

Contents

Preface xv

Introduction i

Economic Models for Regional Analysis 5

2.1 *Introduction* 6

2.2 *Comparative Cost Analysis* 6

- 2.2.1 Introduction, 6 / 2.2.2 The Iron and Steel Industry, 8
/ 2.2.3 The Economic Potential of Ilmenite Recovery from the Continental Shelf Area, 10

2.3 *Input-Output* 19

- 2.3.1 Introduction, 19 / 2.3.2 The Input-Output Framework, 20

2.4 *The Gravity Model (Spatial Interaction Analysis)* 31

- 2.4.1 Introduction, 31 / 2.4.2 Generating the Gravity Model, 33

2.5 *Activity Complex Analysis* 36

- 2.5.1 Introduction, 36 / 2.5.2 The Petrochemical Industries, 37
/ 2.5.3 Activity Complex Analysis Applied to Recreation, 43

Natural Resources in Regional Analysis 49

3.1 *Introduction* 50

3.2 *Natural Resource Classification* 50

3.3 *Ecology and Natural Resources* 51

3.4 *Ecological Principles in Regional Analysis* 53

3.5 *A Proposed Method for Describing Natural Systems and a Framework for Data Collection* 56

- 3.5.1 The Use of the Input-Output Framework to Depict Interrelations Among Ecologic Variables, 56 / 3.5.2 Construction of the Table, 58 / 3.5.3 A Numerical Ecological Classification System, 61

3.6 *Derivation of Some Ecological Interrelation Coefficients* 65

- 3.6.1 Introduction, 65 / 3.6.2 Winter Flounder Production, 65 / 3.6.3 Cod Production, 68 / 3.6.4 Shellfish Production, 69 / 3.6.5 Estimation of Coefficients in the Production of Phytoplankton, 71 / 3.6.6 Plankton Production as a Combination of Phytoplankton and Zooplankton, 81 / 3.6.7 The Phosphorus Cycle, 83 / 3.6.8 The Phosphorus Flow Through a Mussel Population, 88

Combined Economic-Ecologic Analysis 93

4.1 *Introduction* 94

4.2 *The General Approach* 94

4.3 *The General Interrelations Table: Illustrations of Sector (Column) and Commodity (Row) Data* 95

The Case Study 115

5.1 *General Description of Plymouth-Kingston-Duxbury Bay: The Case Study Area* 116

- 5.1.1 Introduction, 116 / 5.1.2 Characteristics of Case Study Area, 116 / 5.1.3 Abiotic Component, 119 / 5.1.4 Biotic Component, 123 / 5.1.5 Summary, 125

5.2 *The Marina Site Selection Process: A Comparison of Key Economic and Ecologic Costs* 125

- 5.2.1 Introduction, 125 / 5.2.2 Comparative Economic Cost Analysis, 127 / 5.2.3 Comparative Ecological Cost Analysis, 136 / 5.2.4 Combined Analysis of Ecologic and Economic Cost Differentials, 146

5.3 *Estimation of Demand for a New Marina at a Plymouth Bay Site* 148

- 5.3.1 Total Demand, 148 / 5.3.2 Supply and Demand Estimates, by Type of Recreational Activity, 154

5.4 *A Classification System for Outdoor Recreational Activities* 157

5.5 *Inputs and Outputs of Recreational Activities* 162

- 5.5.1 Outputs of Recreational Activities, 162 / 5.5.2 Land Requirements for Parking Space, 162 / 5.5.3 Land Requirements for Boat Storage Activities, 166 / 5.5.4 Land Requirements for Boat and Engine Repair Services, 168 / 5.5.5 Required Land Inputs for Sales and Showroom Facilities, 170 / 5.5.6 Land Requirements for the

The Three Sites: Comparison of Rates of Returns at Different Scales of Operation, 214

5.11 The Land-Water Use Plan: Some Major Considerations 220

- 5.11.1 Functional Organization of the Marina Complex, 220 / 5.11.2
Relationship of Marina Activity to Kingston Bay Area, 225 / 5.11.3
Interregional Spatial and Sector Linkages, 228

Recommendations and Conclusions 231

6.1 Recommendations 232

6.2 Conclusions 232

Appendix A Summary of Studies on Mineral Resources of the Continental Shelf 237

1. The Economic Potential of Phosphorite Recovery 238
2. The Economic Potential of the Seawater Magnesia Industry 240
3. The Economics of Offshore Sulfur Recovery 242

Appendix B Notes on Finfish and Shellfish Production Processes 245

1. Winter Flounder Production 246
2. Production of Food for Winter Flounder 248
3. Cod Production 249
4. Shellfish Production 249

SUBJECT INDEX 255

AUTHOR INDEX 267