CONTENTS

Certificate
Declaration
Acknowledgements ... ... ... iv – v
List of Tables ... ... ... vi – vi
List of Plates ... ... ... viii
Introduction ... ... ... ix – xix

CHAPTER – I : PHYSICAL FACTOR (Effecting Water Resources) 1

Physical factors which directly effect
the occurrence of ground and surface water.

GEOLOGY : Archaean, The Vindhyan System:
Lower Vindhyan Series; Upper Vindhyan –
Kaimur Series, Rewa Series, Bhandari Series,
Deccan Trap, Laterite, Alluvium,

PHYSIOGRAPHY : Relief : Physiographic
Divisions – Shivaripura Plateau, Kun Valley,
Vidisha Plateau, (i) The Valley of the
Betwas, (ii) The Bina Valley, (iii) The
Eastern Range, The Khichwara Plateau,
(i) The Western Range, (ii) The Sind Valley
Bina Plateau. The Sanchi hills, The Bhopal
Plateau. The Berasia Plain, The Vindhyan
Range, The Sagar Plateau, Morphometric
Analysis, Upper Betwas Basin.

SOILS : (i) Black Cotton Soils, Medium
Black Soils, Shallow Black Soil, Laterite
Soil, Alluvium Soil.

CHAPTER – II : CLIMATIC CHARACTERISTICS ... ... ... 36

Solar Radiation. Temperature, Mean
Maximum, Mean Minimum, Range of Tempera-
ture, Pressure Conditions, Wind direc-
tion and Velocity, Rainfall, Annual Rain-
fall distribution, Seasonal Rainfall,
Distribution of Rainfall, Rainfall Vari-
bility, Seasonal Variability, Potential
Evaporation Water Balance, Actual Evapora-
transpiration, Water Surplus and Water
Deficit, Evaporation Loss.
CHAPTER - III : DEMOGRAPHIC DETERMINANTS


CHAPTER - IV : ASSESSMENT OF GROUND WATER RESOURCES

Ground Water Condition, Ground Water Exploration, Ground Water Occurrence and Movement, Pre-monsoon ground water table, Post-monsoon Ground Water table, Fluctuation in Ground Water Level in Different Season, Annual Ground Water increment, Ground Water Reservoir, Recharge of Ground Water, Discharge of Ground Water, Pumping test data.

CHAPTER - V : ASSESSMENT OF SURFACE WATER RESOURCES

Importance of Surface Water, Sources of Surface Water, Rivers of the Upper Betwas - Betwa river, Halali river, Beh river, Sagar river, Kethan river, Bina river, Nion river, Ketotan river, Run off of rivers, Farmer Attitude, Chemical Quality of river water - pH value, Total dissolved solids, Bicarbonates and Carbonates, Chlorides, Sulphates, Calcium and Magnesium, Total Hardness, Nitrites, Suitability of Ground Water, For Irrigation, Domestic and Drinking, Use Industrial Use.

CHAPTER - VI : STATUS OF PRESENT USES AND MEANS OF IRRIGATION

Spatial Pattern of Irrigated Area, Growth of Irrigation, Effect of Land-use Pattern on Irrigation, Double Cropping, Suitability of Irrigation Water, Classification of Irrigation Water, Size of holdings and irrigation, Means of Irrigation - Well, Canals, Tanks, Other Sources, Tube Well, Schemes, Beneficial Effects, Bad Effects of Irrigation.
CHAPTER - VII : IMPACT OF IRRIGATION ON CROPPING PATTERN ... 153

Spatial Distribution of Crop and Cropping Pattern, Cereals and Millets, ( Rabi Crop ) - Total Area Under Wheat, Irrigated Area, Under Wheat, Total Area Under Gram, ( Kharif Crop ) Total Area under Jowar, Total Area under Pulses, Oilseeds, Changes in Cropping Pattern, Changes in the Areal Extent of the Crops, Relative Changes in Proportion of Crops, Adoption of Innovations, Irrigation, Use of high Yielding Variety of Seeds, Use of Chemical Fertilizer, Adoption of other Innovations, Tractors, Electric Pumping Sets, Diesel Pumps, Levels of Agricultural Development.

CHAPTER - VIII : NON-IRRIGATIONAL USE OF WATER ... 175


CHAPTER - IX : MANAGEMENT OF WATER RESOURCES ... 190


REFERENCES AND BIBLIOGRAPHY ...