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12.01.2021

**Promotionsverfahren zur Erlangung des akademischen Grades Doktor der Naturwissenschaften
(Dr. rer. nat.) von Herrn John E.K. Akubia**

Sehr geehrte Damen und Herren,

die Dissertation von **Herrn John E.K. Akubia** mit dem Titel

**„Geoinformation-based Spatio-Temporal Assessment of Land-Use/Cover
Change Associated with Urbanization in the Greater Accra Metropolitan Area,
Ghana“**

sowie die Berichte liegen gemäß § 8 S. 2 PromO vom 27. Juli 2016 in der Zeit

vom 14.01.2021 bis zum 28.01.2021

im Dekanat (Zi. F 126) zur Einsichtnahme aus. Die Zeit der Auslagefrist entspricht den
Regelungen der PromoO des FB VI vom 27.7.2016.

**Aufgrund der aktuellen Auflagen der Corona-Bekämpfungsverordnung, ist eine
Einsichtnahme nur nach vorheriger Terminvereinbarung mit dem Dekanat möglich.**

Vorbehaltlich einer einspruchslosen Auslage ist als Termin für die Disputation vorgesehen:

Freitag, 29. Januar 2021, 14:00 Uhr, via Zoom

**Weitere Informationen zur Durchführung der Disputation
finden Sie auf der Homepage der Universität Trier unter:
Fachbereich VI > Der Fachbereich > Aktuelles > Disputationen am FB VI**

Mit freundlichen Grüßen

Univ.-Prof. Dr. Thomas Udelhoven
Dekan

Abstract

Urbanisation has become the most socio-spatial process driving the frequency and distribution of landuse/cover change (LULCC) patterns underpinning the spatial organization of contemporary cities. Understanding the nature, driving forces, impacts and consequences of these changes is crucial to achieving pragmatic spatial planning and development, ecological consequences of urbanization, conservation and sustainability imperatives. Accordingly, this thesis draws on the diffusion-coalescence urban geographic theory and utilized geospatial information technology (remote sensing and GIS) data and tools in combination with spatial metrics and land accounting techniques to examine the spatio-temporal patterns, distributions and geographic directions of actual (2008-2017) and future (2017-2030) LULCC associated with urbanization using the Greater Accra Metropolitan Area (GAMA), Ghana as a case study. More specifically, the present analyzes the spatial expansion and distribution of urban areas, shifting geographies and frontiers of urbanization, spatial differentiation of urban growth at the micro-level (i.e. districts level) and LULCC risks to spatial development planning and ecological sustainability. The results indicate an inverse correlation between urbanization and natural land change. Whilst built-up areas continuously expand, vegetative cover, including agricultural forest lands decreases. Consequently, the progressive conversion from natural to urban-dominated land systems has galvanized massive losses of ecological assets e.g. biodiversity. Additionally, the observed trend and spatial patterns of urban land use development revealed a non-linear spatially differentiated, discontinuous and dispersed urban expansion which is fragmenting fringe (peri-urban) land, indicating strong evidence of peri-urbanization characterized by a sprawling low-density development that is increasingly and spatially skewed towards the eastern and western directions of the metropolitan area. The observed spatial variation in extent and quantum of urban expansion in the administrative districts of the region is predominately related to historical spatial structures and processes underpinning urban development plans and policies (e.g. decentralization). Also, a paradigmatic example of traditional rural districts interacting, more or less subordinately, with the closest urban centres and city core area has been observed; with a pervasive sand mining phenomenon driven by the growing construction industry, playing the mediating role. Consequently, the spatial expansion pattern of this metropolitan city-region is seemingly impacting the spatial organisation of its rural settlements through a relentless shifting of the geographies, hotspots and frontiers of urbanization. The thesis demonstrates that GAMA's urban form is dynamic and changing. In the context of the urban growth theory, the thesis shows that GAMA's current (2008-2017) spatial urban development is in the diffusion phase. However, a prediction based on the current and past urban land change trends indicates that urban development may shift to the coalescence phase by 2030. Although the intensity of urban expansion may remain very high, the rate of expansion is expected to decrease as a result of a change in urban form. The thesis provides an important interpretative key to the prevailing phenomena of urban sprawl and fragmentation in peri-urban spaces, arguing that these prevailing urban development challenges not by random occurrence but are historically-institutionally grounded. The implementation of the nationwide decentralization policy in the 1980s to guide and control spatial growth and land development failed. Instead, it resulted in fragmented growth in the natural landscape on the urban fringe over the past 30 years. This reflects on the current trajectory and pattern of spatial urban expansion. Thus, the study underscores the need for pragmatic spatial growth and development management policies that could avert a continuation of past and current land development trends of urban sprawl and fragmentation. The findings of this thesis may contribute primarily to a better knowledge of long-term urban-land dynamics and most significantly, adds to the current understanding of the spatial patterns of urban land changes underpinning the spatial organisation of fastgrowing metropolitan regions. Overall, this thesis provides a much-needed comprehensive comparative analysis of the spatial growth and patterns of urban development among the different municipalities of GAMA. Also, this study is important in the context of land change science in general, as the case study illustrates a commonly overlooked intensive land use: sand mining, a driving force of fragmented urban development and landscape patterns.