<div align="center">Home page</div>

Title: Understanding Land Use Changes in Pannala DSD

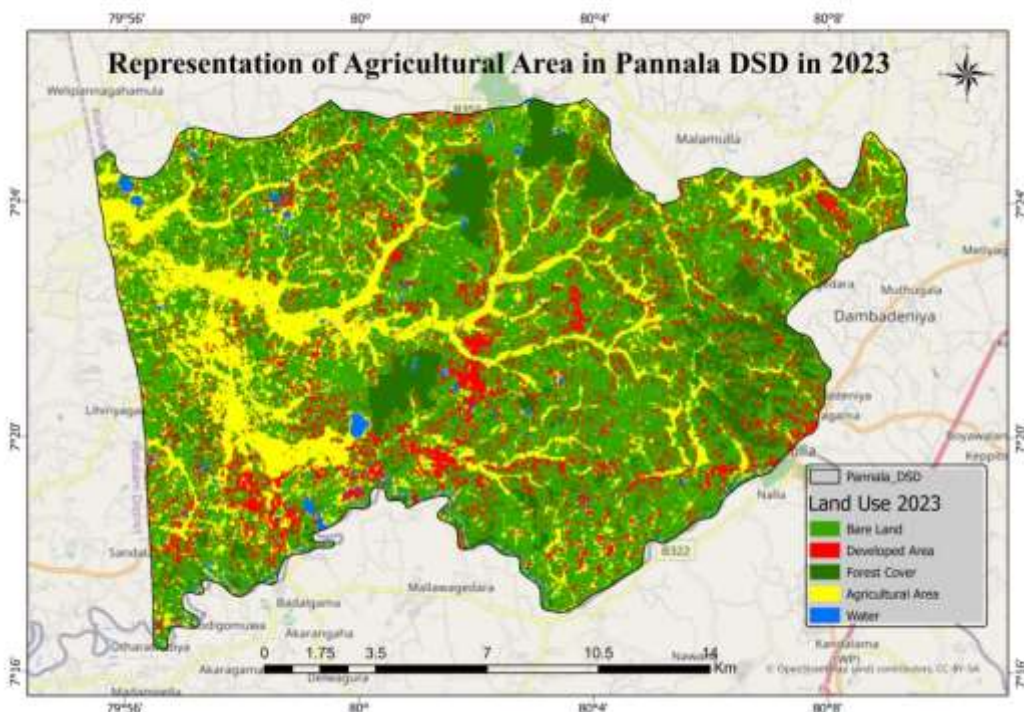Land Use change and paddy cultivation in Pannala DSD

A study of Land cover and agricultural impact in Pannala DSD

Understanding the future prediction of Land use changes in Pannala DSD

Introduction: This website presents an in-depth analysis of land use and land cover changes in the Pannala Divisional Secretariat Division and their impact on paddy cultivation. Our goal is to provide valuable insights for sustainable agricultural practices and policymaking.

Paddy cultivation can also be identified as a major component of local agriculture. Attention is also drawn here to the impact of changes such as urbanization, industrialization, and environmental stress on it.
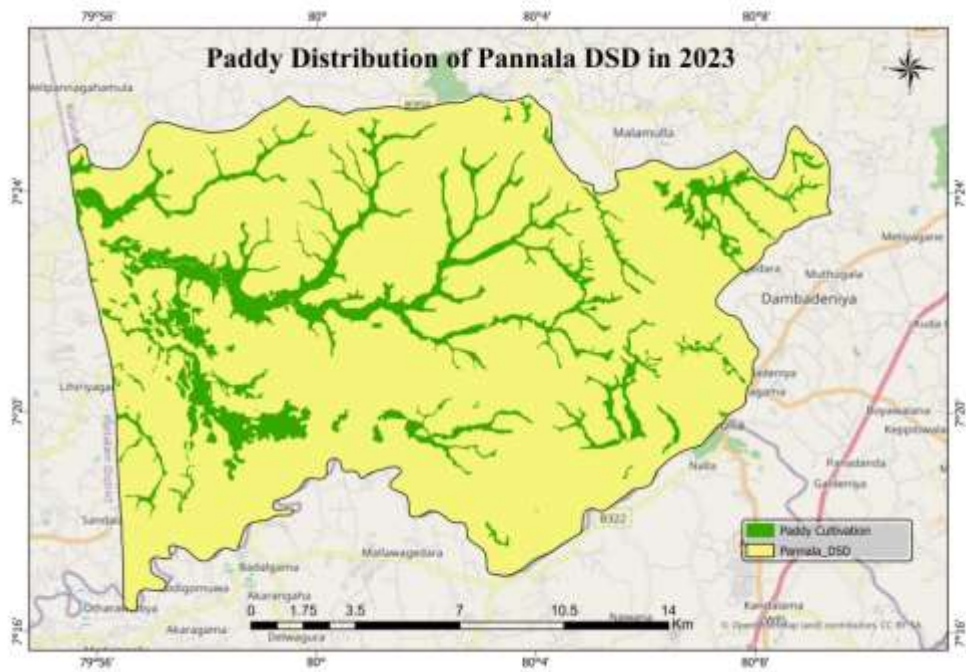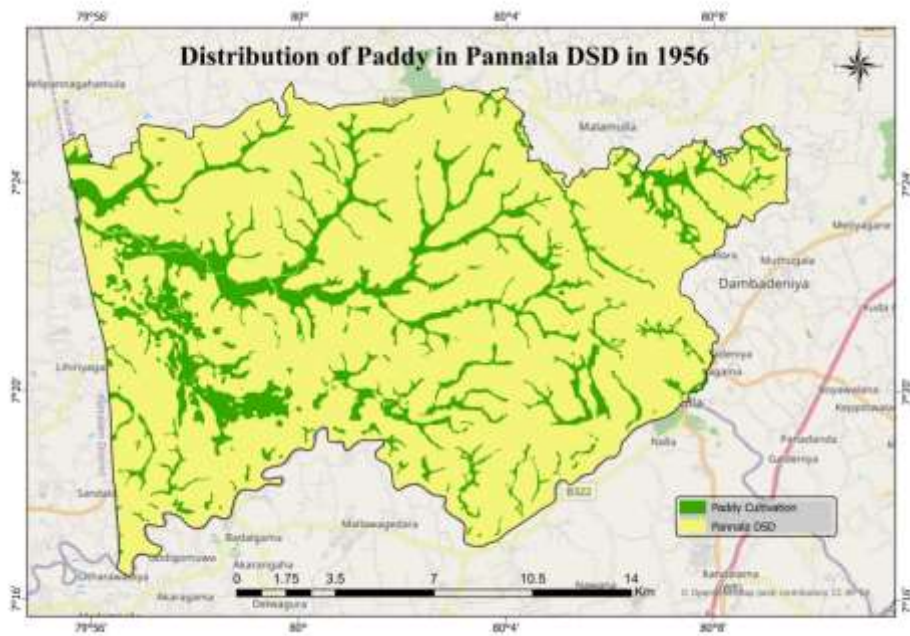
Agricultural Land Use Map- -2023
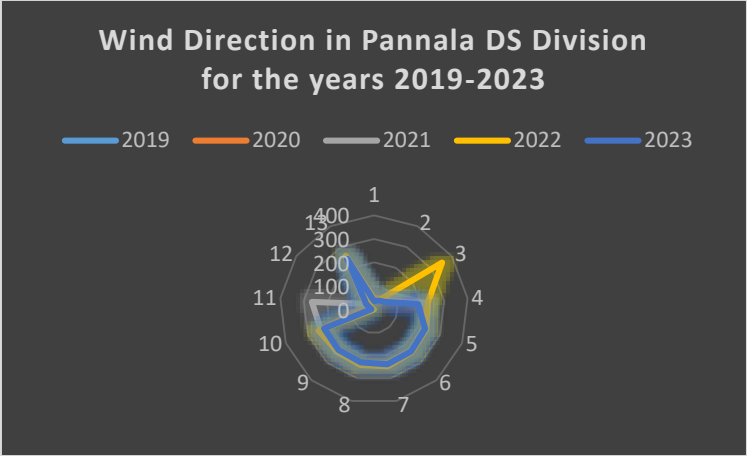
About the study

Background of the study;

Paddy cultivation is an integral part of Sri Lanka's agricultural tradition. In Pannala DSD, rapid urbanization and industrialization have led to significant land use changes, challenging food security and local livelihoods.

Objectives;

- **To identify spatial and temporal changes in land cover in 1956, 2000, 2014, and 2023.**
- **To identify existing agricultural land use changes in Pannala DSD**
- **To determine the key socio-economic and environmental factors driving the changes in paddy cultivation.**
- **To predict future agricultural land use change**
- **To propose policy recommendations and practical measures for mitigating the adverse impacts of land use changes on paddy cultivation**

Distribution of Paddy in Pannala DSD in 1956

Paddy Distribution of Pannala DSD in 2023

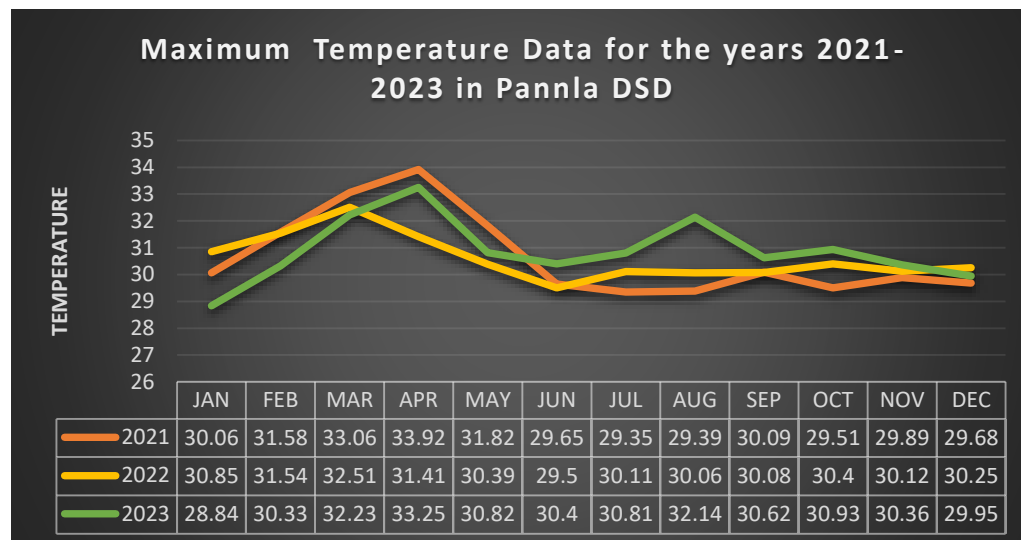Wind Direction in Pannala DS Division for the years 2019-2023

Wind Speed at 10 meters (m/s) in Pannnla DS Division in 2019-2023

wind speed	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
WS10M	2019	5.49	4.2	2.76	2.9	5.9	7.12	6.46	7.02	5.5	3.3	3.4	4.77	4.9
WS10M	2020	4.87	5.4	2.52	2.4	4.9	6.34	5.64	6.05	6.3	5.5	3.5	4.99	4.86
WS10M	2021	4.3	5.1	3.46	3.2	5	6.13	6.58	6.25	6.1	4.8	4.4	4.49	4.99
WS10M	2022	4.56	4.7	3.99	2.9	6.9	6.2	5.74	6.61	6.1	5	3.5	4.77	5.07
WS10M	2023	5.69	5.5	3.5	2.5	5	6.72	6.48	6.15	6.6	3.9	2.7	4.98	4.98

Precipitation (mm) in Pannala DS Division 2019-2021

Maximum Temperature Data for the years 2021-2023 in Pannla DSD

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	30.06	31.58	33.06	33.92	31.82	29.65	29.35	29.39	30.09	29.51	29.89	29.68
2022	30.85	31.54	32.51	31.41	30.39	29.5	30.11	30.06	30.08	30.4	30.12	30.25
2023	28.84	30.33	32.23	33.25	30.82	30.4	30.81	32.14	30.62	30.93	30.36	29.95
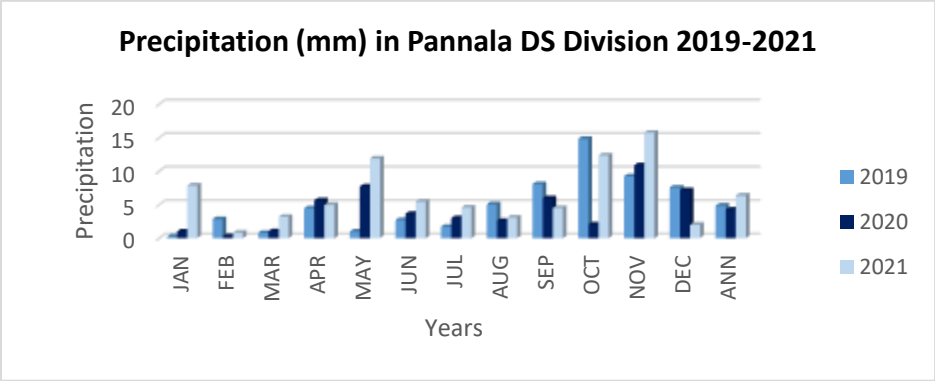
Methodology

Here, satellite images, data from the Survey Department, and Google Earth Pro are used for the first and second objectives. For the third objective, a questionnaire survey is used, and for the fourth objective, the study is conducted using the cellular automata model.

Pages

Land cover change

There is a steady and rapid expansion of developed lands throughout these three periods. From 1956-2023, the developed areas are showing a very low to very high expansion, surpassing agricultural, forest, and hay lands. The land use pattern of the Pannala Divisional Secretariat Division shows a high urban expansion and infrastructure development. The spatial and temporal changes in the study area from 1956 - 2023 are summarized in Table 1.4 below. (Here, the main agricultural land areas in 1956 are summarized together.)
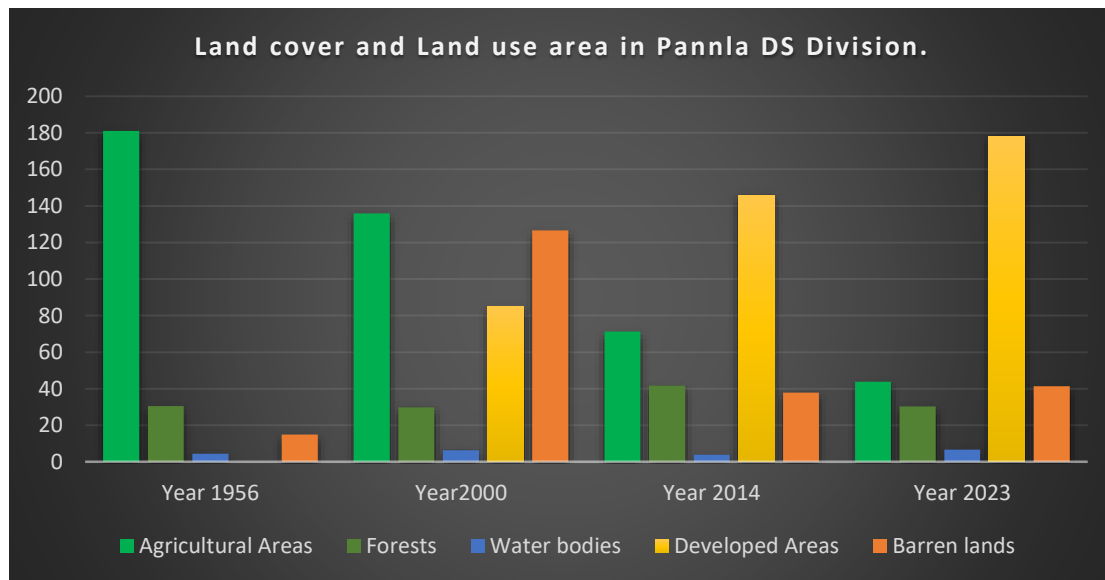
Table 1.4 ; LULC Change 1956-2023 (sq km)

| Land Use Category	Year 1956	Year2000	Year 2014	Year 2023
Agricultural Areas	180.98	135.98	71.31	43.76
Forests	30.54	29.86	41.66	30.41
Water bodies	4.43	6.37	3.84	6.70
Developed Areas		84.99	145.91	178.33
Barren lands	14.97	126.69	37.93	41.45

Source: Prepared by author,2025

The information represented by the above data is illustrated in the following diagrams.

Figure 1.4 LULC by area in Pannala DSD

Source: Prepared by author,2025

Figure 1.5 ;LULC by area in Pannala DSD

Land cover and land use area in Pannal DS Division.

- Agricultural Areas
- Forests
- Water bodies
- Developed Areas
- Barren lands
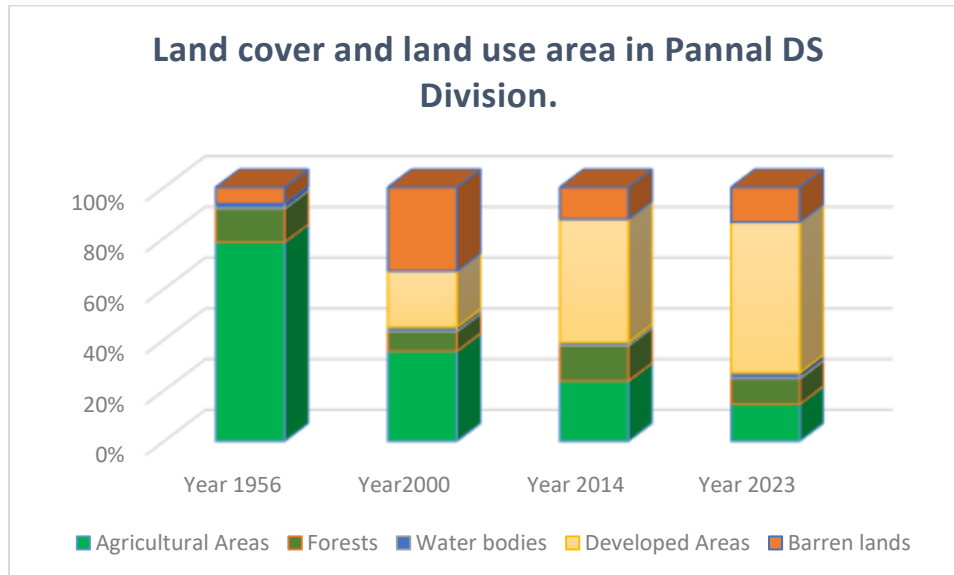
Source: Prepared by author,2025

Referring to Table 1.4 and Figures 1.4 and 1.5 above, the forest pattern shows a fluctuating trend. Although there was a decline in forest cover during 1956-2000, there was a moderate increase during 2000-2014. A decline is shown again during 2014-2023. The temporary increase may indicate reforestation or natural regrowth, while the recent decrease suggests that forests have been cleared again for development.

Also, mainly in the year 1956, there was a high amount of agricultural area of 180 sq km, and by 2023 it had decreased to 43.76 sq km. A very high decrease is shown. These areas have now become developed areas.

Agricultural Land Use

Socio-Economic Factors

Future Prediction

Polices

Current and Future Impacts on Paddy Cultivation

Paddy cultivation in the Pannala Divisional Secretariat Division has experienced significant disruption due to ongoing land use and land cover (LULC) changes. Urbanization, industrial development, and environmental degradation have led to a steady decline in paddy lands. If these trends continue unchecked, the situation is expected to worsen by 2030 and 2040, affecting food security and the livelihoods of farming communities (Gunawardena & Goonetilleke, 2020; Herath et al., 2019). These changes threaten the sustainability of local agriculture and require immediate policy interventions.

The Need for Public Awareness

Raising public awareness about the importance of paddy cultivation and the threats posed by unplanned land use is essential. Many landowners and communities are unaware of the long-term impacts of converting paddy lands into residential or industrial zones. Educating communities through websites, workshops, social media campaigns, and school programs can foster a culture of environmental stewardship and sustainable land use practices (Wijesekera et al., 2021).

Policy Recommendations for Government and Authorities

To mitigate further degradation of paddy lands, local and national authorities must implement strong, enforceable policies. These may include zoning regulations to protect agricultural zones, incentives for sustainable farming, and penalties for unauthorized land conversion. Furthermore, integrating Geographic Information Systems (GIS) into land planning can help monitor LULC changes in real time and guide decision-making (Perera & Amarasinghe, 2022). Collaborative governance between stakeholders—farmers, planners, and policymakers—is key to ensuring the future of agriculture in the region.