# CONTENTS

Abstract ........................................................................................................................................... v

Introduction: Importance of Lessons Learned from Assessment of Groundwater Vulnerability at Chernobyl ........................................................... vii

1. Methods of Groundwater Vulnerability and Protectability Assessment ........................................ 1
   1.1. Method of Hydrogeological Zoning ................................................................. 2
   1.2. Index Methods .............................................................................................. 3
   1.3. Parametric Methods .................................................................................. 9
   1.4. Modeling Methods .................................................................................. 19

2. Chernobyl-Born Radionuclides in Geological Environment .............................................. 25

3. Preferential Flow and Migration Zones in Geological Environment .................................. 39
   3.1. State of Problem Study ............................................................................... 39
   3.2. PFMZ Classification and Occurrence .......................................................... 41
   3.3. Methodological Approaches of PFMZ Study .............................................. 47
   3.4. Indicators of PFMZ Activity in Depressions ............................................. 53
   3.5. Preliminary Evaluations of PFMZ Influence on Upper Groundwater .... 57
   3.6. Practical Importance of PFMZ .................................................................. 60

4. Methodology of Groundwater Vulnerability and Protectability Assessment ....................... 65
   4.1. General Consideration ............................................................................... 65
   4.2. Vulnerability and Protectability Assessment for Upper Groundwater (Unconfined Aquifer) ....... 70
   4.3. Vulnerability and Protectability Assessment for Confined Aquifers ............ 73

5. Groundwater Vulnerability and Protectability to Chernobyl-Born Radionuclide .................. 81
   5.1. Upper Groundwater .................................................................................. 81
   5.2. Confined Aquifers .................................................................................. 93

6. Summary ................................................................................................................... 101

References ................................................................................................................................. 105

Index ............................................................................................................................................. 115