Prioritization of Research for Sri Lanka – 2026

A Consolidated Report on National Research Priorities

August 2025

MEMBERS OF THE NATIONAL RESEARCH PRIORITIZATION AD HOC COMMITTEE

Name of the Member	Designation	Assigned Ministry
Prof. Gomika Udugamasooriya *Co-Chair*	Senior Advisor to HE the President on Science and Technology in Sri Lanka, Senior Member of the National Academy of Inventors in USA, and Professor, University of Houston and MD Anderson Cancer Centre in USA	Overall
Prof. G.W.A. Rohan Fernando *Co-Chair*	Chairman, National Science and Technology Commission, Chairman, Gem and Jewellery Research and Training Institute, and Senior Professor, Open University of Sri Lanka	Overall
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Name of the Member	Designation	Assigned Ministry
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Name of the Member	Designation	Assigned Ministry
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CONTENTS

EXECUTIVE SUMMARY

The **"Prioritization of Research for Sri Lanka – 2026"** marks the first nationally coordinated effort to systematically align research and innovation priorities with the country's overarching development goals. This initiative represents a key action proposed under the forthcoming **National Research and Development Policy (NRDP)**, which is expected to be established in the near future. In the interim, and until the NRDP is formally enacted, the research prioritization process is being carried out by an **Ad hoc Committee**, supported by fifteen (15) Ministry-specific subcommittees engaged in research and development. This process brought together a distinguished group of academics, sectoral experts, and institutional stakeholders to define broad priority research areas and to develop sector-specific recommendations of strategic importance for 2026. Once the NRDP is implemented, more detailed and refined research priorities will be formulated.

The resulting framework outlines a coherent set of research directions across critical domains such as agriculture and food security, digital transformation, education and skills development, energy and environmental sustainability, public health and well-being, fisheries and ocean resources, industrial growth, infrastructure modernization, and community development, among others, aligned with the government's development agenda. These priorities not only respond to Sri Lanka's immediate research needs for 2026 but also chart a pathway toward long-term goals of sustainability, resilience, and global competitiveness.

The report sets out broad research priorities for government research institutes, universities, academic institutions, and other organizations engaged in research and development. It emphasizes the need for cross-sectoral collaboration, evidence-based policymaking, and strengthened institutional capacities to ensure that research translates into tangible societal and economic benefits. By deliberately aligning research investments with the NRDP framework and fostering the innovation ecosystems, the document positions Sri Lanka to harness its intellectual capital and scientific expertise as a transformative driver of a sustainable, inclusive, and equitable future.

1. INTRODUCTION

Sri Lanka stands at a defining juncture in its developmental journey, where the strategic mobilization of research and innovation is essential to achieving national aspirations for sustainability, resilience, and inclusive prosperity. Historically, research efforts in the country have operated without a national-level prioritization mechanism, resulting in fragmented initiatives with limited connection to overarching development goals. Recognizing this gap, one of the critical realignments was to first identify and prioritize research needs that align with the government's national development agenda.

The "Prioritization of Research for Sri Lanka – 2026" report serves as a timely and deliberate policy instrument, providing a coherent, structured framework for directing research investments in line with the nation's evolving socio-economic imperatives. This initiative was carried out through a nationally harmonized process, guided by fifteen Ministry-specific subcommittees on research and development, comprising distinguished academics, domain experts, and institutional representatives. Their collective expertise shaped a forward-looking agenda that addresses both immediate national needs and long-term ambitions.

The report is fully aligned with the forthcoming National Research and Development Policy (NRDP) and the overarching National Policy Framework 2025 – *"A Thriving Nation, A Beautiful Life"*. It advances the notion of research not merely as a technical exercise, but as a sovereign instrument of transformation—one that informs policy, drives innovation, and strengthens Sri Lanka's global positioning.

By defining sector-specific priorities and institutionalizing evidence-based decision-making, the document underscores the role of research as a foundational pillar of national development. The strategic directions outlined call for a paradigm shift in research governance, ensuring that scientific inquiry is purposefully designed, adequately resourced, and demonstrably impactful in advancing national priorities.

2. MINISTRY-SPECIFIC RESEARCH PRIORITIES AND STRATEGIC RECOMMENDATIONS

2.1 MINISTRY OF AGRICULTURE, LIVESTOCK, LAND, AND IRRIGATION

- **Members of the Ad-hoc Committee**

Team Leaders	Dr. Anurudda Karunarathna, Senior Lecturer, Department of Agriculture Engineering, Faculty of Agriculture, University of Peradeniya Prof. Rohitha Prasantha, Chairman, National Institute of Post-Harvest Management (NIPHM) and Professor, Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya
Members	Prof. R.S. Dharmakeerthi, Chairman, Sri Lanka Council for Agricultural Research (SLCARP) and Senior Professor, Department of Soil Science, Faculty of Agriculture, University of Peradeniya Prof. Lakshman Galagedara, Professor, Memorial University of Newfoundland, Canada Prof. Barana Jayawardane, Professor, Department of Animal Science, Faculty of Agriculture, University of Peradeniya Dr. Sanath Hettiarachchi, Chairman, National Aquatic Resources Research and Development Agency (NARA) Mr. Gamini Senarathna, Deputy Director/Project, Ministry of Agriculture

- **Core Areas**: Agriculture & Irrigation, Livestock, Land & Surveying
    a. Agriculture & Irrigation (06)
    b. Livestock & Poultry (04)
    c. Land & Water (02)

Recommendations

No.	Priority Research Area	Expected Outcome for National Development	Justification
Agriculture crop			
1	Value addition for agricultural produce and products	• Increased farmer income by modernizing the agri-food sector. • Creating rural employment and agro-entrepreneurs. • Reduce food losses and food waste by establishing circular economic approaches reinforced with KAP [knowledge, attitude and practice] approach. • Introducing functional foods and nutraceuticals from underutilized crops and agro-industrial by-products.	Value addition transforms raw agricultural commodities into processed, packaged, or branded products, significantly increasing their market value. Reducing food losses and food waste through processing and preservation, and value addition enhances food security in the country. It creates employment opportunities in rural areas, promotes entrepreneurship, and develops SMEs in local food industries. This approach makes agriculture more economically viable, sustainable, and attractive to younger generations while meeting consumer demands for convenient, quality food and other agro-based products. This process is essential for agricultural modernization as it enables farmers and entrepreneurs to capture higher profit margins from export-oriented products rather than selling only raw produce in national and international market.
2	Productivity improvements	• Enhance food security. • Make farming economically viable enterprise and competitive in global markets. • Enhanced soil health. • Establish multi-species cropping and sustainable crop intensification systems. • Introducing controlled release and destination target fertilizer technologies. • Optimized weed, pest and disease control technologies through physical-chemical-biological integrated approaches.	Agricultural productivity improvements are fundamental to modern farming as they maximize output per unit of land, labor, and input resources. Increasing productivity is essential to meet growing food demands without expanding cultivated areas while minimizing environmental pressure on limited forest and land resources. Enhanced productivity through improved seeds, precision farming, efficient irrigation, and soil and plant health directly increases farmer incomes and food security. Higher yields reduce production costs per unit, making agriculture more economically competitive. In this context, it is

No.	Priority Research Area	Expected Outcome for National Development	Justification
		• Quality assured organic and other agricultural inputs for farmers.	a high priority to direct agricultural research to improve productivity by minimizing land, water and ecological footprints.
3	Climate resilient agriculture	• Ensures stable food production and food security: Adoption of climate-smart farming practices and stress-tolerant crop varieties to increase yields, stabilize production under variable weather conditions, and ensure year-round food availability. • Contribution to Low-Carbon Development: Reduced greenhouse gas emissions from agriculture through sustainable land management, agroforestry, and improved livestock and soil practices, aligning with national climate commitments.	Climate-resilient agriculture is critical for Sri Lanka given the country's extreme vulnerability to weather variability caused by climate change. In recent history, the country experiences prolonged droughts in the dry zone, flash floods in the wet zone, landslides in highlands, and unpredicted weather changes which eventually impact on crop production in Sri Lanka. With smallholder farmers being most vulnerable and three-fifths of cropping areas being rain-fed, building resilience through drought-resistant crops, improved soil and water management, and regenerative practices are essential to achieve for food security and improve rural livelihoods.
4	Socio-economic analysis	• Ensure modernization benefits reach smallholder farmers and agro-entrepreneurs. • Data-driven new agricultural policies to assure global competitiveness. • Informed agri- entrepreneurs for establishing sustainable business models. • Establish new markets and value chain models through comprehensive market and value chain analysis.	Socio-economic analysis in agriculture is crucial for understanding the intricate links between farming systems and human well-being. It helps identify barriers to technology adoption, assess the impacts of income distribution, and evaluate the accessibility of agricultural innovations, market dynamics, and external risks. These insights guide the design of policies that benefit both farmers and consumers, avoiding interventions that may widen inequality. By examining factors such as market access, credit availability, and rural infrastructure needs, socio-economic studies inform resource allocation and development priorities. This comprehensive perspective ensures that agricultural modernization strategies remain inclusive, sustainable, and effective in reducing rural poverty while fostering equitable economic growth.

No.	Priority Research Area	Expected Outcome for National Development	Justification
5	Human nutrition	• Nutrition and food quality connect food production to health outcomes. • Make farming more relevant to human wellbeing. • Change food culture for improved human health and quality of life.	Integrating human nutrition R&D into agricultural development marks a vital shift in our approach to producing nutritious, high-quality food and improving the health and quality of life in rural communities. By examining the intricate links between farming practices, food quality, safety, and human health, we can design agricultural systems that not only meet the needs of growing populations but also provide a strong nutritional foundation for healthy, productive lives. This approach underscores agriculture's central role in public health and nutrition research as a critical driver for building sustainable, equitable, and health-promoting food systems.
6	Agricultural mechanization and SMART technologies	• Reduce labor dependency, minimize human error, and optimize resource use. • Enable data-driven decisions for scaling up production, attracting youth to agriculture. • More profitable and sustainable farming systems. • Integrated IoT and blockchain technologies in agricultural supply chain management. • Comprehended databases and decision-making software applications in agriculture.	Agricultural mechanization and SMART technology research are crucial for transforming modern farming systems to meet growing food demands efficiently. These technologies address critical challenges including labor shortages, aging farmer populations, and the need for precision in resource management. SMART technologies like IoT sensors, GPS-guided machinery, and AI-powered analytics optimize input use, reduce waste, and maximize yields while minimizing environmental impact. Mechanization reduces drudgery, attracts young people to agriculture, and enables large-scale production. Research in this field drives innovation in autonomous systems, data-driven decision making, and sustainable farming practices, making agriculture more profitable, competitive, and resilient for future food security.

No.	Priority Research Area	Expected Outcome for National Development	Justification
Livestock & poultry			
7	Dairy & poultry production improvement	• Self-sustenance in livestock and poultry sector. • Diversified and value-added dairy and animal products. • Improved technologies for productive and healthy dairy & poultry while reducing the cost of production.	Prioritizing dairy and poultry production improvement research is essential for agricultural development as these sectors provide critical high-quality animal proteins to growing populations offering faster returns on investment compared to crop agriculture, making them vital for economic development and poverty reduction. Poultry production plays an important role in the food system, providing consumers with a major source of high-quality animal protein through meat and eggs, while dairy provides essential nutrients including calcium, vitamins, and complete proteins. Improvements in feed efficiency, breeding genetics, and sustainable production systems directly enhance food security, rural livelihoods, and nutritional outcomes.
8	Animal feed	• Increased quality feed and forage production and their availability. • Diversified animal feed sourcing and production technologies.	Prioritizing research on animal feed production and alternative feeds is crucial for agricultural development as feed is frequently the main cost of raising animals. Locally available novel feed resource alternatives can promote circular economy concepts, increase food security, and improve sustainable livestock production. Substituting conventional protein crops with sustainable alternatives should be a priority. Alternative feeds utilizing agricultural waste and by-products create circular economies while ensuring sustainable, cost-effective animal protein production for growing populations.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9	Disease control and prevention	• Establish healthy livestock population and breeding stocks. • Readiness to pandemics and disease outbreaks.	Prioritizing research on disease control and prevention is vital for livestock and poultry sector development as animal diseases in production and subsistence environments have the potential to negatively affect consumers, producers, and economies. Losses due to disease originate in many ways including death, medication costs, poor growth, poor production, and poor feed conversion. Effective disease prevention research protects farmer livelihoods, maintain healthy breeding stocks, ensures consistent protein supply, reduces antibiotic resistance, and maintains export market access essential for economic growth.
10	Meat Production (Beef, Goat & Swine)	• Upgrade technologies to boost production, ensure meat safety, and address animal welfare concerns. • Value chain enhancement and legal framework modernization.	The beef, goat, and swine industries play a vital role in providing high-quality protein to a comparatively large segment of the Sri Lankan population. These industries contribute significantly to nutrition security, rural livelihoods, and the agricultural economy. With the continued growth of the tourism industry, the demand for premium-quality meat products is expected to rise substantially, creating new market opportunities. Ensuring the consistent availability of meat at affordable prices, while simultaneously addressing food safety, quality assurance, and animal welfare concerns, will be essential to meeting this growing demand.

No.	Priority Research Area	Expected Outcome for National Development	Justification
Land & water			
11	National land use planning for sustainable agriculture	• Availability of comprehensive, geo-referenced digital land use plans and maps to guide evidence-based cultivation decisions, ensuring optimal allocation of agricultural land according to soil suitability, water availability and climate resilience needs. • Rationalized and updated land use policies that promote agricultural modernization, mechanization, and diversification while safeguarding ecologically sensitive areas. • Identification, prevention, and remediation of illegal land encroachments, particularly within the catchment areas of minor irrigation tanks, to maintain water storage capacity, protect hydrological functions, and reduce downstream water shortages. • Strengthened institutional and community-based land governance systems, enabling participatory decision-making, transparent land allocation, and conflict resolution for sustainable agricultural development.	Prioritizing research on national land use planning for sustainable agriculture in Sri Lanka is critical to address escalating land degradation and resource pressure. Decades of soil erosion, nutrient loss, and habitat destruction have reduced productivity, increased rural poverty, and eroded biodiversity. Limited arable land, rapid urbanization and population growth are further aggravated by illegal land encroachments, particularly in minor tank catchments, which diminish water storage and disrupt watershed functions. Strategic research-based land use planning is essential to optimize agricultural zones, protect sensitive areas, enforce zoning laws, curb encroachment, ensuring sustainable intensification, balanced land allocation, and long-term agricultural, water and ecosystem sustainability.
12	Sustainable agricultural water management	• Sustainable agricultural water management plan that optimizes water allocation, improves irrigation efficiencies and reduces wastage.	Prioritizing research on water management and water quality protection for agriculture in Sri Lanka is critical, given severe climate-induced water challenges. Some parts of the dry zone face absolute water scarcity, while population growth,

No.	Priority Research Area	Expected Outcome for National Development	Justification
		• Deployment of modern and climate-smart technologies to lower the agricultural water footprint. • Improved water quality for agricultural uses through pollution control, nutrient management and best management practices. • Enhanced environmental sustainability by protecting aquatic ecosystems, reducing agrochemical runoff and maintaining the ecological balance of water bodies. • Strengthening institutional and community capacity for water governance, ensuring long-term resilience of agricultural systems to droughts, floods, and water scarcity.	economic growth and industry-led deterioration have increased water competition and scarcity. Research is essential for developing efficient irrigation systems, water conservation techniques, and quality protection measures to sustain agricultural productivity in this water-stressed environment.

2.2 MINISTRY OF DIGITAL ECONOMY

- **Members of the Ad-hoc Committee**

Team Leader	(Eng) Mr. Sanjaya Edirisinghe, Vice President, Microsoft Platforms at Sonata Software, USA
Members	Hon. Eranga Weeraratne, Deputy Minister, Ministry of Digital Economy Dr. Hans Wijesooriya, Chief Advisor to the President on Digital Economy (Eng) Dr. Sisira Ranatunga, Chairman, Sri Lanka State Plantations Corporation Dr. S.R. Sepalika N. Sudasinghe, Director General, National Science Foundation Dr. Rasika Jayasekara, Senior Lecturer in Nursing and Midwifery, Research Degree Coordinator, Ethics Advisor, University of South Australia Mr. Janaka Sampath Geekiyanage, Director (Development), Ministry of Digital Economy

- **Core Areas**:

1. Artificial Intelligence for Government Efficiency (High priority)
2. National Digital Health Innovation (High priority)
3. Climate-Smart Agriculture & Fisheries Analytics (High priority)
4. Renewable Energy Technology & Smart Grids (High priority)
5. Cybersecurity & Digital Trust Framework (High priority)
6. National Multilingual AI for Digital Inclusion (High priority)
7. Smart Mobility & Transport Optimization (High priority)
8. Digital Skills (IT) Development for Secondary & Tertiary Students (High priority)
9. Assistive Technology for Elderly & Persons with Disabilities (Medium priority)
10. Digital Heritage Preservation & Cultural Tourism (Medium priority)
11. Building Sri Lanka's Capabilities for the Global Space Science and Aeronautical Industry (High priority)
12. Building Simulation Platforms and Digital Twins Using Synthetic Data for Cross-Industry Applications (High priority)

- **Recommendations**

No	Priority Research Area	Expected Outcome for National Development	Justification
1	Artificial Intelligence for Government Efficiency (High priority)	Increased efficiency, transparency, and citizen trust in public administration through AI-driven automation, predictive analytics, and intelligent decision-support systems	Government service delivery in Sri Lanka is often slowed by manual processes, siloed data, and inconsistent decision-making. Applying AI to areas such as case triaging, fraud detection, resource allocation, and citizen engagement can reduce service times by 30–50% and improve policy responsiveness. With the National Data Exchange and DigiLocker initiatives already underway, AI can enhance these platforms by enabling intelligent document processing, multilingual chatbots for citizen support, and real-time insights for policymakers. Prioritizing AI for government operations in 2026 will address a pressing governance challenge while showcasing responsible AI practices under the forthcoming AI Policy and Guidelines. The capability exists within local universities, ICTA, and private tech firms, making this a realistic and high-impact target.
2	National Digital Health Innovation (High priority)	Reduced healthcare costs, faster diagnostics, and improved access to specialist care through AI-assisted diagnostics, telemedicine, and integrated patient record systems (EHR).	Sri Lanka faces rising healthcare costs from chronic diseases like diabetes, cancer, and kidney disease, which account for over 70% of healthcare expenditure. R&D can focus on AI-enabled screening tools, telehealth platforms for rural outreach, and a unified Electronic Health Record (EHR) system integrated with indigenous medicine data. This aligns with the government's aim for healthcare 4.0 and can cut diagnostic delays by up to 40%, while enabling remote consultations to reduce patient travel costs. Pilot projects can be executed in collaboration with Ministry of Health, local med-tech startups, and universities within 18–24 months, producing tangible outcomes before 2028. We can encorange to develop customized EHR system for Sri Lanka

No	Priority Research Area	Expected Outcome for National Development	Justification
3	Climate-Smart Agriculture & Fisheries Analytics (High priority)	Increased agricultural productivity and climate resilience, reduced post-harvest loss, and sustainable fisheries management using AI, IoT, and satellite data.	Agriculture contributes ~7% to GDP and employs over 25% of the workforce, yet is highly vulnerable to climate change. R&D can develop AI-based yield forecasting, IoT-driven precision irrigation, early pest detection, and fish stock monitoring using satellite imaging. This will help achieve 10–15% productivity gains and reduce post-harvest losses (currently estimated at 30%) within 3 years. Local research bodies such as the Department of Agriculture, NARA, and universities already possess domain expertise and can collaborate with ICTA for technology integration, making it achievable in the 2026–2028 period.
4	Renewable Energy Technology & Smart Grids (High priority)	Increased share of renewable energy, reduced fossil fuel imports, and lower energy costs through localized solar, wind, and smart grid solutions.	Sri Lanka imports over USD 4 billion worth of fossil fuels annually. R&D in locally manufactured rooftop solar systems, offshore wind power feasibility, and AI-optimized smart grids can directly contribute to the target of 70% renewable energy by 2030. Early wins include deploying smart meters for real-time consumption monitoring and localized energy storage pilots. This aligns with both climate goals and fiscal sustainability, with immediate applicability in urban and rural communities. Partnerships between CEB, universities, and private manufacturers make this achievable by 2028, with visible progress in 2026–27.
5	Cybersecurity & Digital Trust Framework (High priority)	Secure digital public infrastructure, improved data privacy, and reduced cybercrime through a national threat intelligence platform and compliance standards.	With the expansion of GovPay, National Data Exchange, and digital ID systems, cyber risks are escalating. Sri Lanka ranks low in global cybersecurity preparedness indices. R&D should focus on developing a national Security Operations Center (SOC), AI-powered intrusion detection, and privacy-preserving analytics. By 2026, this can enable compliance with the

No	Priority Research Area	Expected Outcome for National Development	Justification
			Personal Data Protection Act and upcoming AI governance policies, reducing high-risk vulnerabilities by at least 40%. Local ICT and defense tech capabilities can deliver these outcomes with regional partnerships.
6	National Multilingual AI for Digital Inclusion (High priority)	Full accessibility of government and private digital services in Sinhala, Tamil, and English, reducing language-based service barriers.	Language barriers reduce equitable access to digital services for millions. R&D in Sinhala/Tamil speech-to-text, machine translation, and voice-based chatbots can make e-government, e-commerce, and education platforms fully inclusive. This directly supports the national inclusion agenda and boosts digital adoption rates. The project is feasible with existing AI research at Moratuwa, Peradeniya, and Jaffna universities, and can achieve deployable pilots in 12–18 months.
7	Smart Mobility & Transport Optimization (High priority)	Reduced congestion, fuel savings, and improved public transport reliability through IoT, GPS, and AI-powered transport scheduling.	Traffic congestion in Colombo alone is estimated to cost over USD 500 million annually in lost productivity and fuel waste. R&D in integrated transport management—real-time bus/train tracking, AI-based traffic light optimization, and predictive maintenance—can reduce delays by 20–30%. Local IT firms and universities have IoT expertise to pilot solutions with SLTB and Railway Department within 2 years, delivering measurable improvements in 2026.
8	Digital Skills (IT) Development for Secondary & Tertiary Students (High priority)	A future-ready workforce equipped with coding, cybersecurity, AI, and data analysis skills, boosting employability and innovation.	Sri Lanka aims for a 200,000-strong digital workforce by 2030, but current digital literacy rates are below 40% in rural areas. R&D can focus on scalable, gamified learning platforms, AI-based personalised learning, and low-cost digital labs in schools. These interventions can raise digital competency by 15–20% within 3 years. The work is implementable through collaboration between the Ministry of Education, ICTA, and EdTech startups.

No	Priority Research Area	Expected Outcome for National Development	Justification
9	Assistive Technology for Elderly & Persons with Disabilities (Medium priority)	Enhanced workforce participation and quality of life for 2 million+ Sri Lankans through affordable assistive devices and accessibility solutions.	Sri Lanka's ageing population (20% over 60 by 2030) presents a social and economic challenge. R&D can develop low-cost hearing aids, smart medication dispensers, mobility-assist robots, and accessible digital interfaces. This promotes inclusive growth, reduces healthcare costs, and enables elderly citizens to remain economically active. Prototypes can be produced locally within 18 months via partnerships with universities and manufacturing SMEs.
10	Digital Heritage Preservation & Cultural Tourism (Medium priority)	Increased tourism revenue and global cultural visibility through AR/VR-based heritage experiences, digitized archives, and blockchain-based record keeping.	Tourism contributes ~5% to GDP but is vulnerable to shocks. R&D can create immersive cultural tourism platforms, digitize ancient manuscripts, and use blockchain for heritage asset protection. This supports economic diversification, attracts high-value tourists, and safeguards cultural assets. Feasible with collaboration between cultural institutions, universities, and the private tech sector, delivering early outputs in 2026–27.
11	Building Sri Lanka's Capabilities for the Global Space Science and Aeronautical Industry (High priority)	Sri Lanka will position itself in the global space science and aeronautical supply chain through R&D in aerospace software, advanced materials, satellite data analytics, and component design, while also developing a skilled workforce in engineering and data science. These efforts will enable participation in international space programs, foster a high-tech export sector, and strengthen Sri Lanka's global scientific reputation.	The global space economy is expected to exceed USD 1 trillion by 2040, driven by private-sector growth and international collaboration. Sri Lanka, with its heritage through the Arthur C. Clarke Centre for Space Science, can leverage this by investing in R&D for aerospace software, satellite data analytics, advanced materials, and component manufacturing. Building a specialized talent pool in space engineering, remote sensing, and orbital mechanics will enable Sri Lanka to supply skilled labor and services globally. Prioritizing this in 2026 can unlock high-tech export markets, attract foreign partnerships, and strengthen the nation's position as a hub for space science innovation.

No	Priority Research Area	Expected Outcome for National Development	Justification
12	Building Simulation Platforms and Digital Twins Using Synthetic Data for Cross-Industry Applications (High priority)	Sri Lanka will reduce dependency on costly foreign digital twin and simulation systems by fostering local R&D in software, hardware, and synthetic data generation tailored to the country's industrial, agricultural, and infrastructure contexts. Developing homegrown digital twin platforms will enable predictive maintenance in manufacturing, smart irrigation in agriculture, urban infrastructure planning, and renewable energy optimization. This will create a new technology export market, lower foreign exchange outflows, and build national expertise in high-value digital engineering, positioning Sri Lanka as a regional hub for simulation and digital twin solutions	The global digital twin market is projected to reach USD 110 billion by 2030, growing at over 35% CAGR, with applications across manufacturing, agriculture, healthcare, and smart cities. Sri Lanka currently imports simulation software and infrastructure, often at high cost, with limited adaptation to local needs such as tropical agriculture, small-scale manufacturing, or climate resilience modeling. By investing in R&D for indigenous digital twin platforms powered by synthetic data, Sri Lanka can customize solutions for domestic industries while developing exportable innovations. Use cases include crop yield simulations for paddy and tea, digital twins for smart factories in apparel and electronics, flood prediction models for disaster management, and energy grid optimization for renewable projects. Training a skilled workforce in simulation technologies and AI-driven modeling will also open new employment avenues. Prioritizing this sector in 2026 ensures both economic savings and long-term competitiveness, while anchoring Sri Lanka in a rapidly expanding global technology ecosystem.

2.3 MINISTRY OF EDUCATION, HIGHER EDUCATION AND VOCATIONAL EDUCATION

- **Members of the Ad-hoc Committee**

Team Leader	Prof. Ajith Karunarathne, Professor, Saint Louis University, USA
Members	Dr. Rasika Jayasekara, Senior Lecturer in Nursing and Midwifery, Research Degree Coordinator, Ethics Advisor, University of South Australia Prof. Gopal Periyannan, Professor, Eastern Illinois University Prof. Laleen Karunanayake, Professor in Chemistry, University of Sri Jayewardenepura, Sri Lanka Dr. Jayantha Senadheera, Senior Lecturer, Department of Mathematics, University of Sri Jayewardenepura, Sri Lanka Mr. Sunil Herath, Entrepreneur, New York, USA Ms. Janaha Selvaraj, Senior Lecturer, Department of Legal Studies, The Open University of Sri Lanka Dr. Anuradha Ariyarathne, Senior Lecturer, Department of Computer Science, University of Sri Jayewardenepura, Sri Lanka

- **Core Areas:**
    a) Early Childhood Development Education (1)
    b) Primary and Secondary Education (5)
    c) Vocational Education (1)
    d) Higher Education (7)

Education reform is central to building a future-ready, globally competitive workforce/Aligns with NPP 2025 focus: "A Civilized Citizen – An Advanced Human Resource".

Addresses systemic gaps: equity, quality, relevance, and global positioning/ Covers School Education, Vocational Education, and Higher Education with a unified R&D framework.

Background

Sri Lanka's policy direction – encapsulated in the National Policy Framework 2025 ("A Thriving Nation, A Beautiful Life") – places education at the heart of inclusive national development. Recognising that a fragmented, exam-centric system no longer meets the demands of the 21st century, the government has prioritised a shift toward a dynamic, learner-centred, and digitally enabled education system that prepares students for local relevance and global competitiveness.

Transforming the education system is not only essential to alleviate socio-economic pressure on students and families, but also critical to producing a future-ready workforce that can meet domestic priorities and capitalize on international opportunities. This calls for a coordinated, evidence-based research and development strategy that addresses system-wide challenges, from early childhood and general education to higher education and workforce transitions.

To achieve this, the Ministry of Education, along with allied institutions in higher and vocational education, has identified the following four national priority areas for action:

1. **Equity and Inclusion** – Ensuring that no learner is left behind by directing resources and innovations to under-resourced schools and marginalised student populations.
2. **Digital Transformation** – Modernising teaching, learning, administration, and governance through integrated digital frameworks, including adaptive learning platforms, learning management systems, and smart institutional governance.
3. **Rural Access and Infrastructure** – Investing in physical infrastructure, connectivity, mobile resources (e.g., mobile libraries/labs), and community-based education support in underserved areas.
4. **Training and Development** – Strengthening the education and health workforce through curriculum reforms, faculty development, pedagogical innovation (e.g., inquiry-based learning, digital pedagogy), and incentivised service in high-need sectors.

Objective

To develop and implement a coherent, realistic, and forward-looking Research and Development (R&D) strategy that supports evidence-informed policymaking, institutional innovation, and transformational reform across Sri Lanka's school, vocational, and higher education systems. The approach focuses on four pillars—equity, digitalisation, rural access, and capacity building—to drive systemic change and ensure alignment with national development goals and international best practices.

Recommendations

Early Childhood Development Education

Priority Research Area	Expected Outcome for National Development	Justification
1. Early Childhood Development Education - Effectiveness of Early Childhood Development Centres on School Readiness and Social Integration. (National Policy Framework, p.3) - Framework for Establishing a National Regulatory Agency to develop, implement, monitor, and periodically certify Mandatory Training and Quality Standards in Early Childhood Education (National Policy Framework, p.3)	Generate evidence-based insights on how access to early childhood centres impacts children's cognitive, emotional, and social readiness for primary schooling. The findings will inform improvements in programme design and equitable centre distribution. Development of a national regulatory framework and competency-based training standards that ensure quality, accountability, and equity across all state and private Early Childhood Development (ECD) centres.	The strategy commits to establishing a centre within 2 km of every child's home or parents' workplace. However, evidence is needed to assess how this proximity affects participation, learning outcomes, and readiness for Grade 1. The policy aims to establish a regulatory agency and mandate minimum qualifications for early childhood educators, as well as quality standards for both state and private ECE centers. However, no unified standard or accreditation system currently exists. Research is essential for benchmarking global best practices, defining core competencies, and developing an effective regulatory model tailored to Sri Lanka's decentralized education system. This will support consistent service quality, public trust, and the protection and development of young children, thereby strengthening long-term human capital formation and social protection.

Primary and Secondary Education

Priority Research Area	Expected Outcome for National Development	Justification
2. Mobile Library and Laboratory Resource Development – Design, implement, and evaluate mobile library and laboratory models to support literacy and science learning in under-resourced and geographically remote schools.	Improved literacy, scientific knowledge, and equitable educational access across rural and underserved regions, contributing to a more skilled, informed, and inclusive society. These mobile units will support consistent curriculum delivery, reduce urban-rural disparities, and strengthen community engagement in education, aligning with national priorities for inclusive human resource development and innovation.	Many rural and remote schools in Sri Lanka lack permanent libraries and science laboratories, leading to disparities in learning opportunities. Developing these facilities uniformly requires substantial time, funding, and staffing. As a scalable alternative, mobile libraries—sponsored by the Department of Education, volunteers, foreign donors, and the diaspora—can distribute books on a rotating basis, thereby extending access to village residents. Similarly, mobile laboratories equipped with basic instruments, chemicals, and instructional materials can coordinate with teachers to facilitate hands-on science education. This research will assess the impact of mobile resources on literacy, curiosity, and curricular equity, supporting evidence-based decision-making for nationwide education reform.

	Priority Research Area	Expected Outcome for National Development	Justification
3.	**Pilot a digital distance learning model** for underserved schools through a centrally coordinated *National Centre for Remote Education*, incorporating an adaptive learning platform and the use of ***Active Book**** for Year 6 core subjects (Science, Mathematics, English), while leveraging Open Educational Resources (OER) to ensure multilingual, scalable, and cost-effective content delivery. - Use of Active Book * as Pilot Project	Equitable access to quality education for students in remote and disadvantaged areas through low-cost, scalable digital solutions. The model will support uniform curriculum delivery, reduce teacher shortages, and promote digital literacy.	Many schools in rural Sri Lanka face a chronic shortage of qualified teachers, particularly in STEM subjects. Traditional infrastructure-based solutions are time- and resource-intensive. *A National Centre for Remote Education*, delivering synchronised or on-demand digital lessons, will help bridge this gap. The Active Book pilot offers an interactive, curriculum-aligned platform to improve individualised learning. When combined with adaptive technology and open educational resources, this approach ensures every learner, regardless of location or language, has access to engaging, standardised, and inclusive educational content. This research will provide the evidence base for nationwide adoption of blended and remote learning models that uphold equity and quality.
4.	**Improving Enrolment in Science, Technology, Engineering, and Mathematics (STEM) Subjects.** - Investigate the factors influencing student interest, access, and enrolment in STEM subjects at the secondary level and design evidence-based strategies to enhance participation, particularly among girls, rural students, and underrepresented communities.	A more equitable and skilled future workforce equipped with STEM capabilities is essential for national competitiveness, innovation, and sustainable development. Increased enrolment in STEM subjects in ***secondary education and higher education*** will directly support economic diversification, digital transformation, and Sri Lanka's transition to a knowledge-based economy.	Despite the strategic importance of STEM for development, enrolment in these subjects remains uneven, especially in rural and estate sectors and among girls. Key barriers include a lack of qualified teachers, limited lab facilities, cultural biases, and poor visibility of STEM careers. Understanding and addressing these challenges is critical to building a robust pipeline of STEM-competent graduates. This research will inform national education and skills development policy, align STEM education with labour market needs, and ensure all learners have equal opportunity to participate in the knowledge economy.

Priority Research Area	Expected Outcome for National Development	Justification
5. Promoting non-Athletic creative and meritorious talents. Admissions Promoting the development of non-Athletic creative talents and research (STEM, art, music, creative writing, etc.) among pupils and the recognition of their regional and national credentials/achievements/merits during the University admissions process.	By promoting and recognizing diverse talents, an inclusive educational environment that encourages excellence across multiple disciplines will be created. Motivated pupils will excel in various fields, leading to increased participation in areas critical for national development, such as technology, culture, and the arts.	The current exclusive focus on athletic achievements overlooks the significant potential of students in areas such as STEM, arts, and humanities. Broadening the recognition framework ensures equality, supports the ambitions of diverse learners, and will nurture a holistic educational experience. Acknowledging a wide range of talents will not only enrich the academic community but also align with global educational trends emphasizing interdisciplinary skills, thereby preparing students to meet the demands of a modern, dynamic economy.
6. Accelerating Examination Marking and Result Release for the G.C.E. Advanced Level in Sri Lanka Design and pilot an optimised examination marking and result entry system for the G.C.E. A/L examinations—modelled partly on efficient practices from [the Australian Tertiary Admission Rank (ATAR) system]—to reduce result release times from the current 4–6 months to under 8 weeks. The system will combine digitised mark entry, real-time data verification, and secure online transmission.	A modern, streamlined G.C.E. A/L marking and result-processing system that ensures results are released within a significantly shorter timeframe, enabling students to apply promptly for higher education, scholarships, and overseas study. This accelerated process will enhance transparency, operational efficiency, and public trust in the national examination system, aligning Sri Lanka's assessment standards with global best practices.	Delays in A/L result release create a bottleneck for university admissions, overseas applications, and career planning. In comparison, systems such as Australia's ATAR process complete paper marking, data entry, moderation, and release within weeks due to integrated digital workflows and decentralised marking. The proposed R&D project will: • Conduct a full process mapping and bottleneck analysis of the current G.C.E. A/L marking, verification, and result-release workflow to identify inefficiencies and delays. • Introduce computer-assisted marking for multiple-choice and eligible short-answer sections, enabling instant scoring after answer

		sheets are scanned, combined with manual reliability checks for accuracy. • Pilot secure, direct digital mark entry at marking centres by authorised examiners for written responses, supported by double-entry verification from the Chief and Additional Examiners. • Adopt double-blind online marking for extended responses/essays, allowing two independent markers to assess scripts simultaneously, with discrepancies automatically flagged for third-party review. • Equip marking panels with laptops, secure Wi-Fi routers, and controlled access to the examination server for real-time data entry and result consolidation. • Implement automated statistical moderation to combine school-based assessments with examination marks, ensuring fairness and consistency across the system. • Develop and deliver examiner training programmes in secure digital data entry, online marking protocols, and rapid verification procedures. • Establish a secure online results portal for immediate public release of finalised marks as soon as processing is complete, reducing the total turnaround time from months to weeks. By integrating technology, revising workflows, and providing the necessary infrastructure, this initiative will ensure a faster, more accurate, and more student-centred examination process

Vocational Education

Priority Research Area	Expected Outcome for National Development	Justification
7. Design and Validation of a Regulatory Framework for Vocational Education in Schools - Develop and test a national regulatory framework for school-based vocational education, ensuring consistent quality, relevance, and alignment with national qualifications frameworks and industry standards**.**	A formalised, quality-assured vocational education ecosystem embedded within general education that enables seamless student progression into Sri Lanka's vocational training institutions (e.g., TVEC, NAITA, DTET managed). This integrated pathway will expand access to certified skill development, reduce youth unemployment, and support the emergence of a highly skilled, industry-relevant workforce that drives national productivity, inclusive growth, and global competitiveness.	Sri Lanka's introduction of a vocational education stream within general schooling is a strategic opportunity to strengthen school-to-work transitions. However, without formal alignment to vocational institutions, students face fragmented or dead-end pathways. Many are unable to translate school-acquired skills into nationally recognised qualifications or further training. Establishing articulation mechanisms—such as credit transfer, skill recognition, and co-managed programmes with institutions like TVEC and DTET—will ensure that students receive coherent, market-relevant education and training. A well-regulated interface between schools and vocational bodies will raise quality, reduce redundancy, and ensure that vocational education at the school level leads to meaningful employment or continued skills advancement.

Higher Education

Priority Research Area	Expected Outcome for National Development	Justification
8. Bridging the Immediate Skill Gap for Unemployed Non-STEM Graduates Conduct a national labour market and graduate tracer study to identify current job openings and specific skills (technical, digital, communication, etc.) lacking among unemployed non-STEM degree holders. Design and develop graduate entry pathways to skilled professions (e.g., Physiotherapy, Nursing, Pharmacy, IT, etc) for eligible non-STEM graduates	Evidence-based workforce development strategies that increase the employability of non-STEM graduates, reduce graduate unemployment, and align higher education pathways with national labour market demands, particularly in health care and emerging service sectors.	Sri Lanka continues to face high unemployment among non-STEM graduates, despite job openings in fields that require practical, digital, and communication skills. Data-driven identification of these gaps is essential for designing effective, targeted solutions that ease the graduate transition into the labour market and reduce national unemployment burdens.
9. Integrating Future Skills and Digital Pedagogy into University Curricula. - Research and develop a modular national curriculum framework to embed future skills—particularly Artificial Intelligence (AI), data science, coding, and prompt engineering—across all undergraduate programmes. This includes faculty capacity building, curriculum audits, and scalable digital pedagogy strategies.	A digitally fluent, future-ready graduate workforce equipped with core competencies in Artificial Intelligence, data science, and prompt engineering across all academic disciplines. This initiative will drive national innovation, support digital transformation in both public and private sectors, and significantly increase Sri Lanka's competitiveness in the global knowledge economy. The development of a modular AI/data literacy framework, supported by a non-STEM digital fluency curriculum, faculty development programmes, and	AI fluency and data literacy are no longer optional; they are foundational for all 21st-century graduates. While some specialised institutions in Sri Lanka have begun offering advanced programmes, most universities still rely on outdated ICT curricula with limited relevance to today's job market. This fragmented approach risks creating a digitally unequal graduate population. By researching international best practices, evaluating the effectiveness of digital pedagogy, and addressing faculty readiness, this R&D initiative ensures that all disciplines—not just STEM—are future-proofed. A national rollout guided by clear policy, training, and accreditation will transform Sri Lanka's higher

	policy guidance for national rollout, will ensure consistent, high-quality implementation across all universities.	education sector into a hub for globally competitive talent in AI and emerging technologies.
10. English Language Education for Global Mobility and Academic Competitiveness. - Design and implement a national-level English for Global Mobility (EGM) initiative, including a comprehensive diagnostic of university students' English proficiency, and develop a standardised, credit-bearing curriculum with faculty training and simulated TOEFL/IELTS preparation modules.	Enhanced English language proficiency among Sri Lankan graduates—particularly in academic speaking, writing, and presentation—enabling greater success in securing international scholarships, assistantships, and employment. A standardised "English for Global Mobility" curriculum, integrated across faculties and supported by faculty training and test preparation systems, will improve global competitiveness and strengthen Sri Lanka's international academic and research presence.	Enhanced English language proficiency among Sri Lankan graduates—particularly in academic speaking, writing, and presentation—enabling greater success in securing international scholarships, assistantships, and employment. High scores in TOEFL/IELTS (particularly in speaking and writing sub-scores) are often required for funding and assistantships. A standardised "English for Global Mobility" curriculum, integrated across faculties and supported by faculty training and test preparation systems, will improve global competitiveness and strengthen Sri Lanka's international academic and research presence.

Priority Research Area	Expected Outcome for National Development	Justification
11. National Graduate Career & Mobility Hub: Enhancing International Academic and Professional Pathways. - Design and establish a centralised National Graduate Career & Mobility Hub (NGCMH) to support Sri Lankan undergraduates and postgraduates in accessing international academic and career opportunities. The initiative will also track and engage graduates abroad, developing reintegration strategies to leverage global expertise for national development.	A growing number of Sri Lankan graduates are successfully securing international academic placements, scholarships, and employment, accompanied by a strategic framework to guide their return and reintegration. This will shift the narrative from brain drain to brain circulation, enriching Sri Lanka's talent pool with globally connected professionals who contribute to innovation, capacity building, and national development.	While some universities in Sri Lanka have career guidance units, most lack the specialised capacity to support students navigating complex international pathways such as graduate admissions, scholarships, and global job market requirements. The current system is fragmented and insufficient in preparing students for international opportunities or engaging with graduates who pursue careers abroad. This R&D initiative will address these gaps by establishing a centralised hub that offers personalised guidance, builds international networks, and provides resources for post-study reintegration. Crucially, it will help transform brain drain into brain circulation by strategically reintegrating globally trained talent into national development efforts.
12. Creating a Safer and More Student-Friendly University Environment. - Develop a national framework to improve student well-being and protection across the university system by researching institutional culture, reporting mechanisms, and psychological safety. A central component includes the design and pilot of a mandatory reporting system for	A safer, more inclusive, and psychologically supportive university environment that reduces incidents of harassment, discrimination, and mental health deterioration, leading to improved student retention, equity, academic performance, and overall quality in higher education. The implementation of a transparent and enforceable reporting and response system for sexual harassment and violence will uphold	Despite Sri Lanka's legal frameworks, such as the Universities Act No. 16 of 1978 and the Prohibition of Ragging and Other Forms of Violence in Educational Institutions Act No. 20 of 1998, many students still face physical and psychological intimidation within universities. Non-compliance often results in marginalisation and fear of retaliation. Additionally, the absence of formal, protected reporting systems for sexual harassment contributes to underreporting and recurrence. Aligning with UN SDG 4 on inclusive, quality

sexual harassment and violence in all universities.	students' rights and align Sri Lanka's higher education sector with national laws and global education quality standards.	education, this R&D initiative will develop institutional mechanisms (e.g. online platforms, counselling protocols, anonymous reporting, and response tracking), support gender equity, and provide anti-discrimination and trauma-informed training for academic and administrative staff. A national student-friendly environment framework will not only meet legal and ethical obligations but also foster safe, supportive spaces for all learners to thrive.
13. Integrating Digital Platforms and Smart Education Systems into Sri Lanka's University Governance and Delivery. - Design and pilot a unified digital ecosystem across Sri Lankan universities—integrating Learning Management Systems (LMS), academic programme management, human resource systems, infrastructure tracking, student services, and funding workflows—to support efficient, data-driven, and technology-enabled higher education delivery and governance.	A digitally transformed higher education system that enhances teaching, learning, institutional management, and strategic planning across all universities. The integration of LMS, HR, infrastructure, and financial management systems will improve academic quality, administrative efficiency, transparency, and responsiveness to national development priorities. A centralized digital framework will also enable real-time performance monitoring, allowing for a more equitable and accountable use of public education investments.	Many Sri Lankan universities still rely on fragmented or outdated systems for academic delivery and administration, resulting in inefficiencies in program tracking, staff deployment, infrastructure utilization, and funding allocation. While LMS platforms exist, their adoption is inconsistent and often limited to basic course delivery. Globally, higher education institutions are leveraging integrated digital platforms to streamline operations, enhance learning experiences, and generate actionable data for policy and funding decisions. This R&D project will assess institutional readiness, international models (e.g., UniFlow, PeopleSoft, Moodle+ERP integrations), and implementation barriers, and develop a scalable digital university governance framework tailored to Sri Lanka's context. The outcome will be a future-ready, tech-enabled university system aligned with national digital transformation goals.

Priority Research Area	Expected Outcome for National Development	Justification
14. Strengthening Research, Innovation, and Commercialisation for National and Global Impact - Develop a national strategy to strengthen the research and innovation ecosystem within Sri Lankan universities and research institutions by aligning with national research priorities, incentivizing international collaboration, promoting academic mobility (including staff exchange and adjunct positions), and establishing pathways for knowledge commercialization and industry engagement.	An internationally engaged, research-intensive higher education system that advances Sri Lanka's national research priorities, enhances global university rankings, and contributes directly to economic development through innovation, commercialisation, and industry collaboration. The increased participation of Sri Lankan institutions in international research networks and the greater mobility of scholars will lead to globally competitive outputs, patent generation, research-led start-ups, and an enhanced reputation for Sri Lankan universities.	Despite having a strong academic foundation, Sri Lankan universities contribute relatively little to global research output, innovation pipelines, or industry partnerships. This is due to fragmented research governance, limited international collaboration, and weak links between academic research and national development priorities. Many institutions lack structured incentives for academic mobility, research commercialisation, or participation in global networks. Strengthening these areas through an integrated R&D strategy will enable universities to align their research agendas with national priorities, attract international collaborators, facilitate staff exchange and adjunct appointments, and promote innovation through commercial pathways. This transformation is essential not only for improving global university rankings but also for ensuring that academic research contributes directly to Sri Lanka's economic growth, technological advancement, and international visibility.

2.4 MINISTRY OF ENERGY

Team Leader	Prof. Athula Rajapakse, Professor, Department of Electrical and Computer Engineering, University of Manitoba, Canada
Members	Dr. Ajith De Silva, Professor, University of West Georgia, USA Dr. G.R. Asoka Kumara, Research Professor, National Institute of Fundamental Studies Prof. Rahula Attalage, Emeritus Professor, University of Moratuwa and Pro Vice - Chancellor (Academic) Sri Lanka Institute for Information Technology (SLIIT) Dr. Tilak Siyambalapitiya, Former Chairman, Ceylon Electricity Board Prof. Wijendra Bandara, Chairman, Sustainable Energy Authority and Professor in Physics, Department of Physics, University of Peradeniya Ms. Gothami Gannoruwa, Assistant Secretary, Ministry of Energy Dr. Prasad Jayathurathnage, Senior Research Engineer, Danfoss Drives, Finland

- **Core Areas**:

1. Accurate short-term forecasting of energy generation from rooftop and ground-mounted PV systems.
2. Domestic Production of Battery Chargers, Solar Inverters and EV chargers.
3. Local development of algorithms, hardware and software systems for implementing smart grid solutions for Sri Lanka.
4. Development of low-cost, high-performance supercapacitors and rechargeable batteries using locally available materials.
5. Energy conservation and enhancement of efficiency of energy use in buildings.
6. Repurposing, recycling, and disposing of used PV modules, used batteries, and e-waste from energy related devices.
7. Development of safe and cost-effective techniques and infrastructure for production, transportation and storage of Green Hydrogen and Green Ammonia for energy and fertilizer use.
8. Exploration of the feasibility of new sites, abandoned sites, and sites at irrigation and large hydropower reservoirs for deploying mini and micro hydro systems for electricity generation and/or energy storage
9. Improving and modernization of processes and systems for heat and electricity generation from biomass and waste.
10. Developing, piloting and replication of a control system to save electrical energy in tea withering and other methods to reduce the consumption of electricity.

➢ **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	Accurate short-term forecasting of energy generation from rooftop and ground-mounted PV systems	• Algorithms and tools for few hours ahead prediction of solar PV Generation. • Reduced PV curtailments. • Improved grid stability.	Sri Lanka has seen a rapid increase in solar photovoltaic (PV) installations. However, many of these installations lack real-time monitoring and the absence of comprehensive forecast of the energy generation from installed rooftop and ground-mounted PV systems for the next few hours limits the ability of power system operators to effectively dispatch the available generating resources. The absence of such predictions has led the utilities in the country to take non-evidence based decisions to curtail the solar PV electricity. These few hours ahead forecasts will enable taking preventive actions to stabilize the grid and minimize solar PV curtailments.
2.	Domestic Production of Battery Chargers, Solar Inverters and EV chargers.	• Locally produced battery chargers, solar PV inverters and EV chargers customized to local needs and conditions. • Development of local Power Electronics manufacturing industry. • Reduced import requirements related to RE deployment. Possible future export opportunities.	Energy storage is urgently needed to increase the share of electricity generated from solar and wind resources. The number of electric vehicles in the country is rapidly growing. Local manufacturing of battery chargers, solar inverters and EV chargers support growth of power electronics manufacturing industry and reduce foreign exchange required for importing these devices. The know-how and some manufacturing exist within the country and what is needed is commercial product development to meet applicable standards.

No.	Priority Research Area	Expected Outcome for National Development	Justification
3.	Local development of algorithms, hardware and software systems for implementing smart grid solutions for Sri Lanka	• Smart electricity metering and demand response solutions. • Energy demand and resource forecasting systems optimized for local conditions. • Microgrid management systems. • Energy aggregating systems.	As the contribution of intermittent sources increases, smart grid solutions are needed to manage the stability of the grid and optimize the use of energy resources. In order to implement demand response programs, advance communication and automation technologies are needed. Domestic development these systems enable customizing them to suit to the local conditions.
4.	Development of low-cost, high-performance supercapacitors and rechargeable batteries using locally available materials.	• Domestically produced energy storage devices. • Reduction in import dependency for batteries and storage systems. • Creation of technology-based industry and associated green jobs.	Sri Lanka urgently needs scalable and affordable energy storage solutions to stabilize its growing solar and wind energy sectors. By utilizing abundant local resources such as coconut shells and natural graphite, the country can develop cost-effective supercapacitors and rechargeable batteries. This approach supports energy self-reliance, reduces import costs, and creates value-added industries, aligning with national goals for economic recovery, rural development, and climate resilience.
5.	Energy conservation and enhancement of efficiency of energy use in buildings.	• Improved energy standards for residential and commercial buildings. • Energy management systems for buildings.	As the construction of large scale residential and commercial buildings is rapidly growing, energy usage in both new and existing buildings, specifically for air conditioning, is expected to grow. It is vital to develop techniques for energy management and energy efficiency standards suitable for Sri Lanka's climatic conditions.

No.	Priority Research Area	Expected Outcome for National Development	Justification
6.	Repurposing, recycling, and disposing of used PV modules, used batteries, and e-waste from energy related devices.	• Safe and cost-effective repurposing of used batteries. • Cost effective recycling of end of life PV modules. • Safe disposal of e-waste from energy related devices. • Reducing environmental impact of PV modules and batteries.	When the life of PV modules and batteries used for electric vehicles and energy storage ends, disposal of these waste will become a huge problem, as these wastes contain highly toxic substances. Solutions to this problem is urgently needed as the lifetime of PV modules and batteries are about 20 and 10 years.
7.	Development of safe and cost-effective techniques and infrastructure for production, transportation and storage of Green Hydrogen and Green Ammonia for energy and fertilizer use.	• Facilitating use of renewable energy for diverse applications. • Reduced dependency on imported fossil fuels and chemical fertilizers. • Establishment of a new green export economy. • Advancement of low-carbon agriculture and industry.	Green hydrogen and ammonia offer strategic solutions to Sri Lanka's twin challenges of energy insecurity and fertilizer import dependence. Utilizing excess renewable energy, the country can produce green hydrogen to use in transport sector, industry and export, or convert hydrogen to ammonia for fertilizer production for local needs. This aligns with global energy transition trends and positions Sri Lanka as a regional hub for green fuels, while reducing emissions and boosting the economy.
8.	Exploration of the feasibility of new sites, abandoned sites, and sites at irrigation and large hydropower reservoirs for deploying mini and micro hydro systems for electricity generation and/or energy storage	• Addition of low-cost, less-variable renewable energy generation. • Addition of small-scale energy storage systems with long operating life. • Industrial development through the utilization of local technical manpower, growth of manufacturing and assembly industries.	Sri Lanka's exceptionally high rainfall and mountainous terrain provide ideal conditions for small-scale hydropower development. By constructing them as pumped storage systems enable to cater to the urgently needed energy storage capacity to accommodate intermittent renewable energy generation. Constructed channels can help manage water flow and prevent erosion. Utilizing these systems, especially during the rainy season, offers a sustainable alternative to large dams. Locally assembled and installed projects will support clean energy generation, irrigation, and rural electrification. This approach strengthens energy security while minimizing environmental and social impact.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9.	Improving and modernization of processes and systems for heat and electricity generation from biomass and waste.	• Improved combustion systems optimized for locally available biomass. • Improved waste collection, transportation, processing and monitoring systems.	A large percentage of Sri Lankans use firewood for cooking. Domestic smoke pollution is unhealthy and fireplaces are very inefficient. There is a significant consumption of firwoods in the industrial sector too. Additionally, there is a pressing need to solve the problem of urban waste. Safe waste to power conversion is an excellent solution for this problem, However, effective combustion systems optimized to local conditions is necessary.
10.	Developing, piloting and replication of a control system to save electrical energy in tea withering and other methods to reduce the consumption of electricity.	• Saving 30% of electricity (estimated to be about 30 GWh/year) used for withering. • Improvement in quality of tea.	Sri Lanka has 600 tea factories, each with at least 12 withering troughs. Research in 1999 by TRI and ECF (presently SLSEA) revealed the potential to save 30% of electricity with the use of variable speed drives on trough motors. By now an estimated 200 factories have installed such drives, but the know-how to control them for optimum performance is lacking. Recent research by UOP and TRI has developed the hardware and software for control of the process using a feedback control system, and prototyped in TRI's Thalawakella research factory. There is an urgent need to (i) complete the work of TRI, (ii) finance development of hardware and trials at several factories in different regions, and (iii) then replicate the results across all 600 factories.

2.5 MINISTRY OF ENVIRONMENT

- **Members of the Ad-hoc Committee**

Team Leaders	Prof. Oliver Ileperuma, Emeritus Professor of Chemistry, University of Peradeniya Dr. Nadeeka Rathnayake, Senior Scientist, Environmental Chemistry and Geochemistry, Environmental Risk Assessment, Hydrobiology Queensland, Australia Prof. Uthpala Jayawardena, Professor in Zoology, Department of Zoology, Faculty of Natural Sciences, The Open University of Sri Lanka
Members	Prof. Lakshman Galagedara, Professor, School of Science and the Environment, Memorial University of Newfoundland, Canada Dr. Lanka Prasada, Academic Researcher / Management Consultant and Former Director Operations - Sri Lanka Coast Guard HQ, Commission Member, National Science and Technology Commission (NASTEC) and Board Member, National Aquatic Resources Research and Development Agency (NARA)

- **Core Areas**:

1. Ecosystem Services and Natural Capital Valuation
2. Environmental Governance, Compliance, and Citizen Science
3. Conservation Strategies for Threatened and Endemic Wildlife
4. Climate Change Impact Assessment and Local Adaptation Models
5. Marine and Coastal Pollution Assessment and Mitigation
6. Blue Economy Development and Sustainable Ocean Resource Use (Overlap with Ministry of Fisheries, Aquatic and Ocean Resources)
7. Integrated Waste Management and Circular Economy Solutions
8. Sustainable Water Resource Management and Pollution Control
9. Air Quality and Urban Pollution Management
10. Sustainable Mining and Post-Mining Land Rehabilitation

➢ **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	Ecosystem Services and Natural Capital Valuation	• Comprehensive inventory and categorization of ecosystem services developed for each ecological zone. • Understanding the strengths of local community perceptions, dependencies, and traditional knowledge related to ecosystem services. • National knowledge base on non-monetary social values, including cultural identity, health, spiritual significance, and recreational benefits enhanced, to guide inclusive environmental policy and planning. • Priority zones designated for conservation, sustainable utilization, or ecological restoration based on ecological and socio-economic value, to optimize biodiversity protection and community benefits.	Sound decision-making for sustainable environmental management requires a robust understanding of the ecological, social, and economic value of ecosystem services. Quantifying and integrating these values—both monetary and non-monetary—will support evidence-based policy, improve land-use planning, and enhance cross-sectoral integration. A multidisciplinary approach is essential to develop valuation methodologies that align with national environmental goals and support biodiversity conservation, climate resilience, and community well-being.
2.	Environmental Governance, Compliance, and Citizen Science	• Institutional coordination improved through the identification of gaps and overlaps among agencies, aligning mandates, enhancing collaboration, and developing coherent strategies. • Evidence-based policymaking strengthened by establishing robust environmental data systems and generating reliable information on land degradation trends, drivers, and impacts to support informed, science-based national decisions.	Strengthened governance ensures effective resource management. Research will close institutional gaps, promote transparency, and promote inclusive, evidence-based, and long-term environmental strategies. This supports national development by enhancing institutional capacity, improving land and resource use efficiency, and aligning governance systems with global sustainability goals such as the UN SDGs.

		• Environmental laws and policies modernized to effectively address emerging challenges and improve tenure security, compliance, and accountability. • Increased public participation and community engagement in environmental governance and decision-making processes, empowering local governments and communities to actively contribute to conservation and sustainable resource management. • Enhanced environmental data systems for improved monitoring, transparency, and accountability, including the development and application of GIS-based tools aligned with the Sustainable Development Goals (SDGs). • Integrated land-use planning promoted to balance agriculture, conservation, urban expansion, and infrastructure development. • Resource allocation optimized through research-driven prioritization of investments in restoration, conservation, and early warning systems, reducing inefficiencies. • Citizen science platforms established to facilitate active public involvement in monitoring biodiversity, pollution, and ecosystem health.	
3.	Conservation Strategies for Threatened and Endemic Wildlife	• Innovative human–wildlife conflict mitigation strategies implemented, minimizing risks to both local communities and wildlife populations • Degraded habitats restored and habitat connectivity enhanced to facilitate species movement and ecosystem resilience.	Sri Lanka's exceptional biodiversity, with its high proportion of endemic species, is increasingly threatened by habitat loss, degradation, and fragmentation caused by land-use change, unsustainable resource extraction, and infrastructure development. These pressures not only endanger

		• Targeted conservation programs advanced to support the recovery and long-term survival of threatened and endemic species. • Community-based conservation initiatives strengthened, promoting local stewardship and sustainable management of natural resources.	species survival but also disrupt ecological processes and reduce genetic diversity. Targeted research is essential to identify priority habitats, assess species' conservation needs, and design evidence-based, innovative mitigation measures. Such approaches—including habitat restoration, the creation of ecological corridors, and community-based conservation—will help protect species, maintain landscape connectivity, and reduce human–wildlife conflict, ensuring the long-term resilience of both ecosystems and local communities.
4.	Climate Change Impact Assessment and Local Adaptation Models	• Climate vulnerability map produced to identify high-risk regions and communities. • Nature-based solutions developed and implemented for disaster risk reduction. • Adoption of climate-resilient agriculture and sustainable land-use practices promoted. • Socio-economic and ecological impacts of shifting rainfall and monsoon patterns and assessed • Local adaptation strategies designed and implemented to address specific climate risks. • Reduced climate vulnerability of communities, ecosystems, and infrastructure. • Evidence-based insights generated to inform and strengthen climate policy. infrastructure.	Climate change is intensifying risks to communities, ecosystems, and national economies by increasing the frequency and severity of extreme weather events, altering rainfall patterns, and driving sea-level rise. These impacts threaten food and water security, biodiversity, infrastructure, and human health. Localized, context-specific research is essential to identify vulnerabilities, develop targeted resilience strategies, and implement adaptation measures that address the unique environmental, social, and economic conditions of each region. Such research will also provide the evidence base needed to inform climate policy, guide investment, and build long-term adaptive capacity.

No.	Priority Research Area	Expected Outcome for National Development	Justification
5.	Marine and Coastal Pollution Assessment and Mitigation	• Marine pollution is reduced through targeted monitoring and mitigation measures. • Coastal and marine ecosystems restored, enhancing biodiversity, fisheries productivity, and tourism resilience. • Capacity strengthened for effective maritime disaster response, including hazard management and prevention of mismanagement during crises. • Regular monitoring systems established for microplastics, oil spills, and other pollutants in marine and coastal environments. • Comprehensive ecosystem assessments conducted to evaluate ocean resources, productivity, and vulnerabilities. • Innovative clean-up and restoration techniques developed and applied to beaches, coral reefs, and mangroves.	Marine and coastal pollution poses significant threats to biodiversity, fisheries, tourism, and the livelihoods of coastal communities. It degrades critical habitats such as coral reefs, mangroves, and seagrass beds, disrupts ecosystem services, and reduces the productivity of marine resources. Targeted research can support the development of effective monitoring programs, innovative clean-up and restoration techniques, and science-based policies for sustainable management and protection of ocean resources, ensuring both ecological health and long-term socio-economic benefits.
6.	Blue Economy Development and Sustainable Ocean Resource Use (Overlap with Ministry of Fisheries, Aquatic and Ocean Resources)	• Increased economic benefits derived from marine sectors, including fisheries, tourism, renewable energy, and marine biotechnology through sustainable practices and innovation. • Strengthened sustainable management and conservation of ocean resources to ensure their long-term productivity and ecological health. • Improved livelihoods and economic resilience of coastal communities by promoting inclusive and sustainable blue economy initiatives.	The blue economy leverages Sri Lanka's Ocean resources for economic growth, employment, and environmental health. Research will guide sustainable exploitation of marine resources, ensuring biodiversity protection and climate resilience while contributing to national GDP.

No.	Priority Research Area	Expected Outcome for National Development	Justification
7.	Integrated Waste Management and Circular Economy Solutions	• Advanced technologies and community-drive models developed and implemented for effective waste segregation, recycling, upcycling, and circular resource utilization. • Enhanced valorization of waste as raw materials for industrial processes, festering resource efficiency. • Renewable energy generation increased through the deployment of waste-to-energy projects utilizing appropriate waste streams. • Recovery of valuable materials, including heavy metals, optimized from various waste sources. • Polythene and plastic recycling expanded to produce innovative new materials and products. • Material recovery rates improved, leading to substantial reductions in landfill waste volumes. • Waste-based industries supported and expanded, contributing to sustainable economic growth. • Green jobs creation and promotion of sustainable livelihoods strengthened within the waste management sector.	A circular economy minimizes waste generation by keeping materials and products in use for as long as possible through reuse, repair, recycling, and resource recovery. By closing the loop on resource use, it reduces pressure on natural systems, recovers valuable materials from waste streams, and lessens the need for extracting virgin resources. This approach not only mitigates environmental impacts such as pollution and landfill dependency but also fosters innovation, supports the development of new industries, creates green jobs, and strengthens long-term economic resilience while promoting sustainable growth.

No.	Priority Research Area	Expected Outcome for National Development	Justification
8.	Sustainable Water Resource Management and Pollution Control	• Strengthen national water security ensuring equitable and reliable access to safe water across all communities. • Significant reduction in pollution levels and measurable improvements in the quality of surface and groundwater resources. • Climate-resilient water management systems developed and implemented to adapt to changing environmental conditions. • Sustainable and efficient utilization of water resources across domestic, agricultural, industrial, and potential export sectors. • Enhanced capacity for integrated watershed management, balancing ecological health with human water needs. • Improved monitoring and early-warning systems established to detect and prevent water pollution and over-extraction risks	Sustainable water management is essential for safeguarding public health, maintaining healthy ecosystems, and supporting economic growth. With increasing pressures from climate change, population growth, industrial activities, and pollution, the need for reliable, clean, and equitably distributed water resources is greater than ever. Integrated watershed management provides a holistic framework for balancing competing water demands, enhancing climate resilience, preventing resource degradation, and ensuring safe water access for domestic, agricultural, and industrial needs. By protecting water quality and availability, Sri Lanka can strengthen food security, biodiversity conservation, and socio-economic stability.
9.	Air Quality and Urban Pollution Management	• Improved air quality leading to reduced public health risks, and compliance with national and international air quality standards. • Strengthened policy frameworks that support cleaner technologies, fuels, and industrial practices. • Establishment of a comprehensive National Air Pollution Monitoring Database to enable evidence-based decision-making and enforcement.	To safeguard public health by reducing exposure to harmful airborne pollutants, while ensuring compliance with national and international air quality standards. This includes addressing the environmental and health impacts of both well-known pollutants (such as particulate matter, nitrogen oxides, and sulfur dioxide) and emerging contaminants like airborne microplastics. Through comprehensive monitoring, research, and policy implementation, Sri Lanka can mitigate pollution sources, improve air quality, and protect vulnerable populations, while contributing to global commitments on environmental protection and sustainable development.

No.	Priority Research Area	Expected Outcome for National Development	Justification
10.	Sustainable Mining and Post-Mining Land Rehabilitation	• Sustainable mining guidelines developed and implemented to minimize environmental and social impacts while promoting responsible resource extraction. • Ecological restoration pilot projects conducted on abandoned and degraded mining sites to rehabilitate landscapes and enhance ecosystem stability. • Community impact assessments integrated into mining rehabilitation plans to ensure social considerations inform restoration efforts. • Strengthened mining policies supported by comprehensive Social Impact Assessments to improve environmental and social governance. • Surveys of sand deposits completed, alongside research into sustainable alternatives for construction material, including promotion of substances like rice husk ash for cements • Post-mining landscapes restored to productive and ecologically balanced conditions, supporting long-term land use sustainability. • Advancement of alternative material development initiatives aimed at reducing dependence on non-renewable mineral resources in the construction and mining sectors has been achieved.	Mining is an important contributor to economic growth, providing raw materials for construction, manufacturing, and export. However, without proper management, mining activities can cause significant environmental degradation, including habitat destruction, water and soil contamination, and long-term landscape alteration. Implementing sustainable mining practices, supported by robust environmental and social safeguards, can minimize these impacts while optimizing resource use. Effective rehabilitation of post-mining sites restores ecological functions, reduces community risks, and creates opportunities for alternative land uses, ensuring that resource extraction aligns with both economic development and environmental stewardship.

2.6 MINISTRY OF FISHERIES, AQUATIC AND OCEAN RESOURCES

- **Members of the Ad-hoc Committee**

Team Leaders	Dr. Sanath Hettiarachchi, Chairman, National Aquatic Resources Research and Development Agency (NARA) Dr. Keerthi Sri Senarathna Atapaththu, Senior Lecturer, Department of Limnology & Water Technology, Faculty of Fisheries and Marine Science & Technology, University of Ruhuna
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- **Core Areas**:
    1. Comprehensive fish stock assessment research and genetic diversity analysis for sustainable fisheries management in Sri Lankan waters.
    2. Application of advanced aquaculture and mariculture technologies for enhanced production and sustainability in Sri Lankan aquaculture sector.
    3. Conducting disease surveillance of economically important aquatic fauna to map disease prevalence, forecasting, and management.
    4. Research on fish feed production and the development of community-based fish feed industries for enhanced aquaculture sustainability.
    5. Comprehensive ecological assessment of coastal (oceanographic studies) and inland aquatic ecosystems: Research on baseline characterization, pollution mitigation, and predictive modeling for marine and freshwater environments.
    6. Upgrading the socioeconomic status of fisher communities through research, awareness, and providing new opportunities, such as aqua tourism.
    7. Exploration and evaluation of economically important non-living aquatic resources.
    8. Development of sustainable fishing technologies and comprehensive mechanisms to control IUU (illegal, unreported, and unregulated) fishing.
    9. Research on minimizing postharvest losses, including depredation of fish, and developing technologies for value addition to primary fishery products with exploration of new and expanding existing markets.
    10. Establishment of a centralized data management system for fisheries and aquaculture, together with the application of modern AI tools.

Recommendations

	Priority Research Area	Expected Outcome for National Development	Justification
1.	Comprehensive fish stock assessment research and genetic diversity analysis for sustainable fisheries management in Sri Lankan waters	i. Identification of the present status (health, exploitation level, and stock structure, etc.) of commercially important fish stocks in Sri Lankan waters. ii. Identification of unexplored fishery resources and their potential exploitation levels. iii. Identification of temporal and seasonal variations in commercially important fish stocks. iv. Implementation of proper management strategies to manage these fish stocks sustainably, while providing optimal economic benefits for the fishing industry v. Identification of genetic variations of fish populations and their relative prevalence to manage rare genotypes.	Understanding the level of exploitation, population structures, and their associated dynamics represents a critical prerequisite for effective fisheries governance and management. However, comprehensive data remain largely unavailable within the Sri Lankan context for nearly all commercially significant fish species as well as for unexploited fishery resources and their contemporary status. Given the escalating fishing pressure, the implementation of sustainable fisheries management strategies has become imperative. Without such data, effective implementation of evidence-based fisheries management strategies is impossible. Consequently, comprehensive information derived through systematic fish stock assessments at the species level, and in certain instances at the genetic level, is essential.

	Priority Research Area	Expected Outcome for National Development	Justification
2.	Application of advanced aquaculture and mariculture technologies for enhanced production and sustainability in Sri Lankan aquaculture sector	i. Develop breeding protocols for commercially important fin fish and shellfish (ornamental and food) for mass production. ii. Develop protocols for the mass production of aquatic plants targeting international markets. iii. Production of high-quality ornamental species with standards to meet demand in the international market. iv. The expansion of farming systems for non-conventional species in Sri Lanka, including sea cucumber, pearl oysters, mussels, and clams, represents a strategic diversification of aquaculture practices. v. Introduction of smart aquaculture to enhance production. vi. Implementing bio-floc technology and recirculating aquaculture systems (RAS) to produce eco-friendly fish production vii. Introducing Integrated Multi-Trophic Aquaculture (IMTA) to increase and diversify fish production.	Aquaculture, rearing aquatic organisms under controlled or semi-controlled conditions, is a production system that provides cost-effective animal protein with minimal environmental impacts compared to livestock production. Despite Sri Lanka possessing the highest water-to-land area ratio in the Asian region, aquaculture practices remain significantly underdeveloped. Nevertheless, substantial potential exists for sector expansion, as fundamental requirements, including the availability of high-quality water resources and suitable land which are readily accessible. Capturing this potential necessitates the implementation of standardized protocols, incorporating contemporary technological advances to enhance productivity and sustainability. Furthermore, the country possesses considerable human capital with the requisite technical knowledge and expertise to facilitate comprehensive aquaculture sector development and achieve strategic production objectives.

	Priority Research Area	Expected Outcome for National Development	Justification
3.	Conducting disease surveillance of economically important aquatic fauna to map disease prevalence, forecasting, and management.	i. Development of strategies to prevent horizontal transmission of diseases. ii. Characterization of spatiotemporal disease dynamics, including the mapping of disease onset patterns, transmission pathways, and epidemiological trends across aquaculture systems to inform evidence-based management decisions. iii. Optimization of inland aquaculture productivity through the implementation of early warning systems on disease outbreaks.	Disease represents the most significant constraint to sustainable aquaculture, causing catastrophic production failures across the global systems due to viral and bacterial infections. While complete elimination remains unattainable, evidence-based management strategies can substantially mitigate damages. Comprehensive disease surveillance has paramount importance for effective outbreak management. Advanced technological approaches, including AI-based predictive modeling, demonstrate considerable potential for enhancing early detection capabilities. However, current systematic scientific approaches to disease surveillance remain inadequate, rendering the sector unsustainable. Consequently, development of a robust surveillance framework constitutes an essential research priority for aquaculture resilience, especially for shrimp farming and the ornamental fish industry.

	Priority Research Area	Expected Outcome for National Development	Justification
4.	Research on fish feed production and the development of community-based fish feed industries for enhanced aquaculture sustainability.	i. Enhancement of aquaculture productivity through the provision of nutritionally balanced formulations optimized for both food fish and ornamental species, resulting in improved growth rates and production efficiency. ii. Reduction of stage-specific mortality rates across critical developmental phases, particularly during vulnerable transitional periods such as fry-to-fingerling metamorphosis, through species-appropriate nutritional interventions. iii. Community capacity building and technological empowerment via the transfer of sustainable feed production technologies, fostering local expertise and economic independence in aquaculture support industries.	Nutritionally balanced feed formulations are critical determinants of aquaculture production success, significantly influencing growth performance and health status. Feed costs represent approximately 60% of total production costs, directly impacting economic viability. Limited availability of stage-specific, nutritionally optimized diets across aquaculture species affects both the food fish and ornamental fish sectors, contributing to elevated stage-specific mortality rates. Consequently, developing locally produced aquafeed systems emerge as a strategic priority for addressing nutritional gaps and enhancing production efficiency. Systematic transfer of aqua-feed production technologies to local communities will simultaneously maximize aquaculture productivity while fostering community capacity building and technological empowerment.
5.	Comprehensive ecological assessment of coastal (oceanographic studies) and inland aquatic ecosystems: Research on baseline characterization, pollution mitigation, and	i. Establishment of a biological, physical, and chemical baseline dataset on the sensitive coastal ecosystems. ii. Identification of ecologically and economically significant species and their ecology. iii. Explore the spatial and temporal dynamics of water quality and faunal and floral diversity in both coastal and inland aquatic ecosystems.	Despite the exceptional biological diversity of Sri Lankan coastal ecosystems, comprehensive spatial and temporal assessments of these systems remain inadequate. Multiple anthropogenic and natural disasters, pose substantial threats to these ecologically sensitive environments. Consequently, establishing comprehensive baseline datasets assumes critical importance for accurate damage assessment and environmental impact evaluation, which are prerequisites for developing evidence-

	predictive modeling for marine and freshwater environments.	iv. Assessment of exotic fish species and their impact on biodiversity, ecosystem health, and integrity of freshwater ecosystems.	based management strategies for sustainable resource utilization. This demands continuous monitoring of biological, physical, and chemical parameters within Sri Lankan coastal waters. For the same reasons a comprehensive ecological assessment is essential for inland waters.
6	Upgrading the socioeconomic status of fisher communities through research, awareness, and providing new opportunities, such as aqua tourism.	i. Introduction of new livelihood opportunities that are interconnected to aquaculture practices to improve the economic returns of farmers. ii. Expansion of conventional aquaculture and traditional fishing activities, aiming to attract more tourists. iii. Improve knowledge, understanding, and perception of aquatic resources among fisher communities to establish responsible fishing communities. iv. Explore culture, user rights, values, aspirations, principles, working rules, standard of living, and the extent of poverty in fishing communities. v. Implementation and empowerment of zonal planning to minimize multistake-holder conflicts in the coastal zone.	Fishing communities are relatively poor and face numerous socioeconomic challenges arising from limited economic opportunities, social constraints, and the seasonal nature of their livelihoods, with uncertainties due to inconsistent income. To address these challenges, it is vital to explore their culture, user rights, values, aspirations, principles, working rules, standard of living, and the extent of poverty. Introduction of alternative income-generating opportunities can enhance their economic resilience. One promising avenue is the integration of aqua tourism with traditional fishing livelihoods. This approach not only improves the living standards and social well-being of fisher families but also contributes to the national economy.

	Priority Research Area	Expected Outcome for National Development	Justification
7	Exploration and evaluation of economically important non-living aquatic resources.	i. Identification of economically important non-living resources in Sri Lankan coastal and offshore regions and ensuring the country's rights to access these resources. ii. Exploration of Marine Resources for **s**ustainable construction material supply, increased export revenue, and local value addition through offshore exploration of sand, placer minerals (heavy minerals), deep sea minerals, and rare earth elements (REEs). iii. Strength national energy security through strategic harnessing of marine and nearshore renewable sources—wind, tidal, and solar—prioritizing renewable energy, reducing carbon footprint, and developing coastal economies.	Heavy minerals in seashores and seabeds represent untapped treasures requiring exploration. While certain heavy minerals hold high monetary value in native or partially purified forms, Sri Lanka lacks value-addition technologies. This creates research opportunities for developing or adopting existing technologies. Sri Lanka's geographic position offers immense potential for wind, tidal, and solar energy along its coastline. Comprehensive oceanographic assessments are essential to identify optimal sites for tidal and offshore wind farms, including mapping tidal currents, wave regimes, and near-shore wind patterns using buoys, satellite data, and modeling tools. Collaborative research with engineering and policy institutions can support technology localization and policy formulation, helping reduce fossil fuel dependency, promote clean energy jobs in coastal regions, and build energy system resilience.

	Priority Research Area	Expected Outcome for National Development	Justification
8	Development of sustainable fishing technologies and comprehensive mechanisms to control IUU (illegal, unreported, and unregulated) fishing.	i. Reduction of the bycatch of small tuna and juveniles of large tuna (skipjack, yellowfin, and bigeye) to the landings. ii. Implement a proper licensing procedure for all multi-day boats to limit the number of fishing operations of all fishing methods, particularly to reduce bycatch landings. iii. Reduced pressure on fish stocks and aquatic habitats by promoting sustainable alternatives to illegal fishing methods, thereby ensuring the long-term viability of economically important fish species and enabling more consistent, year-round fish production. iv. Improved international reputation by minimizing the use of illegal fishing practices, particularly in international waters, thus reducing either the risk of sanctions, trade restrictions, or diplomatic consequences. v. Designing and developing efficient fishing gears and vessels to improve the efficiency of fishing.	Illegal fishing practices have been used for decades despite being prohibited, causing serious harm to marine ecosystems. These destructive methods contribute to habitat degradation, overexploitation of fish stocks, and conflicts among fishing communities. Additionally, the use of illegal gear in international waters risks damaging Sri Lanka's reputation and may lead to trade restrictions or diplomatic consequences. Therefore, exploring sustainable and viable alternatives to illegal fishing gear is a timely and essential research direction. Such efforts can enhance ecological conservation, promote responsible fishing, ensure the long-term sustainability of fishery resources, and reinforce Sri Lanka's standing in global fisheries governance.

	Priority Research Area	Expected Outcome for National Development	Justification
9	Research on minimizing postharvest losses, including depredation of fish, and developing technologies for value addition to primary fishery products with exploration of new and expanding existing markets.	i. Development of postharvest technology to produce value-added products from the flesh of fish, low-valued fish such as surimi, fish balls, and fish paste. ii. Implementing proper strategies to store and transport fish after harvesting. iii. Introduce a continuous monitoring system to track quality deterioration in the entire supply chain, starting from the harvesting to the market. iv. Exploring the possible use of acoustic devices to repel predatory animals to reduce depredation v. Implementing a fishing ground forecasting system using near-real-time satellite data to reduce time spent at sea.	Postharvest loss represents a significant challenge in fish production, with considerable portions discarded at landing sites due to poor quality unacceptable to consumers. Among contributing factors are inadequate handling, poor storage, low-quality ice, and careless operations. Product diversification transforms waste into valuable resources. Poor-quality fish can be processed into high-protein ingredients for aquaculture and livestock feeds. Low-value species can be developed into value-added products for domestic and tourist markets. This comprehensive approach establishes additional production chains, creating employment opportunities and enhancing economic returns, transforming the entire value chain, creating new market segments, and generating alternative income sources for fishing communities.

	Priority Research Area	Expected Outcome for National Development	Justification
10	Establishment of a centralized data management system for fisheries and aquaculture, together with the application of modern AI tools.	i. Implementing a “sustainability reporting” system in the fisheries and aquaculture sector. ii. Implementation of comprehensive baseline data and targeted policy recommendations for Illegal Wildlife Trade (IWT) control in marine waters. iii. Use of modern AI tools in aquaculture (water quality monitoring, feeding, and disease detection, etc) and fisheries (forecasting, fishing ground detection, and by-catch reduction, etc). iv. Develop an efficient distress disseminating system for small-scale fishermen.	Proper reporting and robust database management are crucial for data integrity, transparency, and credible information dissemination to the public and in addition, enable trend analysis, compliance monitoring, and evidence-based decision-making. Growing consumer awareness pressurizes Sri Lankan fisheries governance demanding standardized data management for verified sustainability credentials and policy development. Sri Lanka is a transit hub for IWT, and thus updated data is vital to inform enforcement, protect biodiversity, and strengthen conservation. Further, integrating AI tools can significantly reduce data processing time and accelerate implementation of management strategies, addressing the chronic delays that plague traditional management systems.

2.7 MINISTRY OF FOREIGN AFFAIRS, FOREIGN EMPLOYMENT AND TOURISM

- **Members of the Ad-hoc Committee**

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- **Recommendations**

Foreign Employment

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	Global Labour Market Intelligence, Skills Foresight, and Migration Policy	• Evidence-based migration strategy; demand-driven workforce planning; improved negotiation with destination countries	Research is needed to anticipate fast-changing global labour market trends, forecast skills demand (2025–2035), and understand visa/work permit and migration policy challenges. There is a lack of real-time data on destination countries' evolving needs. Evidence-based intelligence will allow Sri Lanka to target growth sectors, negotiate better bilateral agreements, and align training, as called for in NPP 3.1 (Democratic Economy) and 2.2 (Efficient Workforce).
2.	Skills Development, Credential Recognition, and Pre-departure Support	• Globally competitive Sri Lankan migrants; higher earnings and employment in skilled sectors	Sri Lanka faces skills mismatches and low representation in high-skill jobs. Research should address how to reform TVET, expand upskilling, improve international credential recognition, and deliver comprehensive pre-departure orientation. This supports NPP 1.1 (Advanced Human Resource), 3.1, and SDG 8.

No.	Priority Research Area	Expected Outcome for National Development	Justification
3.	Safe, Efficient, and Transparent Remittance and Financial Systems	• Increased formal remittance inflows, reduced informal transfers, enhanced national FX reserves and investment	With remittances comprising ~8–10% of Sri Lanka's GDP, informal channels like hawala reduce national reserves and expose families to risks. Research is needed on digital fintech, regulatory gaps, and diaspora investment models. Aligns with NPP 3.5 (Digital State), 3.9 (Resource Utilization), and 3.1 (Democratic Economy). Addressing the informal market is essential for macroeconomic stability and financial inclusion.
4.	Migrant Protection, Smart Labour Diplomacy, and Welfare Systems	• Safer migration corridors; better worker rights, social protection, and international reputation	Migrant exploitation, lack of legal protection, and weak bilateral agreements persist. Research is required on MoU design, gender-sensitive protection (especially for women), consular services, and labour diplomacy. This directly supports NPP 2.1 (Safer Society), 2.3 (Gender Equality), and 4.7 (Dignified Diplomacy). Gaps in current welfare programs and implementation challenges must also be assessed.
5.	Returnee Reintegration, Family and Child Well-being, and Rural Resilience	• Productive return migration, reduced poverty and inequality, protection for children and female-headed households	Over 200,000 Sri Lankans return annually, but limited reintegration support leads to wasted skills and social issues. Research should target entrepreneurship for returnees, support for migration-affected families (esp. women and children), and long-term effects on rural poverty. NPP 1.3 (Comfortable Home), 2.4 (Children), and 2.6 (Senior Citizens) require new evidence-based interventions.

Tourism

No.	Priority Research Area	Expected Outcomes for National Development	Justification
1.	Countryside Capitalization and Community Empowerment for Inclusive Responsible Tourism Development	• Replace the top-to-bottom approach with bottom-to-top approach eliminating dependent communities. • Community empowerment and conservation of the environment. • The development process includes female, youth, and people with disabilities • Self-sustaining development rather than borrowing and blowing through entrepreneurial and livelihood development. • Local economic development and rural poverty alleviation. • Tangible and intangible rural resources are capitalized on sustainable tourism to retain the manpower and minimize the migration. • Adherence and implementation of appropriate development policies and strategies. • Mitigate climate change challenges and enhance the sustainable practices. • Community participation and integrated approach enhance peace and reconciliation through inter-cultural and mutual understanding among the different communities.	Efforts to develop human capital in Sri Lanka's tourism sector are vital for fostering inclusive growth, overcoming challenges such as the skills gap, economic inequalities, and lower female participation and local community engagement in tourism. Therefore, it is necessary to conduct research and surveys to identify the ways of enhancing tourism education, training, entrepreneurship, and community engagement. Identifying the existing issues in human capital development in tourism and inclusive tourism growth is essential, and providing solutions to them is vital. The findings of the research in this area will be helpful for the government to improve the national policy on tourism and community development. This would be an inevitable scientific, inclusive, collaborative approach for community empowerment while mitigating the environmental challenges.

No.	Priority Research Area	Expected Outcome for National Development	Justification
2.	Smart and Creative Tourism Development aligning with Digital Transformation and AI integration	• Enhance Sri Lanka tourism performance through Digitalized AI integrated Data Ecosystem. • Connect tourism data, technology, and stakeholders to track visitor trends, support local businesses, and enhance decision-making. • Offers tourists real-time, accurate guidance on attractions, services, and logistics, improving satisfaction and enabling better planning, marketing, and management of the tourism sector. • Anticipating the global trend of Millennial and Alfa generation on virtual/AI applications and smart modes of experience. utilization • Significant role of social media influencers and virtual guest reviews in shaping potential tourist landscapes. • Integrate, upgrade and maintain the balance between AI, Robotic intervention, and human orientation in the tourism industry. • Optimum use of cloud sources to product designing and investment models to meet global challenges on competitions	As Sri Lanka advances toward a digital economy, comprehensive infrastructure—beyond internet speed—is essential. Digital platforms, smart public spaces, cybersecurity, and seamless e-services can enhance public sector efficiency, foster private sector innovation, and promote regional equity. With rising trends like digital nomadism, wellness travel, and remote work, robust digital ecosystems are needed to attract high-value visitors and investors. Enhancing digital readiness aligns with national goals for inclusive growth, export diversification, and global competitiveness. Enhancing and expanding the digital infrastructure and virtual application would enable the tourism practitioners and stakeholder from local and rural setting to connect the global market without any barriers. This also would be inevitable to bring forth smart and creative tourism to anticipate the global trends.

No.	Priority Research Area	• Expected Outcome for National Development	Justification
3.	Tourism Value Chain Analysis and strengthening actors and agencies in diversified income-generating and value-adding activities.	• Scientifically analyzed diversified and segmented tourism value chain embraces optimum carrying capacity for a wide range of actors and agencies along with Attraction, Accessibilities, Amenities, Accommodation, Activities, and Ancillary Services (6As) • Enhancement of the Tourism Satellite Account (TSA), Improving measurements of tourism's economic contribution, including both formal and informal sectors, to guide fiscal planning and international reporting. • Integrate and collaborate with all the stakeholders and sectors through the tourism value chain to attain common goals of sustainable development in a symbiotic approach. • Push the tourism from unsustainable enclave tourist regions to rural and far remote regions to accrue the benefits of sustainable tourism for the entire country. • Enhance quality experience of tourism for potential tourists through the participation of a wide range of actors and agencies while meeting the market realism. • Strategic tourism plan integrates and collaborates actors and agencies along the tourism value chain for sustainable	The present unsustainable, unplanned, ad hoc, and spontaneous tourism developments in enclave tourism regions never allow tourism to move beyond enclave tourism regions to overcome their developmental challenges in rural and far remote areas. Scientific value chain analysis is necessary to integrate all the stakeholders including actors and agencies through the tourism value chain to derive the tourism benefits of a wider community while conserving natural, cultural, and built environments. Only the expansion and establishment of tourism value on different segments of tourism can absorb a wide range of people as actors and agencies with different businesses and livelihoods. Sri Lanka often fails to meet the market realism in all the different concepts of tourism due to the incompleteness and the absence of appropriate tourism value chains.

		performance and practices in known and lesser known regions. • The leakage of tourism earning can be reduced and replaced with improved local facilities and services. • Enables segmenting, targeting and position of diverse and alternative tourism products with Unique Selling Propositions (USPs) to build the different brand image of country and local destinations.	
4.	Collaborative Policy Planning and Implementation through National, regional, and local institutional framework for tourism development and governance	• Improved representation of all the stakeholders with diverse interests including public and private sectors, local communities and academic and research institutions. Increase efficiency and effectiveness of tourism development at national, regional, and local levels through appropriate policy framework, governance and development process. • Symbiotic approach for sustainable development through Destination Management Organizations (DMOs) • Eliminate duplication, re-inventing the wheel, and idling in the development process. • Adopting the most appropriate tourism development approach; human capacity and physical capacity building, policy making and adhering, product designing and development, investment and incentives, marketing, accreditation and networking.	Collaborative policy planning and implementation is essential for the sustainable growth of Sri Lankan tourism as it brings together diverse stakeholders to ensure inclusive, balanced development. Absence of appropriate institutional framework at national, regional and local level of tourism development often curtails the responsible tourism development in the country. A collaborative approach fosters shared ownership, reduces conflicts, and enhances policy effectiveness. Engaging local communities, industry experts, policymakers, and academics enables context-specific strategies that reflect ground realities. It also promotes innovation, accountability, and efficient resource use. In a rapidly changing global tourism landscape, collaborative

		• Strengthens the tourism data base on ecosystem for resilient, sustainable, and inclusive growth through integrated and collaborated digitalization and virtual platforms. • Integrated and collaborated capacity building, product designing and development, policy making, investment, marketing, and monitoring of sustainability.	governance ensures policies are adaptive, resilient, and aligned with long-term national goals while supporting equitable benefits for all stakeholders.
No.	**Priority Research Area**	**Expected Outcome for National Development**	**Justification**
5.	Benchmark Global Tourism Trends and Development in Locating Sri Lanka a Competitive Destination with Diverse Tourism Products	• Sri Lanka tourism development aligned with UN-17SDGs. • Analyze the latest trends in the market and design products to market realism. • Benchmark successful destinations and products to pitch our products to the right target markets. • Enhances the quality of Sri Lanka tourism services and facilities to global standards. • Explore and identify the potential niche tourism segments to design and develop to align our tourism product design and development. • Identifies and enables access to the global technological advancement and digitalization in the tourism and hospitality industry.	Although Sri Lanka is a small island and historically popular destination, today we have met the global competition to retain and sustain as a destination that is able to meet global trends and overcome competitive challenges to attain our sustainable tourism goals. We are compelled to adhere to the guiding principles of UN-17SDGs. Benchmarking responsible tourism practices from other parts of the world enables the country to bridge the ideals and realities to meet market realism. As a developing island destination, we are compelled to study the technological advancement and digitalization process in other parts of the world to shape our future tourism industry.

2.8 MINISTRY OF HEALTH

- **Members of the Ad-hoc Committee**

Team Leader(s)	Prof. Namal Liyanage, Associate Professor of Immunology and Microbial Infection at The Ohio State University Wexner Medical Center USA
Members	Dr. Ariyaratne Manathunga, Consultant Venereologist/National STD/AIDS control programme Sri Lanka. Dr. Duminda samarawikrama, Commodore Superintendent Health, Surgeon Captain, Sri Lanka Navy. Dr. Kirhsiri Senanayake, Senior Lecturer/Consultant Endocrine and general Surgeon, Rajarata University of Sri Lanka. Prof. Kamal Perera, Professor, Consultant Physician, Institute of Indigenous Medicine, University of Colombo, Sri Lanka. Dr. Mario Alles, Specialist in Medical Microbiology and Immunology, and Lecturer, Faculty of Medicine, University of Colombo, Sri Lanka. Prof. Nadira Karunaweera, Senior Professor of Parasitology, Faculty of Medicine, University of Colombo, Sri Lanka. Dr. Nalin Chanimda Rathnayake, Medical Officer-Professorial unit, German Sri Lanka Friendship Hospital for Women, Karapitiya. Sri Lanka. Prof. Niroshan Lokunarangoda, Consultant Cardiologist and Professor in Cardiology, Faculty of Medicine, University of Moratuwa, Sri Lanka. Prof. Prasanna Galhena, Professor, Department of Biochemistry and Clinical Chemistry, Faculty of Medicine, University of Kelaniya, Sri Lanka. Dr. Prashan Fonseka, Senior Medical Officer in Medicine, National Hospital of Sri Lanka. Dr. Rasika Jayasekara, Senior Lecturer in Nursing and Midwifery, Research Degree Coordinator, Ethics Advisor, University of South Australia. Prof. Sunilchandra N. P., Senior Professor Emeritus, Faculty of Medicine, University of Kelaniya. Dr. Wahala M. Wahala, Principal Research Scientist- Discovery Biology-Biotherapeutic Development, Elanco US, Indianapolis, Indiana, USA.

- **Core Areas**:

1. Non-Communicable Diseases (NCDs)
2. Infectious Diseases and Antimicrobial Resistance (AMR)
3. Mental Well-being and Adolescent Health
4. Integrated digital health
5. Trauma care, Occupational Health, and Road Safety.
6. Maternal, Child, and Nutrition Health
7. Traditional Medicine
8. Environment, Climate, and One Health.
9. Oral Health
10. Disaster and Emergency Health Research

- **Recommendations**

The committee strongly believes in and recommends prioritizing funding for **multidisciplinary, multi–PI projects** that unite experts from diverse disciplines to tackle complex national health challenges. The committee further emphasizes the importance of **multi-institutional collaborative initiatives**, linking universities, research institutes, healthcare providers, and industry, over single-PI studies, to ensure broader expertise, shared resources, and optimal outcomes. Such collaborations will maximize impact, foster innovation, produce scalable, sustainable solutions, and be aligned with Sri Lanka's national development goals.

Priority Research Area	Expected Outcome for National Development	Justification
1.Non-Communicable Diseases (NCDs) • Cohort studies on risk marker validation and lifestyle interventions. • Development of digital NCD risk screening tools for primary health care. • Development of point-of-care diagnostics for NCDs. • Implement cross-sectoral screening (religious sites, workplaces). • Studies to identify social determinants and environmental impact on NCD progression.	Enhanced prevention, early detection, and management of NCDs through validated risk markers, digital screening tools, and community-based interventions will significantly reduce premature mortality and morbidity. These advances will lower long-term healthcare costs, improve national productivity, and promote a healthier, more economically active population. Integrating cross-sectoral screening and addressing social determinants will ensure health access and outcomes equity, aligning with sustainable development goals.	NCDs account for 83% of all deaths in Sri Lanka, with 38% occurring prematurely, signaling a major public health challenge. Cardiovascular diseases, cancers, diabetes, and chronic respiratory illnesses are key contributors, straining the healthcare system and reducing economic productivity. Lifestyle changes, environmental exposures, and poor early detection worsen the burden. This leads to higher treatment costs, long-term disability, and reduced workforce capacity. Addressing NCDs is essential to reducing preventable deaths and promoting national development. Investments in early detection, digital screening at primary care, and cross-sectoral interventions, while addressing social determinants, will ensure sustainable and equitable health outcomes.

Priority Research Area	Expected Outcome for National Development	Justification
2. Infectious Diseases and Antimicrobial Resistance (AMR) • Develop Early Detection & Diagnostics for ***Leptospirosis, Dengue, Chikungunya, HIV/STDs.*** • Conduct efficacy studies on vaccine for *Leptospirosis, Rabies* – Implement cattle vaccine trials; improve and evaluate both human and animal vaccination programs. • Implement studies on community-based control Programs for *Dengue, Rabies* – evaluate community-driven vector control and public awareness campaigns. • Research on Surveillance & Monitoring Studies for *HIV/STDs,*	Strengthening infectious disease control through early detection, vaccine trials, AMR stewardship, and integrated surveillance will reduce disease burden, prevent outbreaks, and save lives. Improved diagnostic capacity and targeted interventions for dengue, leptospirosis, chikungunya, rabies, TB, HIV/STDs, and AMR will enhance public health preparedness and response. These efforts will minimize economic disruption, protect vulnerable populations, and reduce healthcare costs. Academic–government collaborations will foster innovation and sustainability. Collectively, this will build a resilient health system, improve population health, and support long-term national development and economic stability.	Sri Lanka faces a significant burden from infectious diseases. Dengue affects 20,000–30,000 people annually, with outbreaks occasionally exceeding 100,000 cases. Leptospirosis remains a significant public health threat, especially during the monsoon season. Chikungunya is underreported due to limited diagnostics. Tuberculosis continues to impact 4,000–6,000 people annually, while HIV/STDs require sustained surveillance and intervention. Rabies remains endemic, with human deaths reported each year despite post-exposure interventions. Antimicrobial resistance (AMR) is escalating, contributing to over 2,300 deaths in 2019. Strengthening early detection, vaccine trials, AMR stewardship, and integrated surveillance through academic–government collaboration is essential to reduce disease burden and advance national health and development goals.

Chikungunya, AMR – Enhance surveillance systems; reduce data bias; monitor resistance trends and high-risk populations. • Undertake Health Systems & Policy Research Projects for *AMR, HIV/STDs, and other diseases* – Study stewardship practices and barriers; promote academic–Ministry of Health partnerships. • Execute Zoonotic & Vector Control Programs for *Leptospirosis, Dengue, Rabies* – Focus on animal reservoir management, integrated mosquito control, and dog vaccination initiatives.		

Priority Research Area	Expected Outcome for National Development	Justification
3. Mental Well-being and Adolescent Health • Study to assess the effectiveness of integrating life-course mental health strategies (e.g., mindfulness, peer support) into primary-level NCD care. • Assess the impact of specialized mental health training for community health nurses on service access, stigma reduction, and patient outcomes in Sri Lanka. • Evaluate mobile and online platforms for youth suicide prevention and mental health promotion. • Compare the effectiveness of peer-led comprehensive sexuality education (CSE), abstinence-only, and digital approaches on	Improved mental health and adolescent well-being will lead to reduced suicide rates, deliberate self-harm, and early pregnancies. Strengthening life skills and expanding access to care will enhance school retention, improve educational outcomes, and prepare a more capable future workforce. Integrating mental and reproductive health services will lower long-term healthcare costs, improve NCD management, and bolster community resilience. Collectively, these efforts will cultivate healthier, more productive citizens, fostering a stronger, more equitable Sri Lankan society.	Sri Lanka is experiencing a growing burden of mental health disorders and adolescent health challenges, posing a critical public health concern. Suicide is among the leading causes of death in the country, with a rate of 14.6 per 100,000 (WHO, 2019), disproportionately affecting young people. High rates of deliberate self-harm (DSH) and teenage pregnancy reflect inadequate access to mental health care, reproductive health education, and timely support services. These issues are further intensified by socio-economic pressures, academic stress, stigma**,** and weak support systems at school and community levels. Mental health and adolescent well-being are foundational to individual success and national development. Poor mental health impairs academic performance, increases the risk of chronic diseases, and limits economic participation. Adolescent health outcomes directly influence adult productivity, reproductive health, and intergenerational health equity. By prioritizing mental and adolescent health through early, evidence-based interventions, Sri Lanka can improve educational outcomes, reduce long-term healthcare costs, and foster a healthier, more resilient population equipped to contribute to national progress.

adolescent reproductive outcomes. • Develop and evaluate digital platforms for mental and reproductive health education. • Assess integration of life skills programs into curricula to enhance emotional resilience and decision-making.		

Priority Research Area	Expected Outcome for National Development	Justification
4. Integrated digital health • Develop and evaluate integrated patient record systems linking mental, physical (NCDs with locally validated risk calculators, communicable diseases), and reproductive health data across public and private providers. • Develop national real-time dashboards combining epidemiologic, demographic, and service utilization data to guide public health responses beyond mental health. • Studies on localizing and piloting mobile applications for chronic NCDs (e.g., diabetes, hypertension), infectious diseases (e.g., dengue alerts), medication	Sri Lanka's integrated digital health initiative will enable coordinated care by linking mental, physical, and reproductive health records across public and private sectors. Real-time dashboards will strengthen outbreak detection and inform evidence-based policymaking. Mobile applications will support chronic disease management and medication adherence, while teleconsultation and remote monitoring will expand specialist access in rural areas. Digital outreach, including SMS campaigns, will improve health literacy, boost vaccination coverage, and enhance emergency preparedness. Together, these measures will increase health system efficiency, reduce disparities, strengthen the workforce, and position Sri Lanka as a regional leader in advancing universal health coverage and sustainable development.	Sri Lanka has initiated a comprehensive effort to integrate digital solutions into its mental health and broader health services, recognizing the potential of technology to improve access, coordination, and outcomes. The country's Digital Health Blueprint provides a strategic framework for developing an interoperable ecosystem, including electronic health records, a national digital transaction platform, and digital prescription services. These initiatives are aligned with national health priorities, aiming to enhance service delivery, strengthen monitoring systems, and enable data-driven decision-making across the health sector. This approach supports more efficient, equitable, and responsive healthcare for all citizens.

adherence, and lifestyle management. • Assess models for expanding teleconsultation, remote monitoring (e.g., heart failure, asthma), and specialist access in rural and underserved areas. • Evaluate the effectiveness of SMS campaigns, mobile apps, and digital portals in improving vaccination uptake, reproductive health outcomes, pandemic preparedness, and disaster health communication		

Priority Research Area	Expected Outcome for National Development	Justification
5. Trauma Care, Occupational Health, and Road Safety. • Studies on the effectiveness of risk assessment scores, frameworks, and evidence-based hazard control tools adapted to Sri Lanka's industrial sectors. • Studies on health and environmental risk factors (e.g., fatigue, substance use, inadequate infrastructure) using mixed-methods approaches, and evaluation of low-cost interventions such as road design improvements and public awareness campaigns. • Implementation studies on providing on-site or linked occupational	Enhanced occupational health and road safety will reduce injury-related deaths and disabilities, ease the burden on health services, and protect household income. Safer roads and workplaces will create a healthier, more secure workforce, increasing productivity, lowering compensation costs, and improving economic performance. Implementing national protocols for injury management, road traffic injury prevention strategies, and widespread workplace safety measures will strengthen labor systems, improve transport safety, and promote more equitable health outcomes. Together, these efforts will advance sustainable development, bolster economic resilience, and support Sri Lanka's long-term health and social well-being.	Occupational injuries and road traffic crashes (RTCs) are among the leading causes of preventable death and disability in Sri Lanka, claiming over 3,000 lives annually and leaving thousands more with long-term impairments, many sustained during work-related activities. These incidents generate substantial economic and social costs through lost productivity, elevated healthcare expenditure, and ongoing disability compensation. The lack of standardized workplace safety protocols, inadequate access to occupational health services, and weak coordination between peripheral and central trauma care systems exacerbate the problem. Addressing these gaps is critical to protecting workers, preventing avoidable deaths and disabilities, and driving inclusive national development. Strengthening enforcement of safety regulations, enhancing emergency response systems, and expanding occupational health coverage will help build a healthier, more resilient workforce. Strategic, evidence-based interventions are essential to reduce the strain on health services and prevent families from falling into poverty due to injury-related income loss.

health professionals, particularly in high-risk sectors, to reduce response times and improve early intervention. • Big data analysis studies on developing triage and referral protocols, using past CT imaging data and long-term patient outcomes to guide transfers from peripheral to tertiary hospitals. • Studies on road safety encompass prevention, pre-hospital care, hospital-based management, and rehabilitation.		

Priority Research Area	Expected Outcome for National Development	Justification
6. Maternal, Child, and Nutrition Health • Evaluation of the bioavailability, feasibility, and acceptability of incorporating locally available nutrient-rich food sources into community diets to combat iron deficiency anemia and improve micronutrient status. • Assessment of the impact of targeted school-based interventions—such as intermittent iron supplementation, feasibility of school-level egg banks, and nutrition education—on malnutrition indicators and academic performance, using cluster randomized controlled trials. • Investigation into integrated models that	Strengthening maternal, child, and nutritional health will improve birth outcomes, reduce child stunting and anemia, and increase school retention and academic performance. These gains will foster a healthier, more productive population, ease the burden on healthcare systems, and drive long-term economic growth. Implementing evidence-based nutrition and maternal–child health programs will ensure equitable access to quality care and build resilient human capital, directly advancing Sri Lanka's national prosperity, social equity, and sustainable development goals.	Sri Lanka faces a triple burden of malnutrition: persistent undernutrition, widespread micronutrient deficiencies, particularly iron deficiency anemia, and rising rates of overweight and obesity. National surveys consistently report high levels of stunting and anemia among women and children, while the recent economic crisis has intensified food insecurity and deepened maternal and child nutritional vulnerability. Maternal mortality remains at 29 per 100,000 live births, and significant neonatal disparities persist. Malnutrition in all its forms impairs child growth, cognitive development, and educational attainment, while increasing susceptibility to infections and non-communicable diseases. These effects reduce adult productivity and place substantial strain on healthcare systems. Strengthening maternal and child health (MCH) and nutrition is critical to building resilient human capital, ensuring workforce readiness, and driving sustainable economic growth in Sri Lanka.

combine maternal nutrition support, mental health services, and antenatal care delivery at the primary health care (PHC) level. • Analysis of the effectiveness of perinatal and antenatal care tracking technologies in improving service delivery, follow-up, and continuity of care in rural and underserved areas.		
7. Traditional Medicine • Evaluate and standardize herbal products through preclinical and clinical studies to assess safety, efficacy, dosing, and bioavailability, developing export-ready, evidence-based wellness and therapeutic formulations. • Innovate herbal product development for global markets through	Positioning traditional medicine as a research and innovation frontier will expand access to safe, validated, and affordable health solutions, promote self-care and preventive health practices, and generate new export revenue through high-quality herbal products. A strengthened R&D ecosystem will boost Sri Lanka's global competitiveness in Ayurveda and other traditional systems, foster robust academic–industry partnerships, and safeguard indigenous knowledge. These advances will drive sustainable health and economic and cultural development, contributing to national prosperity and international recognition.	The global herbal medicine market, valued at USD 233 billion in 2024, is projected to reach USD 437 billion by 2032, driven by increasing consumer demand for natural health solutions, preventive care, and plant-based wellness products. Sri Lanka's rich heritage in Ayurveda and traditional medicine offers a unique competitive advantage, yet its potential remains underutilized in healthcare delivery and international trade. With growing awareness of the side effects of synthetic drugs and an aging global population seeking alternatives for managing chronic and lifestyle-related diseases, scientifically validated herbal products present a significant leadership opportunity. Integrating traditional knowledge with modern pharmacological research, including WHO-compliant clinical trials, can

multidisciplinary collaborations among academia, industry, and traditional healers, leveraging modern extraction and formulation technologies, and aligning with clean-label and evolving global consumer trends. • Develop a Traditional Knowledge Digital Library (TKDL–Sri Lanka Model) to digitally document validated traditional medicinal practices and herbal uses, integrate with global intellectual property frameworks to protect indigenous knowledge, and serve as a national resource for researchers, regulators, and industry. • Conduct collaborative clinical trials evaluating traditional medicine as a complementary therapy		enhance Sri Lankan herbal products' quality, safety, and global credibility. Establishing a national framework to support innovation, research, and global-standard product development will deliver substantial health benefits while generating sustainable economic growth and export revenue.

for NCD management (e.g., diabetes, obesity, cardiovascular disease) and develop safe, evidence-based nutraceuticals and herbal supplements, including studies on integrating traditional medicine in health tourism. • Research on capacity building and infrastructure to strengthen Ayurvedic and traditional medicine research institutions, supporting joint studies to evaluate herbal pharmacology using biomarkers, in vitro methods, and animal models, and contributing to Ayurveda Pharmacopoeia development aligned with global standards.		

8. Environment, Climate, and One Health. • Feasibility study for a national / regional One Health research center, promoting collaboration across sectors and borders (e.g., SAARC, ASEAN) to address zoonoses, AMR, environmental degradation, and food safety. • Longitudinal study using national health and climate data (temperature, rainfall, extreme weather) to examine trends in respiratory diseases, cardiovascular events, CKD, and other climate-sensitive NCDs across regions. • Ecosystem-based monitoring for	Implementing an integrated Environment and One Health agenda will strengthen health system resilience, reduce the risk of disease outbreaks, and improve preparedness for climate-related health threats. Establishing a national One Health hub will position Sri Lanka as a regional leader in climate–health research, foster international partnerships, and drive evidence-based policy innovation. These initiatives will protect vulnerable communities, ensure sustainable food and water systems, and advance progress toward the Sustainable Development Goals (SDGs) in health, environment, and climate action. This approach will promote a healthier population, a more stable economy, and long-term ecological and health security.	Sri Lanka faces growing health risks from environmental degradation and climate change, which drive disease patterns shifts, increase the incidence of vector-borne, water-borne, and heat-related illnesses, and threaten food security, air quality, and access to safe water. Chronic Kidney Disease of Unknown Etiology (CKDu) has emerged as a major public health concern, particularly in agricultural communities, with evidence suggesting links to environmental exposures, water quality, and occupational hazards. These challenges are intensified by extreme weather events, biodiversity loss, and ecosystem disruption, factors that disproportionately affect low-income and marginalized populations. Climate change acts as a multiplier, worsening the burden of non-communicable diseases, infectious diseases, malnutrition, and mental health conditions. Implementing an integrated Environment and One Health agenda will address the interconnections between human, animal, and environmental health, strengthen system-wide resilience, and enable early detection and control of emerging threats. Establishing a national One Health hub will foster international collaboration, advance climate–health research, and drive evidence-based policy innovation. These coordinated, multidisciplinary strategies are essential to protect vulnerable communities, safeguard sustainable food and water systems, and ensure long-term ecological, health, and economic security.

emerging zoonotic infections in wildlife and livestock, with implications for early warning systems. • Metagenomic studies on gut and soil microbiomes in vulnerable and indigenous populations to explore the health impact of ecosystem changes and potential mitigation strategies.		
9. Oral Health • Development and evaluation of early detection tools for oral cancer and oral potentially malignant disorders (OPMDs) at the primary care level, including identification of molecular risk markers, community-based screening models, cessation strategies for tobacco, betel, and	Strengthening oral health research and innovation will enhance early detection, prevention, and management of oral diseases across all age groups, reducing healthcare costs, improving quality of life, and boosting productivity. Integrating oral health into primary care, NCD management, maternal–child health, and eldercare systems will promote equitable access and sustainable health outcomes. Positioning Sri Lanka as a regional leader in oral health research will foster academic excellence, attract international collaboration, and build long-term resilience within the national health system.	Oral health is a critical yet often under-recognized determinant of overall health and quality of life. In Sri Lanka, oral diseases remain highly prevalent, leading to pain, tooth loss, poor nutrition, systemic health complications, school absenteeism, and reduced workforce productivity. The economic burden of managing late-stage conditions, such as oral cancer, dental caries, periodontal disease, and trauma, is considerable, placing strain on individuals, families, and the healthcare system. Vulnerable groups, including children, older people, and low-income communities, bear a disproportionate share of this burden. Strategic investment in research and development (R&D) is essential to produce evidence-

alcohol use, and strengthening of oral cancer registries. Assessment of the feasibility and clinical effectiveness of integrating these approaches into NCD management programs. • Design and implementation of preventive strategies for caregivers and children, including fluoride-based interventions, nutrition-driven behavioral approaches, and caries risk prediction models integrated into maternal and child health services. • Assessment and analysis of the national prevalence and risk factors for periodontal disease, development of low-cost early diagnostic tools, and investigation into its links with diabetes, cardiovascular		based, culturally appropriate, and cost-effective oral health solutions that align with national health priorities and international best practices, ultimately reducing disease prevalence and improving population well-being.

disease, and pregnancy outcomes, alongside integration of periodontal care into NCD programs. • Mapping and evaluation of regional trauma patterns, emergency response and referral systems, surgical outcomes, and rehabilitation effectiveness, coupled with design of preventive strategies for high-risk populations. • Mapping and optimization of oral health service access for older adults, development of community-based care models, enhancement of caregiver training, innovation of age-appropriate dental technologies, and integration of oral health into national eldercare policies.		

Priority Research Area	Expected Outcome for National Development	Justification
10. Disaster and Emergency Health Research • Investigation into the frequency, impact, and geographic distribution of common disasters to identify high-risk zones and vulnerable populations in Sri Lanka. • Evaluation of the effectiveness, coordination, and operational gaps in Sri Lanka's current emergency medical response systems. • Assessment of the feasibility of adopting and adapting international disaster medical models, such as Japan's DMAT, to strengthen the existing health system. • Development and testing of standardized training programs and simulation-based	Advancing disaster medicine research and preparedness will strengthen Sri Lanka's capacity to reduce disaster-related mortality and morbidity, improve the speed and efficiency of emergency responses, and limit economic and social disruptions. Establishing a nationally integrated disaster medicine framework will foster resilient communities, protect public health infrastructure, and position Sri Lanka as a regional leader in disaster preparedness. These efforts will contribute to sustainable development, national security, and long-term social and economic stability.	Sri Lanka is highly vulnerable to natural and artificial disasters, including floods, landslides, droughts, cyclones, and industrial accidents. Between 1990 and 2019, the country experienced 241 disasters, affecting 13.4 million people and causing estimated annual economic losses of USD 500 million. Climate change, rapid urbanization, and geographic factors further increase the frequency and severity of such events, underscoring the urgent need for a robust disaster medicine system. Global evidence indicates that effective disaster medical preparedness can reduce mortality by 20–50% and shorten emergency response times by 30–40%, significantly improving survival rates and recovery outcomes. Strategic investment in disaster medicine will save lives, protect infrastructure, sustain economic productivity, and enhance national resilience while contributing to Sri Lanka's commitments under the Sustainable Development Goals.

capacity-building approaches for disaster preparedness in healthcare. • Design and analysis of strategies to integrate disaster medicine into national public health systems through cross-sectoral collaboration and early warning mechanisms.		

2.9 MINISTRY OF INDUSTRY AND ENTREPRENEURSHIP DEVELOPMENT

- **Members of the Ad-hoc Committee**

Team Leaders	Prof. G.W.A. Rohan Fernando, Chairman of National Science and Technology Commission (NASTEC), Chairman, Gem and Jewellery Research and Training Institute (GJRTI) and Senior Professor, The Open University of Sri Lanka Prof. Gamini Rajapakshe, Senior Professor, University of Peradeniya
Members	Mr. Chathuranga Abeysinghe, Deputy Minister, Industry and Entrepreneurship Development Prof. O.A. Ileperuma, Emeritus Professor, University of Peradeniya Dr. D. Ananda Karunaratne, Former Vice Chancellor, Rajarata University of Sri Lanka Dr. Anura Dissanayake, CEO, International Institute for Development Transformation (IIDT) and former Head of Advisory Services Department, Rubber Research Institute (Eng) Dr. Sisira Ranatunga, Chairman, Sri Lanka State Plantations Corporation Dr. Prasad Jayathurathnage, Senior Research Engineer, Danfoss Drives, Finland Mr. Suranga Chanaka Kumara, Representative for the Ministry of Industry and Entrepreneurship Development Mr. Hemantha Perera, Executive Committee Member – National Chamber of Commerce (NCC), Managing Director, Sarasavi Industries (Pvt) Ltd., Pannipitiya

- **Core Areas**:

1. Mineral-Based Value Addition
2. Functional Food Products and Agri-Biotechnology
3. Food safety
4. Biobased Products
5. Bio-fertilizers and Biopesticides
6. Waste Recycling and Reuse
7. Green Hydrogen & Renewable Energy Technologies
8. Electronics & IoT Device Manufacturing
9. Additive Manufacturing (3D-Printing) Industry
10. Pharmaceutical Research & Vaccine Production
11. Advanced Robotics & Automation

➢ **Recommendations**

Priority Research Area	Expected Outcomes for National Development	Justification
1. Mineral-Based Value Addition		
Eppawala Apatite Deposit	• Promoting the sustainable production of phosphate fertilisers (such as Single Superphosphate and Triple Superphosphate) using Eppawala apatite, with the aim of reducing reliance on imported phosphorus-based fertilisers and enhancing national food security. • Development of High-Purity Phosphoric Acid suitable for industrial use and as a precursor for $LiFePO_4$ and $NaFePO_4$ cathode materials in lithium-ion and sodium-ion batteries, promoting green energy storage.	Sri Lanka's Eppawala apatite deposit, one of the highest-grade phosphate reserves in South Asia, remains vastly underutilised. Furthermore, producing high-purity phosphoric acid from Eppawala apatite opens avenues for advanced battery applications, such as $LiFePO_4$ and $NaFePO_4$ cathode materials. This supports the transition to green energy technologies, while stimulating industrial growth, research collaboration, and skilled employment.
Sri Lankan Graphite	• Increased Export Value through the development of high-value graphite-derived products such as expanded graphite, graphene, and composite materials for industrial applications. • Import Substitution for products such as oil absorbents, conductive fillers, battery-grade materials, and thermal management systems.	Sri Lanka is home to some of the world's highest-purity vein graphite, yet it is predominantly exported in raw form with minimal value addition. Prioritising research and innovation in advanced graphite processing—such as for lithium-ion and sodium-ion batteries, supercapacitors, thermal management systems, and oil spill recovery materials—will enable the development of high-tech industries rooted in local resources. This strategic shift will reduce dependence on costly imports, increase foreign exchange earnings through value-added exports, and foster technology-based entrepreneurship. By promoting science-led localisation, this initiative will strengthen industrial self-reliance, create skilled employment, and enhance the nation's economic and technological resilience.

Priority Research Area	Expected Outcomes for National Development	Justification
Zircon and Its Derivatives: A Strategic Resource for Advanced Industrial Applications	• Sri Lanka's zircon-rich mineral sands represent an underutilised strategic resource with significant potential for industrial value addition. • Local conversion of zircon ($ZrSiO_4$) into zirconia (ZrO_2) will enable the production of advanced ceramics, fuel cells, refractories, and biomedical implants. • Transformation of zirconia into cubic zirconia (American diamond) creates opportunities in the synthetic gemstone industry, enhancing export value in the gem and jewellery sector. • Synthesis of zirconium diboride (ZrB_2) will enable Sri Lanka to enter ultra-high-temperature applications in aerospace, nuclear, and defence technologies.	Recently, zirconia has become a new mobile phone body material, backplane and fingerprint identification cover. Our recent investigations revealed that high-quality zirconia (ZrO2) can be locally synthesized at comparatively low cost using raw Zircon sand (ZrSiO4) obtained from Pulmoddai (Patent no. 21467 , 01st November 2022)
Precipitated Calcium Carbonate (PCC) and Magnesium oxide: High-Value Applications from Calcite- and Dolomite-Based Resources	• Development of High-Purity $CaCO_3$ and MgO Nanomaterials for use in pharmaceuticals, cosmetics, food additives, paints, and advanced composites. • Reduction in Imports of precipitated calcium carbonate, magnesium oxide, and related filler and coating materials through locally produced substitutes.	One of the most significant applications of value-added carbonate minerals is the production of precipitated calcium carbonate (PCC), a high-demand material across numerous Sri Lankan industries, including paper, plastics, rubber, paints, cosmetics, textiles, pharmaceuticals, and food processing. Currently, local industries rely heavily on imported PCC, incurring substantial expenditure—over half a million tonnes were imported in a single month in 2011 alone. Advancing local PCC production will reduce this dependency. Furthermore, nano-structured $CaCO_3$ and MgO offer immense potential as dual-function drug delivery carriers and

Priority Research Area	Expected Outcomes for National Development	Justification
	• Expansion of Industrial Applications, including use in bioplastics, adhesives, 3D printing materials, and controlled-release fertilisers. • Generation of High-Value Products from widely available raw materials such as calcite and dolomite, particularly in rural and mineral-rich regions	nutrient supplements, particularly in targeted therapies for cancer patients, supporting both therapeutic and nutritional needs.
Advanced Low-Temperature Processing of Ilmenite/Rutile In mineral sands for Titanium Dioxide and Iron Oxide Recovery	• Value Addition to Ilmenite via TiO_2 and Fe_2O_3 Production. Extraction of 100% High-Purity Titanium Dioxide (TiO_2) and Iron Oxide (Fe_2O_3) from locally mined ilmenite using advanced, low-temperature, and environmentally benign processing technologies. Development of Industrial-Grade TiO_2 for key applications in paints, pigments, photocatalysis, solar energy, cosmetics, and electronic coatings, reducing import dependence. • Production of High-Quality Fe_2O_3 for use in ceramic pigments, catalysts, magnetic materials, water treatment, and construction products. • Production of zerovalent iron and its stabilization using suitable coatings	Ilmenite, one of Sri Lanka's most abundant mineral resources, offers immense potential for value addition through the production of phase-specific titanium dioxide (TiO_2) and iron oxide (Fe_2O_3). Our team has developed a low-temperature, environmentally friendly process for selectively extracting and converting ilmenite into high-purity rutile, anatase, or brookite TiO_2, as well as α-Fe_2O_3, suitable for industrial and technological applications. This process has already secured under a WIPO international patent, with two national (NIPO) patents are under evaluation. The technology significantly reduces environmental impact, enhances product purity, and supports import substitution, export growth, and the establishment of a local TiO_2-based materials industry.

Priority Research Area	Expected Outcomes for National Development	Justification
Recovery of Rare Earth Elements (REEs) from Monazite: Strategic Resource Development for Advanced Technologies	• Establishment of Environmentally Responsible Extraction and Separation Technologies for REEs from Monazite, enabling sustainable resource utilization. • Production of High-Purity Individual REEs, including neodymium, praseodymium, samarium, and gadolinium, to support high-tech industries. • Development of Indigenous Supply Chains for critical REEs used in electric vehicles, wind turbines, permanent magnets, lasers, medical diagnostics, and defense applications. • Import Substitution for strategic elements, reducing reliance on foreign sources and enhancing national security. • Upgrading of Low-Value Gem Materials, such as geuda and other inferior-quality corundum, into high-value blue sapphires through scientifically optimized heat-treatment and diffusion processes. • Development of High-Precision Jewellery Manufacturing Technologies, including CAD/CAM, micro-setting, and laser finishing, enabling export-quality production with minimal wastage.	Sri Lankan monazite, primarily found in coastal placer deposits, contains significant concentrations of rare earth elements (REEs) including cerium (~45%), lanthanum (~25%), neodymium (~15%), praseodymium (~5%), and trace amounts of samarium, gadolinium, and dysprosium. These REEs are essential for modern technologies such as permanent magnets, electric vehicles, wind turbines, lasers, and medical imaging. At present, Sri Lanka exports monazite-rich mineral sands without value addition. Prioritising research into environmentally sound extraction and selective separation techniques will enable the country to build strategic REE supply chains, support high-tech industrialisation, reduce import dependency, and increase export revenue through advanced material production. Sri Lanka, renowned for its rich gem deposits, still exports a large volume of low-value gemstones such as geuda, which can be transformed into high-value blue sapphires through controlled heat-treatment and diffusion techniques. Precision jewellery manufacturing using CAD/CAM and micro-setting technologies, Sri Lanka can shift from traditional craftsmanship to high-tech, branded exports. This approach enhances export revenue, promotes import substitution, fosters SME growth, and secures Sri Lanka's place in the ethical and traceable gem supply chain.

2. Functional Food Products and Agri-Biotechnology		
Priority Research Area	**Expected Outcome for National Development**	**Justification**
Advanced Food Processing and Functional Foods	Development of High-Value Functional Foods and Nutraceuticals incorporating local bio-resources with proven health benefits (e.g., antioxidant-rich fruits, medicinal herbs, marine extracts). Reduction of Post-Harvest Losses through the adoption of advanced preservation and processing technologies such as freeze-drying, nanoencapsulation, and vacuum infusion.	Investing in R&D for novel food preservation, fortification, and functional food development offers a transformative path for Sri Lanka's agro-industrial sector. Advanced processing technologies can significantly reduce post-harvest losses while enabling the production of value-added, health-enhancing exports. For example, studies have demonstrated that kithul (palm) flour can enrich yoghurts, porridges, and snacks, producing functional foods with export potential. Such innovations elevate local crops into premium products, improve national nutrition, and reduce dependency on imported processed foods and supplements. This research will position Sri Lanka as a competitive supplier of specialty and nutraceutical food products in the global wellness market.
Climate-Resilient Crop Breeding & Agri-Biotech	• Development of Climate-Resilient Crop Varieties with enhanced tolerance to drought, salinity, floods, pests, and temperature extremes. • Application of Modern Breeding Tools, including marker-assisted selection, CRISPR-based gene editing, and genomic prediction for accelerated varietal development. • Enhancement of Nutritional Profiles (biofortification) to address malnutrition and support public health.Strengthening of Seed Systems to ensure the availability of certified, stress-tolerant seeds to farmers.	Climate change poses a serious threat to Sri Lanka's agriculture, with rising temperatures, erratic rainfall, and increased salinity impacting crop yields. Investing in climate-resilient crop breeding and agri-biotechnology is essential to ensure food security, farmer resilience, and agricultural sustainability. By applying modern breeding techniques such as genome editing, marker-assisted selection, and molecular diagnostics, Sri Lanka can rapidly develop crops adapted to local agro-ecological stressors. Nutritionally enhanced and pest-tolerant varieties will reduce reliance on chemical inputs, support organic agriculture, and open export opportunities. A strong R&D foundation in agri-biotech will future-proof national agriculture and contribute to climate adaptation goals.

3. Food safety		
Priority Research Area	**Expected Outcome for National Development**	**Justification**
Managing food contaminants/hazards along the food chain, preventing adulterants, and ensuring public health	• Improved public health through reduced exposure to foodborne contaminants and adulterants. • Strengthened national food safety regulations and evidence-based policymaking. • Enhanced food industry practices through better contamination control and quality assurance. • Increased consumer confidence in locally produced and imported food products. • Reduced healthcare costs associated with foodborne illnesses and chronic exposure to contaminants. • Support for sustainable agriculture and food systems through safer inputs and practices. • Boosted export potential by aligning with international food safety standards. • Capacity building and awareness among food handlers, producers, and regulatory bodies. • Development of rapid detection methods for food hazards and adulterants. • Promotion of interdisciplinary collaboration between health, agriculture, and food sectors.	This research is crucial to safeguard public health in Sri Lanka by addressing food safety challenges. Contaminants, adulterants, and hazards in the food chain pose significant health risks and economic burdens. Strengthening monitoring, regulation, and risk management through targeted research will help reduce exposure to harmful substances, improve consumer confidence, and support national food security.

4. Bio-based Products		
Biodegradable Plant-Based Packaging Materials e.g., plates, food containers, protective packaging	• Establishment of a Sustainable, Bio-Based Packaging Industry utilising local agricultural by-products such as banana fibre, rice husk, sugarcane bagasse, and areca sheath, reducing reliance on synthetic plastics. • Reduction in Plastic Imports and Non-Biodegradable Waste, supporting the national circular economy and environmental goals. Development of Biodegradable Packaging Products, including plates, food containers, trays, and protective packaging for consumer goods, retail, and food sectors. • Creation of New Export-Oriented Product Lines, meeting the growing global demand for eco-friendly, compostable packaging. • Support for Agro-Based SMEs and Rural Entrepreneurship, promoting value addition at the farm level. • Compliance with International Environmental Standards, facilitating access to regulated green markets. • Job Creation and Skills Development in bio-material engineering, sustainable manufacturing, and packaging innovation. • Promotion of Public-Private-Academic Collaborations to scale up R&D and technology transfer in biodegradable material science.	Recent research has shown that coconut coir fibres can be transformed into cellulose-based biopolymers for tableware and protective packaging, exhibiting mechanical properties comparable to polystyrene. These coir-derived bioplastics are biodegradable, as confirmed by soil burial tests, offering a sustainable alternative to harmful single-use plastics. This demonstrates the feasibility of producing high-value, export-ready packaging from abundant local resources. Additionally, Sri Lankan innovators have developed plant-fibre-based shoes, hats, and car components, showcasing the potential of biodegradable materials beyond packaging. Investing in this area will curb plastic pollution, reduce imports, and establish Sri Lanka as a supplier of eco-friendly materials to global markets.

Rubber products into nano-particles and nano-composites	• Development of High-Value Rubber-Based Nanocomposites with enhanced mechanical, thermal, and barrier properties for use in automotive, construction, electronics, healthcare, and defense sectors. • Conversion of Natural Rubber and Waste Rubber into nanoparticles and nano-reinforced materials, enabling waste valorisation and circular economy applications. • Reduction in Raw Material Imports by producing advanced functional materials locally for industrial applications. • Strengthening Sri Lanka's Rubber Industry through integration of nanotechnology, promoting competitiveness and innovation. • Export Diversification via advanced rubber-based products targeting high-performance markets.	Transforming Sri Lanka's natural and waste rubber into nanoparticles and high-performance nanocomposites represents a major leap in industrial value addition. Nanostructured rubber materials offer superior mechanical strength, thermal stability, and chemical resistance, making them ideal for use in tyres, vibration isolators, flexible electronics, and biomedical devices. This approach not only enhances the global competitiveness of Sri Lanka's rubber industry, but also promotes waste rubber recycling, supporting circular economy goals. By developing local expertise in nanocomposite formulation, the country can reduce dependency on imported additives and polymers, increase export revenue, and create skilled employment in advanced materials science and smart manufacturing.
Yarn manufacturing from banana and other plant-based fibres	• Establishment of a Sustainable Natural Fibre Industry based on locally available plant sources such as banana fibre, hemp, jute, pineapple leaf fibre, and coconut husk, reducing dependency on imported synthetic fibres. • Development of High-Strength, Eco-Friendly Yarn suitable for textile and	Sri Lanka possesses abundant underutilised plant-based fibres such as banana pseudo-stems, pineapple leaves, and coconut husks, which can be converted into high-strength, biodegradable yarns for textile and garment manufacturing. These natural fibres offer a sustainable alternative to synthetic textiles, reducing plastic microfibre pollution and import dependence. Recent innovations have demonstrated that banana fibre yarn is suitable for producing durable fabrics

	garment manufacturing, including woven fabrics, fashionwear, and functional clothing. • Support for Green Certification and Export Competitiveness through adoption of environmentally friendly and traceable fibre sources.	for clothing, home textiles, and eco-footwear. Investing in yarn production from agro-waste will foster rural entrepreneurship, support green apparel exports, and align with global demand for eco-textiles. This initiative strengthens the local textile value chain and promotes climate-resilient, circular industry models.
Extracting amorphous silica nanoparticles from rice husk and applications of amorphous silica nanoparticles	• Establishment of Scalable Technologies for extracting high-purity amorphous silica nanoparticles from rice husk, an abundant agro-waste by-product in Sri Lanka.	Rice husk, an abundant agro-waste in Sri Lanka, contains over 15% silica by weight, offering immense potential for the production of high-purity amorphous silica nanoparticles. By developing clean, scalable extraction methods, this waste stream can be converted into a high-value industrial nanomaterial. Amorphous silica has wide-ranging applications in rubber, plastics, coatings, construction, pharmaceuticals, and environmental remediation. Importantly, this innovation supports waste valorisation, reduces reliance on imported silica-based additives, and contributes to green, resource-efficient manufacturing. It also enables the development of exportable nanomaterials and promotes rural industrialisation, aligning with national goals in sustainability, circular economy, and materials innovation.
5. Bio-fertilizers and Biopesticides		
Bio-fertilizers and Biopesticides	• Promotion of Sustainable and Climate-Resilient Agriculture by replacing or reducing chemical fertilizer and synthetic pesticides with environmentally friendly bio-inputs. • Significant Reduction in Agrochemical Imports, lowering foreign exchange	Developing biofertilisers (microbe-based soil enhancers) and natural biopesticides will support Sri Lanka's transition to eco-friendly and sustainable agriculture, while significantly reducing reliance on imported agrochemicals. Sri Lankan scientists have pioneered a biofilm biofertiliser capable of replacing 50% of chemical fertiliser in rice cultivation, while increasing yields by 24%. Scaling up such innovations—

	expenditure and dependency on volatile global supply chains. • Improvement of Soil Health and Biodiversity through enhanced microbial activity, reduced chemical residues, and restoration of soil organic matter. • Development of Locally Adapted, Cost-Effective Biofertilisers and Biopesticides using indigenous microbial strains, plant extracts, and agro-waste derivatives.	along with plant-extract-based biopesticides and the use of beneficial insects—will improve soil health, farmer safety, and environmental quality. This approach aligns with global organic farming trends, reduces pollution, promotes export-quality agri-products, and conserves foreign exchange, all while safeguarding national food security and productivity.
6. Waste Recycling and Reuse		
E-Waste Recycling & Urban Mining	• Recovery of Valuable and Critical Raw Materials such as gold, silver, copper, palladium, and rare earth elements from discarded electronic devices. • Reduction of E-Waste in Landfills, minimising environmental and human health hazards from heavy metals and toxic components. • Establishment of Local E-Waste Recycling Facilities with advanced material separation, pyrolysis, and hydrometallurgical capabilities. • Import Substitution of critical materials used in electronics, batteries, and green technologies.	E-waste is one of the fastest-growing waste streams globally, yet much of it in Sri Lanka ends up in landfills or informal sectors, causing severe environmental pollution. Urban mining—the process of extracting valuable materials from discarded electronics—offers a sustainable solution. Devices such as mobile phones, computers, and batteries contain recoverable gold, silver, copper, and rare earths. Developing scientifically managed e-waste recycling systems will enable resource recovery, pollution reduction, and import substitution of critical raw materials. This initiative supports the circular economy, green job creation, and net-zero emissions targets, while aligning global sustainability commitments and responsible consumption practices.

7. Green Energy		
Green Hydrogen & Renewable Energy Technologies	• Establishment of Green Hydrogen Production Capacity using renewable energy sources such as solar, wind, and hydropower via electrolysis. • Import Substitution of Fossil Fuels through locally produced hydrogen for energy, transport, fertiliser, and industrial use. • Integration of Renewable Energy Technologies such as solar PV, wind turbines, energy storage systems, and smart grids. • Development of Hydrogen Storage, Transport, and Conversion Technologies, enabling a full hydrogen value chain. • Reduction in Greenhouse Gas Emissions, supporting Sri Lanka's national climate commitments and carbon neutrality targets. • Creation of High-Tech Green Jobs in hydrogen, renewables, and grid integration. • Energy Security and Price Stability, reducing dependence on imported fossil fuels and exposure to global price shocks.	Investing in green hydrogen production and renewable energy R&D will position Sri Lanka at the forefront of next-generation energy systems. With abundant sunlight and wind, the country can explore efficient solar-powered electrolysis to produce hydrogen as a clean, exportable fuel. This aligns with emerging global priorities to combine solar energy with hydrogen generation. In parallel, research into offshore wind turbines, wave energy converters, and high-efficiency solar PV will enhance energy self-sufficiency. Sri Lanka can also collaborate with Greenstat Hydrogen Lanka, established by a Norwegian company, to accelerate innovation. Mastery of these technologies supports exports, green jobs, and the 70% renewable electricity target.
8. Electronics & IoT		

Electronics & IoT Device Manufacturing	• Establishment of Local Manufacturing Capacity for electronic components, sensors, and IoT-enabled devices across sectors such as agriculture, healthcare, environment, transport, and industry. • Development of Customisable, Low-Cost IoT Solutions tailored to national needs (e.g., smart agriculture, air quality monitoring, water management, and predictive maintenance). • Promotion of Design-to-Product Innovation Ecosystems, linking universities, startups, and industries. • Import Substitution for basic and intermediate electronic components, reducing foreign exchange outflows. • Upskilling of Workforce in embedded systems, PCB design, hardware-software integration, and electronics fabrication. • Acceleration of Digital Transformation in public services and SMEs through locally developed smart solutions. • Support for Export-Oriented Electronics and Device Startups, targeting regional and niche global markets.	Establishing R&D centres for electronics design and IoT device development will capitalise on Sri Lanka's growing pool of engineers and its strategic location. With over 1,000 engineering graduates annually and a tech-savvy workforce, the country is well positioned to become a hub for electronics manufacturing and innovation. By developing niche smart devices for agriculture, smart cities, environmental monitoring, and even custom semiconductor components, Sri Lanka can move up the value chain from basic assembly to original design manufacturing (ODM). This will generate skilled employment, boost high-tech exports beyond the current ~$500 million, and accelerate the digitalisation of domestic industries.

	• Enhances technological self-reliance and builds sovereign digital infrastructure. • Reduces vulnerability to global supply chain disruptions in electronics. • Supports green industrialisation, smart cities, and digital public service delivery. • Promotes STEM education–industry linkages and high-tech entrepreneurship. • Positions Sri Lanka as a regional hub for affordable, application-specific electronics and smart devices.	
9. Additive Manufacturing		
Additive Manufacturing (3D-Printing) Industry	• Development of Custom-Made Prostheses and Biomedical Implants using biocompatible materials such as hydroxyapatite and titania, derived from locally available apatite and ilmenite resources, enabling affordable, patient-specific healthcare solutions. • Production of High-Purity Metal Powders and Nanoparticles (e.g., titanium, aluminium, and nickel alloys) through the FFC Cambridge Process, supporting advanced additive manufacturing applications in aerospace, defense, and medical sectors. • On-Demand Manufacturing of Vehicle Spare Parts and precision parts for scientific and medical instruments,	R&D in additive manufacturing (industrial 3D printing) will enable local production of complex parts and products on demand. This technology can fabricate everything from machine spares to medical implants layer-by-layer, drastically cutting the need to import specialized components. By establishing 3D printing centers, Sri Lanka can support its industries (e.g. printing spare parts for textile machines, automotive components, or even housing materials) with rapid prototyping and low-volume manufacturing. Embracing additive manufacturing also encourages innovation in design, supports SMEs in product development, and positions Sri Lanka in the global trend of distributed, agile production, improving industrial self-sufficiency.

	reducing import dependence and supply chain delays. • Establishment of an Indigenous 3D Printing Ecosystem including design, prototyping, and manufacturing infrastructure. • Import Substitution of orthopaedic implants, industrial tools, and precision components through local 3D printing capacity. • Creation of High-Skilled Employment in materials science, biomedical engineering, and digital fabrication. • Support for SME Growth in decentralised, on-demand manufacturing, especially in rural or underserved regions. • Strengthening of Research-Industry Linkages through application-focused collaborations in advanced manufacturing technologies.	
10. Pharmaceutical Products		
Pharmaceutical Research & Vaccine Production	• Strengthening of National Health Security through the establishment of local capabilities for vaccine development, production, and storage, reducing dependency on imported vaccines. • Manufacture of Indigenous Pharmaceutical Formulations including	Advancing pharmaceutical R&D—from drug formulation to vaccine development—is vital for national health security, import reduction, and export diversification. Sri Lanka currently imports the majority of its essential medicines; establishing research collaborations, pilot-scale production plants, and clinical trial infrastructure for key drugs (e.g. antibiotics, insulin) and vaccines (e.g. dengue, COVID-19) will

	generic drugs, biosimilars, and herbal/natural therapeutics, based on local disease burdens and available bio-resources. Developing organic synthesis to manufacture generic drugs. • Technology Transfer and Licensing Partnerships with global pharmaceutical and biotechnology firms to accelerate local manufacturing capacity. • Establishment of GMP-Compliant Production Facilities for vaccines and essential medicines, aligned with WHO standards. • Import Substitution for a wide range of critical pharmaceuticals, reducing foreign exchange outflows and ensuring supply chain resilience. • Support for Clinical Trials and Regulatory Infrastructure, enabling safe, evidence-based product development. • Skilled Workforce Development in pharmaceutical sciences, biotechnology, and quality control. • Export Potential of selected vaccines and pharmaceuticals to regional markets. • Public-Private-Academic Collaborations for R&D in emerging areas such as mRNA platforms, nanomedicine, and personalised drug delivery systems.	reduce this dependency. By leveraging Sri Lanka's rich biodiversity, modern laboratories can also explore plant-based drug discovery, including potential anti-cancer compounds from endemic species. A robust local pharmaceutical research ecosystem, guided by strong regulatory frameworks, will attract global partnerships, enhance medicine access, and foster a high-value biotech industry for regional markets.

11. Robotics and Automation		
Advanced Robotics & Automation	• Development of Locally Designed and Assembled Robotics Systems for applications in manufacturing, agriculture, healthcare, logistics, and disaster response. • Integration of Automation Technologies into industrial production lines, smart farming systems, and public infrastructure, improving efficiency, safety, and precision. • Import Substitution through the creation of affordable, application-specific robotic solutions tailored to local and regional needs. • Support for SME Modernisation and Productivity Enhancement by introducing cost-effective robotic tools and automated systems. • Creation of High-Skilled Employment in areas such as mechatronics, embedded systems, AI-based control systems, and robot maintenance services. • Encouragement of Tech Start-Ups and Exportable IP in service robots, medical devices, warehouse automation, and educational robotics. • Contribution to National Digital and Smart Industry Strategies, positioning Sri Lanka as a hub for robotics R&D and agile manufacturing.	Advanced robotics and automation are central to the transformation of Sri Lanka's industrial and service sectors. Investing in locally developed robotic systems will enhance productivity, safety, and cost-efficiency in manufacturing, agriculture, logistics, and healthcare. With a growing pool of engineering talent and increasing demand for precision and speed, Sri Lanka can create customised automation solutions for local and regional markets. Promoting R&D in robotics will foster high-tech start-ups, reduce reliance on imported equipment, and generate exportable technologies. This aligns with national goals of digitalisation, smart industry development, and employment generation in emerging technology sectors.

2.10 MINISTRY OF PLANTATION INDUSTRY AND COMMUNITY INFRASTRUCTURE

- **Members of the Ad-hoc Committee**

Team Leaders	Prof. R.S. Dharmakeerthi, Chairman, Sri Lanka Council for Agricultural Research (SLCARP) and Senior Professor, Department of Soil Science, Faculty of Agriculture, University of Peradeniya Dr. (Eng.) Sisira Ranatunga, Chairman, Sri Lanka State Plantations Corporation
Members	Prof. Lakshman Galagedara, Professor/Memorial University of NL, Canada Dr. Anurudda Karunarathna, Senior Lecturer, Department of Agricultural Engineering, Faculty of Agriculture, University of Peradeniya Dr. Keerthi Mohotti, Former Director, Tea Research Institute (TRI) Dr. Susantha Siriwardena, Former Director, Rubber Research Institute (RRISL) Dr. Sanathani Ranasinghe, Former Director, Coconut Research Institute (CRI) Dr. Kumudini Gunasekara, Former Head of the Plant Breeding, Tea Research Institute (TRI) Dr. Aruna Wijesooriya, Former Deputy Director, Sugarcane Research Institute (SRI) Dr. G. G. Jayasinghe, Former Director, Cinnamon Research Institute (CiRI)

- **Core Areas**:
  1. Mechanization of upstream and downstream operations
  2. Climate-resilient plantation technologies
  3. Crop improvement and new clone development
  4. Soil and plant health management
  5. New product development, value addition and quality enhancement
  6. Eco- and worker friendly technologies and operations
  7. Use of data driven and AI tool based systems for decision making
  8. Technology transfer systems and digital transformation
  9. Diversified cropping/agroforestry systems
  10. Waste valorization
  11. Socio economics and business management

➢ **Procedure adopted**

The two team leaders discussed with the volunteers listed from the R & D for Renaissance Era group provided to them. They then identified important plantation crops that were not represented in the list and contacted potential contributors for the assigned task. Even though sugarcane research institutes come under different ministries, the sugarcane industry was included in this document. The group of volunteers then met online to identify the potential broad priority research areas, taking into consideration the major issues in the plantation sector. They identified several key issues that need to be researched and find solutions. They are;

- Low land productivity (poor soil health, planting materials, cropping systems)
- Labor shortage
- High pest and disease incidences
- Less value addition
- Low product quality
- Poor extension service
- Vulnerability to climate change
- Waste disposal
- Lack of land suitability assessment
- Lack of real time updated databases
- Lack of modernization
- Reluctance to digital transformation
- Poor manufacturing practices
- High energy cost
- Inadequate research culture for multidisciplinary research collaboration

The group identified research needs for the above mentioned issues. Team leaders identified expected outcomes and justified the need for the identified broad priority research areas. The draft document was circulated among all members in the group for their inputs for improvements. In the meantime Ministry of Plantation and Community infrastructure (MOPCI) has forwarded priority research areas identified by crop research institutes under the purview of their MOPCI. After several rounds of WhatsApp communications, the improved version was circulated to the group members. Director General -Planning, MOPCI -had helped to organize a meeting with all research institutes and plantations to present our ideas to them and to obtain their feedback as well. The role of science and technology in national development and the new government process for research prioritization for 2026 was presented by the Chairman of NASTEC. The presentation emphasized aligning research and innovation with national priorities to drive economic transformation and sustainable growth. Based on that discussion, improvements to the drafted research priorities were done and the document was finalized. The final version of the document includes the following crops:

➢ **Crops considered:**

Tea, Rubber, Coconut, Sugarcane, Cinnamon, Cashew, Palmira, Kithul

➢ **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1	Mechanization of upstream and downstream operations	• Reduced labor dependency, enhance productivity and cost-effectiveness • Achieved energy efficient operations in the plantation industry	Severe labor shortages in the plantations hamper timely agricultural operations, hence the productivity and production. Mechanization of upstream and downstream operations could reduce the dependency on labor and ensures quality consistency and efficiency. Mechanization could reduce production costs, making Sri Lankan exports competitive in the global market. However, research is also needed to develop energy efficient machineries to ensure our compliance to adopted international protocols
2	Climate-resilient plantation technologies	• Sustained crop yields under changing climate conditions • Achieved saving on climate hazard relief funds	Climate change has created adverse weather patterns in Sri Lanka and threatened the sustainability of plantations. Appropriate technologies have to be developed to ensure climate resilient plantations. Development of novel climate resilient clones, effective climate SMART agronomic operations, new agro-forestry systems …etc. could reduce the vulnerability of the plantations for climate change issues and ensure long-term viability of the industry .
3	Crop improvement and new clone development	• Increased yields, quality, and resilience to pests/diseases and climate change • Increased farmer income	Yields obtained from existing clones under current management practices is low, despite the genetic potential is much higher. While promoting technology adoption at farmer level, it is essential to develop new planting materials capable of achieving higher yields under current crop management practices, with due consideration for G × E interactions. In addition, there is a need for the development of new clones that are early-maturing, disease-resistant, and with improved yield quality parameters. The integration of modern molecular biology and biotechnological tools with traditional breeding methods for

			perennial crops needs to be considered for the efficient development of improved new clones. Efficient and cost-effective plant propagation technologies also has to be developed.
4	Soil and plant health management	• Increased yields and farmer income • Improved input use efficiency and low environmental pollution • Developed optimum land use for plantation crops	It has been reported that about 30 cm of top soil has been eroded during the last 100 or so years in lands under plantation crops. This and other agro-management practices have declined soil fertility. On the other hand, number of new plant diseases have emerged devastating certain plantation crops. Therefore, development of new technologies for improving soil and plant health in plantation crop cultivating lands is a priority. Considering the recent advances in the world, improving different soil organic matter fractions, soil moisture and nutrient availabilities, as well as effective P&D management technologies using more cost effective and eco-friendly technologies is required. In addition an understanding on the degree of variability of different soils, their potential for different crops, P&D incidence mapping and forecasting are also essential to develop site-specific crop management technologies.

No.	Priority Research Area	Expected Outcome for National Development	Justification
5	New product development, value addition and quality enhancement	• Increased export competitiveness through a diverse product range • Achieved access to premium markets and increased export earnings • Generated new employment opportunities • Reduced postharvest losses.	Value addition to plantation crop produce is rather low in Sri Lanka. Ceylon Tea, True Cinnamon, and rubber can earn higher export revenue through product refinement, quality improvements, branding, and targeted value-addition. In addition there is a need for new product development to find new markets as well as to become a more effective market competitor. Development of new products could also reduce the waste generation from the plantation industry. New product development together with value addition could generate new employment opportunities and entrepreneurs.
6	Eco- and worker friendly technologies and operations	• Reduced chemical footprint and promote organic practices • Enhanced health and safety of workers, reduce injuries and absenteeism • Achieved compliance to international protocols for environmental protection such as net zero carbon emission and energy efficient operations	Overuse and misuse of agro-chemicals, such as fertilizers and pesticides, in plantations affects functions and services provided by such ecosystems. Stringent maximum residue limits (MRL) imposed by importing countries could also hamper export prospects of our products. Developing biopesticides and biofertilizers as substitutes for conventional agrochemicals and identification of new eco-friendly and effective chemicals for the industrial use will promotes sustainability of plantation industry. Moreover, minimizing carbon, water and energy foot prints to protect the environment is a must in the world today. Plantation workers face health risks from chemicals, insects, UV radiation, etc. Development of more ergonomic protective gears and low risk chemicals will boost worker retention and their well-being.

No.	Priority Research Area	• Expected Outcome for National Development	Justification
7	Use of data driven and AI tool based systems for decision making	• Reached more efficient plantation industry • Achieved easy access to real time databases and forecasting models • Minimized crop losses and optimize control measures • Ensured access to EU markets and traceability	Use of AI based technologies in the plantation industry is very low, although it could be used for many operations in the field and factories. Upstream operations such as soil management, pesticide applications, produce processing and also downstream operations can be made more innovative and continuously enhanced by embracing AI-driven solutions and strategic plans. Data-driven forecasting enables early warning systems and cost-effective pest/disease management and to obtain higher yields. Moreover, EU Deforestation Regulation requires traceable sourcing. Development of digital data base for plantation crops will protect exports, ensure transparency, and reduce compliance risk.
8	Technology transfer systems and digital transformation	• Adopted innovations quickly at grassroots levels • Improved adoption rates of new technologies • Improved knowledge and skills among stakeholders • Enhanced Economic Growth • Improved Efficiency and Sustainability • Socioeconomic Empowerment and Inclusion	Technology adoption in the plantation crop sector is far below the expected levels, especially in the small holder sector. While poor income from small land parcels could have been one reason, weak and inefficient extension service reduce the technology adoption. This demands the development of alternative extension strategies to boost the farmer awareness about new technologies and increase their adoption rates. Modern platforms (mobile, ICT, crop clinics) and skilled advisory systems improve knowledge delivery. Involving farmers in research ensures relevance, practicality, and increases ownership, driving real-world adoption and impact. Understanding behaviors of people engaged in plantation crop production and identifying effective techniques through participatory approach to change their negative behaviors is a novel strategy to boost technology adoption.

			Manual processes are time-consuming, prone to errors, and often lack real-time access to data, which hinders efficiency. The digital transformation would streamline operations, reduce errors, and improve overall productivity. Research in digital transformation can also promote equitable access to technology, ensuring inclusivity for rural populations, women, and marginalized groups, driving poverty reduction and social mobility.
9	Diversified cropping/agroforestry systems	• Improved land productivity, income, and climate resilience • Promoted eco-tourism and foreign exchange earnings	Most of the plantation crops adopt mono-cropping systems leading to low land productivity, vulnerability for land degradation and various market and environmental threats. Therefore, technologies have to be developed to transform mono cropping plantations into agro-forestry systems. Agro-forestry or perennial intercropping systems could be used to promote eco-tourism in plantations and earn more foreign exchange earnings. Such systems also increases biodiversity, buffers climate risk, improves soil, stabilizes income and also support SDGs. Effective agronomic practices have to be developed for intercropping/agro-forestry systems together with quantification of environmental benefits associated with such systems.

No.	Priority Research Area	Expected Outcome for National Development	Justification
10	Waste valorization	• Transformed waste into valuable economic products and environmentally beneficial resources • Reduced environmental pollution	Different types of wastes are generated after factory operations and need treatment with eco-friendly technologies prior to their disposal to the environment. However, there is a potential for reuse and recycle waste generated in factories. Crop waste can be recycled as soil amendments, fertilizers, bioenergy sources, or byproducts, reducing environmental pollution, generating additional income, and boosting circular economy.
11	Socio economics and business management	• Identified new market opportunities and/or competitive markets • Established new policies to ensure sustenance of the plantation sector	Socio-economic research conducted for the plantation crops and industry is rather merger in Sri Lanka, and that has largely hindered the identification of significant policy decisions. Moreover, plantation industry in Sri Lanka has only a limited market for its products, partly due to low diversification into value added products. With the increase in value addition and development of new products, their market competitiveness can be enhanced, both in the local as well as in the export market.

2.11 MINISTRY OF RURAL DEVELOPMENT, SOCIAL SECURITY AND COMMUNITY EMPOWERMENT

- **Members of the Ad-hoc Committee**

Team Leaders	Prof. Lakshman Galagedar, Professor, Memorial University of Newfoundland, Canada Prof. Ajith De Silva, Professor, University of West Georgia, USA
Members	Prof. Ajith Karunarathne, Professor, Saint Louis University, USA Prof. Gopal Periyannan, Professor, Eastern Illinois University, USA Dr. Sanath Hettiarachchi, Chairman, National Aquatic Resources Research and Development Agency (NARA) Mrs. Namalie Siyambalapitiya, Former Director/Planning, Road Development Authority (RDA)

- **Core Areas**:

1. Climate-Smart, Precision Agriculture and Smallholder Resilience
2. Youth-Centric Skills Development and Rural Employment Generation
3. Community-Driven Project Sponsorship and Partnership Models
4. Community Learning Hubs for Rural Empowerment and Digital Inclusion
5. Study of the impact of Regional and Community Fairs on Promoting Rural Innovation and Development
6. Optimizing Rural Road Infrastructure and Transport Connectivity
7. Integrated Strategies for Sustainable Livelihood Improvement in Rural Sri Lanka
8. Digital Supply Chains and Value Addition for Rural Products
9. Fisher Community Empowerment and Coastal Livelihood Diversification
10. Fisher Community Empowerment and Coastal Livelihood Diversification

- **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	Climate-Smart, Precision Agriculture and Smallholder Resilience. *(Research on scalable, low-cost precision agriculture technologies and sustainable practices to boost productivity, climate resilience, and reduce input costs for smallholders)*	To strengthen Sri Lanka's food security, rural climate resilience, and inclusive economic growth by promoting stable, climate-resilient agricultural productivity that reduces import dependency and reinforces local food systems; enabling farmers and rural communities to adapt to climate risks through sustainable practices and resilient technologies; creating green jobs and inclusive opportunities in sustainable agriculture to empower marginalized groups; and enhancing agricultural efficiency through increased adoption of appropriate technologies among smallholders, supported by evidence-based policy recommendations.	Rural communities in Sri Lanka rely heavily on agriculture, making them highly vulnerable to climate change, low productivity, and rising input costs. Smallholder farmers, who form the majority, face limited access to modern technology and resources. Investing in research on climate-smart and precision agriculture can transform this sector by improving yields, reducing costs, and enhancing resilience. Low-cost, data-driven technologies offer scalable solutions that promote sustainability, food security, and inclusive economic growth. Such innovation empowers marginalized groups, strengthens local economies, and supports long-term social and environmental well-being.

No.	Priority Research Area	Expected Outcome for National Development	Justification
2	Youth-Centric Skills Development and Rural Employment Generation *(Evidence-based strategies to align education, TVET, and entrepreneurship with high-potential rural sectors (e.g., agribusiness, renewable energy, digital services) to curb youth unemployment and migration.)*	To develop evidence-based strategies for sustainable rural employment by identifying high potential sectors for youth skill development such as agribusiness, renewable energy, ICT, and tourism, and by recommending localized job creation approaches while providing inputs to refine national education, TVET, and youth employment policies.	Rural youth make up a large segment of Sri Lanka's population but face persistent unemployment and economic insecurity. Contributing factors include limited access to quality education, lack of relevant skills, weak links to labor markets, and few local job opportunities. These challenges drive rural poverty, youth frustration, and migration. Despite existing interventions, there is limited region-specific research on the real causes and patterns of rural youth unemployment, leading to fragmented policymaking that fails to address underlying issues or respond to emerging trends.
3.	Community-Driven Project Sponsorship and Partnership Models. *(Develop a digital framework and centralized platform for mapping rural development needs and matching them with donors, sponsors, and CSR initiatives.)*	To establish a centralized, strategic framework that maps rural development projects, fosters multi-sector collaboration, improves donor engagement, and aligns grassroots needs with available resources through sustainable, community-led models, while implementing key performance indicators to track progress and inform national policy.	Many rural communities in Sri Lanka lack access to financial and technical support for small scale development initiatives. This research proposes a collaborative model involving multiple stakeholders to connect local projects such as clean water, agriculture, crafts, and renewable energy with donors and sponsors. By mapping and organizing these initiatives, the approach improves transparency, strengthens resource allocation, and attracts targeted investments. It empowers low income communities, supports innovation, and promotes sustainable community led development. The project aims to build inclusive, long term support systems through active collaboration among public, private, and community actors.

No.	Priority Research Area	Expected Outcome for National Development	Justification
4	Community Learning Hubs for Rural Empowerment and Digital Inclusion. (*Pilot and assess school-linked learning centers focused on digital literacy, civic education, and vocational upskilling to enhance human capital and inclusion.)*	To build a more informed, skilled, and empowered rural population in Sri Lanka by integrating education, technology, and community outreach to expand access to lifelong learning, employment readiness, and civic participation, thereby enhancing human capital and driving inclusive economic growth and social transformation.	This research addresses a critical development challenge in Sri Lanka, where 78% of the population resides in rural areas with limited access to knowledge, skills, and digital resources. By introducing school-linked community learning hubs, the study aims to empower rural populations through improved access to information, digital literacy, and lifelong learning opportunities. Utilizing existing school infrastructure and engaging local graduates or senior students as facilitators, the initiative fosters community-based learning, leadership, and capacity-building at the grassroots level. Conducted in collaboration with the Ministries of Education and Science & Technology, this pilot offers a scalable, cost-effective model for strengthening rural resilience, promoting inclusive development, and narrowing socio-economic disparities through participatory and context-specific approaches.
5	Study of the impact of Regional and Community Fairs on Promoting Rural Innovation and Development (*Study the socio-economic impacts of regional fairs in promoting grassroots entrepreneurship, cultural preservation, and market access.)*	To revitalize rural economies through grassroots innovation, cultural preservation, and creative enterprise; strengthen local entrepreneurship and income generation rooted in community identity; enhance social inclusion, community pride, and intergenerational knowledge sharing; and improve market and tourism access for rural producers to support inclusive and sustainable rural development.	Supporting regional fairs that highlight new arts, local cuisine, furniture, crafts, and sustainable technologies along with mentorship and marketing support encourages creativity and cultural expression. These fairs help strengthen rural economies, create income opportunities, and promote innovation driven entrepreneurship rooted in local identity. They also foster community pride, preserve traditional knowledge, and connect rural talent to wider markets and development networks.

No.	Priority Research Area	Expected Outcome for National Development	Justification
6.	Optimizing Rural Road Infrastructure and Transport Connectivity. *(Conduct a national audit and propose a GIS-based planning tool to prioritize rural road projects and community transport services based on livelihood impacts.)*	To conduct a comprehensive audit of rural road investments in Sri Lanka over the past 15–20 years evaluating expenditure, project completion, and current conditions; develop a prioritization framework with guidelines based on connectivity and access to key services; design integrated community-based transport services linking smaller villages to major networks and essential centers; explore strategies to optimize existing infrastructure with missing links and resources for sustainable livelihoods; promote cross-sectoral collaboration among ministries for coordinated planning; and establish or update a GIS-based Rural Road Information Management System to support evidence-based planning and monitoring.	Optimizing rural road development and transport services is vital for enhancing access to markets, healthcare, education, and tourism in Sri Lanka. A comprehensive review of past investments will identify gaps and inefficiencies, while integrated planning and community-based transport solutions will improve connectivity and livelihoods. Cross-sector collaboration ensures resources target high-impact areas, promoting sustainable rural development and reducing disparities within and between rural and urban communities.

No.	Priority Research Area	Expected Outcome for National Development	Justification
7.	Integrated Strategies for Sustainable Livelihood Improvement in Rural Sri Lanka *(Assess and pilot context-specific livelihood clusters that co-locate sustainable agriculture, fisheries, poultry, dairy sectors, crafts, and SMEs with value chain support and shared infrastructure.)*	To conduct integrated livelihood assessments across rural sectors mapping income sources, skills, gender roles, and market access; identify and test climate-resilient, cost-effective agricultural and fisheries, poultry, dairy sectors; analyze value chains in crafts and artisanal products to uncover branding, market, and employment opportunities; explore digital tools and innovation in rural SMEs to boost productivity and profitability; assess access to finance and business services to overcome barriers; and pilot livelihood clusters or rural enterprise zones that co-locate production, processing, and services with shared infrastructure and strong market linkages.	Improving rural livelihoods in Sri Lanka requires a holistic understanding of existing income sources, local capacities, and emerging challenges such as climate change, limited market access, and weak financial services. This research will inform integrated, evidence-based strategies that promote sustainable and inclusive economic growth. By strengthening value chains, fostering innovation, and improving access to technology, finance and infrastructure, the initiative will empower rural communities, reduce poverty, and support resilient, locally driven development.

No.	Priority Research Area	Expected Outcome for National Development	Justification
8.	Digital Supply Chains and Value Addition for Rural Products. *(Identify value-addition opportunities and develop mobile applications to link producers directly with markets, reducing reliance on intermediaries and boosting rural incomes.)*	To identify value addition opportunities and new market avenues for rural agricultural, horticultural, and industrial products to increase income and profitability through product diversification and reduced middlemen dependency; develop a mobile application to streamline supply chains and enhance direct market access; strengthen rural entrepreneurship and innovation with improved connectivity and market intelligence; enhance transparency, efficiency, and fairness in rural trade and distribution systems; and contribute to inclusive economic growth and improved livelihoods across Sri Lankan rural communities.	Rural producers in Sri Lanka often face limited market access and low returns due to lack of value addition and dependence on middlemen. This research aims to identify opportunities for product diversification and new markets for agricultural, horticultural, and village-level industrial products such as fruits, vegetables, milk, and coir. It will also develop digital tools, including mobile apps, to improve supply chain efficiency and connect producers directly with consumers and markets. The study supports rural income generation, reduces exploitation, and promotes inclusive economic growth through application, innovation and better market integration.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9.	Fisher Community Empowerment and Coastal Livelihood Diversification *(Design targeted interventions for fisher communities, including sustainable fisheries practices, coastal resource management, and access to markets and services.)*	To empower fisher communities in Sri Lanka by designing and implementing targeted interventions that promote sustainable fisheries practices, effective coastal resource management, and enhanced access to markets and essential services, thereby supporting livelihood diversification and long-term community resilience.	Fisher communities in Sri Lanka face challenges from overfishing, environmental degradation, and limited market access, threatening their livelihoods and food security. Sustainable fisheries and coastal resource management are vital for preserving marine ecosystems, while livelihood diversification enhances income stability. Targeted interventions are essential to empower these communities, promote resilience, and support sustainable, inclusive development of Sri Lanka's coastal regions.
10.	Rural-Focused Educational Reforms for Equitable Development. *(Investigate educational gaps and policy reforms needed to align rural schooling with local development needs, including curriculum localization and teacher capacity.)*	To investigate educational gaps and recommend policy reforms to align rural schooling in Sri Lanka with local development needs through curriculum localization and enhanced teacher capacity.	Rural areas in Sri Lanka often face educational disparities that hinder equitable development and limit opportunities for local communities. Aligning education with local development needs through curriculum localization and improved teacher capacity is essential to make learning more relevant, foster skill development, and empower rural students. This research will inform policies that promote inclusive education and support sustainable rural growth.

2.12 MINISTRY OF SCIENCE AND TECHNOLOGY

- **Members of the Ad-hoc Committee**

Team Leader	Dr. Gamini Piyadasa, Public Relations Officer to the Hon. Minister of Science and Technology Prof. Jagath Pitawala, Professor in Material Science, Faculty of Applied Sciences, Uva Wellassa University
Members	Prof. Oliver Illeperuma, Emeritus Professor of Chemistry, University of Peradeniya Prof. Gamini Rajapaksha, Senior Professor, Department of Chemistry, University of Peradeniya Prof. Ajith Karunarathne, Professor, Saint Louis University, USA (Eng) Dr. Sisira Ranatunga, Chairman, Sri Lanka State Plantations Corporation Prof. Namal Liyanage, Associate Professor, Ohio State University College of Medicine, USA Prof. Ajith De Silva, Professor, University of West Georgia, USA Dr. Prasad Jayathurathnage, Senior Research Engineer, Danfoss Drives, Finland Prof. Saman Dharmakeerthi, Chairman, Sri Lanka Council for Agricultural Research Prof. Lakshman Galagedara, Professor, Memorial University of NL, Canada Dr. Sanath Hettiarachchi, Chaiman, National Aquatic Resources Research and Development Agency (NARA) Dr. Sumith Doluweera, Principal Senior Lecturer, Georgia State University Prof. G.R. Asoka Kumara, Research Professor, National Institute of Fundamental Studies, Kandy Prof. K.P.S. Chandana Jayaratne, Senior Lecturer, University of Colombo, and Chairman, Arthur C. Clarke Institute for Modern Technologies Mr. Saraj Gunasekara, Acting Director (Space Technology & Applications), Arthur C. Clarke Institute for Modern Technologies Mr. Indika Medaganagoda, Senior Research Scientist, Arthur C. Clarke Institute for Modern Technologies Dr. Janaka adassuriya, Department of Physics, University of Colombo Dr. S.R. Sepalika N. Sudasinghe, Director General, National Science Foundation Eng. Kavindra Jayawardena, Arthur C. Clarke Institute for Modern Technologies Eng. Tharindu Dayaratne, Eng. Sampath Marasinghe, Arthur C. Clarke Institute for Modern Technologies Mr. Oliver Ranasinghe, Sri Lanka Air Force Dr. Achala Pallebedda, Faculty of Engineering, University of Peradeniya

- **Core Areas**:
    1. Establishing a national institute for specialized instrument and system developments maintenance center
    2. Quantum-Enhanced Sodium-Ion (Na-Ion) Batteries and EV battery Using Sri Lanka’s Natural Resources
    3. Understanding and Identification of potential health risk associated with contamination of heavy metals in urban environments/ public-health
    4. Establishment of Motor Test Bench for EV Testing Laboratory
    5. Development of Point-of-Care and Rapid Diagnostic Tools for Non-Communicable and Infectious Diseases (NCD).
    6. Gender Gap in the STEM labor force.
    7. Scientific Investigation on traditional technological wisdom
    8. SMEs and export-oriented SMEs and Start-Ups
    9. Improving ocean’s capacity of carbon sequestration
    10. Innovation, Quality Enhancement, and Global Competitiveness of Traditional Spices
    11. Development of Anti-Venom Solutions for Snakebite Envenoming
    12. Establishing a national institution to study the fundamental issues hindering Sri Lanka's development and to seek solutions for them
    13. Targeted Delivery and Slow Release of Drugs
    14. Orthopaedic and dental prostheses
    15. Green energy technologies

- **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	Establishing a national institute for specialized instrument and system developments maintenance center	Development of new instruments, systems and modification of existing ones to meet national requirements, along with the repair of currently broken or non-functioning instruments, electronic systems in government organizations national laboratories, hospitals, and similar institutions.	A significant amount of foreign currency is spent on purchasing new instruments, systems despite the availability of sufficient expertise within the country. Additionally, many high-value instruments, systems are discarded due to the lack of appropriate repair and service facilities. Therefore, establishing such a center is a vital national necessity to address these challenges and serve the country effectively through import substitution.
2	Quantum-Enhanced Sodium-Ion (Na-Ion) Batteries and EV battery Using Sri Lanka's Natural Resources	Within 5 years, it aims to deliver batteries with 50% lower costs than lithium-ion, 3,000+ skilled jobs, and $100M+ in export revenue. By powering rural microgrids and EVs, it will reduce energy imports by 30% while cutting carbon emissions. The initiative will position Sri Lanka as an innovator in next-gen battery technology, leveraging homegrown quantum material expertise.	With global Na-ion battery demand projected to reach $12B by 2030 (CAGR 22%), this research addresses Sri Lanka's urgent need for affordable energy storage to complement its solar expansion. The 2022 energy crisis cost $450M in fuel imports - quantum-enhanced batteries can mitigate this while utilizing our unique vein graphite (99% purity) and monazite sands. The technology aligns with National Energy Policy targets for 70% renewable energy by 2030. Starting in 2026 allows gradual capability building through partnerships with existing mineral processing facilities, ensuring realistic implementation while positioning Sri Lanka ahead of regional competitors in this emerging market.

No.	Priority Research Area	Expected Outcome for National Development	Justification
3	Understanding and Identification of potential health risk associated with contamination of heavy metals in urban environments/ public-health	Increase the public awareness of safety in terms of toxic elements to ensure the public safety and healthy development. Implementation of national regulation	Public are susceptible to heavy metals toxicity. Exposure to heavy metals like Pb, Cd, As and Hg even in low concentration can lead to developmental delays, cognitive impairment and other serious health issues specially in children. A significant portion of consumer goods sold in Sri Lanka are imported. Many consumers may not aware of the potential dangers of heavy metals. Therefore, stringent testing and regulation are needed to ensure public health in Sri Lanka.
4	Establishment of Motor Test Bench for EV Testing Laboratory	The automated test kit provides precise and consistent measurements of key performance metrics, ensuring reliable evaluations for e-bike motor performance. It supports the establishment of a sustainable, environmentally friendly national transport system..	Electric vehicles (EVs) are vital for a green transport system. With higher efficiency and lower wear than ICEs, EV adoption is increasing. Establishing a Motor Test Bench is essential for performance evaluation, R&D, and quality assurance of EV motors, thereby advancing local technology and supporting national clean transport initiatives.
5	Development of Point-of-Care and Rapid Diagnostic Tools for Non-Communicable and Infectious Diseases (NCD).	The development and local production of point-of-care and rapid diagnostic tools will improve access to early and accurate diagnosis of both NCDs and infectious diseases, reducing mortality, complications, and long-term healthcare costs. Strengthened disease surveillance and outbreak response will enhance national resilience to public health emergencies.	Non-communicable diseases (NCDs) such as diabetes, cardiovascular disease, and chronic kidney disease account for more than 80% of deaths in Sri Lanka. In contrast, infectious diseases, Developing locally produced, cost-effective, high-sensitivity point-of-care and multiplex rapid diagnostic tools will address these gaps by enabling early detection,

No.	Priority Research Area	Expected Outcome for National Development	Justification
6	Gender Gap in the STEM labor force.	Closing the gender gap in STEM will ensure that women have access to more high-skilled employment and are meaningfully included in the economic growth that is driven by technology and innovation [UN 2023]	In Sri Lanka, …between 2013 and 2021, there has not been any notable progress in reducing gender inequalities in terms of labour force participation…[ILO 2024] a significant gender gap exists within the STEM labor force, with women underrepresented compared to men.[UN 2023] ·
7	Scientific Investigation on traditional technological wisdom Agriculture/irrigation/ traditional medicine [Ayurveda, Siddha, Unani, Deshiya Chikitsa]etc	known as traditional ecological knowledge (TEK), offers significant economic contributions by informing sustainable resource management, enhancing productivity in various sectors, and fostering unique cultural and creative industries for economic growth and development. 1.Research on Ayurveda literature and fundamentals of ayurveda doctrine 2. Research on Ayurveda treatments and primary healthcare 3. Research on Ayurveda medicines, pharmacology, pharmacopoeia and pharmacovigilance	Sri Lankans could be able to build a proud history with traditional technological wisdom which shaped by rich cultural features of the ancient period. · This knowledge, often passed down through generations, provides valuable insights into natural resource management, material science, and agricultural practices, leading to more efficient and environmentally friendly methods
8	SMEs and export-oriented SMEs and Start-Ups	• Scientific Solutions to Society with special attention to Rural Development and Community Empowerment • Addressing R&D needs of SMEs and enhance innovation capacity of SMEs • Fostering export-oriented SMEs and Start-Ups	GRC Focus: Responsible Research Assessment, promoting sustainable research, supporting the Sustainable Development Goals (SDGs), and advancing equality, diversity, and inclusion in research.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9	Improving ocean's capacity of carbon sequestration: .	Enhanced ocean carbon sequestration capacity will contribute to Sri Lanka's climate resilience by reducing atmospheric CO_2 levels, slowing global warming, and mitigating sea-level rise impacts. The initiative will strengthen blue economy opportunities, protect coastal communities, sustain fisheries, and safeguard marine biodiversity—ensuring long-term environmental stability and economic security.	Sri Lanka's densely populated coastal belt is highly vulnerable to sea-level rise, erosion, and saltwater intrusion, threatening livelihoods and national infrastructure. Increasing the ocean's carbon storage through both natural pumps (solubility, biological, carbonate) and advanced methods such as seawater alkalization and electrochemical CO_2 removal can significantly accelerate carbon drawdown. These technologies enhance ocean alkalinity, promote long-term carbon storage, and protect coral reefs from acidification. By integrating innovative carbon removal with marine ecosystem restoration, Sri Lanka can position itself as a regional leader in climate mitigation, safeguard its blue economy, and secure a sustainable future for its people and environment.
10	Innovation, Quality Enhancement, and Global Competitiveness of Traditional Spices	Improved Quality and Consistency, High-Value Product Diversification, Foreign Exchange Growth, Sustainable and Climate-Resilient Production, .Global Brand Recognition and Rural Economic Empowerment.	Traditional spices such as cinnamon (*Cinnamomum verum*), black pepper, cardamom, clove, and nutmeg have deep cultural significance and strong global demand due to their culinary, medicinal, and functional properties. Despite their traditional value and export potential, issues like inconsistent quality, low value addition, inadequate branding, and limited market diversification reduce their global competitiveness. Strategic R&D in genetic improvement, sustainable cultivation, precision processing, product diversification, and brand positioning can help economic benefits, strengthen rural livelihoods, and increase foreign exchange earnings.

No.	Priority Research Area	Expected Outcome for National Development	Justification
11	Development of Anti-Venom Solutions for Snakebite Envenoming	The development of safe, effective, and locally relevant anti-venom solutions will significantly reduce deaths and disabilities caused by snakebite envenoming, a neglected tropical disease affecting rural communities in Sri Lanka.	Sri Lanka records thousands of snakebite incidents annually, with significant mortality and long-term disability, particularly among agricultural workers in rural areas. The country's current anti-venom supply is fully imported, often targeting venom profiles from other regions, leading to reduced effectiveness and a higher risk of adverse reactions. Delays in access and limited cold chain capacity in remote areas further exacerbate outcomes. Developing locally produced anti-venoms tailored to the venomous species in Sri Lanka will improve safety, efficacy, and accessibility. This initiative will save lives and preserve livelihoods, strengthen national self-reliance in essential medicines, and open potential for regional export markets.
12	Establishing a national institution to study the fundamental issues hindering Sri Lanka's development and to seek solutions for them	Identify and suggest solutions to remove obstacles hindering Sri Lanka's economic and social development, ultimately aiming to eradicate poverty	There are numerous practices in Sri Lanka that significantly impact its development, such as the operation of private buses. These buses contribute extensively to economic losses through delays, increased fuel and spare parts consumption, and traffic congestion, thereby affecting overall efficiency. Moreover, they give rise to social issues like early morning starts, late-night returns, increased electricity consumption, and considerable time spent commuting.

13	Targeted Delivery and Slow Release of Drugs	The development of targeted delivery and slow-release systems using non-toxic porous inorganic nanomaterials and biocompatible polymer matrices will enable controlled and site-specific administration of anticancer drugs, as well as therapies for stroke and Parkinson's disease patients, thereby improving efficacy and reducing side effects. This research holds high national relevance as it addresses critical public health challenges, fosters translational medicine in collaboration with medical and dental faculties, and contributes to the advancement of Sri Lanka's biomedical innovation and pharmaceutical independence.	Targeted drug delivery and slow-release technologies are crucial for enhancing therapeutic outcomes in cancer, stroke, and Parkinson's disease, which are pressing health burdens in Sri Lanka. By encapsulating drugs in safe nanomaterials such as $CaCO_3$ and MgO, embedding them in electrospun biopolymer matrices, and fabricating bucco-adhesive patches, the approach ensures controlled release, reduced dosage frequency, and minimized systemic toxicity. Rigorous biological testing, combined with mathematical modelling of release kinetics, ensures scientific and clinical robustness. Importantly, this research fosters strong collaboration between clinicians and academics of both dental and medical faculties, ensuring translational impact for patient care and advancing national biomedical capacity.
14	Orthopaedic and dental prostheses	The development of orthopaedic and dental prostheses using hydroxyapatite nanoparticles derived from local apatite minerals, zirconia nanoparticles from zircon, and bone cement (poly(methyl methacrylate)) enables customized, biocompatible, and durable solutions for patient-specific needs. This research is nationally significant as it leverages local resources, ensures affordability, and translates directly to patient benefit through close collaboration with orthopaedic surgeons and dental clinicians, thereby strengthening Sri Lanka's medical innovation capacity.	The increasing demand for affordable, high-quality prosthetic solutions in Sri Lanka underscores the importance of this research on customized orthopaedic and dental implants. By developing hydroxyapatite nanoparticles from locally available apatite and zirconia nanoparticles from zircon, and combining them with bone cement (PMMA), we create biocompatible, durable, and patient-specific prostheses. Rigorous biological testing, ethical clearance, and clinical transplantation ensure safety and efficacy, with two such prostheses already successfully implanted in needy patients. Furthermore, innovative "telescopic prostheses" have been developed to treat children with brittle bone disease, demonstrating direct social impact. This collaboration with orthopaedic surgeons and dental academics strengthens national healthcare and promotes local biomedical industry development.

15	Green energy technologies	The development of energy storage and conversion devices such as supercapacitors and dye-sensitized solar cells using locally available materials like graphite, graphene products, and coconut-shell-based activated carbon provides sustainable and cost-effective alternatives to imported technologies. This research is nationally relevant as it promotes renewable energy, reduces dependency on foreign raw materials, and positions Sri Lanka as a contributor to green energy innovation.	Energy security and sustainable development are critical national priorities, and locally sourced advanced materials can play a transformative role. By utilizing graphite and graphene products, along with coconut-shell-based activated carbon, this research develops supercapacitors and dye-sensitized solar cells tailored to local needs. These devices offer high energy efficiency, reduced costs, and environmentally friendly solutions for electricity storage and renewable energy conversion. Importantly, the use of indigenous raw materials enhances value addition within Sri Lanka, creates opportunities for local industries, and reduces import dependency. This initiative strengthens the nation's capacity in green technology, renewable energy, and climate change mitigation.

2.13 MINISTRY OF TRANSPORT, HIGHWAYS, PORTS, AND CIVIL AVIATION

- **Members of the Ad-hoc Committee**

Team Leader	Eng. W.R. de Mel, Senior Lecturer, Dept. of Materials and Mechanical Technology, University of Sri Jayawardenapura
Members	Prof. Primal Fernando, Professor, Dept. of Mechanical Engineering, University of Peradeniya Dr. Ajantha Kalyanaratne, Senior Lecturer, Dept of Economics, University of Sri Jayawardenapure Dr. R.S.M. Samarasekara, Senior Lecturer, Dept. of Mechanical Eng., University of Sri Jayawardenapure Eng. Iromi Ranasoma, Deputy Director General of R&D Division, Road Development Authority. Eng T. Thilakshan, Transport Engineer, National Transport Commission Dr. Delika M. Weragoda, Teaching Fellow, School of Engineering, University of Kent, UK Eng. G.M.N.N Wijerathna, Senior Engineer, Prixcar Services (Car transport Service), Australia. Eng. R M T S Rajapaksha, Mechanical Engineer attached to the Ministry of Transport, Highways, Ports, and Civil Aviation Eng, R M J C Bandara, CHARTERED CIVIL ENGINEER , Project Manager at Tudawe Brothers Pvt Ltd

- **Core Areas**:
  1. Passenger Demand Identification and Route Reassessment.
  2. Pilot Project on Reclaimed Asphalt Pavement (RAP)
  3. Evaluating the gaps for effective integration of transport modes
  4. Pilot Project on Roller Compacted Concrete Pavements (RCCP)
  5. Evaluating the potential for the adoption of new renewable sources for a sustainable transportation ecosystem
  6. Pilot Project on Fibre Micro Surfacing
  7. Effective Utilisation of Transport as a Tool for Rural Development
  8. Pilot Project on Internal Curing Concrete (ICC)
  9. Pilot Project on Semi-Rigid Pavements
  10. Pilot Project on Stone Mastic Asphalt Surfacing (SMA)

- **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1. (Transport sector)	Passenger Demand Identification and Route Reassessment.	Improved public transport planning and resource optimisation, leading to reduced congestion and enhanced service quality.	Effective public transport requires alignment between service provision and real passenger needs. Many current routes are outdated or inefficient, causing overcrowding on some lines and underuse on others. By identifying actual travel patterns and reassessing routes accordingly, transport authorities can reduce congestion, improve punctuality, and optimise resource allocation. This research is essential for transitioning to a demand-responsive public transport system that maximises user satisfaction, minimises operational costs, and supports inclusive urban mobility planning.
2. (Road sector)	Pilot Project on Reclaimed Asphalt Pavement (RAP)	Low Construction Cost, Material Saving	As an initial step for this research, a paper was presented in the Annual Sessions of IESL and published in pp.[317-326], 2024 © The Institution of Engineers, Sri Lanka under the title of Sustainable Road Infrastructure Development in Sri Lanka: Overcoming Implementation Challenges of Reclaimed Asphalt Pavement (RAP). This study investigates the challenges hindering the widespread implementation of Reclaimed Asphalt Pavement (RAP) in Sri Lanka's road infrastructure development. RAP presents a sustainable solution by incorporating recycled asphalt materials into pavement construction. The findings highlight that while RAP offers significant benefits in terms of sustainability, cost savings, and environmental conservation, its adoption in Sri Lanka faces several unique challenges. Therefore, it is recommended that, in the initial phase, existing plants be modified to incorporate up to 10% RAP in HMA production, promoting sustainable paving practices in Sri Lanka. Therefore, with a

			plant material and trial pilot project for the laying of RAP with monitoring at least for five years is proposed and required technical specification needs to be developed as part of the national standards for RAP integration.
3. (Transport sector)	Evaluating the gaps for effective integration of transport modes	Seamless multimodal transport systems that enhance commuter experience, reduce transfer times, and promote public transport usage.	Multimodal transport systems are vital for improving journey efficiency and accessibility. However, in many regions, fragmented planning and infrastructure gaps hinder seamless transfers between modes such as buses, rail, and non-motorised transport. Evaluating these disconnects is critical to ensuring modal interoperability, reducing commuter stress, and promoting public transit over private vehicles. This research supports the development of integrated mobility frameworks that enhance service convenience, encourage modal shifts, and contribute to sustainable urban transport strategies.
4. (Road sector)	Pilot Project on Roller Compacted Concrete Pavements (RCCP)	Low Construction Cost, Less Maintenance and Less Life Cycle Cost	As a part of the adaptation of new technology, many new wearing course options to suit our traffic loading, subgrade, other aspects like practicality in implementation with available machinery, cost effectiveness, which have not been practised in Sri Lanka, has been trailed through desk studies and then by sample collection and laboratory tests whenever required. Accordingly, the Technical Specification for Roller Compacted Concrete Pavements (RCCP) has been prepared. This is suitable for rural as well as main roads where it warrants concrete pavements, resulting in economic construction and early opening to traffic. Roller-compacted concrete, which takes its name from the construction method used to build it. It is a concrete of zero-slump consistency in its unhardened state, and it is defined as concrete compacted by roller. The major benefits are low construction cost, no need formwork, no reinforcement required, can withstand high temperatures, resistance to chemical attack, less maintenance and less life cycle cost etc. Therefore, this Technical Specification for Roller Compacted Concrete Pavements (RCCP) has to be trialed on a Pilot

			Project and it has to be monitored for at least 5 years before circulation of this Technical Specification for Roller Compacted Concrete Pavements (RCCP) for wide application in Road construction in Sri Lanka.
5. (Transport sector)	Evaluating the potential for the adoption of new renewable sources for a sustainable transportation ecosystem	Reduction in carbon emissions and fossil fuel dependency by transitioning to cleaner energy solutions in the transport sector.	The transport sector remains a significant contributor to greenhouse gas emissions and fossil fuel dependency. With global and national commitments to carbon neutrality, assessing the viability of renewable energy in transport is timely and necessary. This research will guide investment decisions, policy development, and infrastructure planning to foster a low-carbon transport future. It supports both climate action and energy diversification goals by enabling a shift toward cleaner, more sustainable mobility solutions.
6. (Road sector)	Pilot Project on Fibre Micro Surfacing	Cost-Effective, Higher Crack and Skid Resistance	As a part of the adaptation of new technology, many new wearing course options to suit our traffic loading, subgrade, other aspects like practicality in implementation with available machinery, cost effectiveness, which have not been practised in Sri Lanka, has been trailed through desk studies and then by sample collection and laboratory tests whenever required. Accordingly, the Technical Specification for Fibre Micro Surfacing has been prepared. This is a cost-effective maintenance treatment for medium-level of cracks in asphalt pavements. Double Bitumen Surface Treatment (DBST) is considered as the traditional practicing method for surface dressing in Sri Lanka. This was replaced with Hot Mixed Asphalt (HMA) for maintenance of the roads, and it is not an economical solution. There are other cost-effective surface treatments such as micro surfacing, slurry seal, fog seal, chip seal, cape seal and sand seal, etc. However, those surface treatments cannot treat pavement with fatigue cracking or significant linear cracking. Fibre Micro Surfacing will be a potential solution for maintenance of severely cracked areas. As a result, it is a good crack sealing method with high skid resistance and crack

			resistance. Also, it is a cost-effective overlaying technology. Therefore, this Technical Specification for Fibre Micro Surfacing has to be trialed on a Pilot Project, and it has to be monitored for at least 5 years before circulation of this Technical Specification for Fibre Micro Surfacing for wide application in Road construction in Sri Lanka.
7. (Transport sector)	Effective Utilisation of Transport as a Tool for Rural Development	Enhanced economic opportunities and accessibility for rural populations through improved connectivity.	Transport is a fundamental enabler of socio-economic development, particularly in rural areas where connectivity gaps restrict access to essential services and markets. Enhancing rural mobility can stimulate economic activity, improve livelihoods, and reduce regional inequalities. This research explores how strategic transport interventions can empower rural communities, strengthen supply chains, and promote inclusive growth. A focus on accessible, affordable, and context-appropriate transport solutions is key to achieving equitable national development and meeting rural development objectives.
8. (Road sector)	Pilot Project on Internal Curing Concrete (ICC)	Material Saving, Longer Service Life	As a part of the adaptation of new technology, many new wearing course options to suit our traffic loading, subgrade, other aspects like practicality in implementation with available machinery, cost effectiveness, which have not been practiced in Sri Lanka, has been trailed through desk studies and then by sample collection and laboratory tests whenever required. Accordingly, the Technical Specification for Internal Curing Concrete (ICC) has been prepared. This is a self-curing concrete which does not require external curing and helps to minimise the cracking in concrete roads, eliminate autogenous shrinkage cracks, reduced elastic modulus, improved hydration, unit weight reduction, strength increase, longer service life, material saving (cement, River sand), etc. Therefore, this Technical Specification for Internal Curing Concrete (ICC) has to be trialed on a Pilot Project, and it has to be monitored for at least 5 years before circulation of this Technical Specification for Internal Curing Concrete (ICC) for wide application in Road construction in Sri Lanka.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9. (Road sector)	Pilot Project on Semi-Rigid Pavements	Improved Road Surface, Long Life Span	As a part of the adaptation of new technology, many new wearing course options to suit our traffic loading, subgrade, other aspects like practicality in implementation with available machinery, cost effectiveness, which have not been practiced in Sri Lanka, has been trailed through desk studies and then by sample collection and laboratory tests whenever required. Accordingly, the Technical Specification for Semi-Rigid Pavements has been prepared. This is a higher rutting and deformation resistance road surfacing with both flexible and rigid pavement characteristics. These semi-rigid Pavements consist of open graded asphalt with a void percentage between 22% to 30% on a volume basis, and they are filled with a high-strength cementitious mortar possessing high fluidity and internal friction. The major benefits are higher rutting and deformation resistance, high skid resistance, resistance to petroleum products, oil, chemical, moisture damage, high flexural strength, no expansion joints, low construction and maintenance cost, long life span, etc. Therefore, this Technical Specification for Semi-Rigid Pavements has to be trialed on a Pilot Project, and it has to be monitored for at least 5 years before circulation of this Technical Specification for Semi-Rigid Pavements for wide application in Road construction in Sri Lanka.

No.	Priority Research Area	Expected Outcome for National Development	Justification
10. (Road sector)	Pilot Project on Stone Mastic Asphalt Surfacing (SMA)	Improved Road Surface, Noise Reduction	As a part of the adaptation of new technology, many new wearing course options to suit our traffic loading, subgrade, other aspects like practicality in implementation with available machinery, cost effectiveness, which have not been practiced in Sri Lanka, has been trailed through desk studies and then by sample collection and laboratory tests whenever required. Accordingly, the Technical Specification for Stone Mastic Asphalt Surfacing (SMA) has been prepared. This is a durable mixture for heavy traffic roads. This is a relatively thin (12.5 to 40 mm) gap-graded, densely compacted Hot Mixed Asphalt (HMA) that is used as a surface course on both new construction and surface renewal. It is a mixture of asphalt cement, course aggregate, crushed sand and additives. These mixes are different from normal dense grade HMA mixes in that there is a much greater amount of coarse aggregate in the SMA mix. The major benefits are that it can be used on major highways with heavy traffic volumes, has higher rutting resistance, high durability, noise generated by the traffic is low, good friction characteristics, etc. Therefore, this Technical Specification for Stone Mastic Asphalt Surfacing (SMA) has to be trialed on a Pilot Project, and it has to be monitored for at least 5 years before circulation of this Technical Specification for Stone Mastic Asphalt Surfacing (SMA) for wide application in Road construction in Sri Lanka.

2.14 MINISTRY OF URBAN DEVELOPMENT, CONSTRUCTION AND HOUSING

- **Members of the Ad-hoc Committee**

Team Leader	Dr. Anurudda Karunarathna, Senior Lecturer, Department of Agricultural Engineering, Faculty of Agriculture, University of Peradeniya Eng. Niranjan Fernando, Chairman, State Engineering Corporation of Sri Lanka
Members	Prof. Lakshman Galagedara, Professor, Memorial University of Newfoundland, Canada Prof. Rahula Attalage, Emeritus Professor, University of Moratuwa and Pro Vice-Chancellor (Academic) Sri Lanka Institute for Information Technology (SLIIT) Prof. Kushan Wijesundara, Professor, Faculty of Engineering, University of Peradeniya Prof. Tushara Chaminda, Professor, Faculty of Engineering, University of Ruhuna Dr. Chamila Gunasekara, Senior Lecturer & ARC DECRA Fellow, School of Engineering, RMIT University, Australia

- **Core Areas**: Ministry of Urban Development, Construction and Housing

2.10 Constructions (04)

2.11 Urban development and housing (03)

2.12 Water resources and supply (03)

➢ **Recommendations**

No	Priority Research Area	Expected Outcome for National Development	Justification
Constructions			
1	Advanced and eco-friendly construction materials	• Economical and optimum materials for structural and non-structural configurations: Invent and develop new construction materials such as green-concrete, cross-laminated timber, self-healing concrete, innovative bio-based materials that minimize embodied energy while offering economical and optimum materials for structural and non-structural configurations.	Research in advanced eco-friendly construction materials is critically needed to address the construction industry's massive environmental impact, carbon emissions and excessive consumption of non-renewable raw materials. Currently used construction materials and alternatives often lack the structural integrity, durability, and cost-effectiveness required for widespread adoption. Thus, urgent research is essential to develop high-performance, economically viable materials that meet safety standards while reducing environmental footprint. This research will bridge performance gaps, establish regulatory frameworks, optimize manufacturing processes, and enable the construction industry to contribute meaningfully to country's sustainable development goals.
2	New construction procedures and construction technology upgrading	• National construction industry database: Use digital technologies to develop a national construction industry database including major construction equipment, machinery, equipment/ machinery management system available in the country. • Guidelines on new construction technology and procedures: Introducing new technology and construction procedures/ technology upgrading	Research in new construction procedures and technology upgrading is essential to address critical industry challenges including skilled labor shortages, safety hazards, economic losses, material wastage, and project delays that plague modern construction. Traditional methods cannot meet demands for faster delivery, higher quality, and improved safety standards required by rapid urbanization and infrastructure needs. Research must develop automated construction techniques, digital integration systems, and innovative project management methodologies to enhance productivity and reduce human error. With construction accidents causing significant number of fatalities annually and

No	Priority Research Area	Expected Outcome for National Development	Justification
		procedures (e.g. segmental construction, Building Information Modeling, modular construction) optimized for localized conditions. • Modernize design and analysis procedures in the construction industry using modern numerical tools, predictive & descriptive tools. • Ensure safety engineering, occupational health & safety	projects frequently exceeding projected budgets, systematic research into advanced procedures and technology adoption is crucial for transforming construction into a safer, more efficient, and economically sustainable industry.
3	Resource circularity in construction industry	• Establish resource circular construction industry through LCA and whole-life costing approaches • Construction waste valorized and recycled through sustainable and eco-friendly technologies	Research in resource circularity and whole-life costing approaches is critically needed to transform the construction industry from linear consumption models to sustainable circular systems. Current practices in the construction industry generate substantial amounts of waste annually while focusing solely on upfront costs, ignoring long-term environmental and economic impacts. Thus, research must develop integrated frameworks combining circular design principles with comprehensive life-cycle economic analysis. This research is essential for establishing material flow optimization, end-of-life value recovery, and true cost accounting that includes maintenance, energy consumption, and disposal costs, enabling informed decision-making that balances environmental sustainability with long-term economic viability.
4	Novel maintenance and structural health monitoring procedures	• Novel maintenance and structural health monitoring procedures and guidelines: Establish novel procedures such as digital monitoring technologies, including sensors, data analysis, and digital twins,	Research in novel maintenance and structural health monitoring procedures is essential to address aging infrastructure crises and infrastructure failures. Traditional inspection methods are labor-intensive, costly, and often detect problems too late, leading to catastrophic failures and

No	Priority Research Area	Expected Outcome for National Development	Justification
		to assess the health and performance of structures like buildings, bridges, dams, and tunnels.	safety risks. Research must develop real-time monitoring systems using IoT sensors, AI-powered predictive analytics, and automated assessment technologies to enable proactive maintenance strategies. This research is critical for extending infrastructure lifespan, reducing maintenance costs, preventing structural failures, and ensuring public safety while optimizing resource allocation in an era of constrained budgets.
Urban development and housing			
5	Innovations to diverge conventional urban planning into sustainable, adaptive and climate-resilient infrastructure planning and policy integration	• Improved disaster response capacity: Strengthens national ability to prepare for and respond to natural disasters through integrated, resilience-focused planning and policies. • Guidelines for resilient construction: Develops relevant standards for disaster-resistant building, encouraging climate-smart infrastructure investment. • Stronger monitoring and regulation systems: Enhances disaster monitoring, regulation, and early warnings to minimize human, material, and economic losses. • Tourism-friendly urban infrastructure: Develops strategic research outcomes to make a city welcoming and convenient for visitors, while also considering the needs of residents and the environment.	Research into innovations diverging conventional urban planning toward modern systems is urgently needed to address escalating urbanization challenges. Traditional top-down planning models cannot adequately respond to climate change, natural disasters, social inequality, and technological disruption facing contemporary cities. Research must develop adaptive planning frameworks integrating smart technologies, data-driven decision-making, and participatory governance models. This research is critical for creating resilient, sustainable urban systems that can dynamically respond to changing demographics, environmental conditions, and citizen needs while moving beyond rigid zoning laws toward flexible, technology-enabled planning approaches that promote equity and livability.

No	Priority Research Area	Expected Outcome for National Development	Justification
		• Institutional collaboration and policy reform: Promotes cooperation among researchers, policymakers and builders to support evidence-based policies and aligned development goals.	
6	Dynamic and predictive micro-environmental modeling for urban ecosystem service quantification, resilience and energy performance	• Integrated urban heat island mitigation through nature-based solutions and energy system optimization • Resilient urban infrastructure through predictive modeling for climate-adaptive urban energy systems and ecosystem	Research in dynamic and predictive micro-environmental modeling is critically needed to address complex urban sustainability challenges where ecosystem services, climate resilience, and energy performance intersect. Current urban planning lacks integrated tools to quantify how green infrastructure simultaneously affects air quality, carbon sequestration, stormwater management, and building energy consumption at neighborhood scales. With cities experiencing intensifying heat islands, extreme weather events, and energy demands, research must develop high-resolution spatiotemporal models that can predict ecosystem-energy interactions under changing climatic conditions. This research is essential for optimizing urban design decisions, maximizing ecosystem service benefits, enhancing climate resilience, and achieving net-zero energy targets through evidence-based integration of natural and built systems.
7	Optimization of urban infrastructures for sustainable and integrated waste management	• Optimized circular economic infrastructure design for integrated urban waste-to-resource systems • Smart waste collection and processing network optimization	Research in optimizing urban infrastructures for sustainable and integrated waste management in Sri Lanka is critically needed to address the country's escalating waste crisis, with cities lacking adequate processing and sanitary disposal facilities. Current open dumping and inefficient collection and resource recovery systems contaminate groundwater, pollute coastal areas, and threaten public health in densely populated

No	Priority Research Area	Expected Outcome for National Development	Justification
			urban centers. With Sri Lanka's urbanization rate increasing and limited land availability for new landfills, research must develop context-appropriate technologies to integrate available large-scale facilities and to promote circular economic approaches that suit tropical climates, local economic conditions, and cultural practices. This research is essential for preventing environmental degradation, protecting tourism-dependent coastal zones, and creating sustainable waste management solutions.
Water resources and supply			
8	Descriptive and predictive modeling of water supply in changing climate scenario	• Integrated urban water cycle models: Development of holistic urban water models that simulate the entire water cycle including supply, distribution, consumption, wastewater treatment, stormwater management, and reuse systems under changing climatic conditions • Climate-resilient water management and adaptive water supply network optimization plans: Create machine learning algorithms that integrate real-time hydrological data, demand forecasting, and climate projections to optimize water allocation, storage management, and distribution system performance under various warming scenarios	Research in descriptive and predictive modeling of water supply under changing climate scenarios is urgently needed to address escalating water security threats. Climate change is intensifying droughts, altering precipitation patterns, and increasing extreme weather events, jeopardizing water availability. Traditional water management approaches based on historical data are inadequate for future planning under unprecedented climatic variability. Research must develop sophisticated modeling frameworks that integrate climate projections, hydrological processes, and supply-demand dynamics to predict water availability, identify vulnerable regions, and optimize adaptive management strategies. This research is critical for ensuring water security, preventing conflicts, and enabling proactive infrastructure investments for the future.

No	Priority Research Area	Expected Outcome for National Development	Justification
9	Use of digital infrastructure for water quality monitoring, assessment and remediation	• AI-driven water quality assessment and contamination source identification tools: Develop artificial intelligence and machine learning systems that can analyze complex water quality data from multiple sources to identify contamination patterns, predict pollution events, and trace contamination sources in real-time	Research in digital infrastructure for water quality monitoring, assessment, and remediation is critically needed to address growing water contamination threats affecting people who lack access to safely managed drinking water. Traditional manual monitoring methods are insufficient for detecting real-time contamination events, emerging pollutants, and waterborne pathogens that pose immediate health risks. With increasing industrial pollution, agricultural runoff, and climate-induced water quality fluctuations, research must develop IoT sensor networks, AI-driven assessment systems, and automated remediation technologies that can provide continuous monitoring, rapid contamination detection, and immediate response capabilities. This research is essential for preventing waterborne disease outbreaks, ensuring regulatory compliance, and protecting public health through proactive water quality management.
10	Assess socio-environmental aspects, economic impact of water supply and wastewater projects	• Integrated socio-economic impact assessment framework: Develop a comprehensive assessment framework for water infrastructure development in vulnerable communities • Water infrastructure valuation: Life-cycle environmental and economic analysis of water infrastructure systems	Research assessing socio-environmental aspects and economic impacts of water supply and wastewater projects is critically needed to ensure infrastructure investments achieve sustainable development goals while avoiding unintended consequences. Current project evaluations often focus narrowly on engineering metrics, overlooking significant social equity impacts, environmental externalities, and long-term economic effects that determine project success. Thus, research must develop comprehensive assessment frameworks that quantify health benefits, gender equality improvements, ecosystem impacts, and climate resilience costs. This research is essential for optimizing resource allocation, preventing environmental degradation, ensuring equitable access, and maximizing socioeconomic returns from water infrastructure investments.

2.15 MINISTRY OF YOUTH AFFAIRS AND SPORTS

- **Members of the Ad-hoc Committee**

Team Leader	Prof. Ajith De Silva, Professor, University of West Georgia, USA
Members	Dr. Muditha Senerath Yapa, Chief Innovation Officer, National Innovation Agency and Director General, National Initiatives for Research and Development for Commercialization (NIRDC) Dr. Suranga Dharmarathne, Associate Professor Engineering, University of Indianapolis, USA Dr. Jude Fernando, Associate Professor, Sustainability and Social Justice, Clark University, USA Dr. Lal Ekanayake, Institute of Sports Medicine Dr. Shiromi De Alwis, Anti-Doping Agency, Ministry of Youth Affairs and Sport Mr. Suranga Batepola, Ministry of Youth Affairs and Sport

- **Core Areas**:

1. National Youth Sports Development & Performance
2. Youth Needs Assessment and Engagement with Government
3. Youth Mental Health and Athlete Psychology
4. Sport Medicine, Injury Prevention & Nutrition
5. National Athlete Ranking, Talent Identification, and Olympic Strategy
6. Youth Inclusion, Marginalization, and Assimilation
7. Youth Civic Participation, Volunteerism, and Leadership
8. Anti-Doping, Substance Use, and Clean Sport
9. Community Infrastructure & Resource Utilization for Youth Empowerment
10. Youth Innovation, Technology, and Green Entrepreneurship

- **Recommendations**

No.	Priority Research Area	Expected Outcome for National Development	Justification
1.	National Youth Sports Development & Performance *(National youth sports programs, Sport-specific norms and benchmarks, Talent identification models, Community-based access to sports)*	To design and implement a sustainable, inclusive national after-school sports program in Sri Lanka that promotes physical fitness, mental resilience, teamwork, discipline, leadership, and clean sport values among youth. It seeks to expand access in underserved areas, develop a multi-sport curriculum, support talent identification through national benchmarks, optimize the use of school sports infrastructure, create community employment opportunities, and evaluate the social and developmental impact through evidence-based, regionally tailored pilot programs.	Early access to structured sports enhances physical fitness, mental resilience, and values like teamwork, discipline, and leadership. A national after-school sports program ensures inclusive development across Sri Lanka, especially in underserved areas. Establishing sport-specific norms and benchmarks will guide training and ensure consistency in youth development. Talent identification models will support evidence-based selection and nurturing of future athletes. Community-based access to school sports infrastructure not only promotes clean sport and lifelong engagement, but also creates local employment, reduces operational costs, and contributes to long-term national and social development.

No.	Priority Research Area	Expected Outcome for National Development	Justification
2.	Youth Needs Assessment and Engagement with Government *(Comprehensive needs research from youth, Database creation and alignment with national policy, Understanding youth expectations from government)*	To conduct a comprehensive youth needs assessment in Sri Lanka that captures personal aspirations, expectations from government, and required support systems, to build a national database that informs youth-centered policy and aligns development efforts with the real priorities of the younger generation.	Youth in Sri Lanka often feel unheard in national decision making, leading to policies that miss their real needs and aspirations. This research will collect detailed data on personal goals, challenges, and expectations from government, creating a comprehensive youth database. With this evidence, policymakers can directly address the most pressing concerns of young people, aligning national development with their priorities. By focusing on the top five or ten issues identified through this study, the government can deliver more targeted, impactful solutions that foster trust, inclusion, and long-term youth engagement in national progress.
3.	Youth Mental Health and Athlete Psychology *(National youth mental health framework, Athlete psychological readiness and mental resilience, Integration of Buddhist philosophy (Holistic Approaches) in sports psychology)*	To develop a national framework that enhances youth mental health and athlete psychology in Sri Lanka by improving mental health literacy, expanding early intervention and access to care, integrating social-emotional learning into education, strengthening data systems, and promoting culturally relevant mental conditioning to build resilience, reduce performance anxiety, and support long-term well-being and elite athletic performance.	Youth mental health challenges are rising in Sri Lanka, with stigma, low literacy, and limited early intervention delaying care. This research aims to establish a national framework that integrates age-appropriate education, school based screenings, and access to professional support to address these gaps. By embedding social emotional learning and culturally rooted psychological tools including Buddhist philosophy into schools and sports, the initiative promotes resilience, focus, and wellbeing. Strengthening data systems will ensure responsive support, while culturally relevant mental conditioning will enhance athlete performance and mental toughness, creating a holistic model for youth mental health and athlete psychology.

No.	Priority Research Area	Expected Outcome for National Development	Justification
4.	Sport Medicine, Injury Prevention & Nutrition *(Biomechanics, Injury surveillance and rehab Nutrition (modern and traditional), Sport equipment innovation)*	To design and implement a holistic sports medicine, injury prevention, and nutrition framework for youth in Sri Lanka that integrates ethical sporting values, culturally informed dietary practices, supplement safety, traditional and modern nutrition, sport-specific rehab protocols, injury surveillance systems, and locally innovated sports equipment, in order to enhance performance, reduce injury risk, support responsible athlete development, and align with the physical and cultural needs of diverse sporting communities.	Sri Lanka faces rising challenges in youth substance abuse, poor recovery, and injury mismanagement in sports. This research addresses these issues by promoting ethical sporting practices, leveraging traditional nutrition to reduce supplement reliance, and developing sport-specific dietary and rehab protocols. Injury surveillance and biomechanics will guide prevention, while local equipment innovation improves access and performance. Grounded in national priorities and supported by leading labs, this holistic approach enhances athlete health, reduces doping risks, cuts healthcare costs, and strengthens Sri Lanka's high-performance sports ecosystem for sustainable, culturally relevant athlete development.

No.	Priority Research Area	Expected Outcome for National Development	Justification
5.	National Athlete Ranking, Talent Identification, and Olympic Strategy *(National athlete ranking systems, Olympic sport identification and development strategy, Performance tracking and promotion pathways)*	To develop a standardized, data-driven national athlete ranking system that enables performance tracking, inclusive talent identification, and structured advancement pathways, while strategically identifying Olympic sports best suited for Sri Lankan athletes based on physiological, psychological, and contextual factors, to guide long-term development and international competitiveness.	Sri Lanka lacks a unified system to track, recognize, and develop athletic talent across all levels. A national athlete ranking system will bring transparency, encourage healthy competition, and support evidence-based talent identification from school to elite levels. By collecting reliable performance data and promoting structured advancement pathways, this initiative will strengthen athlete development, guide resource allocation, and support national selection. It will also identify Olympic or international sports best suited for Sri Lankan athletes, ensuring strategic focus and inclusivity by incorporating diverse regional talent into the country's long-term high-performance sports strategy.
6.	Youth Inclusion, Marginalization, and Assimilation *(Addressing systemic marginalization,*	To investigate the systemic causes of youth marginalization in Sri Lanka, evaluate existing assimilation programs, explore shared interests across diverse cultural, ethnic, and economic groups, and identify new	Youth from marginalized communities in Sri Lanka often face systemic barriers that limit their inclusion and participation in national development. Despite existing programs, gaps remain in effectively unifying youth across ethnic, cultural, and economic lines. This research aims to identify the root causes of marginalization, evaluate the effectiveness of current

	Promoting inclusion across ethnic, cultural, and economic lines, Assessing and improving assimilation programs)	strategies to promote unity and inclusive youth development.	assimilation efforts, and explore shared values and interests that can foster a more inclusive national identity. By proposing new, context-specific strategies, the study will contribute to stronger social cohesion and ensure that all young people have equal opportunities to thrive and contribute to society.
7.	Youth Civic Participation, Volunteerism, and Leadership *(National volunteer-leadership program, Recognition of volunteerism in education, Enhancing youth engagement in civil society and governance, Participatory civic engagement initiatives)*	To evaluate existing volunteer and leadership programs in Sri Lanka and their impact on youth development, assess the role of educational institutions, NGOs, and corporate networks in sustaining youth engagement, identify gaps and barriers in current civic initiatives, and develop a strategic national framework that integrates community service into formal education, promotes participation in civil society and governance, incorporates international best practices, and introduces policy mechanisms to formally recognize volunteerism in academic and vocational pathways.	Youth engagement in civil society is declining in Sri Lanka, limiting their contribution to democratic governance and community development. A national volunteer leadership program can reverse this trend by empowering young people, enhancing leadership skills, and fostering civic responsibility. Recognizing volunteer hours in academic and vocational admissions will incentivize participation, while real world experience promotes personal growth and career exploration. By studying current challenges and opportunities, this research aims to develop a strategic framework that strengthens youth participation, builds democratic institutions, and ensures more inclusive, responsive, and future focused governance.

No.	Priority Research Area	Expected Outcome for National Development	Justification
8.	Anti-Doping, Substance Use, and Clean Sport *(Anti-doping education Substance abuse prevention, Scientific research on doping detection, Rehabilitation programs for addicted youth)*	To conduct scientific research on substance, use and addiction among young athletes in Sri Lanka, evaluate the effectiveness of existing rehabilitation programs, enhance the accuracy and reliability of anti-doping testing, identify washout periods for commonly used prohibited medications, and develop clear, evidence-based guidelines for therapeutic use exemptions and results management to strengthen clean sport practices nationally.	With rising narcotic abuse among youth in Sri Lanka, young athletes are increasingly vulnerable to substance use and addiction. This research is essential to assess the effectiveness of current rehabilitation programs in promoting recovery and clean reintegration into sport. Additionally, scientific investigation into the pharmacokinetics and washout periods of banned substances will guide accurate doping detection and athlete education. By strengthening the therapeutic use exemption (TUE) process with evidence-based criteria, the study will support fair decision making while safeguarding athlete health and upholding clean sport principles.

No.	Priority Research Area	Expected Outcome for National Development	Justification
9.	Community Infrastructure & Resource Utilization for Youth Empowerment *(Shared use of school sports infrastructure Models for community integration and financial sustainability, Equitable access to infrastructure and services for youth empowerment)*	To optimize the shared use of school sports infrastructure by expanding community access, enhancing financial sustainability for schools, and reducing government expenditure through efficient facility utilization and management.	The lack of a formal model for the optimal use of school sports infrastructure limits the ability to share these valuable facilities with the wider community. Additionally, insufficient funding for sports infrastructure development poses a critical challenge. Therefore, it is essential to focus on maximizing existing facility utilization to reduce government expenditure, improve financial sustainability for schools, and broaden community access, ensuring efficient use of resources for youth empowerment and sports development.
10.	Youth Innovation, Technology, and Green Entrepreneurship *(IT and digital literacy, Rural tech hubs, Youth entrepreneurship and innovation ecosystems, Green tech and climate-smart business models, Youth-driven environmental and sustainability solutions, Startup incubators)*	To empower youth through digital literacy, technology hubs, and entrepreneurship programs that foster sustainable agriculture, green innovation, and social enterprises, while bridging the rural-urban divide, promoting climate action, and driving economic growth through new business creation and community-focused tech solutions.	Youth led initiatives in agriculture, technology, and green entrepreneurship are vital for sustainable development in Sri Lanka. By integrating digital literacy with climate smart farming, youth transform traditional practices into resilient, innovative systems that ensure food security and economic growth. Their engagement bridges rural and urban divides, preserving cultural heritage while embracing technology. Youth driven climate action fosters environmental restoration and sustainable livelihoods, positioning Sri Lanka competitively in the global green economy. Empowering youth with IT skills and entrepreneurial support enables them to address local challenges with innovative solutions, ensuring inclusive development and l progress.