
    - These innovations reduce labor costs, improve efficiency, and introduce technologies that empower farmers to remain competitive in evolving agricultural markets.

Collectively, these components make Agro-based Industrial Towns more than just centers of processing, as they become regional hubs of knowledge, innovation, and skill development, where farming is not only sustained but elevated into a driver of economic growth and modernization.

Agro-based City



At the highest level of the collaborative model lies the Agro-based City, the crown of the agro-regional framework. While Industrial Towns integrate service towns into hubs of agro-processing and value addition, the Agro-based City emerges when multiple industrial towns are brought together into a unified regional center, which represents the culmination of collaboration, where fragmented plots have evolved, through clusters, villages, service towns, and industrial towns, into a fully integrated agro-economy capable of shaping regional development and contributing to national prosperity.

Management Role

The Agro-based City is governed by the Provincial Ministry of Agriculture, which acts as the administrative body for the entire region. At this level, management takes on a strategic role through integrating grassroots collaboration from farmer clusters upward into provincial and national agro-policy frameworks. The governance system follows a Top-Down / Bottom-Up Integration Model, where national-level planning and agro-policy development are informed by local realities, while local voices are amplified into regional and national decision-making.

Stakeholders under this Provincial Ministry of Agriculture are as follows.

- Representatives of Local Committees – Bringing village-level concerns and farmer voices into city-level planning
- Representatives of Regional Committees – Ensuring alignment between industrial towns and provincial governance
- National Supply Chain Managers – Coordinating the flow of goods across districts and provinces
- Provincial Director General of Agriculture Department – Overseeing agricultural policy and development at the provincial scale
- Provincial Director General of Irrigation Department – Managing irrigation systems critical for regional agricultural productivity.
- Provincial Director General of Agrarian Department – Ensuring agrarian services, farmer welfare, and land-related governance.

Together, these stakeholders make the Agro-based City a command center of agriculture, where local collaboration scales up to national influence, ensuring that farmers' efforts translate into regional prosperity and international competitiveness.

Key Components

The Agro-based City stands as the highest tier of the collaborative model, where agriculture is elevated from a regional system to a globally connected agro-economy. Its strength comes from key components that integrate farming communities with advanced infrastructure, modern practices, and international markets.

1. International Market
    - Acts as the gateway for agricultural exports, linking local farmers to global trade networks. By creating direct access to international buyers, this component increases farmer incomes, diversifies markets, and strengthens the competitiveness of local produce in the global economy.
2. Major Logistic Hub (High-Capacity Transport System)
    - The city hosts a large-scale logistics and transport network designed to move agricultural products quickly and efficiently across districts and provinces.
    - This ensures that farmers have the infrastructure to deliver produce without delays, reducing post-harvest losses and enabling smoother supply chains from farm to market.
3. Urban Agriculture Management
    - Agro-based Cities also promote and regulate urban agriculture, integrating farming into city spaces through vertical gardens, rooftop farms, and modern community gardens.
    - This reduces the dependency on distant supply chains for perishable crops, promotes food security, and encourages sustainable lifestyles within urban centers.
4. Modern Agriculture Methods
    - At the city level, advanced agricultural technologies such as precision farming, climate-smart practices, and controlled-environment agriculture are promoted.
    - These methods not only increase yields but also help farmers adapt to climate change, conserve resources, and maintain long-term sustainability of the sector.

Together, these components transform the Agro-based City into a command center of agriculture, where local farming is seamlessly connected to global markets, modern technology, and urban sustainability, ensuring that the agriculture sector thrives both regionally and internationally.

While the Collaboration Model provides a visionary structure for transforming fragmented, small-scale farming into a unified, multi-tiered agro-regional system, our field consultations with nearly 75 farmers and some government officials revealed two critical concerns that could hinder its ground-level applicability,

- Land ownership security – Farmers feared that pooling lands could eventually dilute or dispute their individual property rights.
- Profit-sharing fairness – Farmers questioned how benefits would be distributed among clusters and how disputes would be resolved.

To address these concerns, the model was strengthened through the integration of three key mechanisms which are,

1. **Land Bank System**
2. **Digital Cadastral System**
3. **Profit Sharing Mechanism**

Land Banking System

Sri Lanka's agricultural sector faces a dual challenge, large tracts of fertile land lie idle or fragmented, while many farmers struggle to access sufficient acreage to sustain or expand their livelihoods. This mismatch undermines productivity, rural incomes, and food security.

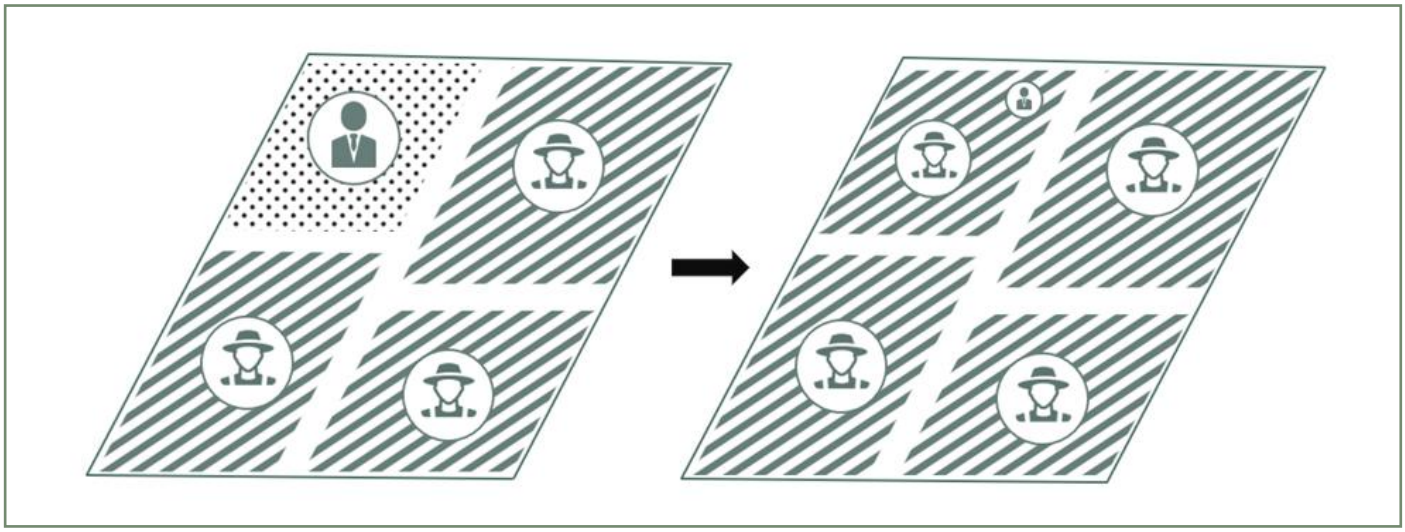
The proposed Land Banking System is a strategic response to this challenge. It is designed to unlock underutilized or abandoned agricultural land by creating a transparent, government-backed mechanism through which landowners can register their properties and farmers can obtain legal, time-bound access for cultivation. The system preserves ownership rights while turning idle plots into productive assets, thus bridging the gap between "a farmer without land" and "a land without a farmer."

As a policy instrument, the Land Bank goes beyond simple leasing. It provides a structured platform for land pooling, consolidation, and cluster farming, enabling farmers to scale up operations, adopt modern practices, and share risks and incentives collectively. By integrating digital cadaster tools and participatory local governance, the strategy ensures transparency, equitable benefit-sharing, and rapid, locally informed decision-making.

This introduction positions land banking not merely as a mechanism but as a core strategic pillar for revitalizing agriculture, increasing farmer incomes, and ensuring sustainable land management nationwide.

Why a land bank system was integrated within the collaboration model?

Scenario 1 - A Farmer without Land & A Land without a Farmer.



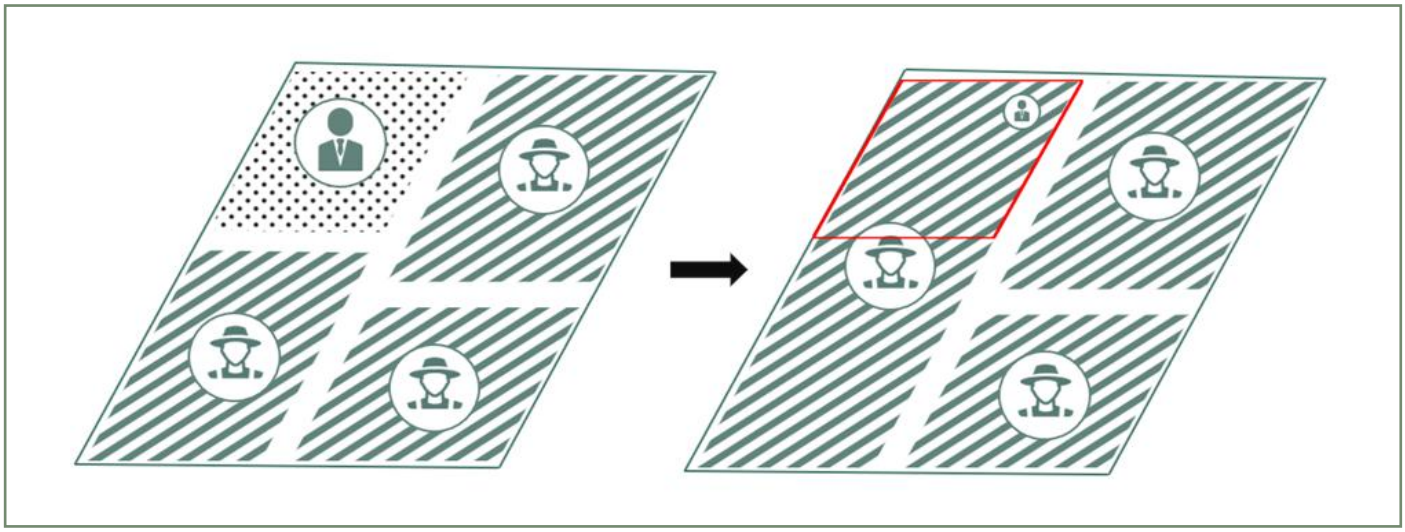
In many parts of the country, fertile fields stand silent — not for lack of potential, but because their owners no longer farm them and are unwilling to sell. At the same time, skilled farmers search for land to expand their production and sustain their families. The proposed Land Banking System turns this paradox into an opportunity.

By registering idle or fragmented plots with the Land Bank, owners can lease them transparently to farmers eager to cultivate. This simple mechanism creates a triple win:

- Landowners retain full ownership while earning a reliable, dispute-free income.
- Landless or smallholder farmers gain legal access to additional land, enabling them to invest and grow.
- The nation benefits from higher agricultural output as once-idle lands return to productive use.

Through structured leasing, clear digital records, and local oversight, the Land Bank transforms unused farmland into a shared asset that fuels livelihoods, strengthens food security, and revitalizes rural economies.

Scenario 2 - A Farmer Expecting to Grow More



Across rural districts, many ambitious farmers find themselves hemmed in by land scarcity even as neighbouring fields sit unused. Their vision is to grow more, modernize their practices, and supply larger markets — but fragmented holdings keep them small. The Land Banking System unlocks this potential by enabling farmers to lease nearby uncultivated plots through a transparent, government-backed process.

By consolidating scattered parcels into larger, more manageable blocks, the Land Bank creates room for mechanization, crop rotation, and shared infrastructure. Everyone benefits,

- Farmers expand their production capacity and increase their income.
- Landowners earn new revenue streams without losing ownership or facing disputes.
- Communities and the nation gain from enhanced efficiency and the full use of fertile agricultural lands.

Through this mechanism, underused plots become the foundation for larger-scale, collaborative farming that drives productivity and rural development.

Core Policy Framework

Policy

Establishing a Land Banking System for Coordinated and Transparent Land Management

Strategic Action

Develop a centralized land bank to register, consolidate, and manage agricultural lands while ensuring farmers retain ownership rights

The Land Bank will,

- Record and manage land ownership transparently
- Enable land pooling and consolidation for collaborative farming
- Support government in allocating lands for agriculture, infrastructure, and agro -industries without disputes
- Act as a foundation for risk-sharing and incentive distribution at the cluster level

Literature reviews

Land banking as an instrument for agricultural land consolidation: comparative perspectives from Europe (Demetriou, 2014).
Institutional mechanisms for reducing land fragmentation and enabling collaborative farming (Van Dijk, 2003).
The role of land information systems in transparent governance and efficient land allocation (Enemark, 2005).
Land pooling and consolidation as tools for sustainable agricultural intensification (Niroula & Thapa, 2005).

Case studies

Government of the Netherlands. (n.d.). Land consolidation and land banking system for agricultural land pooling and large -scale farming in the Netherlands. Ministry of Agriculture, Nature and Food Quality.
National Land Service under the Ministry of Agriculture. (n.d.). Use of Land Bank mechanisms for managing abandoned agricultu ral lands in Lithuania. Government of Lithuania.
Government of Gujarat. (n.d.). Town Planning Schemes (TPS): Integrating land pooling and land banking for infrastructure and agro-industrial development in Gujarat, India. Urban Development & Urban Housing Department.

The Government will establish a national Land Banking System as the central mechanism for coordinated, transparent, and equitable management of agricultural lands. The system will unlock idle or fragmented land for productive use, while preserving ownership rights and ensuring fair benefit-sharing between landowners and cultivators.

This policy framework was guided through some key principles which are,

- Transparency and Accountability - All land registration, leasing, and allocation processes will be recorded in a publicly accessible digital platform.
- Ownership Protection - Farmers and landowners retain legal ownership; the Land Bank acts only as a management and facilitation body.
- Productive Utilization of Land - Priority is given to bringing abandoned or underused agricultural lands back into cultivation.
- Participatory Governance - Regional and local committees, operating under the Commissioner-General, will manage allocation and support services to ensure decisions are locally responsive.
- Equitable Benefit-Sharing - The Land Bank will serve as a foundation for risk-sharing and incentive distribution within farmer clusters.

Drawing on successful land banking experiences in Japan, the Netherlands, Lithuania and India, the proposed Land Banking System will function as a single, transparent platform for registering and managing agricultural land. It will match unused plots with willing cultivators and consolidate fragmented holdings into larger, collaborative farms while safeguarding ownership rights. By streamlining leasing and government allocations for agriculture, infrastructure and agro-industries, and by providing a built-in framework for risk-sharing and fair incentive distribution within farmer clusters, the system ensures that both landowners and cultivators benefit equitably and that idle farmland becomes a driver of sustainable rural growth.

To implement a robust and transparent Land Banking System, it is essential to address existing legal and policy constraints. Current statutes such as the Agrarian Development Act, No. 46 of 2000 and the Paddy Lands Act, No. 1 of 1958 were designed for an earlier era of small-scale, locally administered agriculture and do not yet provide the flexibility or decentralized authority required for land banking. Without targeted amendments, the system risks becoming slow, fragmented, or legally ambiguous. Updating these laws to empower regional and local committees, streamline decision-making, and remove outdated acreage limits will create the legal foundation for effective land pooling, cluster farming, and equitable benefit-sharing under the proposed Land Bank.

Gaps in Existing Policies and Legal Frameworks

Agrarian Development Act, No. 46 of 2000, Section 37 (2)

37. (1) There shall be established a Land Bank entrusted with the possession of certain agricultural lands, under this Act for all or any of the following purposes :— Establishment of the Land Bank.

(a) granting of such agricultural lands to cultivators who can improve agricultural productivity of such lands ;

(b) enabling agricultural lands which are not satisfactorily cultivated to be cultivated according to the provisions of this Act ;

(c) the provision of financial assistance to tenant cultivators to purchase the ownership of the paddy land in respect of which they are the tenant cultivators ; and

(d) enabling owners of paddy lands to purchase the right of cultivation of such paddy lands, by the granting of monetary assistance.

(2) Until a Land Bank is constituted under the provisions of subsection (1) each Agrarian Development Council shall discharge the functions of the Land Bank :

Provided that when an Agrarian Development Council is discharging the functions of the Land Bank it shall act in accordance with the directions of the Commissioner-General.

(3) Regulations may be made in respect of the powers and activities, of the Land Bank.

At present, the Agrarian Development Act vests authority in the Agrarian Development Council to manage land-related issues until a land banking system is formally established. This centralized arrangement can slow decision-making and limit responsiveness to local needs.

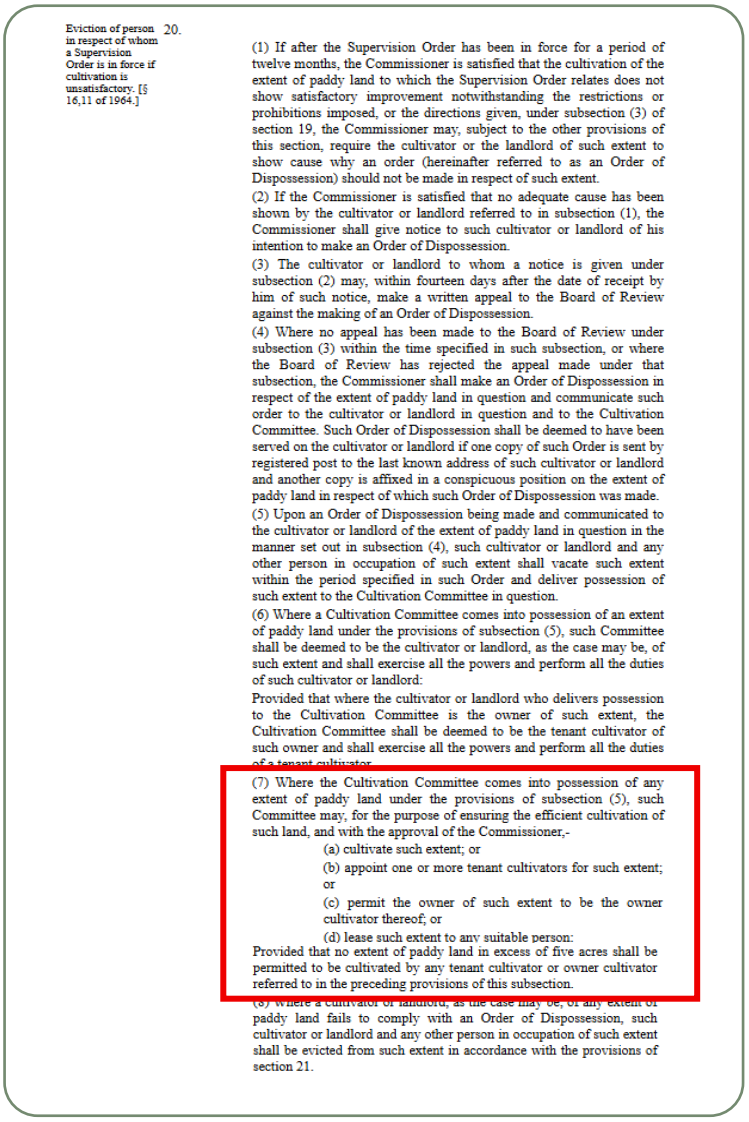
Amendment Required - Decentralize Land Bank Functions via Regional and Local Committees

Empower Regional and Local Committees to execute Land Bank functions in coordination with Agrarian Development Councils (ADCs). Regional Committees shall oversee strategic allocation and governance, while Local Committees manage implementation, farmer support, and monitoring. All committees operate under the Commissioner-General's guidance to ensure accountability. Amend Section 37(3) to formally recognize these committees' roles.

Purpose,

- Accelerate localized decision-making.
- Support land pooling, cluster farming, and equitable financial assistance.
- Clarify legal authority and strengthen local land governance.

Paddy Lands Act, No. 1 of 1958, Section 20 (7)



Eviction of person in respect of whom a Supervision Order is in force if cultivation is unsatisfactory. [§ 16,11 of 1964.]

20. (1) If after the Supervision Order has been in force for a period of twelve months, the Commissioner is satisfied that the cultivation of the extent of paddy land to which the Supervision Order relates does not show satisfactory improvement notwithstanding the restrictions or prohibitions imposed, or the directions given, under subsection (3) of section 19, the Commissioner may, subject to the other provisions of this section, require the cultivator or the landlord of such extent to show cause why an order (hereinafter referred to as an Order of Dispossession) should not be made in respect of such extent.

(2) If the Commissioner is satisfied that no adequate cause has been shown by the cultivator or landlord referred to in subsection (1), the Commissioner shall give notice to such cultivator or landlord of his intention to make an Order of Dispossession.

(3) The cultivator or landlord to whom a notice is given under subsection (2) may, within fourteen days after the date of receipt by him of such notice, make a written appeal to the Board of Review against the making of an Order of Dispossession.

(4) Where no appeal has been made to the Board of Review under subsection (3) within the time specified in such subsection, or where the Board of Review has rejected the appeal made under that subsection, the Commissioner shall make an Order of Dispossession in respect of the extent of paddy land in question and communicate such order to the cultivator or landlord in question and to the Cultivation Committee. Such Order of Dispossession shall be deemed to have been served on the cultivator or landlord if one copy of such Order is sent by registered post to the last known address of such cultivator or landlord and another copy is affixed in a conspicuous position on the extent of paddy land in respect of which such Order of Dispossession was made.

(5) Upon an Order of Dispossession being made and communicated to the cultivator or landlord of the extent of paddy land in question in the manner set out in subsection (4), such cultivator or landlord and any other person in occupation of such extent shall vacate such extent within the period specified in such Order and deliver possession of such extent to the Cultivation Committee in question.

(6) Where a Cultivation Committee comes into possession of an extent of paddy land under the provisions of subsection (5), such Committee shall be deemed to be the cultivator or landlord, as the case may be, of such extent and shall exercise all the powers and perform all the duties of such cultivator or landlord:

Provided that where the cultivator or landlord who delivers possession to the Cultivation Committee is the owner of such extent, the Cultivation Committee shall be deemed to be the tenant cultivator of such owner and shall exercise all the powers and perform all the duties of a tenant cultivator.

(7) Where the Cultivation Committee comes into possession of any extent of paddy land under the provisions of subsection (5), such Committee may, for the purpose of ensuring the efficient cultivation of such land, and with the approval of the Commissioner,-

(a) cultivate such extent; or

(b) appoint one or more tenant cultivators for such extent; or

(c) permit the owner of such extent to be the owner cultivator thereof; or

(d) lease such extent to any suitable person:

Provided that no extent of paddy land in excess of five acres shall be permitted to be cultivated by any tenant cultivator or owner cultivator referred to in the preceding provisions of this subsection.

(8) Where a cultivator or landlord, as the case may be, of any extent of paddy land fails to comply with an Order of Dispossession, such cultivator or landlord and any other person in occupation of such extent shall be evicted from such extent in accordance with the provisions of section 21.

Currently, tenant cultivators or owner-cultivators are restricted to five acres under Section 20(7) of the Act. This limitation hinders larger-scale farming and modernization.

Amendment Required: Remove Five-Acre Limit for Paddy Cultivation

Eliminate the five-acre restriction, permitting any tenant or owner-cultivator to farm the full extent of paddy land allocated or leased through the Land Bank. Oversight shall remain with the Cultivation Committee and Commissioner, with adherence to supervision orders and existing eviction procedures.

Purpose,

- Enable legal cultivation of larger areas.
- Enhance agricultural efficiency and modernization.
- Foster long-term investment in paddy farming while maintaining accountability.

Digital Cadaster System

Core Policy Framework

Policy

Developing a Digital Cadaster System for Transparent and Spatially Accurate Land Management.

Strategic Action

Establish a GIS-based online cadastral system integrating land titles, ownership data, and cadastral maps into a unified digital platform.

The Digital Cadaster System will,

- Maintain accurate and updated digital records of all agricultural lands registered under the Land Bank
- Provide a legal and spatially accurate framework to prevent and resolve boundary disputes
- Facilitate decision-making for land consolidation, irrigation planning, and infrastructure development
- Enable integration with land use policies, taxation systems, incentives, and farmer support programs

Literature reviews

The role of digital cadastres in improving land governance and reducing disputes (Williamson, Enemark, Wallace &Rajabifard, 2010).
GIS-based cadastral systems for sustainable land management in developing countries (Pašakarnis & Maliene, 2010).
Digital cadastres as enablers of e-governance and smart land administration (Kaufmann & Steudler, 1998).
Integration of cadastral data with agricultural policies for land consolidation and rural development (Dale & McLaughlin, 1999).

Case studies

Estonian Land Board. (n.d.). e-Cadastre system: Providing real-time online access to cadastral and land ownership data in Estonia. Government of Estonia.
Ministry of Rural Development. (n.d.). Digital India Land Records ModernizationProgramme (DILRMP): GIS-based cadastral mapping for improved land governance in India. Government of India.
Rwanda Natural Resources Authority. (n.d.). National Land Tenure Regularization Program: Digitalcadastre for secure ownership and conflict reduction in Rwanda. Government of Rwanda.
Kadaster Netherlands. (n.d.). Kadaster System: Integrating land registration and cadastral mapping for infrastructure and agricultural planning in the Netherlands.Government of the Netherlands.

To manage data within the Land Bank, a GIS-based online cadastral system is proposed. This digital platform would integrate land titles, ownership data, and cadastral maps into a unified framework.

To underpin the Land Banking System with transparency, legal security, and spatial accuracy, a national Digital Cadaster System will be established. This GIS-based online platform will integrate land titles, ownership data, and cadastral maps into a single authoritative database, ensuring that every parcel of agricultural land is clearly identified, recorded, and accessible for policy and operational decisions.

Guiding Principles

- Transparency - All registered lands and transactions are visible in real time to authorized stakeholders, reducing disputes and corruption.
- Accuracy and Legal Certainty - Spatially precise data matched with verified ownership records provides a defensible framework for leasing, allocation, and taxation.
- Integrated Planning - Cadastral information will support irrigation, infrastructure, and cluster-farming plans at local and national levels.
- Interoperability - The system will link with land use policies, taxation systems, incentive schemes, and farmer support programmes to streamline service delivery.

The Digital Cadaster will maintain up-to-date digital records of all agricultural lands registered under the Land Bank, provide a legal and spatially accurate framework to prevent and resolve boundary disputes, and supply data-driven insights to guide land consolidation, irrigation planning, and infrastructure development. By integrating with other government systems, it will enable more efficient allocation of resources and incentives to farmers and landowners alike.

This approach reflects best practices from countries such as Estonia, India, Rwanda and the Netherlands, where digital cadasters have enhanced land governance, reduced disputes, and improved agricultural planning.

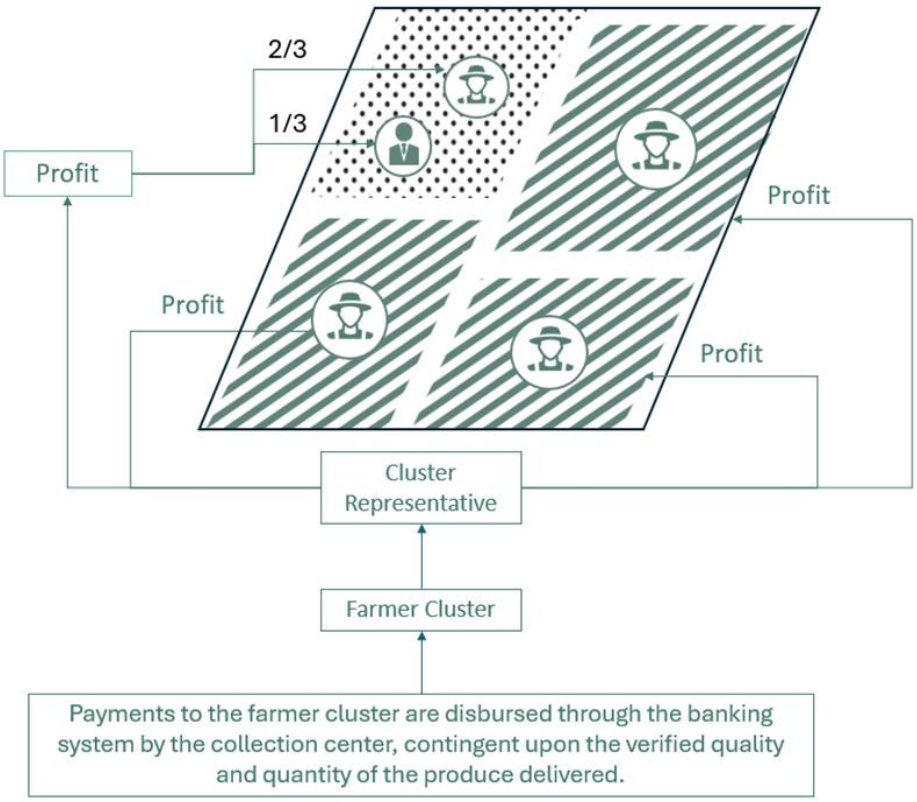
Profit Sharing within the Collaboration System

The Land Bank supports a collaborative farming approach organized into farmer clusters. Each cluster operates as a primary unit, with a designated farmer representative responsible for financial operations. However, all strategic financial decisions are made collectively by cluster members to ensure participatory governance and shared accountability.

Roles and Responsibilities of Farmer Representatives

- Oversee administration and accurate record-keeping of pooled financial resources.
- Distribute risk-sharing compensations to farmers according to established guidelines to mitigate potential losses.
- Facilitate the transition of the farmer cluster toward self-sufficiency by promoting organic fertilizers and sustainable agricultural practices.

Payment and Profit-Sharing Mechanism



Payments to farmer clusters are channeled from the collection center through the formal banking system. This ensures transparency and traceability of transactions. The amount disbursed to each cluster is tied directly to the verified quality and quantity of produce delivered, rewarding both productivity and adherence to quality standards.

Once the payments are received, profits are allocated within the cluster through a consultative process that includes all farmers. This participatory approach guarantees that profit sharing reflects agreed-upon rules and remains fair to every contributor.

When cultivation takes place on land owned by someone else, profits are divided according to pre-set arrangements — typically one-third to the landowner and two-thirds to the farmer who undertakes the cultivation. This model balances the rights of ownership with the effort and risk of farming.

In addition, three percent (3%) of the net profit from each cluster is set aside in a dedicated cluster fund. This fund supports collective activities and strengthens financial sustainability, acting as a safety net for situations such as crop damage or other unforeseen risks.

By embedding the Land Banking System, Digital Cadaster, and Profit-Sharing Mechanism into the Collaboration Model, the Agro-Regional Plan directly addresses farmers' concerns about land security and equitable benefit distribution. This integration transforms the model from being only a structural framework of clusters, villages, towns, and cities into a trustworthy, farmer-centered system. Farmers are now assured that,

- Their land ownership is protected and disputes minimized through cadastral transparency.
- Their efforts are rewarded fairly through structured, participatory profit sharing.
- Their collective future is secured through land banking and pooled cluster funds.

In short, this integration bridges the gap between conceptual vision and practical reality, making the collaborative farming model not only ambitious but also realistic, equitable, and farmer-approved.

3.5.2 STRATERGY 02 - INFORMATION STRATEGY

The agricultural sector in Sri Lanka, while serving as the backbone of rural livelihoods, is characterized by systemic inefficiencies that hinder its potential contribution to national development. Key challenges such as fragmented land ownership, over-reliance on middlemen, market asymmetries, price volatility, and post-harvest losses persist despite decades of policy interventions. Farmers remain disconnected from market signals, often cultivating crops based on tradition, speculation, or short-term profits rather than reliable data on consumer demand and supply dynamics. Meanwhile, intermediaries capture a disproportionate share of value, leaving farmers with low farm-gate returns while consumers face high retail prices.

To address these issues, Strategy 02 proposes the establishment of an integrated information management system, titled GreenBridge. This system envisions a digital platform that connects the agricultural production base with the broader market and policy environment. Functioning as a centralized and transparent knowledge and transaction hub, GreenBridge will facilitate information flows between farmers, markets, exporters, logistics providers, and consumers. The ultimate goal is to improve agricultural productivity, enhance farmer incomes, minimize wastage, and foster a more equitable and sustainable agricultural marketing system.

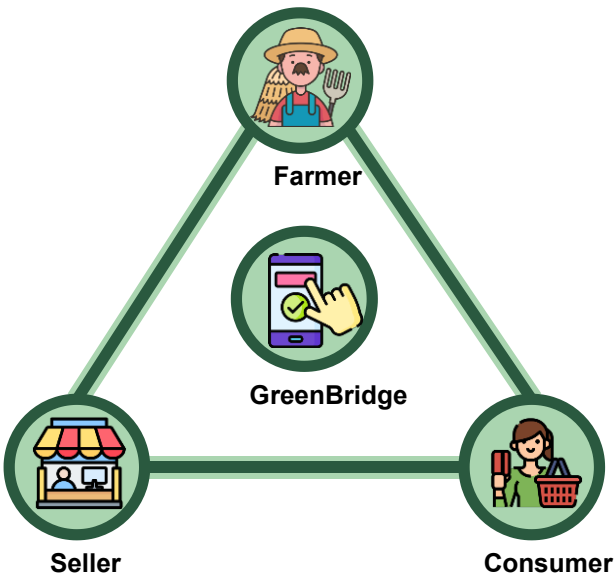
Core Policy Framework

Policy

Empower local economies and drive agricultural innovation with advanced digital platforms for market access and effective flow of information across supply chains

Strategic Action

GreenBridge : The Mobile App



GreenBridge embodies the Core Policy Framework of the Information Strategy by fostering an inclusive, data-driven agricultural ecosystem. Guided by the principles of transparency, interoperability, traceability, and equity, it delivers a secure and integrated digital platform that connects all actors in the supply chain. GreenBridge promotes real-time, accurate information sharing, enabling fair pricing, market access, quality compliance, and evidence-based decision-making. This accelerates productivity, sustainability, and innovation while strengthening local economies.

Guiding Principles

GreenBridge has been conceived and developed in alignment with the Policy Framework of the Information Strategy. Its operation is grounded in the following guiding principles, which ensure the platform supports sustainable, inclusive, and innovative agricultural development:

1. Transparency & Real-Time Information

   Provide open and timely access to data across all levels of the supply chain to enable fair pricing, informed decisions, and accountability.

2. Interoperability & Integration

   Seamlessly connect farmers, collectors, processors, exporters, wholesalers, retailers, and consumers through a unified, secure, and data-driven platform.

3. Traceability & Accountability

   Maintain end-to-end visibility of origin, certifications, quality standards, and batch data to uphold trust and regulatory compliance.

4. Equity & Fair Market Access

   Empower smallholders and local communities by reducing middlemen, ensuring inclusive participation and equitable benefits for all stakeholders.

5. Evidence-Based Decision-Making

   Deliver actionable insights—such as price trends, demand forecasts, cultivation guidance, and logistics planning—to improve productivity and planning.

6. Innovation & Value Addition

   Promote sustainable practices, quality enhancement, packaging, branding, and export readiness to increase competitiveness and market reach.

7. Consumer Engagement & Feedback

   Integrate consumer feedback loops to improve product quality, responsiveness, and supply chain efficiency.

These principles guide the development and deployment of GreenBridge to ensure that it is not just a technology platform, but a strategic enabler of systemic change in agricultural markets.

GreenBridge operationalizes the Policy Framework through the following actions,

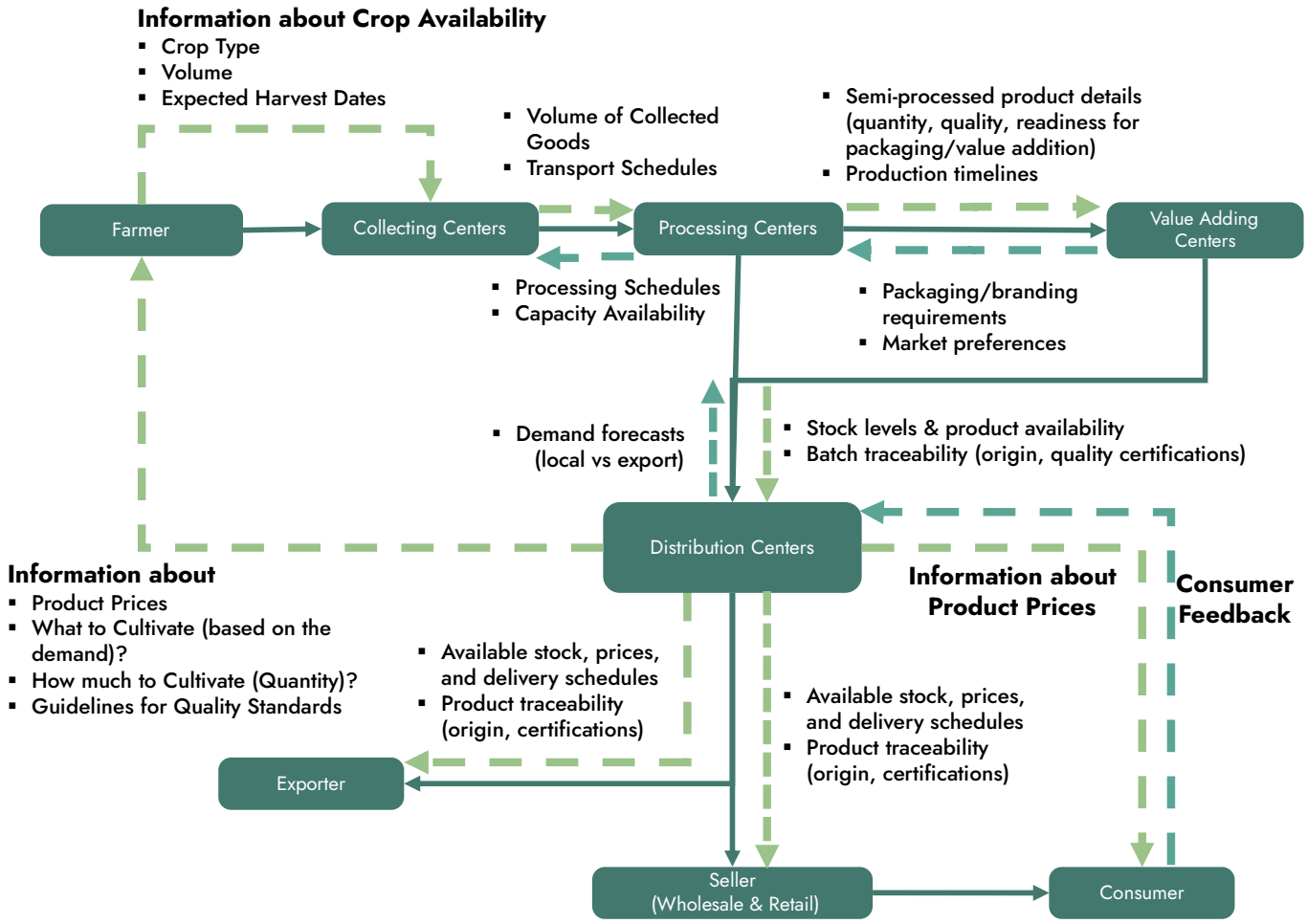
- Integrated Stakeholder Network: Seamlessly linking farmers, collectors, processors, exporters, wholesalers, retailers, and consumers into one interoperable, data-rich platform.
- Actionable Market Intelligence: Providing real-time data on product prices, demand forecasts, cultivation planning, quality standards, logistics, and processing schedules.
- Transparency & Traceability: Embedding end-to-end visibility of origin, certifications, and batch data to ensure accountability and compliance.
- Efficient Market Transactions: Enabling real-time stock availability, delivery schedules, and consumer feedback loops for faster, fairer transactions.
- Innovation & Value Addition: Aligning packaging, branding, and export readiness with market preferences to enhance competitiveness and sustainability.

By adhering to the Policy Framework's guiding principles, GreenBridge becomes the digital backbone of the agricultural supply chain, translating the vision of inclusive, information-rich, and innovation-driven local economies into measurable impact.

System Workflow

The rationale for GreenBridge is grounded in the observed gaps between agricultural production and market access, as revealed in the fieldwork and stakeholder analysis. Farmers currently make decisions without accurate data on crop demand, resulting in both gluts and shortages. Post-harvest losses, particularly for perishable commodities, are exacerbated by inadequate storage and inefficient logistics. Price discovery mechanisms are opaque, with middlemen exercising control over farm-gate rates. Additionally, limited institutional coordination and weak knowledge transfer channels have contributed to low adoption of modern technologies.

An integrated information system responds to these challenges by ensuring that all actors in the value chain are guided by real-time, evidence-based information. By embedding features such as price updates, demand forecasts, logistics scheduling, and traceability mechanisms, the system addresses structural inefficiencies while also building resilience against external shocks such as climate variability and market disruptions.



The conceptualization of GreenBridge draws from a problem-driven planning framework. The process began with problem framing, where disconnection between production, market accessibility, and institutional support was identified as the root challenge. This was followed by stakeholder engagement, which revealed widespread concerns about price instability, lack of bargaining power, and inadequate access to knowledge.

Information Inputs and Outputs Across the Agricultural Value Chain (GreenBridge System)

Farmer Stage

At the farmer stage, GreenBridge captures critical input data directly from the source to ensure accuracy and transparency. Farmers enter details such as the type of crop, the area under cultivation, the expected yield, and anticipated harvest dates. They also provide quality assurance information, including seed source, farming methods, and pesticide usage, along with location data for logistics and traceability.

In return, the system delivers valuable outputs to empower farmers in decision-making. They receive real-time market prices for different crops, demand forecasts distinguishing between local and export markets, and clear guidelines for cultivation-covering quantity, quality standards, and certification requirements. Farmers also gain access to consumer feedback on product performance, helping them align their practices with market needs.

For example, a farmer may register that they expect 2,000 kg of bananas by November; based on this information, GreenBridge can advise them on expected demand and the best price channels to maximize their earnings.

Collecting Centers

At the collecting center stage, GreenBridge facilitates the efficient intake and management of produce from farmers. Staff at these centers input essential data into the system, including the total volume of collected goods, results from initial quality checks such as freshness, grading, and contamination tests, and packaging details like batch codes and farmer IDs for traceability.

In return, the system provides outputs that streamline operations and improve fairness. Collecting centers receive transport schedules for moving goods to processing or distribution hubs, real-time storage availability information, and automated price allocations for farmers based on weight and quality grades.

For example, a farmer's batch is tested at the collection center; the quality grade is recorded in GreenBridge, and the payment is calculated immediately according to weight multiplied by grade—ensuring transparency and prompt remuneration.

Processing Centers

At the processing center stage, GreenBridge captures and manages critical data to ensure smooth operations and compliance with quality standards. The centers input detailed batch information received from collecting centers, including the origin, quality, and volume of produce. They also record processing schedules such as milling, cleaning, or cutting, along with equipment and plant capacity availability to optimize workflow and minimize delays.

The system, in turn, generates valuable outputs to guide subsequent steps in the supply chain. It provides details on semi-processed products—covering quantity, quality, and readiness for further value addition—along with updated timelines for transferring goods to value-adding centers. Additionally, it records and shares certification data, such as hygiene and safety standards, to ensure regulatory compliance and build market trust.

For example, a rice batch can be registered in the system as "semi-processed, ready for polishing," after which GreenBridge automatically generates an estimated completion date for the next processing stage.

Value-Adding Centers

At the value-adding stage, GreenBridge enables centers to transform semi-processed goods into market-ready products while maintaining full transparency. These centers input detailed information into the system, including the quantity, quality, and certification status of semi-processed products they receive. They also record market preferences, such as consumer demand for organic, branded, or specially packaged goods, along with the specific branding and packaging requirements for each batch.

In return, the system produces comprehensive outputs that support quality assurance and traceability. It provides final product details—indicating when goods are packaged, branded, and export-ready—along with full batch traceability, including origin, farmer details, and certification status. The platform also generates structured pricing for processed products, ensuring consistency and fairness across the supply chain.

For example, cassava flour may be branded and packaged at a value-adding center, with its batch code automatically linked back to the farmer through GreenBridge, guaranteeing transparency and accountability.

Distribution Centers

At the distribution stage, GreenBridge supports centers in efficiently managing and dispatching products to their destinations. Staff at distribution centers input essential information into the system, including current stock levels received from value-adding centers and processors, records of product availability along with certification and origin details, and demand forecasts differentiating between local and export markets.

In return, the platform generates outputs that streamline operations and improve market responsiveness. It provides distribution schedules to retailers and exporters, up-to-date information on available stock and delivery timelines for buyers, and regularly updated demand–supply balance reports to help plan shipments and avoid shortages or oversupply.

For example, a supermarket chain can use the GreenBridge app to view available onion stock at a distribution center and reserve supply in advance, ensuring timely delivery and consistent availability for customers.

Exporters

Exporters interact with the system by providing key inputs necessary for international trade. These inputs include export requirements, such as international quality certifications and shipping schedules, as well as market destination data, which specifies the volumes required by overseas buyers.

The system, in turn, generates several outputs that assist exporters in managing their operations efficiently. These outputs include information on available export-ready stock, complete with traceability details such as origin, certifications, and packaging. Additionally, the system provides delivery timelines and pricing for international buyers, along with insights into demand trends in overseas markets.

For example, if an exporter requests 500 kg of certified organic mangoes, the system can display the available stock along with relevant details about the farmers and processing methods, enabling informed decision-making and smooth export operations.

Sellers (Wholesale & Retail)

Sellers, including both wholesalers and retailers, provide essential inputs into the system to manage supply and meet consumer demand. These inputs include retailer demand, specifying which crops are needed, in what quantity, and by when. Additionally, sales data such as consumer preferences and popular products are fed into the system to help optimize stock management and planning.

In response, the system generates outputs that support sellers in their operations. This includes information on stock availability and product traceability, as well as delivery schedules and logistics for timely distribution. The system also provides updates on wholesale and retail prices, enabling sellers to make informed decisions.

For example, a retailer can place orders directly through the system, reducing dependence on middlemen and streamlining the supply chain.

Consumers

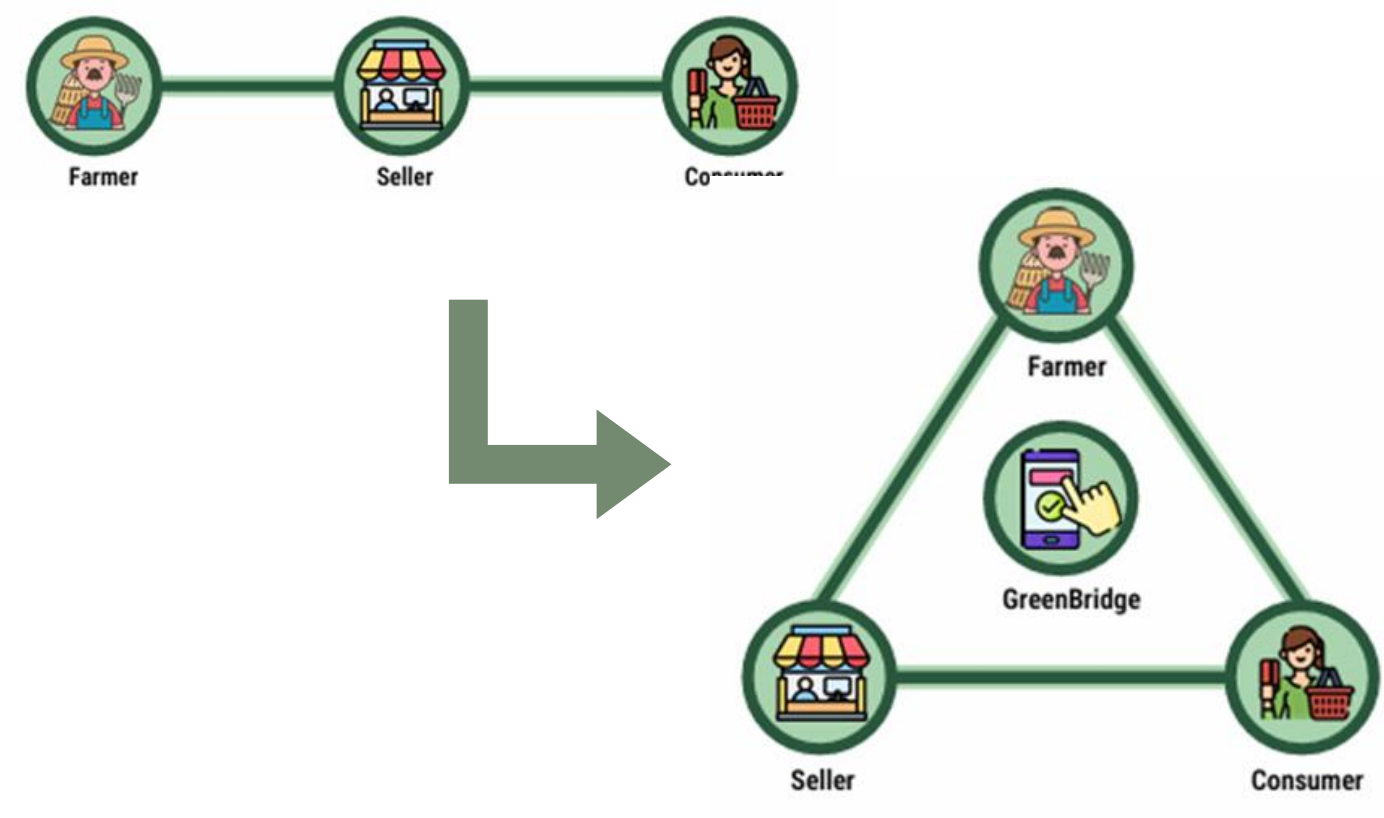
Consumers contribute important inputs to the system, such as feedback on product quality and their personal preferences. They also provide purchasing data, including the volume and type of products bought and seasonal trends in their buying behavior. This information helps the system understand demand patterns and consumer expectations.

In return, the system provides several valuable outputs to consumers. These include transparent product information, such as the origin, farmer ID, and certifications associated with the product. Consumers also receive up-to-date price data and information on product availability, along with details about food safety and nutritional value.

For example, a consumer can scan a QR code on a packet of rice to learn which farmer grew it, where it was processed, and which certification it carries, offering complete transparency and confidence in their purchase.

The system supports different stakeholders at each stage of the supply chain with specific functions tailored to their needs. Farmers receive guidance on cultivation practices, access to real-time market prices, and payments linked to the quality of their produce. Collecting centers ensure initial quality control, register batches, and manage payments to farmers. Processing centers record semi-processing data and certify the quality of products, while value-adding centers focus on final branding, packaging, and generating market-ready products.

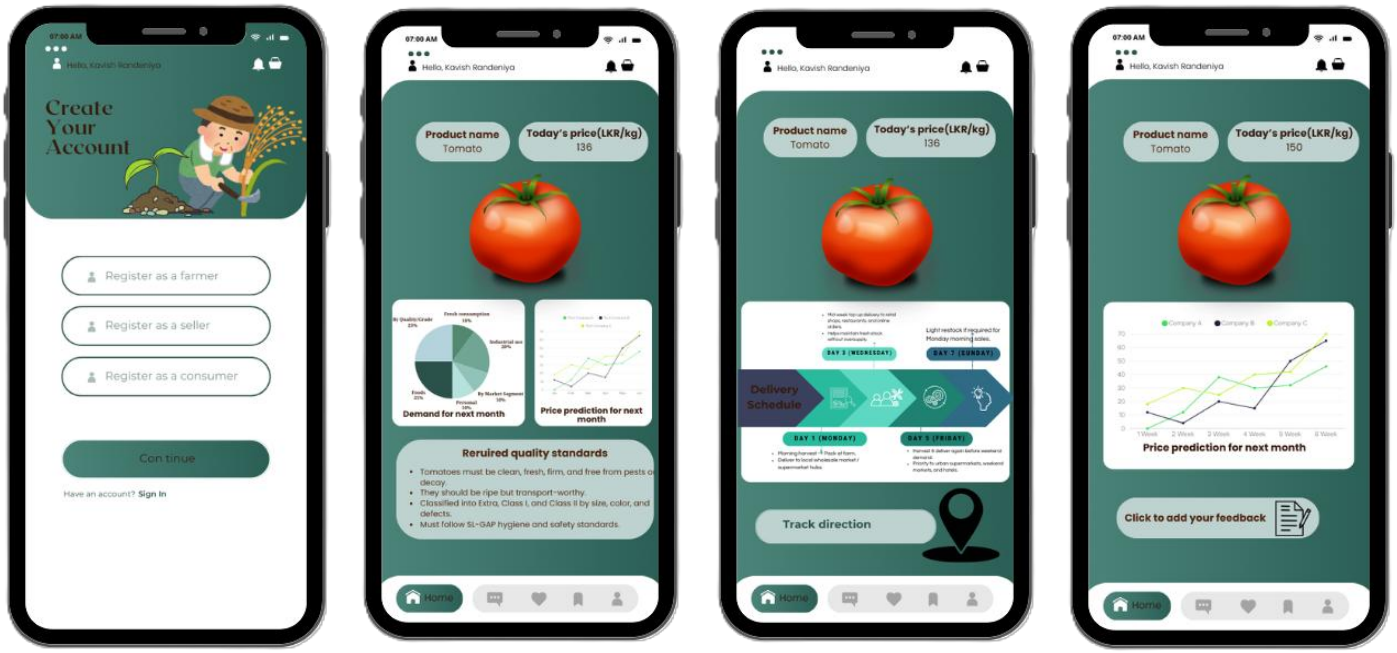
Distribution centers play a key role in balancing stock and demand and coordinating deliveries efficiently. Exporters gain access to certified, export-ready products with complete traceability, while sellers can view available stock, schedule deliveries, and stay updated on retail trends. Finally, consumers benefit from transparent product information and can provide feedback that influences production decisions, closing the loop across the supply chain.



System Inputs and Outputs

The GreenBridge system relies on a variety of inputs to function effectively. These include farmer data, such as crop type, expected harvest, and land extent, as well as market data, including price updates, demand patterns, and consumer preferences. Institutional data, such as extension advisories, quality standards, and policies, also feed into the system, along with logistics information covering transport schedules, storage capacity, and export channels.

Based on these inputs, the system generates outputs that benefit multiple stakeholders. Farmers receive crop recommendations, price forecasts, and access to buyers. Retailers gain reliable supply data, reducing uncertainty in procurement. Exporters benefit from certified, traceable supply chains, while consumers enjoy price transparency, quality assurance, and food safety guarantees. Policymakers can access dashboards with analytics on production, demand, and trade, enabling evidence-based decision-making and improved policy planning.



How Inputs and Outputs Are Processed to Run the System

The GreenBridge system processes inputs and outputs through multiple coordinated stages to ensure efficiency, transparency, and reliability. It begins with **data collection and registration,** where farmers and collecting centers input raw data such as crop type, quantity, harvest dates, quality grade, and location. Validation modules check data consistency, verifying farmer IDs, realistic yield ranges, and proper batch coding, while time-stamping and geo-referencing each entry for traceability. For example, when a farmer registers 500 kg of tomatoes, the system validates the registration, assigns a batch code, and links it to the farm location.

Next, **data integration and storage** consolidate all inputs from farmers, processors, retailers, exporters, and consumers into a centralized cloud database. The system filters redundant or duplicate records, ensuring each batch is uniquely identified and accessible across the supply chain. For instance, a batch of onions recorded at a collection center is linked to the farmer's ID and simultaneously updated in the processing center's schedule.

The system then performs **analysis and forecasting** using AI and machine learning algorithms to assess supply and demand patterns. Forecasting modules align upcoming harvests with market requirements, both local and export, while quality data informs pricing models, allowing higher-grade produce to command premium prices.

Logistics and scheduling are optimized once volumes and timelines are entered. The system generates transport schedules, calculates efficient routes to reduce costs and post-harvest losses, and updates storage availability in real time. For example, tomatoes may be assigned to the nearest cold storage and scheduled for transport within 24 hours to maintain freshness.

Through **traceability and certification,** every batch is tracked along the supply chain with a unique code. Each stage—from collection to processing, value addition, distribution, and retail/export—updates the batch record with quality checks, certifications, and processing details. Blockchain or digital ledgers ensure data integrity. A consumer in Colombo, for example, can scan a QR code on packaged rice to see the farm location, processing center, and certification date.

Feedback loops allow consumers, retailers, and exporters to provide insights on taste, pricing, and complaints, which are fed back to farmers and other stakeholders to improve future production. If customers report poor shelf life for cucumbers, the system can flag handling issues at collection centers for corrective action.

Payment and profit allocation are automated, with farmer payments calculated based on quantity, quality grade, and current market prices. Digital payment gateways ensure rapid, secure disbursement, while profit-sharing mechanisms can be implemented for cooperatives. For instance, a farmer delivering 100 kg of Grade A tomatoes may receive instant payment at a higher rate than another farmer delivering lower-grade produce.

Finally, **continuous monitoring and policy support** aggregate data for government agencies and policymakers. Dashboards highlight regional production levels, shortages, and export potential, helping authorities design subsidies, regulate prices, and strengthen food security. For example, the Ministry of Agriculture can predict a paddy shortage and issue early seed subsidies based on system data.

Overall, this multi-stage processing ensures a "good system" by enhancing **accuracy**, with validated real-time data**; transparency**, through accessible records at every stage; **efficiency**, via optimized logistics and streamlined payments; **trust**, using blockchain-enabled traceability; **adaptability,** through forecasting tools that respond to market or climate changes; and **equity**, ensuring farmers receive fair prices based on quality and quantity.

Advantages and Disadvantages

The GreenBridge system offers several advantages that strengthen the agricultural supply chain. It reduces inefficiencies and post-harvest losses, ensures fairer pricing for farmers, and increases their income. By providing access to real-time data and traceability, the system enhances the competitiveness of Sri Lankan agriculture in global markets. Additionally, it promotes sustainable practices through more informed and efficient use of resources.

However, the system also has potential disadvantages. High initial investment costs are required for infrastructure, technology, and training. There is a risk of excluding digitally marginalized farmers who may lack access or literacy to fully benefit from the platform. Without strong governance, sensitive data could be misused, and the system's effectiveness depends on continuous policy support and coordination among institutions.

The GreenBridge information management system represents a significant step toward addressing persistent inefficiencies in Sri Lanka's agricultural sector. By leveraging digital technologies to seamlessly connect production with markets, the system has the potential to empower farmers, reduce post-harvest losses, ensure fair pricing, and enhance national competitiveness. With adequate policy support, sustained investment, and strong collaboration among stakeholders, GreenBridge can evolve into a transformative initiative that not only revitalizes agriculture but also contributes meaningfully to broader socio-economic development.

3.5.3 STRATERGY 03 - URBAN CORRIDOR AND INTEGRATING AGRICULTURAL ZONING WITH TOURISM

Introduction

The proposed urban and spatial structure for 2040 emphasizes a balanced integration of urban development, agriculture, and ecological conservation. This approach is based on the policy framework of Sustainable Urban Corridor Development with Ensured Ecological Balance. It aims to preserve agricultural lands, promote green infrastructure, and ensure that ecological sustainability is embedded in the process of regional growth.

The region has been identified as a strategic corridor for urban and agricultural development. The proposed urban hierarchy and spatial structure provide a framework where ecological resilience, agricultural productivity, and urban expansion complement each other.

Policy Framework

Policy Statement

Sustainable Urban Corridor Development with ensured Ecological Balance.

This policy provides the guiding principles for integrating ecological sustainability into the region's urban development. The framework encourages adaptive land-use planning where agricultural lands are preserved, while other land-use categories can transition into built-up areas under strict green-building standards.

Strategic Actions

To implement this policy, several strategic actions are proposed

1. Preservation of Agricultural Lands
   - All agricultural lands are to be protected to maintain food security and rural livelihoods.
   - Conversion of land to built-up areas will be permitted only outside agricultural zones.
2. Green Building Integration
   - All new constructions on converted lands must adopt green building and green housing principles.
   - Green infrastructure will be prioritized to balance ecological damage from urbanization.
3. Density-Based Regulations
   - Low-Density Built-Up Zones: Developers will be incentivized (extended floor levels, relaxed controls) for adopting green principles.
   - High-Density Built-Up Zones: Adoption of green building and housing standards will be mandatory as a precondition for development approval.

Literature Review

The policy framework is supported by international research and urban sustainability practices

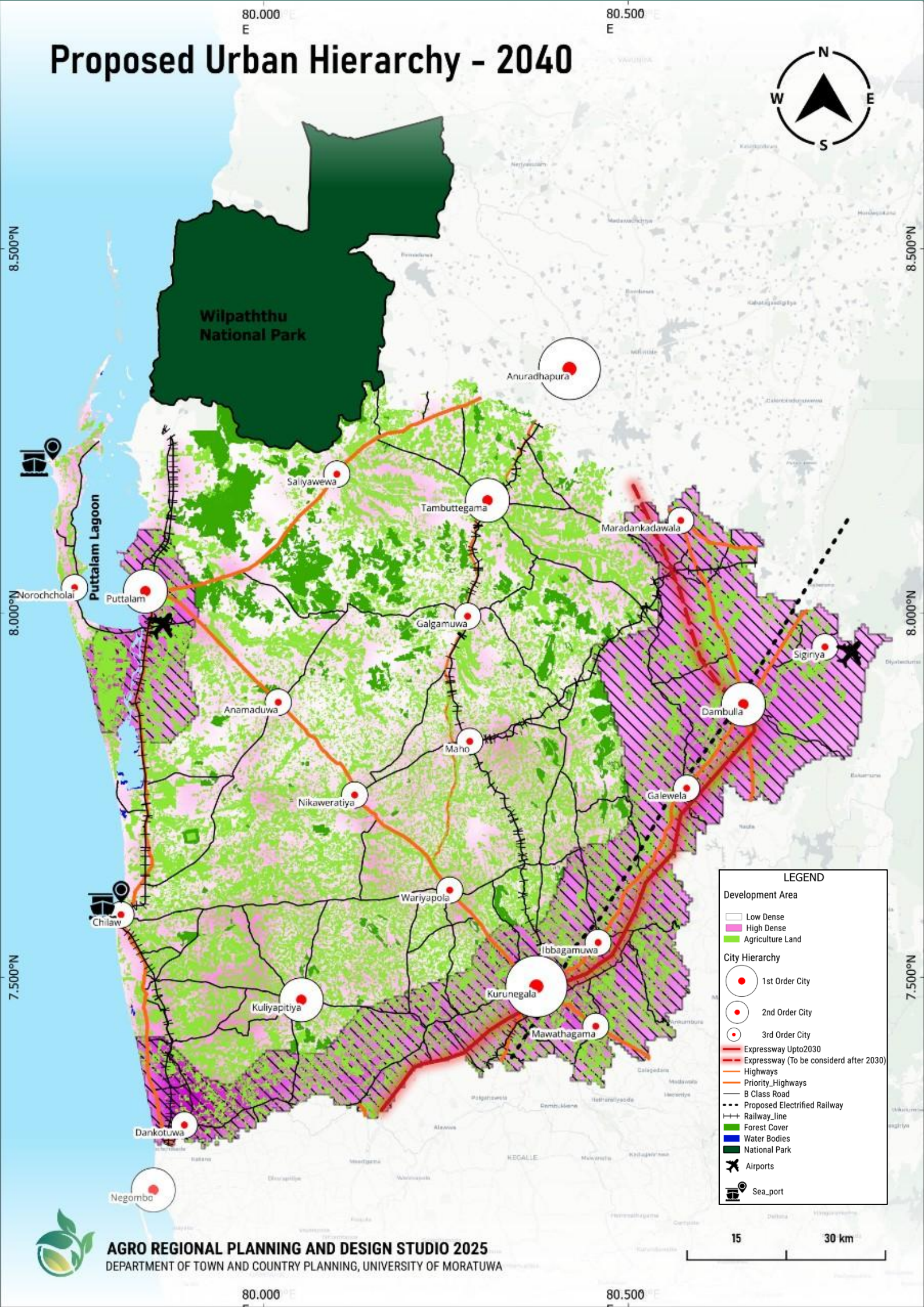
- Green Infrastructure Strategy: Green spaces and eco-networks can provide both ecological and social benefits, fostering sustainable urban environments (Benedict & McMahon, 2006).
- Incentives for Green Buildings: Development rights and planning tools in Asian cities highlight the effectiveness of incentivizing eco-friendly urban development (Shrestha et al., 2019).
- Urban Heat Island Mitigation: Higher densities combined with green building policies reduce urban heat island effects and improve microclimates.
- Ecological Compensation Mechanisms: Integrating ecological compensation in land-use planning enhances biodiversity conservation (McKenney & Kiesecker, 2010).

Case Studies

The proposed strategy builds upon global best practices

- Singapore - Mandatory Green Mark Certification ensures all new buildings adopt ecological compensation measures.
- Freiburg, Germany - Incentive-based approaches promote green roofs and ecological design, balancing high-density growth with environmental sustainability.
- Pune, India - Transferable Development Rights (TDRs) have been effectively used to encourage green building practices.

These cases demonstrate the feasibility of combining regulatory requirements with incentive mechanisms to ensure urban ecological balance.


Proposed Urban Hierarchy - 2040
80.000 E
80.500 E
8.500°N
8.000°N
7.500°N
N
W
E
S
Wilpaththu National Park
Anuradhapura
Saliyawewa
Tambuttegama
Maradankadawala
Puttalam Lagoon
Norochcholai
Puttalam
Galgamuwa
Siginya
Anamaduwa
Dambulla
Maho
Galewela
Nikaweratiya
Wariyapola
Chilaw
Ibbagamuwa
Kurunegala
Kuliyapitiya
Mawathagama
Dankotuwa
Negombo
LEGEND
Development Area
Low Dense
High Dense
Agriculture Land
City Hierarchy
1st Order City
2nd Order City
3rd Order City
Expressway Upto2030
Expressway (To be considerd after 2030)
Highways
Priority_Highways
B Class Road
Proposed Electrified Railway
Railway_line
Forest Cover
Water Bodies
National Park
Airports
Sea_port
15
30 km
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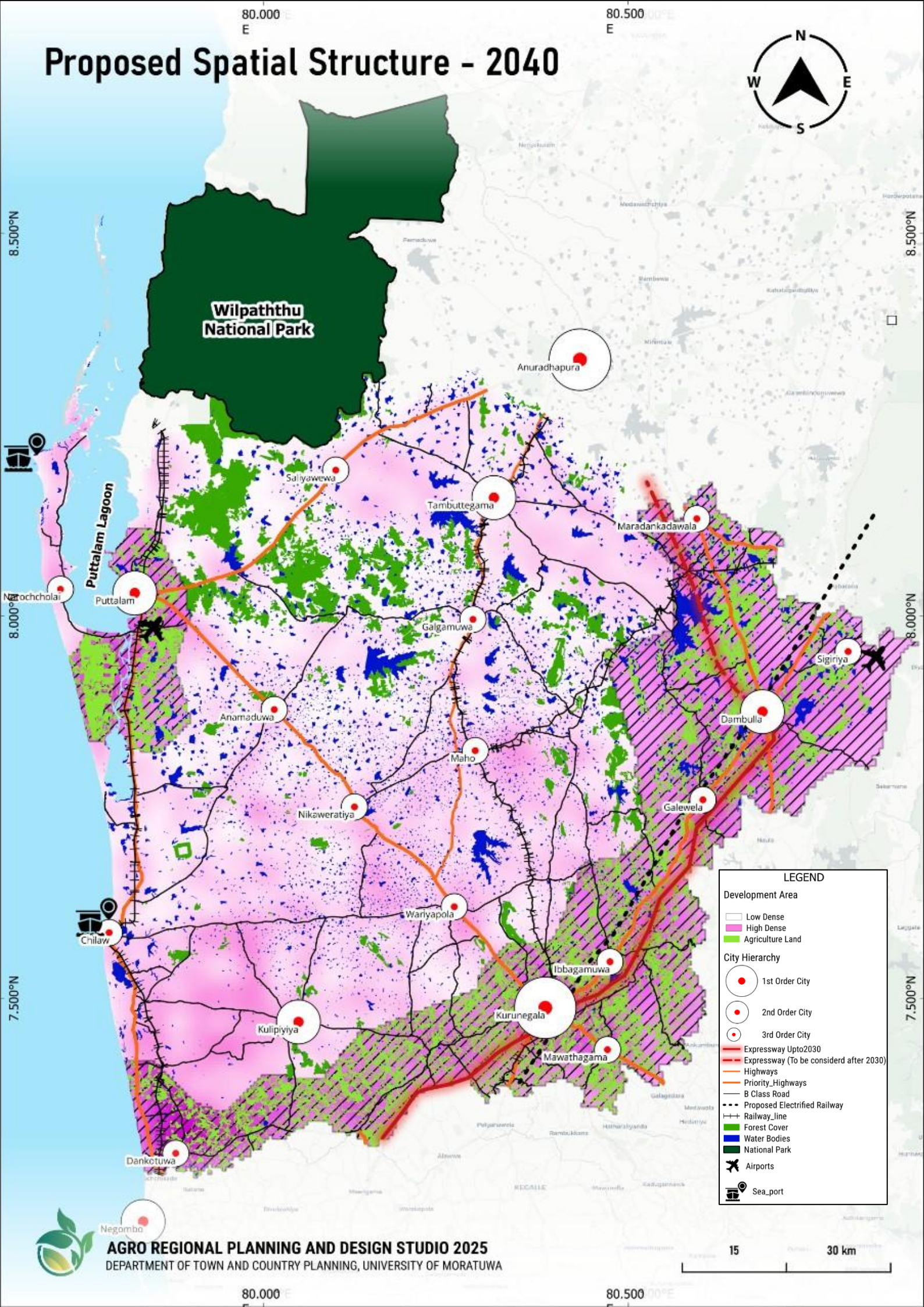
Proposed Spatial Structure - 2040



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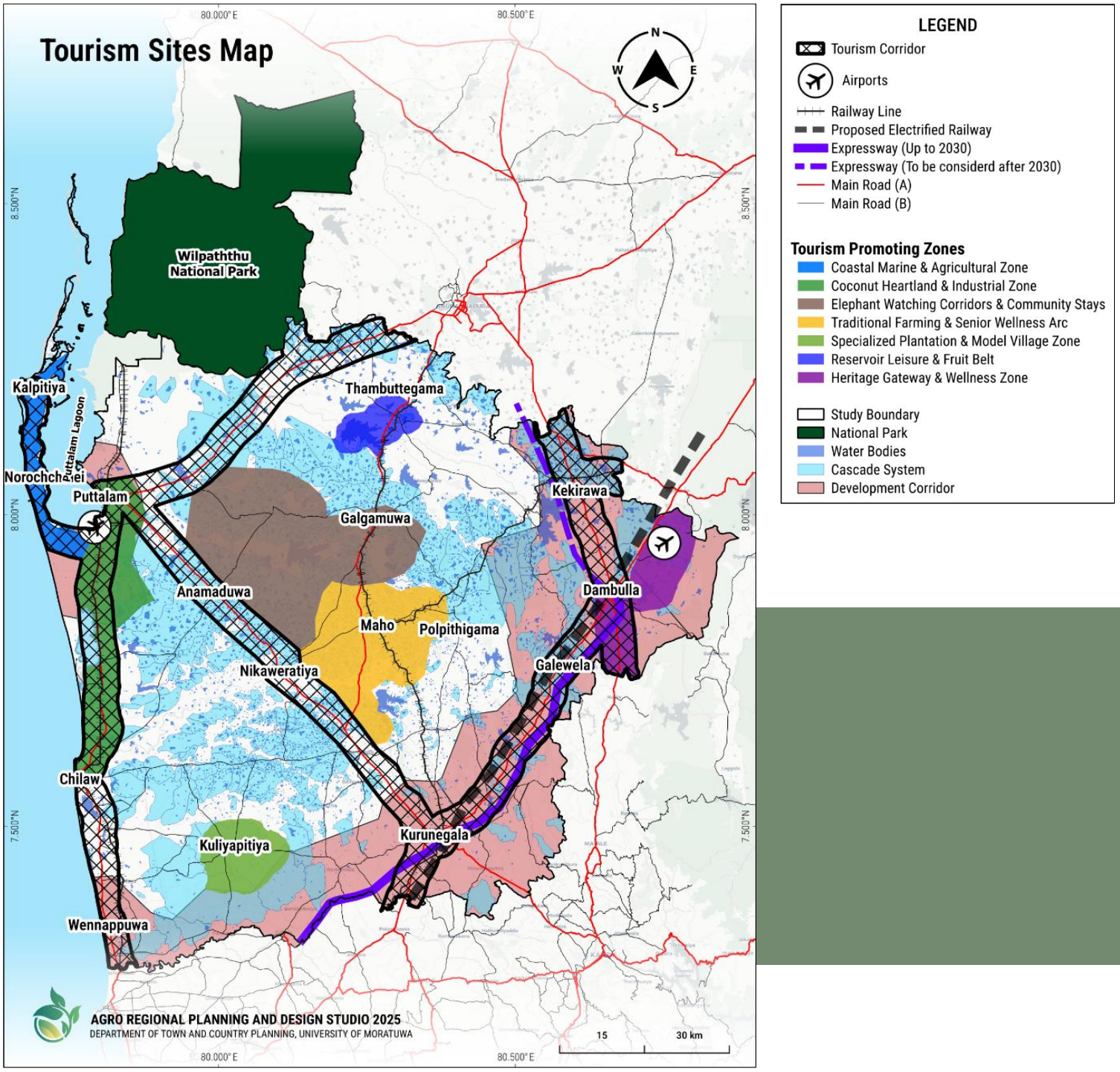
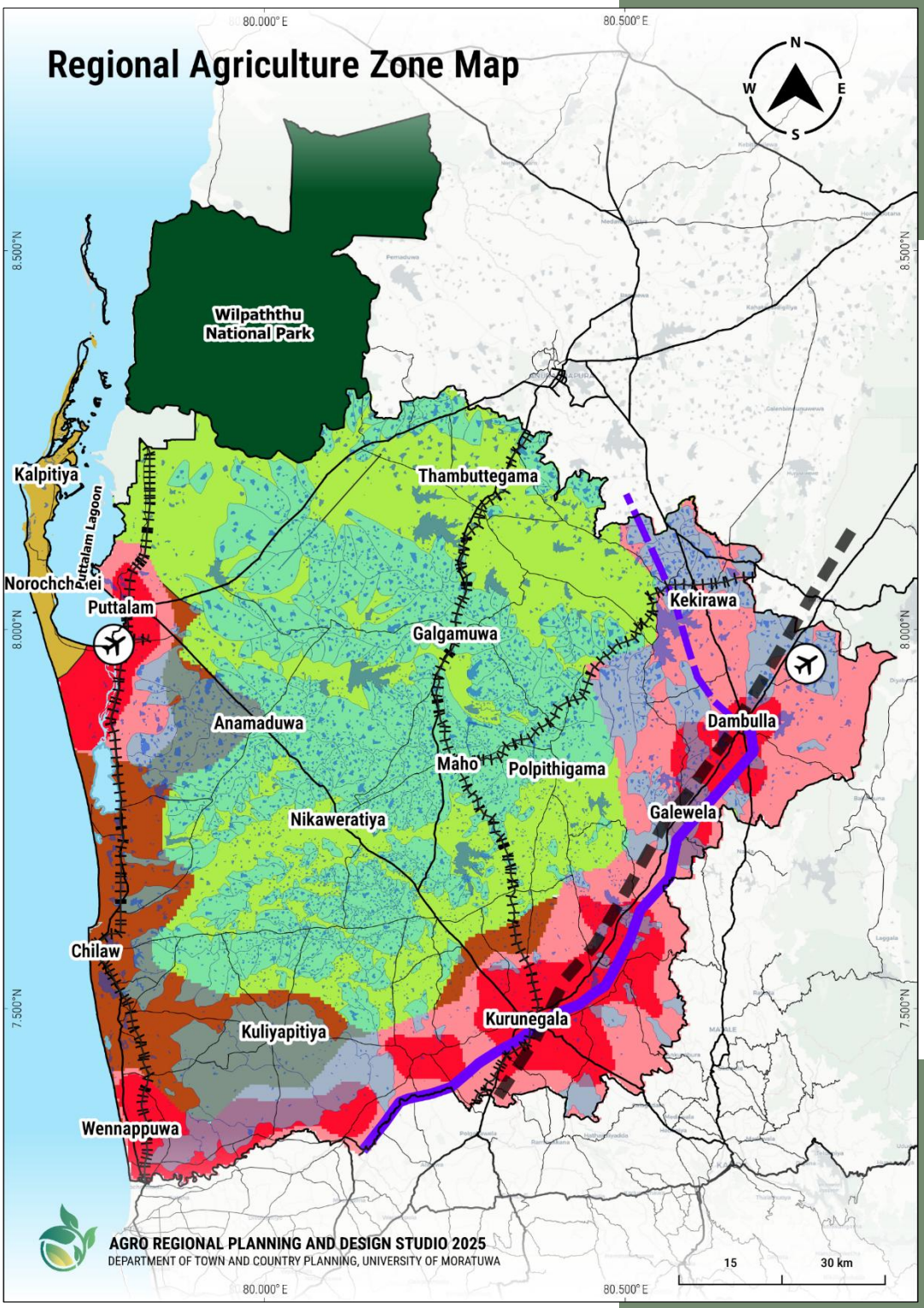
Integrating Agricultural Zoning with Tourism Promotion

Our final plan integrates agricultural zoning and tourism promotion so that farming, ecology, and visitor experiences reinforce each other across the corridor.

Five distinct Agricultural Zones were delineated using land-use patterns, water resources, and settlement intensity. These zones overlap with seven Tourism Promotion Zones that mentioned in previous strategy, creating opportunities for agro-tourism, heritage conservation, and climate-resilient economic growth.




Regional Agriculture Zone Map
80.000° E
80.500° E
8.500°N
8.000°N
7.500°N
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E
S
Wilpaththu National Park
Kalpitiya
Puttalam Lagoon
Norochchaiei
Puttalam
Thambuttegama
Galgamuwa
Kekirawa
Dambulla
Anamaduwa
Maho
Polpithigama
Galewela
Nikaweratiya
Chilaw
Kuliyapitiya
Kurunegala
Wennappuwa
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DEPARTMENT OF TOWN AND COUNTRY PLANNING, UNIVERSITY OF MORATUWA
15
30 km
LEGEND
Airports
Railway Line
Proposed Electrified Railway
Expressway (Up to 2030)
Expressway (To be considerd after 2030)
Main Road (A)
Main Road (B)
Regional Agriculture Zones
Compact Development with Urban Agriculture
Dispersed Development with Urban Agriculture
Intensive Irrigated Agriculture Zone
Plantation & Specialty Crop Zone
Coastal Agro Zone
Study Boundary
National Park
Water Bodies
Cascade System

Compact Development with Urban Agriculture

Main Areas - **Kurunegala, Puttalam, Dambulla, Wennappuwa**

Dense urban centers combine home gardens, market gardens, and rooftop farming, ensuring a steady supply of fresh produce.

Tourism Linkages,

- Heritage Gateway & Wellness Zone – Dambulla, where rooftop gardens and urban farming can supply eco-resorts and Ayurvedic wellness centers.
- Coastal Marine & Agricultural Zone – Puttalam, where fresh vegetables and herbs enhance seafood-based culinary tourism.
- Coconut Heartland & Industrial Zone – Towns channel fresh produce to the Coconut Heartland, while urban gardens support coconut-based culinary tourism.

Because these towns act as transport and service hubs, produce from surrounding rural zones can be marketed quickly to tourist destinations. Future development can emphasize green roofs, vertical farming, and farm-to-table dining, reinforcing both food security and urban tourism experiences.

Dispersed Development with Urban Agriculture

Main Areas - **Kekirawa, Sigiriya, Watareka, Pannala**

These low-density settlements maintain wide green spaces and village gardens.

Tourism Linkages,

- Heritage Gateway & Wellness Zone – Sigiriya and its buffer villages, where visitors can experience traditional home-garden agriculture during cultural tours.
- Specialized Plantation & Model Village Zone – Pannala and surroundings, where smallholder gardens complement model agro-villages and spice tours.
- Coconut Heartland & Industrial Zone - Smallholder farms supply diverse crops, linking village agriculture to industrial coconut processing and agro-tourism.

The dispersed pattern allows community homestays and interactive farm visits, linking directly with cultural and wellness tourism. These settlements form a transition belt between the compact urban cores and intensive irrigated areas, creating a continuous supply chain of fresh produce for both local residents and tourist facilities.

Intensive Irrigated Agriculture Zone

Main Areas - **Galgamuwa, Thambuttegama, Maho, Nikaweratiya**

This is the heart of the traditional tank–cascade irrigation system, producing high yields of paddy and vegetables.

Tourism Linkages,

- Elephant Watching Corridors & Community Stays – Galgamuwa is an elephant-dense area with frequent Human–Elephant Conflict (HEC). Agricultural expansion is limited, but the same landscape attracts wildlife tourism and eco-safaris.
- Reservoir Leisure & Fruit Belt – Thambuttegama and Rajanganaya, where large reservoirs support boating, bird-watching, and fruit plantations.
- Traditional Farming & Senior Wellness Arc – Maho and its surroundings, where ancient cascade irrigation systems are preserved and demonstrated, providing authentic agro-heritage experiences for senior visitors seeking wellness and relaxation.

These overlaps demonstrate how agriculture and tourism can coexist: rehabilitated tanks sustain irrigation while providing habitats for elephants and migratory birds, while traditional irrigation culture enriches wellness-based tourism. Strengthening cascade management will ensure water security for farmers and reliable scenic attractions for tourism.

Plantation & Specialty Crop Zone

Main Areas: **Chilaw, Anamaduwa, Kuliyapitiya, Madampe**

Coconut, cashew, and fruit plantations dominate this zone. And also, can promote export-based agricultural plantation in this zone.

Tourism Linkages,

- Coconut Heartland & Industrial Zone – Chilaw and Udappu, where visitors tour coconut plantations, observe toddy tapping, and join coconut-based culinary trails.
- Specialized Plantation & Model Village Zone – Kuliyapitiya and Narammala, where spice gardens and model agro-villages host workshops on organic farming and youth agro-tech.

The plantations provide a backbone for culinary tourism, handicraft fairs, and agro-industry demonstrations, while also buffering the interior irrigated areas from coastal climatic impacts.

Coastal Agro Zone

Main Areas - **Kalpitiya, Norochcholei**

This sandy-soil belt combines vegetable farming, coconut groves, with rich marine ecosystems.

It aligns directly with the Coastal Marine & Agricultural Zone, which promotes dolphin and whale watching, kite surfing, mangrove kayaking, and seafood-based culinary trails.

Careful land-use control will allow aquaculture and vegetable production to supply coastal resorts without degrading mangroves or fisheries. Salt-tolerant crops and climate-resilient farming practices can further strengthen the link between agriculture and beach tourism.

Inter-Zone Connections and Future Synergies

Food Supply Chains

Compact and dispersed urban agriculture zones serve as primary collection and distribution hubs, channeling fresh produce from irrigated and plantation areas to coastal resorts and heritage tourism centers.

Agro-Tourism Circuits

Visitors can move from coastal dolphin watching to inland reservoir leisure, then on to coconut plantations and finally heritage sites, experiencing diverse farming systems along one corridor.

Ecological Corridors

The tank-cascade landscapes of the Intensive Irrigated Zone form wildlife corridors that connect elephant habitats to forest patches and reservoirs, enriching eco-tourism and biodiversity conservation.

Cultural Continuity

Traditional farming methods demonstrated in dispersed and irrigated areas complement wellness tourism focused on Ayurveda, meditation, and village homestays, preserving living heritage while providing income.

Climate Resilience

Shared water management between the irrigated interior and coastal agro zone ensures drought mitigation and stable supplies for both agriculture and tourism enterprises.

Goals and Objectives

Goal 1: Strengthening Collaborative Agro-Networks

- Facilitate collaboration among stakeholders for shared knowledge, resources, and innovations.
- Shorten supply chains and ensure efficient information distribution.
- Integrate agro-tourism networks with tourism to enhance the regional economy.

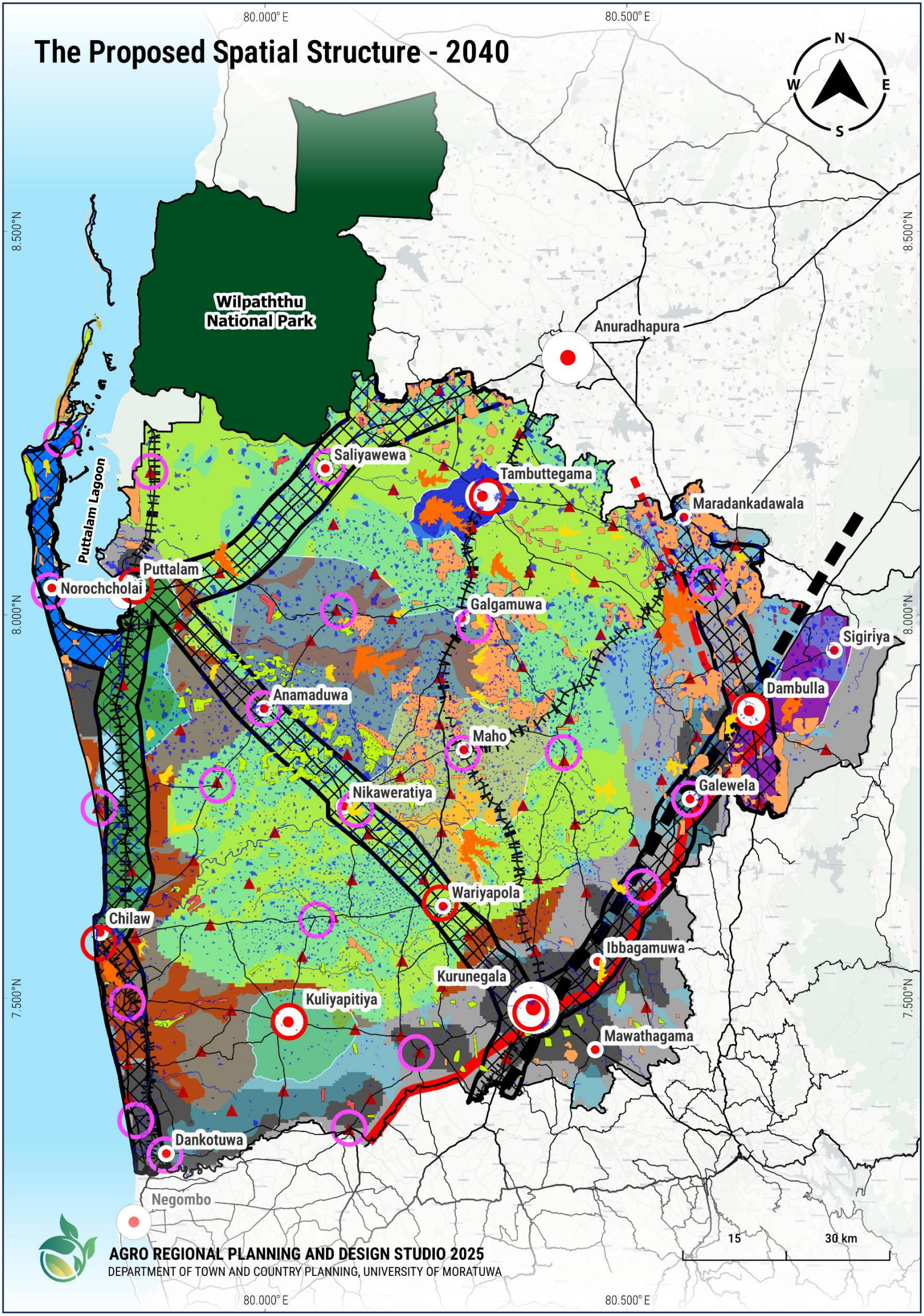
Goal 2: Blending Vernacular and Scientific Knowledge

- Integrate agricultural knowledge into university and vocational training curricula to create a skilled labor force.
- Combine scientific methods with traditional farming knowledge to improve productivity, reduce post-harvest losses, and optimize resource use.
- Preserve traditional cascade water management systems while rehabilitating and reusing water sources for circular agriculture.

Goal 3: Advancing Technology and Innovation for Circular Growth

- Revitalize waste management through circular systems that reduce waste, recycle materials, and create resource extensions.
- Innovate energy management in agriculture by integrating renewable energy and energy-efficient systems to reduce farm operating costs.
- Promote circular economy principles across urban and agricultural systems to ensure long-term sustainability.

This Proposed Spatial Structure – 2040 map is the spatial expression of the three core strategies developed through the Agro-Regional Plan: The Collaboration Model, the Information Strategy, and the Urban Corridor & Integrating Agricultural Zoning with Tourism Strategy. Rooted in these principles, the map organizes the Northwestern Region into a multi-tiered agro-regional system—farmer clusters, agro-based villages, service towns, industrial towns, and an agro-based city—creating a connected and resilient agricultural landscape. It highlights strategic corridors, value-adding zones, ecological buffers, mobility networks, and market linkages that collectively transform fragmented farmlands into a coordinated regional agro-economy. By aligning spatial planning with collaboration, culture, and circularity, this structure presents a forward-looking vision for 2040 where agriculture, livelihoods, and regional development grow in harmony.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Negombo
15
30 km
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LEGEND

- National Park
- Study Boundary
- Main Roads
- Railway Line
- Proposed Electrified Railway
- Expressway (Up to 2030)
- Expressway (To be considerd after 2030)
- Airports

Cascade Tank - Functional

- Small Tanks
- Medium Tanks
- Large Tanks
- Rivers & Canals
- Cascade System

Proposed Waste Sites

- Waste Collecting Centres
- Waste Processing Centres

Proposed City Hierarchy

- Agro Based City
- Agro Based Industrial Town
- Agro Based Service Town

Renewable Energy Land

- Biomass
- Solar
- Wind
- Agro Based Villages

Tourism Zones

- Coastal Marine & Agricultural Zone
- Coconut Heartland & Industrial Zone
- Elephant Watching Corridors & Community Stays
- Traditional Farming & Senior Wellness Arc
- Specialized Plantation & Model Village Zone
- Reservoir Leisure & Fruit Belt
- Heritage Gateway & Wellness Zone
- Tourism Corridor

Agro Zones

- Compact Development with Urban Agriculture
- Dispersed Development with Urban Agriculture
- Intensive Irrigated Agriculture Zone
- Plantation & Specialty Crop Zone
- Coastal Agro Zone

"If agriculture goes wrong, nothing else will have a chance to go right."

- M. S. Swaminathan -

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