ASSESSMENT OF URBANIZATION EFFECTS ON CLIMATE: A CASE STUDY ISLAMABAD

By

ZAINAB IMRAN

MARIUM SHOUKAT

CH. ABUZAR HASSAN

Department of Earth and Environmental Sciences

Bahria University, Islamabad

2019

ASSESSMENT OF THE EFFECTS OF URBANIZATION ON CLIMATE: A CASE STUDY ISLAMABAD

This thesis is submitted to Bahria University, Islamabad in partial fulfilment of the requirement for the degree of BS in Environmental Sciences

ZAINAB IMRAN

MARIUM SHOUKAT

CH. ABUZAR HASSAN

Department of Earth and Environmental Sciences

Bahria University, Islamabad

2019

ABSTRACT

This study focuses upon the changing trends in amount of rainfall, humidity and temperature as urbanization occurs in Islamabad. Meteorological data for the years 1997-2017 on these parameters was acquired from Pakistan Meteorological Department, Islamabad. Graphs showing monthly, quarterly and yearly variations were made. Trend lines show the differences that have occurred over the years. Remote Sensing and Geographic Information System were used for assessing the changes in land cover in Islamabad. Data acquired from LANDSAT was used in this study and information about five major classes (built-up, barren land, forest, vegetation and water bodies) was extracted for Islamabad for the years 2000, 2010, 2015 and 2017. Urban development is seen influencing the spatial patterns of Islamabad. With the rapid increase in built-up area, the temperature has decreased while precipitation and humidity have increased by 0.66% and 0.98% respectively. With the lessening vegetation the temperature of the city has increased by 0.3% whereas rainfall has decreased by 0.17%. As the images revealed, water bodies have increased in percentage and so has humidity by 0.89%. Rainfall has also shown a positive relation and maximum temperature displays a negative relation i.e. a decrease in temperature due to the presence of water bodies. It is seen that all classes are differently affecting the climatic factors. If the presence of one class positively affects the climate it may not be the same for the second as well. Small variations are Hence, it is concluded that the techniques of Remote Sensing and Geographic Information System supplemented with meteorological data on climatic factors can prove very efficient and effective for studying the metropolitan growth patterns as well as the change in land cover over a temporal range.

ACKNOWLEDGEMENT

First and foremost, praises and thanks to the Allah who is the supreme power, the most gracious and the most merciful, the Almighty, for His showers of blessings throughout my research work to complete the research successfully,

I would like to express my deep and sincere gratitude to my research supervisor, Mr. Muhammad Khubaib Abuzar, Senior Assistant Professor, Department of Earth and Environmental Sciences, Bahria University Islamabad, for giving me the opportunity to do research and providing invaluable guidance, support and apprehension throughout this research. He has taught me the methodology to carry out the research and to present the research works as clearly as possible. It was a great privilege and honour to work and study under his guidance.

I would like to thank Dr. Aansa Rukya Saleem, Senior Assistant Professor, Department of Earth and Environmental Sciences, Bahria University Islamabad, for her valuable comments which improved the quality of my research. I would like to gratitude to Professor Dr. Mohammad Zafar, Post Graduate Coordinator, Department of Earth and Environmental Sciences, Bahria University Islamabad for the moral and positive comments. I am also very grateful to Professor Dr. Tahseenullah Khan, Head of the Department, Department of Earth and Environmental Sciences, Bahria University Islamabad for his encouragement to complete this research. I am also much obliged to all the Faculty Members of earth and environmental sciences department, Bahria University. My thanks go to all the people who have supported me to complete the research work directly or indirectly

Finally, I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing me for my future.

ABBREVIATIONS

AA	Annual average
ET	Evapo-transpiration
GIS	Geographic Information System
ICT	Islamabad Capital Territory
LULC	Land Use Land Cover
MT	Maximum temperature
PMD	Pakistan Meteorological Department
RS	Remote Sensing
TM	Thematic Mapper
UHI	Urban heat island
USGS	United States geographical survey

CONTENTS

FIGURES

TABLES