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TRADITIONAL ITTERI AGROECOLOGICAL PRACTICES AND THEIR ROLE IN SUSTAINABLE RURAL DEVELOPMENT IN TAMIL NADU, INDIA

[1]Mr R Deepakkumar, [2]Dr. P. Balamurugan and [3]Dr. T Raj Pravin

[1]DPhd Research Scholar and [2]Director, Centre for rural development, Faculty of Arts, Annamalai university, Chidambaram- 608 002; [3]Associate Professor (Agricultural Extension), Horticultural Research Station (HRS), Pechiparai, Kanyakumari

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Corresponding author: Shruthi S. Naik,

ABSTRACT

Traditional *itteri* agroecological systems are multifunctional semi-natural vegetation systems embedded within agricultural landscapes of Tamil Nadu, but their ecological characteristics, management practices, and livelihood contributions remain inadequately documented. This study examined the distribution, vegetation composition, ownership, maintenance, and ecosystem services of *itteri* systems in Erumaipatti Block, Namakkal District, Tamil Nadu. A two-stage stratified random sampling design was adopted, and data were collected from 300 respondents using a structured questionnaire. The terms *itteri* (84.3%) and *itterai* (83.3%) were widely recognised. Although 55% of respondents considered these systems beneficial, they occurred on only 42% of respondents' holdings. Government poromboke and community lands accounted for approximately 72% of reported *itteri*-associated land. Vegetation diversity was substantial, comprising trees (98.0%), shrubs (90.7%), grasses (88.3%), herbs (85.7%), climbers (82.3%), and creepers (81.7%). Respondents identified diverse provisioning, regulating, supporting, and cultural ecosystem services, including food, fuel, fodder, medicinal resources, nutrient cycling, pollination, carbon sequestration, microclimate regulation, habitat provision, and spiritual values. Most systems received moderate to high levels of maintenance, reflecting continued local engagement. The findings highlight the importance of *itteri* landscapes as socio-ecological infrastructure supporting biodiversity, agricultural production, rural livelihoods, ecological connectivity, and cultural values.

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INTRODUCTION

Our country supports 17.8% of the world's population on 2.4% of its land, and nearly two-thirds of its workforce depends on agriculture. More than 60% of cultivated area is rainfed and over 80% of farmers are small or marginal. The Green Revolution model of chemical inputs, intensive irrigation and cheap power lifted foodgrain output to a record 357.73 MMT (PIB, 2026), yet about 71% of people cannot afford a healthy diet (Centre for Science and Environment, 2022). The agriculture sector now faces stagnating yields, shrinking per capita land, rising temperatures and erratic rainfall. It has also degraded soil, groundwater and biodiversity, and left many farmers indebted. Meeting these challenges requires food systems that are productive, ecologically sound and affordable for the poor (FAO, 2018). Over the last three decades, India has seen rising mean temperatures and more frequent extreme rainfall due to climate change, which affect the productivity of crops, livestock and fish. Climate change also aggravates other pressing problems, including natural resource degradation, market volatility, rising input costs and diminishing returns to added inputs. These trends have serious implications for the livelihoods of people who depend on agriculture (Rao *et al*., 2019). Although India has moved from being a food-deficit country to achieving home-grown food security, its agriculture must still tackle malnutrition, poverty and hidden hunger amid rapid population growth, biodiversity loss, depletion of natural resources (especially soil and water) and unprecedented climate change. Schemes such as the NFSA 2013, PM POSHAN, NFSM, PM-RKVY and PKVY address food security, but natural farming programmes (PKVY, MOVCDNER, APCNF) largely operate at the individual-farm level. Agroecological systems work at a wider scale and are valued for their nutritional benefits, financial viability, ecological soundness and cultural acceptability (Saravanan and

Berry, 2021). Community participation in managing them creates jobs, sustains ecosystem services and builds climate resilience among the rural poor. Meeting these challenges requires a shift towards food systems that produce more food sustainably with less environmental impact (FAO, 2018). Among sustainable food production systems, *Itteri*, a traditional agroforestry system, applies ecological and social principles to the management of food and agriculture. It is an assemblage of natural vegetation, including thorny shrubs, herbs, lianas and, most importantly, multipurpose trees, growing in or beside agricultural fields or roads and deliberately managed by farm family members (World Forest Voices, 2022). The vernacular name refers to mixed trees and bushes along bullock-cart tracks, footpaths and motorable roads, and sometimes along seasonal streams. It is also known as *Itteli*, *Itterai* or *Olungai* in Tamil Nadu. *Itteri* is part and parcel of traditionally evolved land-use systems known for their rich biodiversity, multi-tier structure, and multiple products and services in the semiarid agricultural ecosystem of northwestern Tamil Nadu since time immemorial. Its composition depends on geographic location, adjacent natural forests, cropping pattern, livestock population and, above all, the needs of the farm household.

Traditional agroecological systems (TAES) now face diversity loss, mono-cropping, land degradation, invasive species, urbanisation, labour shortages, fragmentation and climate variability (Fox et al., 2014). Over the past three to four decades itteri and its associated knowledge have dwindled in Tamil Nadu. Most systems remain undocumented, poorly studied and unvalued economically. Their decline has been linked to collapsing avian ecology and rising peafowl numbers, fuelling human-animal conflict. Ecological and economic analysis, along with documentation of socio-cultural factors, is therefore urgent, since tree-lined bunds and boundaries still support yields in some pockets. This study examines selected itteri systems in Namakkal district, focusing on people's management practices, their contribution to sustainable rural development (livelihoods, nutrition, ecological resilience, social sustainability), and the role of people's participation in conserving them.

MATERIALS AND METHODS

The study was conducted in the Erumaipatti Block of Namakkal District, Tamil Nadu, southeastern India. This block has 24 grama panchayats wherein 1,05,655 population residing. The main occupation of the major population in the study area is agriculture and allied activities. The study area extends approximately from 11°00.9′ to 11°30.3′ N latitude and 78°02.7′ to 78°31.2′ E longitude, covering about 17 km from west to east and 35 km from south to north, with a total geographical area of approximately 329 km². Elevation ranges from −199 m to 717 m above Mean Sea Level (MSL) (Fig. 1). The terrain is characterized by considerable topographic variation, with the Nainamalai Hills forming the western boundary, the Thalamalai Hills lying to the south, and the Kolli Hills occurring to the north and east. Thus, the study area encompasses both hilly and relatively plain terrain associated with the foothills of the Eastern Ghats. This study is first of its kind to document the practices of itteri in development of sustainable livelihoods. A two-stage stratified random sampling design was adopted to ensure adequate representation of the diverse agroecological and socioeconomic settings within the study area. In the first stage, Erumaipatti Block was purposively selected because of its predominantly agriculture-oriented economy, with relatively greater emphasis on commercial agricultural activities and comparatively limited concentration of Micro, Small and Medium Enterprises (MSMEs). In the second stage, 10 panchayats, comprising nine Gram Panchayats and one Town Panchayat, were selected and stratified into three distinct locational and topographical categories: (i) areas located near natural forests, within a 3 km radius; (ii) areas adjoining urban centres, including municipal or town panchayat areas, within a 5 km radius; and (iii) areas located away from both urban centres and natural forest areas. This stratification was intended to capture variations in agricultural conditions and livelihood settings associated with differences in proximity to forests and urban centres. This sampling approach ensured that the study adequately captured the spatial and ecological heterogeneity of the study area, thereby enhancing the representativeness and reliability of the findings. From each of the 10 selected survey locations (indicated in Fig 1), 30 households were randomly selected, resulting in a total sample size of 300 households. To facilitate comparative analysis across landholding classes, the 30 households selected from each location were equally distributed among three landholding categories, with 10 households in each category: small (<1 ha), medium (1–2 ha), and large (>2 ha). Thus, the overall sample comprised 100 households from each landholding category. The survey was conducted from June 2024 to October 2026.

RESULTS AND DISCUSSION

Itteri(traditional agroecological system) was most often reported along paths and roads leading to fields (92.6%), followed bywaterways and rocky areas (78.3%) and common lands (77.7%). Differences in location were statistically significant ($\chi^2(4) = 30.23$, $p < .001$; Cramér's $V = 0.13$).During the historical conversion of forest landscapes into agricultural lands, possibly several centuries ago, farmers in the region appear to have retained certain patches or linear strips of natural vegetation without complete clearance (Haruka, 2011; Dhanya et al., 2016). The findings indicate that itteri systems are perceived as important habitats and refuges for a range of wildlife species. Positive responses, combining "agree" and "strongly agree," were highest for primates such as slender loris and monkeys (72.0%), followed by small, hoofed animals and hares (68.3%), small carnivores (67.0%), rodents (63.3%), and small mammals such as pangolins (54.7%). The comparatively high recognition of primates and small carnivores suggests that the vegetation structure of itteri may provide suitable cover, food resources, resting sites, and movement routes within predominantly agricultural landscapes. In contrast, the relatively high neutral response for pangolins (45.3%) may reflect their cryptic and nocturnal behaviour and consequently lower visibility to respondents, rather than necessarily indicating their absence. Overall, these perceptions suggest that itteri may function as a semi-natural habitat and ecological corridor connecting fragmented vegetation patches, thereby potentially facilitating wildlife movement and contributing to biodiversity conservation within agricultural landscapes. Positive response represents the combined number and percentage of respondents who selected "Agree" or "Strongly agree." Percentages may not total exactly 100 due to rounding.

The findings indicate that itteri systems are widely perceived as providing habitats for diverse groups of fauna. Positive responses, combining "agree" and "strongly agree," were exceptionally high for snakes (94.3%), insects (96.0%), other small animals such as earthworms, centipedes and millipedes (94.0%), and birds (94.3%). Gadekaret al., 2020 have recorded 114 bird species belongs to 51 families in homegardens ecosystems in Maharashtra which is similar kind of deliberate management of trees for centuries. The strong recognition of these faunal groups suggests that the diverse vegetation and relatively less disturbed conditions associated with itteri may provide food, shelter, breeding sites, and movement corridors for wildlife within agricultural landscapes. In particular, the occurrence of birds and insects may have wider ecological significance through functions such as pollination, seed dispersal, and regulation of other organisms, while soil-associated fauna such as earthworms and other invertebrates may contribute to decomposition and nutrient cycling. Overall, the findings highlight the perceived role of itteri as a semi-natural habitat and biodiversity refuge embedded within agricultural landscapes, potentially supporting ecological The findings indicate that itteri systems are widely perceived as providing habitats for diverse groups of fauna. Positive responses, combining "agree" and "strongly agree," were exceptionally high for snakes (94.3%), insects (96.0%), other small animals such as earthworms, centipedes and millipedes (94.0%), and birds (94.3%). The strong recognition of these faunal groups suggests that the diverse vegetation and relatively less disturbed conditions associated with itteri may provide food, shelter, breeding sites, and movement corridors for wildlife within agricultural landscapes. In particular, the occurrence of birds and insects may have wider ecological significance through functions such as pollination, seed dispersal, and regulation of other organisms, while soil-associated fauna such as earthworms and other invertebrates may contribute to decomposition and nutrient cycling.

CONCLUSION

This study highlights *itteri* as a traditional, multifunctional agroecological landscape feature that retains considerable ecological, livelihood, and socio-cultural significance in the study area. The widespread recognition of the terms Itteri and Itterai, together with other locally used names, reflects the persistence of traditional knowledge associated with these landscapes. Although a majority of respondents perceived itteri as beneficial to farming, its presence was reported in only 42% of respondents' holdings, indicating a decline or transformation of this traditional landscape feature. Its predominance on government poromboke and community lands further emphasizes its character as a shared landscape resource and the importance of collective management for its continued existence.

The high reported occurrence of trees, shrubs, grasses, herbs, climbers, and creepers demonstrates the structural diversity of itteri vegetation. Respondents also associated these systems with a broad range of ecosystem services, including the provision of food, fuel, fodder, timber, medicinal resources and other produce; nutrient cycling, seed dispersal and soil fertility; pollination, wind protection, erosion control, climate regulation, water and air purification, and flood regulation. In addition, respondents strongly recognised itteri as habitat for birds, insects, snakes, small fauna and several mammalian groups. Cultural benefits, particularly spiritual and religious values, inspiration, and recreation, further demonstrate that the significance of itteri extends beyond its material and ecological functions.

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