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Enhancing Paddy Yield in Kole Wetlands: Padasekharam Level Classification and Intervention Strategies

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Authors' contributions

This work was carried out in collaboration among all authors. Authors SVG, AB, CVS, AKR, JM and SKS contributed equally to the conception, design, experimentation, and drafting of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The Kole Wetlands of Kerala, a Ramsar-designated agroecosystem, play a vital role in regional food security, climate regulation, and rural livelihoods. This study presents a novel padasekharam-level classification model that integrates five-year productivity data (2019–2023), cultivated area,

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and inter-annual yield stability (Coefficient of Variation, CV) to identify heterogeneity across 271 management units. Padasekharams were grouped into eight typologies (A–H) using a three-dimensional framework: size (large/small), yield level (high/low), and yield stability (stable/unstable; CV threshold: 20%). Results revealed stark contrasts: Groups A (Large–High–Stable) and E (Small–High–Stable) demonstrated consistent performance due to robust infrastructure and climate-smart practices, while Groups D (Large–Low–Unstable) and H (Small–Low–Unstable) suffered from high volatility (CV >75%), driven by bund degradation, drainage congestion, and agronomic lapses. A group-specific intervention matrix linked field performance to tailored strategies, emphasizing water infrastructure rehabilitation (e.g., sluice installation for Group H), risk mitigation (e.g., submergence-tolerant varieties for Group F), and precision agronomy (e.g., site-specific nutrient scheduling and Alternate Wetting and Drying for Group A). Beyond the Kole, the model has applicability for similar floodplain rice ecosystems in Kuttanad (India), the Haor basins (Bangladesh), and the Mekong Delta (Vietnam). By linking yield classification with actionable strategies, this framework shifts policy emphasis from blanket subsidies toward localized, climate-smart investments. The approach supports Kerala's Climate-Resilient Agriculture Mission and contributes to Sustainable Development Goal 2 (Zero Hunger).

Keywords: Paddy yield; Kole wetlands; intervention strategies; padasekharam level classification.

1. INTRODUCTION

The Kole Wetlands of Kerala, extending across the Thrissur and Malappuram districts, represent one of India's most unique paddy ecosystems. Recognized under the Ramsar Convention, these wetlands span over 13,600 hectares and support seasonal rice cultivation on alluvial floodplains using a bunded basin system. Paddy farming in the Kole is crucial not just for food security but also for rural employment, ecosystem services, and flood mitigation. Despite these benefits, the region faces growing stress due to climate variability, delays in water release, bund failure, and declining returns from rice cultivation. Local communities report falling productivity and increasing uncertainty in cropping decisions (Government of Kerala, 2024).

Existing literature has highlighted several drivers behind stagnating paddy yields in Kerala, such as poor varietal replacement, low investment in irrigation modernization, and lack of site-specific advisory systems (Sunil *et al*., 2023; Karunakaran, 2014; Vivek & Bonny, 2023). Many government interventions adopt a uniform approach, ignoring micro-variations in field conditions, landholding structures, and productivity zones. While studies have analyzed rainfall impact (Riya & Ajith Kumar, 2023), varietal response, and farmer adaptation (Lasithamol *et al*., 2025), few have attempted spatially disaggregated analysis at the padasekharam level—i.e., the smallest management unit of Kole land. Moreover, limited research has examined inter-annual yield stability or tailored interventions for low-performing or volatile zones. Recent studies have highlighted that agricultural wetlands provide not only provisioning services such as rice and fisheries, but also regulating and cultural ecosystem services critical to climate resilience and community well-being (Asare *et al*., 2022; Wood *et al*., 2024; van Dam *et al*., 2025). These functions, however, are increasingly threatened by climate variability and altered hydrology (Saseendran et al., 2000; Zhang et al., 2021), underscoring the need for context-specific management strategies.

This paper addresses that gap by analyzing padasekharam-level data on area, productivity, and five-year yield trends (2019–2023) across 271 units in the Kole wetlands. Using a composite classification approach, padasekharams are grouped into performance categories based on average yield, field size, and stability (coefficient of variation). The study aims to identify critical typologies of underperformance and recommend targeted agronomic, institutional, and infrastructural interventions. The results will help planners, extension officials, and farmer organizations to shift from blanket strategies to performance-driven, zone-specific solutions tailored to the ecological and social realities of the Kole ecosystem.

2. RESEARCH METHODOLOGY

2.1 Research Design and Objectives

This study adopted a quantitative, spatially disaggregated approach to classify and analyze the productivity performance of padasekharams in the Kole Wetlands. The primary goal was to categorize padasekharams based on three critical variables—net cultivated area, average paddy productivity, and yield consistency over time—and derive actionable intervention strategies tailored to each category.

2.2 Data Sources and Preparation

The dataset comprised padasekharam-wise area, production, and productivity values for the period 2019–2023. These were extracted from the Atlas of Kole Lands of Kerala: Volume 2, published by Kerala Agricultural University, and validated against official panchayat records (Sunil *et al.,* 2024). Data fields included GIS-mapped net sown area (ha), total production (kg), and yield (kg/ha). Entries with missing or anomalous values were excluded after verification. A total of 271 padasekharams across the Thrissur Kole and Ponnani Kole were retained for final analysis.

2.3 Classification Framework

The classification employed a three-dimensional typology to evaluate padasekharam performance in the Kole wetlands. First, padasekharams were categorized by area into 'large' and 'small' based on the median size of approximately 48 hectares. Second, productivity was assessed using the average yield over the five-year period from 2019 to 2023. Padasekharams with an average yield above the median value of around 4.0 tonnes per hectare were designated as 'high-yield', while those below were marked as 'low-yield'.

The third dimension, yield stability, was determined using the Coefficient of Variation (CV), a widely adopted metric for agroecological risk assessment (Pandey & Bhandari, 2009; FAO, 2020). A CV below 20% was classified as stable performance, based on established thresholds for rice systems in floodplain ecosystems (Nath & Lal, 2017; IRRI, 2022), while CV ≥20% indicated unstable yield patterns. This threshold aligns with Kerala's agroclimatic variability, where sub-20% CV reflects manageable risk under typical monsoon fluctuations. Combining these three dimensions resulted in eight final categories: A (Large–High–Stable), B (Large–High–Unstable), C (Large–Low–Stable), D (Large–Low–Unstable), E (Small–High–Stable), F (Small–High–Unstable), G (Small–Low–Stable), and H (Small–Low–Unstable). This multidimensional classification enabled a more nuanced understanding of performance dynamics and intervention needs across the padasekharams.

2.4 Statistical and Analytical Tools

All computations, including CV, averages, and frequency distribution, were performed in MS Excel and R. Trend lines were plotted for each group to visualize performance volatility. Results were cross-tabulated to identify intervention priority areas. Strategy recommendations for each group were validated through structured workshops with 42 members of the Kole Farmers' Federation and technical experts from KAU's Agronomic Advisory Wing. These workshops employed a Delphi method, iteratively refining interventions based on field realities (e.g., bund integrity, water access) and local feasibility. Participatory mapping exercises further cross-verified spatial trends in yield stability.

This composite method allowed for granular diagnosis of stagnating, vulnerable, and outperforming zones. The grouping system thus served both analytical and policy planning purposes and enables targeted interventions responsive to actual field performance.

3. RESULTS AND DISCUSSION

3.1 Overview of Padasekharam Classification

A total of 271 padasekharams were classified into eight typological groups based on area, average yield, and inter-annual yield stability. The most common category was Group E (Small–High–Stable) with 68 padasekharams (25.09%), indicating the success of small farms in maintaining high and consistent productivity. This was closely followed by Group F (Small–High–Unstable) with 67 units (24.72%), reflecting high output under unstable conditions, likely due to pest or weather sensitivity.

At the opposite end, Group A (Large–High–Stable) included 35 padasekharams (12.92%), highlighting the limited distribution of optimal and resilient large-scale fields. Group H (Small–Low–Unstable) accounted for 65 fields (23.99%), pointing to the widespread presence of marginal, risk-prone production zones.

Groups C (Large–Low–Stable) and G (Small–Low–Stable) had no representation, suggesting that low-yielding but stable systems are either rare or have shifted due to external pressures. Overall, the classification confirms high variability in productivity and climate resilience across the Kole wetlands, consistent with prior observations on infrastructure gaps and input mismanagement.

3.2 Spatial Distribution Patterns

Spatial analysis of the reclassified dataset revealed clear geographic clustering of padasekharam groups across the Kole wetlands. High-performing and stable padasekharams—notably those in Group A (Large–High–Stable) and Group E (Small–High–Stable)—were predominantly concentrated in regions such as Arimpur, Adat, Puzhakkal, and parts of Tholur. These areas benefit from early water release schedules, functional field bunds, and proximity to regulator-controlled irrigation canals like Peechi and Chimoni, which enable timely sowing and reduce risks of prolonged waterlogging. The presence of cohesive farmer organizations in these panchayats further supports synchronized planting and adoption of recommended varieties.

In contrast, low-performing and unstable padasekharams, especially those in Group D (Large–Low–Unstable) and Group H (Small–Low–Unstable), were mostly located in peripheral and low-lying panchayats such as Anthikkad, Chazhoor, and parts of Thanniyam. These fields face chronic drainage congestion, breached or eroded bunds, and greater susceptibility to saline intrusion and prolonged flooding, especially during late monsoons. Infrastructural neglect and poor maintenance of internal canal networks further exacerbate inter-annual yield volatility.

This spatial disparity aligns with broader wetland rice cultivation patterns globally, where micro-level differences in water governance, bunding integrity, and elevation gradients significantly determine both productivity and risk exposure (Nath & Lal, 2017). Targeted interventions in vulnerable zones—especially Group H clusters—are essential for restoring production resilience and equity across the Kole system.

3.3 Yield Stability and CV Trends

Updated analysis of the Coefficient of Variation (CV) across padasekharam groups reveals pronounced disparities in yield stability. The most consistent performance was observed in Group E (Small–High–Stable) with an average CV of 12.2%, followed closely by Group A (Large–High–Stable) at 12.8%. These low CV values reflect the success of well-managed systems with dependable irrigation, efficient bunding, and timely crop operations. Their stability confirms the role of both physical infrastructure and localized farm management in buffering climatic variability.

In contrast, yield fluctuations were severe in Group H (Small–Low–Unstable) with a CV of 81.6% and Group D (Large–Low–Unstable) at 75.3%, highlighting the vulnerability of these regions to environmental stressors. Group F (Small–High–Unstable) and Group B (Large–High–Unstable) also showed elevated CVs of 38.3% and 37.0% respectively, despite having high average yields. The instability in these groups is commonly linked to flooding, pest incidence, bund breaches, and sowing delays, particularly during high rainfall years such as 2020 and 2022.

Table 1. Distribution of padasekharams by final classification

Group	Typology	Count	% of Total
A	Large–High–Stable	35	12.92
B	Large–High–Unstable	27	9.96
C	Large–Low–Stable	0	0
D	Large–Low–Unstable	9	3.32
E	Small–High–Stable	68	25.09
F	Small–High–Unstable	67	24.72
G	Small–Low–Stable	0	0
H	Small–Low–Unstable	65	23.99
	Total	271	100

Table 2. Coefficient of Variation (CV) by padasekharam group (2019–2023)

Group	Typology	Avg. CV (%)	Stability	Remarks
A	Large–High–Stable	12.8	Stable	Excellent bunding and drainage
B	Large–High–Unstable	37.0	Unstable	Volatile under rainfall stress
C	Large–Low–Stable	0.0	Stable	Predictable but low yield
D	Large–Low–Unstable	75.3	Unstable	Structural degradation
E	Small–High–Stable	12.2	Stable	Good drainage and varietal fit
F	Small–High–Unstable	38.3	Unstable	High pest and climate risk
G	Small–Low–Stable	0.0	Stable	Low but steady yields
H	Small–Low–Unstable	81.6	Unstable	Severely affected by flooding

These findings support the observations of Bowden *et al.* (2023), who reported a strong inverse relationship between monsoon onset variability and paddy yield stability in Kole wetlands. Similarly, Pandey and Bhandari (2009) highlight that drought and erratic rainfall exacerbate yield instability in Asian rice systems, underscoring the need for adaptive strategies in vulnerable zones. The data underscores the need for targeted risk-mitigation strategies, particularly in Groups D, F, and H, to address structural deficiencies and improve adaptive capacity.

3.4 Infrastructure–Performance Linkages

The updated classification reinforces a clear relationship between infrastructure quality and padasekharam performance. Padasekharams in Group A (Large–High–Stable) and Group E (Small–High–Stable) consistently benefitted from robust infrastructure—well-maintained bunds, efficient drainage channels, and routine desilting of canals. These areas, especially in panchayats like Adat, Arimpur, and Puzhakkal, also featured active local institutions that oversaw sluice gate management and collective irrigation planning, enabling timely sowing and harvest cycles with minimal climate-induced disruption.

In contrast, padasekharams in Group D (Large–Low–Unstable) and Group H (Small–Low–Unstable)—notably in Anthikkad, Chazhoor, and Thanniyam—suffered from deteriorated bunds, silted feeder canals, and non-functional sluices. These structural deficiencies exacerbated the impacts of heavy rainfall, leading to prolonged submergence, delayed transplanting, and higher yield losses. In several cases, fields in these groups recorded CVs above 70%, indicating extreme yield volatility despite comparable soil and varietal conditions.

These observations align with findings by Srinivasan (2010)**,** who documented degradation of bunds, silted canals, and poor sluice management in the Kole wetlands, particularly affecting padasekharams in Anthikkad and adjacent low-lying blocks. They also reinforce findings by Li *et al*., (2023) who emphasize that infrastructure resilience is the cornerstone of sustainable productivity in wetland-based rice systems. Economic assessments reinforce this perspective, showing that investments in wetland infrastructure rehabilitation and green water-management solutions generate substantial socio-ecological returns compared with input-based subsidies (Palafox-Juárez *et al*., 2025; Garcia-Herrero *et al*., 2023).

3.5 Agronomic Practices and Variety Suitability

Updated field-level data confirm that agronomic management played a critical role in differentiating padasekharam performance across groups. In Groups A (Large–High–Stable) and E (Small–High–Stable), farmers consistently adopted recommended rice varieties such as Uma, Jyothi, and Sreyas, which are well-suited to the Kole wetland agroecology. These groups also implemented Site-Specific Nutrient Management (SSNM) and Alternate Wetting and Drying (AWD) techniques—practices that not only improved nutrient uptake but also enhanced water use efficiency and root development. As a result, these padasekharams showed high yields with relatively low Coefficient of Variation (CV), indicating consistent performance even in moderately variable climate conditions.

In contrast, padasekharams in Groups D (Large–Low–Unstable) and H (Small–Low–Unstable) were characterized by poor agronomic planning. Farmers in these groups often relied on non-recommended or outdated seed varieties, lacked awareness or access to balanced fertilization protocols, and showed limited adoption of integrated pest and disease management. These shortcomings led to reduced crop vigor, delayed maturity, and increased susceptibility to both biotic (pests, pathogens) and abiotic (waterlogging, salinity) stressors. Many of these padasekharams recorded yield fluctuations of over 80%, despite being in similar agroclimatic zones as better-performing counterparts.

These patterns validate the findings of Bouman and Tuong (2001) and Li *et al*. (2023), who emphasized that knowledge-based interventions—including variety matching, nutrient scheduling, and water-smart practices—are far more effective than blanket input supply models in sustaining wetland rice productivity. Future extension efforts in the Kole region should therefore prioritize localized training, participatory variety selection, and real-time crop monitoring to improve resilience and close yield gaps.

3.6 Group-Wise Strategic Intervention Matrix

Based on the updated classification of 271 padasekharams, targeted interventions are proposed to align with the specific constraints and potential of each group. These strategies draw on ground-level observations, stakeholder feedback, and yield-CV profiles, and aim to enhance both productivity and resilience across the Kole ecosystem.

These recommendations are in line with recent insights from IRRI (2022), and ongoing projects under Kerala Agricultural University's Kole Agri-Resilience Initiative. They reflect the need to balance yield enhancement, infrastructure revival, and climate-smart transitions tailored to localized needs across the Kole wetlands.

Table 3. Group-wise strategic recommendations for kole padasekharams

Group	Strategic Focus Areas	Expanded Recommendations
A	Precision enhancement & scaling	Integrate Alternate Wetting and Drying (AWD) with sensor-based field monitoring; promote mobile-based real-time advisory apps; scale precision nutrient delivery and IPM modules via cooperatives.
B	Infrastructure & varietal resilience	Reinforce main and lateral bunds using geotextiles or compacted soil; promote short-duration flood-tolerant varieties like *Swarna Sub1*; install field-level sluices and emergency drainage channels.
C	Diversification & mechanization	Support off-season cropping (short-duration pulses or leafy vegetables); facilitate mechanized sowing/harvesting tools via FPOs; explore reclaimed-bed rabi cropping pilots.
D	Rehabilitation & alternate livelihoods	Implement padasekharam-specific restoration through bund re-sectioning, canal clearing, and sluice installation; engage Kudumbashree units in duck rearing, aquaculture, and mat weaving as alternative incomes.
E	Sustainable intensification	Expand ICT-enabled pest/nutrient advisory platforms; encourage climate-smart rice practices including low-emission fertilization; support organic matter recycling via compost pits and green manures.
F	Risk mitigation & adaptation	Introduce submergence-tolerant and BPH-resistant varieties; deploy community weather alert systems and emergency bund repair kits; strengthen agro-advisory dissemination using farm radio and SMS.
G	Varietal trials & community seed systems	Initiate participatory varietal trials with support from KVKs and research stations; develop community seed hubs and training on seed storage and purity checks; map micro-elevation to match germplasm.
H	Infrastructure rebuilding & water governance	Launch ward-level bund restoration drives using MGNREGA convergence; install manual or solar-powered irrigation pumps; create local irrigation committees to regulate rotational flow and canal outlet scheduling.

3.7 Policy Implications and Wider Applicability

The refined classification model—based on area, yield performance, and inter-annual yield stability (CV)—demonstrates strong potential for broader application beyond the Kole wetlands. This aligns with global insights on overcoming water challenges in wetland agriculture (FAO, 2020), emphasizing the need for localized water management strategies. Its utility lies in its ability to pinpoint spatial and structural disparities across wetland agroecosystems, enabling evidence-based, group-specific interventions. The methodology, which combines multi-year productivity data with field-level attributes such as bund condition and crop management, can be replicated in other lowland paddy ecosystems like the Kuttanad wetlands (Kerala), the Haor basins (Bangladesh), or the Mekong Delta (Vietnam).

From a policy perspective, this model equips planners to prioritize investments under programs like MGNREGA, RKVY, and Rebuild Kerala Initiative by directing resources toward unstable and marginal padasekharams (Groups D, F, and H). It also supports the strategic clustering of interventions—such as bund restoration, varietal dissemination, and digital agro-advisory rollouts—based on group characteristics rather than administrative boundaries.

Furthermore, by linking field classification outputs with remote sensing platforms and farmer feedback via mobile apps or extension surveys, state departments can build dynamic intervention dashboards. This aligns directly with Sustainable Development Goal 2 (Zero Hunger) and Kerala's Climate-Resilient Agriculture Mission, emphasizing a shift from uniform subsidy regimes to data-driven, location-specific investments that maximize impact per unit of public spending. The model offers a replicable template for transforming how wetland paddy systems are understood, managed, and supported under climate uncertainty.

4. CONCLUSION

This study provides a detailed classification of 271 padasekharams in the Kole Wetlands, using a multi-criteria framework based on cultivated area, five-year average yield, and coefficient of variation (CV) to assess inter-annual yield stability. The classification revealed distinct performance zones—where Groups A and E emerged as stable, high-yielding padasekharams due to robust infrastructure and informed agronomy, while Groups D and H reflected yield vulnerability due to bund failure and agronomic lapses.

The findings underscore the inadequacy of blanket input-driven policies and highlight the value of a data-driven, spatially disaggregated framework for targeted public investment. The proposed intervention matrix offers actionable guidance for state departments, local governments, and farmer institutions to prioritize restoration, risk mitigation, and sustainable intensification.

Replicable across similar wetland ecosystems, this framework supports ongoing efforts under SDG 2 (Zero Hunger) and Kerala's Climate-Resilient Agriculture initiatives. It directly aligns with the Kerala State Action Plan on Climate Change (Government of Kerala, 2022), which prioritizes adaptive agricultural strategies for vulnerable ecosystems. Future work should incorporate income variability, water command data, and real-time farmer feedback. Empowering padasekharam-level institutions with this diagnostic tool will be crucial in realizing productivity gains, ecological balance, and rural livelihood security across the Kole landscape.

While this study provides valuable insights, certain limitations should be acknowledged. The classification model is based primarily on historical yield and area data (2019–2023), which may not fully capture recent socio-economic or institutional changes influencing productivity. Socio-economic variables such as labor availability, input access, and farmer decision-making were not directly incorporated, though they are known to shape outcomes in wetland systems. Additionally, while expert validation workshops strengthened the intervention framework, further participatory trials at the farm level are necessary to confirm long-term effectiveness. Future research should therefore integrate socio-economic indicators, hydrological monitoring, and farmer feedback systems to refine and operationalize the model.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1. Chat GPT 4o (mini) has been used for editing and correcting of article.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Appendix 1. List of Padasekharams included in different groups

Group	Padasekharams
A	Arumuri Kole Padavu, Chaladi Pazham Kole Padavu, Karotte Kolepadavu, Kodayatti Vazhikoran Kole Padavu, Krishnankotta, Rejamuttu, Vilakkumadam Karshaka Samithi, Alappad Padavu, Pullu, Varyamkole, Manalurthazham, Uppungal Padavu, Chenam Tharissu Padavu, Jubilee Thevar Padasekaram, Jubilee Thevar Padavu, Kodannur Kole , Chirakazhathazham, Chittamthazham, Pazhanji, Valiyadam Vattakaayal, Vettikadavu, Kattoor Thekkumpadam Koottukrisi Sangham, Karimpadam Kole Karshaka Samathy, Chemmanda Puliyapadam, Kolothupadam, Neelayil Kole Padavu, Noonakkadav, Kolothumpadam, Chathan kole, Kurudan Akkatan, Nalumuri Nadumuri, Payee Kole, Mundurthazham Kole Padavu, Menchira Padav, Sangham Kole North Padav
B	Manakody-Veluthur Ulppadam, Anthikad, Inchamudi, , Jayanthi, Kanimangalam , Pallipuram-Alappad Kole , Mangad, Muriyad Kayal Thekkeppadam, Annakara Vadakku, Madhukkara Thekku, Madhukkara Vadakku , Elamutha , Kizhakke Karimbadam, Padinjare Karimbadam, Ponnamutha, Thekke Konjira, Wadakke Konjira, Kollathupadam kole padavu, Thiruthummal kole padavu, Ayilakkad Kannenkayal Kole, Chirukandath Kole, Choorakatukara Padavu, Puthen Kole, Karuthani-vally kole padavu, Ponnorthazham, Sangham Kole South Padav, Kattoor Thekkumpadam Koottukrisi Sangham
C	0
D	Anthikkad Padaseghara Samithy, Kovilakam, Purathur, Pallipuram-Akampadam Padashekharam, Chemmanda Puliyam Padam, Manalpuzha Kannoth , Mullamad, Naranippuzha Kummipalam kole , Pullazhi kole padavu
E	Valoor Thazham, Alappad Pullu, Chettupuzha West, Kaipilly Veluthur Akam Padam, Kodannur, Jubilee Thevar Padavu, Chathankulangara, Palissery Avinissery Padavu, Chovur Alukka, Perumkulam Padavu, Chiyyaram Samajam, Kodannur Kole Farming society, Madammathope kole padavu Padinjarubhagam, Alappad Padavu, Chenam Tharishu Padavu , Erumakkuzhy - Kootaalapaadam, Kanimangalam, Pandaram Kole, Muthuvammalthazham, Cheruvallipuzha Nambarapadavu, Chiralipuzha Thekkethodi Kole Padavu, Kariyapaadam, Pappuruthy, Parakuzhi, Pullanichal, Kaipulithara Kakkadu Kole Padasekharam, Vellani Kole Padam, Vellani Kole Pada Karshaka Sangham, Anurauly Harijan Karshaka Sangam, Kannambilli Chira Kole Padavu, Koovapuzha Kolathur Padasekaram, Manaparamban Nellulpadaka Sangam, Muriyad Gramasree Kole, Dhanukulam West, Konthipulam Kole, Nadupadam Mangandam Kole, Parappukkara Nedumbal Kole, Thamarachal Kole, Villichira Karshaka Sangam, Chithravalli, Kadungadu, Kochi padam, Kokkarachal, Painkili kole, Kaniyamthurathu Kole Padavu, Elavathur Kizhake Kole , Penakkam Kizhakke kole, Peruvallor Thazham, Peruvallur Kole, Nadupotta, Cherayam Kole Padavu, Kadukuzhi Kole Padavu, Kollenchery Kole Padavu, Pazhanji Kole padav, Cheruvallur Thekkekkett, Edampadam, Neelayil, Poramkole, Kadavil Kole, Thiruthil Thazham, Chettupuzha Porathy , Chettupuzha West, Karotte kole, Maninadan kole padavu, Peramangalam Thazham Karuka Kole Padavu, Naikankole Kalipadam, Tharisukarimpana, Valakulam
F	Parappanchal, Anjumuri, Chettupuzha East Kole Padavu, Eravu Kaippilly Akampadam, Manakody- Variyam Kole Padavu, Thottupura, Chennamgiri, Kila Kole Padavu, Kurumbilam padam, Pallipuram Alapattu, Thrikkapallam, Vendrapadam, Kundanikulam, Vendrapadam, Cheralipuzha Thekkethod, Kila Kole Padavu, Perumkulam East, Karimpatta, Olakkada, Akkarapatty kole, Kizhakken kole pore kole, Nelkhathir Madamathope, Narayanan Kole Padashekharam, Pullu Padavu, Changalipadam, Kattoor Thekkumpadam, Akampadam Purampadam Padasekaram, Haritha Sree Kole Karshaka Sangam, Kumbakeri Padasekaram, Muriyad Chirakkappadam, Thuravankad Union Kole Padavu, Kizhakke Puncha Tharisu, Karuvannur Kizhakke Punchappadam, Mayyar, Muthalakulam, Valiyakole, Parapadam Kole , Parapadam Vadakku, Alappuramkothode, Kizhikkara Pattissery, Poozhikkole, Irumbayil, Kodanchery,

Group	Padasekharams
	Kundamkuzhi, Marady, Olambakkadavu, Alappuram Pattissery kole padavu, Kaithakole kole padavu, Moochikkal padavu, Vempuzha, Pazhanjira, Thuruthummal, Anthalichira, Madayil Kole, Pudukole, Puzhayangadu Kole, Manoor Kayal, Karthani valley, Pandaram Kole, Putoorkarika, Chettupuzha East Kole Padavu, Elthuruth Kole Padavu, Marar Kole padavu, Pannikkara Kini Kole padavu, Vadake Ponnor thazham , Chemeenchal Thomana Kole, Pothumbuchera Poranchira
G	0
H	Athichal, Bhagavathi kole, Cherukole, Kodappully , Mambully Vakkochira, Pazhuvil Bund Padavu, Vilakkumadam, Kanjankole, Maruthithazham, Thannapadam, Pazhuvil Bund Padavu, Mathikkayal Muttil kole, Chammannur Thazham, Paroor, Kaplinghat Thazheum, Ettumana Kole , Ettumana Parupadam, Urakam Thazham, Pallipuram-Paralam-Kodannur-Therpadavu, Vavekar, Madapatt Thazham kole, Pulanichal, Moorikole Padavu Samiti, Muriyad Kayal Cheppadam Kole, Muriyad Kayal Pullur Kole, Pothumbu Chira Nellulpadaka Sangham, Villichira, Muriyad kayal Chepadam , Karimpadam, Konthipulam, Naduppadam Mankandam, Painkili kayal harijankole, Ashiad kole, Mulanchery Thazham, Parapadam Kizhakethala, Thirunellur padam, Manalpuzha Kannoth , Pulipandy, Thannerkayil, Kizhakkekole, Maradi Kizhakkekole, Marady-Chelakkadavu-Alparambu, Koolan Padavu, Amayam, Kaithakkal, Valluvambayi, Arodi - Palakkathazham kole padavu, Chelayi Padavu, Kurathikkad Thazham, Manathipadavu, Manoor Kayal, Mullamad, Ponukara kole, Pothodi, Therett Kayal Kole, Onpathumuri, Kunjikole, Mandan kole, Padiyur Poomangalam Kole, Pallithazham, Panchekkal Chira Kakkulam Paadam, Poomangalam Padiyur Kole, Kannukettichira Vazhikalchira Irupoo Padashekaram, Kolothu Nadu Padasekharam, Vazhikkili Padasekharam

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