

博士論文審査結果報告
Report on Ph.D. / Doctoral Dissertation Defense

National Graduate Institute for Policy Studies (GRIPS)

政策研究大学院大学

Professor (joint-appointment) Rasmy Mohamed

連携教授 Rasmy Mohamed

審査委員会を代表し、以下のとおり博士論文審査に合格したことを報告します。

On behalf of the Doctoral Dissertation Review Committee, I would like to report the pass result of the Doctoral Dissertation Defense as follows.

プログラム名 Program	防災学プログラム Disaster Management Program	
学位申請者氏名 (ID) Ph.D. Candidate (ID)	Tedla Mihretab Gebretsadik (DOC20132) Tedla Mihretab Gebretsadik (DOC20132)	
Dissertation Title 論文タイトル (タイトル和訳)	A Study on Integrated Water Resources Management Practices for Sustainable Transboundary River Basin Development: The Case of the Blue Nile Basin 持続可能な越境河川流域開発のための統合的水資源管理実践に関する研究：青ナイル川流域での事例	
学位名 Degree Title	博士 (防災学) Ph.D. in Disaster Management	
論文提出日/ Submission Date of the Draft Dissertation	2023年5月17日/ May 17, 2023	
論文発表・審査会開催日/ Date of the Defense and the Doctoral Dissertation Review Committee	2023年6月14日/ June 14, 2023	
論文最終版提出日/ Submission Date of the Final Dissertation	2023年8月23日/ August 23, 2023	
審査委員会/ Doctoral Dissertation Review Committee	主査 Main referee	Mohamed Rasmy Mohamed Rasmy
	審査委員 Referee	小池 俊夫 Toshio Koike
	審査委員 Referee	廣木 謙三 Kenzo Hiroki
	審査委員 Referee	中山 幹康 (名誉教授 東京大学) Mikiyasu Nakayama (Professor Emeritus, the University of Tokyo)
	審査委員 (博士課程委員会) Referee (Doctoral Programs Committee)	Pressello Andrea Pressello Andrea

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1. Summary of Defense and Evaluation

Doctoral dissertation defense of Mr. Tedla Mihretab Gebretsadik (DOC20132) was held on June 14, 2023 at GRIPS. Doctoral dissertation review committee, which consisted of five review members including the main referee (Prof. Mohamed Rasmy), co-referees (Prof. Toshio Koike and Prof. Kenzo Hiroki), an external referee (Professor Emeritus Mikiyasu Nakayama from the University of Tokyo), and a doctoral program committee member of GRIPS (Prof. Pressello Andrea) attended the defense meeting and evaluated draft doctoral dissertation and final defense presentation. All the referees evaluated the candidate performance as excellent and dissertation work can contribute to science as well as society, significantly. The review committee also provided minor comments and suggestion to further improve the draft dissertation, which was originally submitted to the committee by the candidate on May 17, 2023.

2. Dissertation overview and summary of the presentation.

The candidate's PhD thesis was focused on developing an integrated water resources management practices for sustainable Nile River basin development under climate change using the latest available information from ground, satellite, and climate projection model outputs. The Nile basin is a water conflict region and the recent development in the basin (e.g., the construction of Grand Ethiopian Renaissance Dam) brought very complex transboundary water management situation in the region. Therefore, this study, which is crucial and timely, mainly focused on the following components.

1. The assessment of climate change impacts on the water resources of the upper Nile basin
2. Proposing the appropriate actions (e.g. operation of dam) to smoothen/reduce the climate change impacts (e.g. floods) and to maximize the power generation using latest cutting-edge data and model

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3. Proposing several policy recommendations based on the results obtained from this research to benefit the upstream and downstream countries.

Climate change impacts on the Blue Nile River were assessed using 30-year in situ climate data (1981–2010) and five carefully selected and then bias-corrected General Circulation Models (GCMs) for future (2026-2045) climate projections. The results suggest the probability of an increase in total precipitation, accompanied by an increase in the intensity and frequency of future extreme rainfall events will lead to increase in total river flow, peak discharges, and flood inundation which will increase risk of floods in the future. Socio-economic impact assessments on projected extremes indicated an increase in devastating impact on people, urban area and crop lands.

Consequently, for efficient water resource management and disaster risk reduction, the availability of data is essential, however, the inadequacy of spatiotemporal hydro-climatic data limits the efficacy of hazard monitoring and early warning activities. As a result, this study also evaluated near-real-time satellite precipitation products and short-term numerical weather forecasts. The results showed that they are very useful and can provide adequate lead-time for climate change adaptative measures such as real-time flood monitoring, flood early warning, and dam operation to minimize the flood damages and improve the power generation.

This study also found that the GERD dam due to its very high capacity is instrumental to accommodate the projected extreme flow volume to smoothen the high and low flow signals and maximize the project's benefit in the entire basin. The policy suggestion of this study pointed to adaptive measures such as the implementation of informed decision making on water-related disasters early warning and reservoir operations in the upstream of the basin can significantly contribute to the enhancement of integrated water resource management practices of the downstream regions in the Blue Nile basin.

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3. Evaluation Notes from the Doctoral Dissertation Review Committee (including changes required to the dissertation by the referees)

All the review committee members evaluated the dissertation as outstanding with the evaluation score of 5.

Summary of the comments and suggestions were:

- Overall, the research outcomes are outstanding and will help to implement the sustainable development in the basin and will bring benefits to the regions in terms of flood risk reduction and power generation. Some minor corrections are
 - Policy proposal should be based on the finding of this study
 - Describe the application of the developed methodology to other river basins.
- This is an innovative study which can reverse the negative ideas of the downstream countries on the huge reservoir by showing the potential contributions of flood risk reduction under climate change. This study also proposed to increase flood storage by optimizing the dam operation based on the predicted inflow into the dam with reasonable accuracy and lead-time.
- First part of the dissertation is an excellent work toward much improved rainfall and runoff estimation.
 - As compared to the first part, the part of policy recommendations seems a bit detached from the first part. Studying history of other major international water systems (e.g. Mekong, Ganges, etc) might have enhanced the recommendations.
- This dissertation makes an original academic contribution by filling a gap in the literature and by developing an evidence-based new methodology and it is innovative and could have an important impact on the solution of problems related to sustainable water resources management in transboundary river basins. The candidate has answered satisfactorily to questions he received after his presentation.

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- It is recommended to make sure to include in the dissertation all the necessary citations, acknowledgments of the sources of information, quotation marks when quoting someone directly, paraphrasing with citation, etc.
- I suggest that you can show where your research stands in that debate and how your dissertation stands out in the field.
- There seem to be several abbreviations that are not included in the List of Abbreviations. I recommend to ensure that all the abbreviations are included in the List.
- The candidate clarified climate change impacts and their implication to its water resources management system, and suggest ways to improve policies. The research is significant in the following aspects: a) It is a thorough analysis from extensive data collection, model building, and in-depth investigation on climate change impact on a large-scale basin of the Blue Nile; b) It tackled, with success, key policy challenges on water resources management in relation to climate change in the Blue Nile, one of the most complicated basin in terms of not only hydrology but also hydro-politics; c) the methodology of research can be applied to various basins in the other regions as well as contribute to negotiation process of various international water courses. It can also help creating a science-based decision-making method for international policy on water resources management.

4. Confirmation by the Main Referee that changes have been done to the satisfaction of the referees and final recommendations

The candidate submitted the revised manuscript to the main advisor along with a note that described changes in response to the comments and questions at the defense as the committee members left the final check entirely to the main adviser. The main adviser checked the revised version, together with a plagiarism check, and told the candidate to add

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a few minor revisions. On August 22, 2023, the final version was submitted, and the main adviser found it satisfactory.

The doctoral dissertation review committee recommends that GRIPS award the degree of Ph.D. to Mr. Tedla Mihretab Gebretsadik.