

学位論文の要旨

Abstract of Thesis

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学位論文題目 Title of Thesis (学位論文題目が英語の場合は和訳を付記)

A Comparative SPI-Based Assessment of Drought Tendencies across Inland, Coastal, and Remote Island Zones of the Mekong Delta Region, Vietnam
(ベトナム メコンデルタ地域における内陸部・沿岸部・遠隔島嶼地域を対象とした干ばつ傾向の比較評価 -SPIに基づく分析-)

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Water resource vulnerability, driven by uneven precipitation, limited water allocations, and increasing human pressures, poses significant challenges to sustainable development in many regions, including the Mekong Delta Region of Vietnam. While extensive studies have assessed precipitation trends and drought conditions in the Mekong Delta Region, most have focused on inland or coastal areas with high development potential. In contrast, small islands within the region have received minimal academic attention. This research gap is primarily due to data limitations, accessibility challenges, and the small or low population density of these islands.

However, these small islands play a critical role in the region's socio-economic development, ecological stability, and water resource dynamics. Growing tourism, groundwater over-extraction, and limited infrastructure make these islands highly vulnerable to water shortages, particularly during dry seasons. Yet, previous studies have largely excluded these areas from drought risk assessments, leaving significant blind spots in understanding the region's overall water security.

This research is original in that it provides the first integrated assessment of drought patterns across the underrepresented inland, coastal, and islands of the Mekong Delta Region, Vietnam. It explicitly includes small islands often overlooked due to data limitations.

In this study, four representative locations—one inland area (Moc Hoa), one coastal area (Rach Gia), and two islands (Phu Quoc and Tho Chu)—were analyzed using the Standardized Precipitation Index (SPI) from 1994 to 2020. The results reveal distinct spatial and temporal drought tendencies: severe droughts have become increasingly common inland since 2011, while extreme drought events have been concentrated in coastal areas. Notably, Tho Chu Island experienced frequent and intense droughts, with a significant increase in severe drought occurrences after 2011. Furthermore, Tho Chu's drought patterns closely resemble those observed in the inland area of Moc Hoa, despite the clear geographic differences. These findings suggest that inland and island regions may share

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underlying water resource vulnerabilities, underscoring the need to incorporate islands into broader drought assessments.

Although several studies have analyzed drought trends in the Mekong Delta Region, small islands such as Tho Chu and Phu Quoc have been largely excluded from systematic evaluation due to data scarcity and logistical challenges. However, water insecurity in these island regions is intensifying due to climatic variability and anthropogenic factors, including rapid tourism development and unsustainable water use. Ignoring these island-specific challenges undermines efforts to develop comprehensive, effective water management strategies for the Mekong Delta Region.

The objective of this study is to evaluate and compare drought tendencies across these underrepresented inland, coastal, and island regions, with particular emphasis on small islands. By systematically integrating islands into the analysis, this research provides new insights into regional drought dynamics and offers critical knowledge to support inclusive, sustainable water resource management in the Mekong Delta Region.

This thesis consists of six chapters: Chapter I introduces the background of water resource challenges in Southeast Asia, with particular emphasis on the Mekong Delta. It highlights the overlooked importance of small and remote islands, identifies research gaps, and outlines the objectives, originality, and significance of this study. Chapter II presents a comprehensive review of global, regional, and Mekong Delta-specific drought research, emphasizing the scarcity of studies that address small island drought tendencies and the need for more inclusive and context-sensitive assessments. Chapter III describes the study areas, including inland, coastal, and island regions of the Mekong Delta. It also explains the methodology for Standardized Precipitation Index (SPI)-based drought evaluation, the data sources used, and the limitations of the study. Chapter IV reports the results of the SPI analysis, highlighting drought intensity, frequency, and duration trends across different regions. Spatial patterns, regional contrasts, and shared vulnerabilities between inland and island zones are discussed. Chapter V provides an extended discussion of these findings, drawing comparisons between inland, coastal, and island zones, linking results to local drought impacts, and exploring implications for water management and policy. Chapter VI summarizes the key findings and contributions of the study. It highlights the originality of incorporating islands into comparative drought research, offers practical recommendations for strengthening regional water resource management, and provides suggestions for future research directions.

By explicitly incorporating small islands into drought assessments, this research addresses a critical knowledge gap in Mekong Delta studies. The findings contribute to more comprehensive and region-specific water management strategies, ultimately supporting climate resilience, sustainable development, and water security for vulnerable inland, coastal, and island communities.