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審査研究科	生命環境科学研究科
学位論文題目	A Study on Strategic Pollution Management: Towards Enhanced Policy Outcomes for Sustainable Development （戦略的な環境汚染管理に関する研究 －持続可能な発展に向けた政策効果の向上を目指して－）

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論　文　の　要　旨

This doctoral research aimed to develop an improved policymaking framework for pollution management underpinned by empirical case studies which demonstrate the importance of policymaking process and ways to enhance policy planning process by applying geospatial tools. The author proposed a conceptual analytical framework as an integrated spatio-temporal approach of policy making and assessment using GIS on publicly available data, based on which four case studies selected from different income groups, development patterns and pollution contexts were presented.

In Chapter 1, the author identified current situations and emerging problems in strategic pollution management, specifically, inherent scale gap and misalignments in actions, lack of systematic approach to policymaking and pollution management, and lack of environmental management capacity, and presented the objectives of her research.

In Chapter 2, the author presented extensive literature review on evolving analytic tools to advance cross-scale study and integrated policy management, theories and ideas proposed to improve policymaking process as well as lack of data, analytical and policy planning capacity and enforcement in middle income countries which are facing intensifying and diversifying pollution. The author then presented a policy cycle framework which clarified existing policy analytical tools and weak linkage to be covered in her research using GIS and publicly available data.

In Chapter 3, the author explained case study selection procedures such as country size, socio-economic status, diversity of environmental issues, potential direction of development. The selection countries for case studies were China, Saint Lucia, and Ghana, all in the middle-income country

category.

In Chapter 4, the author presented the results on the five mega-cities in China as a case of industry-driven pollution. As a result of calculation of SO_2 emissions and estimation of the pollution reduction potentials under abatement technology application using IIASA-GAINS-China model, the author found that there were gaps in effectiveness in air pollution control due to differences in local realities in the mega-cities studied. The chapter also discussed the importance of facilitating country level policy cross-city support system aligned with local realities.

In Chapter 5, the author presented a case study of Saint Lucia, a service-driven small island developing country. As a result of analyzing environmental data and awareness data using GIS, the author found that environmental awareness and *hot* environmental issues were geographically associated and thus pollution control and other environmental policies including education could be more effective with geospatial understanding of the issues.

In Chapter 6, the author presented a case study of Ghana rapidly developing with mixed industries. As a result of mapping forest loss intensity, land pollution, and health-related variables using GIS, the author found that locations of forest loss and land pollution were moderately associated and health variables were spatially clustered. The author concluded that land pollution as a result of mixed pollution can be better understood for strategic pollution control by overlaying geospatial information of different pollution data and relevant health data.

In Chapter 7, the author concluded that, based on the findings from the three case studies, application of GIS tools with publicly available data can link the weak part (i.e., policy feedback and learning) of the conventional policy cycle and can support policy decision making particularly in cross-scale environmental issues, which will enable strategic pollution management in developing countries.

審　　査　　の　　要　　旨

This dissertation research is driven by a penetrating overall goal, that is, to propose a strategic pollution management framework with more effective and applicable policy analytics tools for developing economies. The research provides following academic and practical contributions. First, the author performed extensive literature review covering policy planning and evaluation theories, geo-spatial techniques in policy planning, pollution abatement potentials, and environmental awareness and behavior to develop the theoretical framework of policy cycle that was examined in this dissertation. Second, the author proposed application of GIS tools in strategic pollution management which help visualize centers or hot spots of environmental issues and its potential causes and effects including policy inputs and outputs. Having tested the GIS applications in the three case studies supports the author's assertion on effective utilization of the tools for holistic and synergized policy cycle proposed in this research.

The final examination committee conducted a meeting as a final examination on 28 January, 2019. The applicant provided an overview of the dissertation, addressed questions and comments raised during Q & A session. All of the committee members reached a final decision that the applicant has passed the final examination.

Therefore, the final examination committee approved that the applicant is qualified to be awarded the degree of Doctor of Philosophy in Environmental Studies.