## Contents

### Part I Theory and Methodology

1. **Global Environmental Issues and Human Wellbeing**
   - Key Global Environmental Problems ........................................ 3
   - 1.1 Global Warming ............................................................. 3
   - 1.1.2 Ozone Depletion and Destruction ................................... 4
   - 1.1.3 Sharp Decrease of Forest Cover ................................. 5
   - 1.1.4 Declining of Biological Diversity .................................. 6
   - 1.1.5 Acid Rain Pollution ....................................................... 6
   - 1.1.6 Land Desertification ...................................................... 7
   - 1.1.7 Marine Pollution and Damage ....................................... 7
   - 1.1.8 Water Pollution and Freshwater Resource Shortage .......... 8
   - 1.1.9 Toxic Chemical Pollution and Cross-Border Transfer of Dangerous Waste ....................................................... 8
   - 1.2 Influencing Factors of Global Environmental Issues .......... 9
   - 1.2.1 Economic and System Influence .................................. 9
   - 1.2.2 Influence from Population and Society ......................... 11
   - 1.2.3 Influence from Cultural Tradition and Ethnic Consciousness ............................................. 12
   - 1.2.4 Influence from Alienation of Science and Technology...... 13
   - 1.3 Global Ecological Environment and Human Wellbeing .......... 14
   - 1.4 Hard Exploration in Global Environmental Protection ........ 18
   - 1.5 Enhancing Environmental Protection as a Common Understanding ....................................................... 20

2. **Theoretical and Reality Basis of GEC Research**
   - Theoretical Basis of GEC ......................................................... 23
   - 2.1 GEC Is a Key Component of Environmental Economic System ............................................. 23
   - 2.1.2 GEC Supplemented and Developed Environmental Economic Theories ............................................. 25
2.1.3 GEC Is the Continuation and Deepening of Competitiveness Theory ............................................ 28
2.1.4 GEC Is the Ability for Sustainable Development Worldwide .................................................. 28

2.2 Reality Basis of GEC ......................................................................................................................... 29
2.2.1 Enhancing GEC Is Related to Human Survival and Development .................................................. 30
2.2.2 Enhancing GEC Is a Definite Requirement of Combat Against Climate Change ......................... 31
2.2.3 Enhancing GEC Is the Key Part of Enhancing the Comprehensive Competitiveness .................... 32
2.2.4 Enhancing GEC Is a Practical Choice to Realize Sustainable Development .................................. 33
2.2.5 Enhancing GEC Is an Innovation to Overcome the Limitation of Environment Related Theories in Practice ............................................................................................................. 34

3 Main GEC Research Contents ............................................................................................................... 37
3.1 Understanding of Relation Between Environment and Economy ...................................................... 37
3.1.1 Understanding of the Relation Between Environment and Economy Before the Industrial Revolution .......................................................... 37
3.1.2 Understanding of the Relation Between Environment and Economy After the Industrial Revolution ........................................... 38
3.1.3 Understanding of the Relation Between Environment and Economy Since the 1960s ......................... 39
3.2 Environment and Competitiveness Relevance Analysis .................................................................... 39
3.2.1 Equivalence Theory: Environment Is Competitiveness ........................................................................ 40
3.2.2 Element Theory: Environment Is a Component Element of Competitiveness ............................... 40
3.2.3 Influence Theory: Environmental Protection Influence Competitiveness ...................................... 41
3.2.4 Summary: Environmental Competitiveness Is an Integrated Concept .............................................. 42
3.3 Economic Transition and Environmental Competitiveness Promotion Coupling Analysis .................. 43
3.3.1 Green Economic Transition Is the Common Choice of the World ...................................................... 43
3.3.2 Greatly Enhance the Competitiveness of the Environment Is an Important Breakthrough in Economic Transformation .............................................. 45
3.3.3 Enhance Environmental Competitiveness Coupled and Consistent with Economic Transformation ........ 46
3.3.4 Empirical Analysis on Consistency of Environmental Competitiveness Enhancement and Economic Transformation .................................................. 48
Contents

3.4 Connotations of GEC .......................................................... 53
3.4.1 Concept of GEC ........................................................... 53
3.4.2 Connotations of GEC ..................................................... 54
3.5 Compositions of GEC .......................................................... 56
3.5.1 Component Elements of GEC and Their Functions .......... 56
3.5.2 Internal Relations of GEC Elements ............................... 58

4 GEC Indicator System/Mathematical Model Design & Evaluation Methodology .............................................. 61
4.1 Features and Principles of Design ........................................... 61
4.1.1 Composition and Characteristics of GEC ....................... 62
4.1.2 Principles of Constructing GEC Indicator System and Mathematical Model ................................. 64
4.1.3 Overall Coordination of Relationship Between the Principles .................................................. 67
4.2 Construction of GEC Indicator System ............................... 67
4.2.1 Methodology ............................................................... 67
4.2.2 Selection of Indicators in System Layer and Module Layer .......................................................... 69
4.2.3 Selection of Indicators in Factor Layer ......................... 72
4.2.4 Selection of Indicators in Foundation Layer and Description .................................................... 74
4.3 Construction of GEC Model Based on Modified AHP ............ 78
4.3.1 Dimensionless Treatment to Indicators ......................... 78
4.3.2 Assessment of Indicator Weight ................................. 79
4.3.3 Establishment of GEC Model ................................. 81
4.4 Method of Determining GEC ............................................... 81
4.4.1 Definition of GEC Evaluation Period and Area Coverage .................................................. 81
4.4.2 Indicator Ranking Sections ............................................ 82
4.4.3 Analysis of Indicator Scores ........................................ 82

5 Technical Roadmap of GEC Evaluation & Analysis ................. 85
5.1 General Research Organization and Contents ....................... 85
5.1.1 Research Framework ................................................... 85
5.2 GEC Indicators Selection and Data Source .......................... 87
5.2.1 Selection of Indicators ................................................... 87
5.2.2 Data Collection, Statistics and Calculation .................... 88
5.2.3 Data Extreme Value Analysis ........................................ 89
5.3 GEC Indicator System Correlation Analysis ......................... 90

Appendix I: Indicators in Foundation Layer and Description .... 92
Resource Environmental Competitiveness (REC) .................. 92
Ecological Environmental Competitiveness (EEC) .................. 97
Environmental Carrying Competitiveness (ECC) .................... 102
Environmental Management Competitiveness (EMC) ............. 108
Environmental Harmony Competitiveness (EHC) ................... 112
## Part II General Report

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Overall Evaluation and Comparative Analysis on GEC</td>
<td>119</td>
</tr>
<tr>
<td>6.1</td>
<td>Overall Evaluation of GEC</td>
<td>119</td>
</tr>
<tr>
<td>6.1.1</td>
<td>GEC Evaluation Results</td>
<td>119</td>
</tr>
<tr>
<td>6.1.2</td>
<td>GEC Factor Scores and Contribution Rate</td>
<td>128</td>
</tr>
<tr>
<td>6.1.3</td>
<td>GEC Echelon Scores</td>
<td>129</td>
</tr>
<tr>
<td>7</td>
<td>Regional Analysis of GEC</td>
<td>133</td>
</tr>
<tr>
<td>7.1</td>
<td>Balance Analysis of GEC</td>
<td>133</td>
</tr>
<tr>
<td>7.2</td>
<td>Regional Evaluation and Analysis of GEC</td>
<td>133</td>
</tr>
<tr>
<td>7.3</td>
<td>Special Evaluation &amp; Analysis on Regional Environment Competitiveness</td>
<td>136</td>
</tr>
<tr>
<td>7.3.1</td>
<td>Evaluation and Analysis on Asia’s GEC</td>
<td>136</td>
</tr>
<tr>
<td>7.3.2</td>
<td>Evaluation and Analysis on Europe’s GEC</td>
<td>143</td>
</tr>
<tr>
<td>7.3.3</td>
<td>Evaluation and Analysis on Africa’s GEC</td>
<td>152</td>
</tr>
<tr>
<td>7.3.4</td>
<td>Evaluation and Analysis on Oceania’s GEC</td>
<td>159</td>
</tr>
<tr>
<td>7.3.5</td>
<td>Evaluation and Analysis on North America’s GEC</td>
<td>162</td>
</tr>
<tr>
<td>7.3.6</td>
<td>Evaluation and Analysis on South America’s GEC</td>
<td>168</td>
</tr>
<tr>
<td>7.3.7</td>
<td>Evaluation and Analysis on G20 Nations’ GEC</td>
<td>174</td>
</tr>
<tr>
<td>7.3.8</td>
<td>Evaluation and Analysis on the GEC of BRICS</td>
<td>175</td>
</tr>
<tr>
<td>8</td>
<td>Evaluation and Comparative Analysis on REC</td>
<td>177</td>
</tr>
<tr>
<td>8.1</td>
<td>Evaluation Results of REC</td>
<td>177</td>
</tr>
<tr>
<td>8.2</td>
<td>Factor Scores and Contribution Rates of REC</td>
<td>192</td>
</tr>
<tr>
<td>9</td>
<td>Evaluation and Comparative Analysis on EEC</td>
<td>197</td>
</tr>
<tr>
<td>9.1</td>
<td>Evaluation Results of EEC</td>
<td>197</td>
</tr>
<tr>
<td>9.2</td>
<td>Factor Scores and Contribution Rates of EEC</td>
<td>209</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation and Comparative Analysis on ECC</td>
<td>213</td>
</tr>
<tr>
<td>10.1</td>
<td>Evaluation Results of ECC</td>
<td>213</td>
</tr>
<tr>
<td>10.2</td>
<td>Factor Scores and Contribution Rates of ECC</td>
<td>228</td>
</tr>
<tr>
<td>11</td>
<td>Evaluation and Comparative Analysis on EMC</td>
<td>233</td>
</tr>
<tr>
<td>11.1</td>
<td>Evaluation Results of EMC</td>
<td>233</td>
</tr>
<tr>
<td>11.2</td>
<td>Factor Scores and Contribution Rates of EMC</td>
<td>248</td>
</tr>
<tr>
<td>12</td>
<td>Evaluation and Comparative Analysis on EHC</td>
<td>253</td>
</tr>
<tr>
<td>12.1</td>
<td>Evaluation Results of EHC</td>
<td>253</td>
</tr>
<tr>
<td>12.2</td>
<td>Factor Scores and Contribution Rates of EHC</td>
<td>268</td>
</tr>
<tr>
<td>13</td>
<td>Main Features of GEC</td>
<td>273</td>
</tr>
<tr>
<td>13.1</td>
<td>Environment Competitiveness Is the Overall Representation and Combined Result of Economic, Social and Natural Environment, Reflecting the Capacity and Level of the Countries on Sustainable Development</td>
<td>273</td>
</tr>
</tbody>
</table>
13.2 ECC Contributes the Most to the Overall Score of Environment Competitiveness, the Countries Differs Slightly on the Scores of REC and ECC and Differs Greatly on the Scores of EEC, EHC and EMC........... 275

13.3 Developing Countries and Developed Countries Differ Greatly, and the Emerging Market Countries Have Much Room for Improvement............................................ 276

13.4 Scores of Environment Competitiveness Differ Slightly Among the Regions but the Ranks Differ Greatly: The Countries of Oceania, Europe, South America and North America Rank Ahead While Asian and African Countries Rank Behind ....................... 280

14 **Enlightenment from the Results of GEC Evaluation** ...................... 283
14.1 Insisting on Strengthening the Environmental Protection and Combining the Development with the Protection ................. 283
14.2 Improving the Utilization Efficiency of Resources and Promoting Resource Conservation and Recycling............... 285
14.3 Increasing the Capital Investment on the Environmental Infrastructure Construction and Enhancing the Capacity of the Environment Carrying ......................... 286
14.4 Increasing the Efforts on the Environmental Regulation and Governance to Effectively Improve and Enhance the Environmental Quality ........................................................... 286
14.5 Strengthening the Coordination and Cooperation in the World Climate and Environmental Issues to Achieve Mutual Benefit and Win-Win ....................... 287
14.6 Strengthening the Environmental Advocacy Efforts to Enhance the Environmental Awareness of People ...... 288
14.7 Developing the Environmental Technology and Innovation to Solve the Global Environmental Problems.... 289

15 **Basic Thinking and Policy & Suggestion to Enhance GEC** .............. 291
15.1 Basic Thinking to Enhance GEC ................................................. 291

15.1.1 Global Environmental Cooperation Is the Basis to Enhance GEC......................... 293
15.1.2 Transition, Innovation and Green Revolution Are the Motive Powers to Drive the Improvement of GEC ............................... 293
15.1.3 To Enhance the Five Sub-Indexes Jointly Is the key Point to Enhance GEC ................. 294
15.1.4 Global Vision and Dynamic Perception Are the Means of Seeking the Path to Enhance GEC ........................................... 295
15.2 Policy & Suggestion to Enhance GEC

15.2.1 To Develop Green Economy Greatly and Advance New Thinking of Sustainable Development

15.2.2 To Cope with Global Climate Change Positively and Promote the Healthy Development of Low-Carbon Economy

15.2.3 To Enhance the Ability of Science & Technology Innovation and Support the Coordinated Development of Service Environment and Economy

15.2.4 To Strengthen International Cooperation and Form the Robust Composite Force for Global Environment Improvement

15.2.5 To Reinforce the Guarantee of Organization Mechanism and Establish Effective Framework of Global Environment Improvement

Part III Sub Report

16 Report on Global Environment Competitiveness of Albania

17 Report on Global Environment Competitiveness of Algeria

18 Report on Global Environment Competitiveness of Angola

19 Report on Global Environment Competitiveness of Argentina

20 Report on Global Environment Competitiveness of Armenia

21 Report on Global Environment Competitiveness of Slovenia

22 Report on Global Environment Competitiveness of Austria

23 Report on Global Environment Competitiveness of Azerbaijan

24 Report on Global Environment Competitiveness of Bangladesh

25 Report on Global Environment Competitiveness of Belarus

26 Report on Global Environment Competitiveness of Belgium

27 Report on Global Environment Competitiveness of Benin

28 Report on Global Environment Competitiveness of Bolivia

29 Report on Global Environment Competitiveness of Bosnia and Herzegovina

30 Report on Global Environment Competitiveness of Botswana

31 Report on Global Environment Competitiveness of Brazil

32 Report on Global Environment Competitiveness of Bulgaria
33 Report on Global Environment Competitiveness of Cambodia ...... 373
34 Report on Global Environment Competitiveness of Cameroon ...... 377
35 Report on Global Environment Competitiveness of Canada ............ 381
36 Report on Global Environment Competitiveness of Chile ............. 385
37 Report on Global Environment Competitiveness of China .......... 389
38 Report on Global Environment Competitiveness of Colombia .... 393
39 Report on Global Environment Competitiveness of Congo, Rep. .... 397
40 Report on Global Environment Competitiveness of Costa Rica ...... 401
41 Report on Global Environment Competitiveness of Cote d’Ivoire .......................................................... 405
42 Report on Global Environment Competitiveness of Croatia .... 409
43 Report on Global Environment Competitiveness of Cuba .......... 413
44 Report on Global Environment Competitiveness of Cyprus ......... 417
45 Report on Global Environment Competitiveness of Czech Republic ..................................................... 421
46 Report on Global Environment Competitiveness of Denmark ...... 425
47 Report on Global Environment Competitiveness of Dominican Republic ................................................... 429
48 Report on Global Environment Competitiveness of Ecuador .... 433
49 Report on Global Environment Competitiveness of Egypt .......... 437
50 Report on Global Environment Competitiveness of El Salvador .... 441
51 Report on Global Environment Competitiveness of Eritrea ......... 445
52 Report on Global Environment Competitiveness of Estonia ....... 449
53 Report on Global Environment Competitiveness of Ethiopia ...... 453
54 Report on Global Environment Competitiveness of Finland ....... 457
55 Report on Global Environment Competitiveness of France ......... 461
56 Report on Global Environment Competitiveness of Gabon ......... 465
57 Report on Global Environment Competitiveness of Georgia ...... 469
58 Report on Global Environment Competitiveness of Germany ...... 473
59 Report on Global Environment Competitiveness of Ghana ....... 477
60 Report on Global Environment Competitiveness of Greece ....... 481
Report on Global Environment Competitiveness of Guatemala ...... 485
Report on Global Environment Competitiveness of Guinea............. 489
Report on Global Environment Competitiveness of Haiti .............. 493
Report on Global Environment Competitiveness of Honduras ....... 497
Report on Global Environment Competitiveness of Hungary ......... 501
Report on Global Environment Competitiveness of India ............. 505
Report on Global Environment Competitiveness of Indonesia ...... 509
Report on Global Environment Competitiveness of Iran ............. 513
Report on Global Environment Competitiveness of Iraq ............. 517
Report on Global Environment Competitiveness of Ireland .......... 521
Report on Global Environment Competitiveness of Israel .......... 525
Report on Global Environment Competitiveness of Italy .......... 529
Report on the Global Environment Competitiveness of Jamaica ..... 533
Report on the Global Environment Competitiveness of Japan ....... 537
Report on the Global Environment Competitiveness of Jordan ....... 541
Report on the Global Environment Competitiveness of Kazakhstan ........................................................................................ 545
Report on the Global Environment Competitiveness of Kenya ...... 549
Report on the Global Environment Competitiveness of South Korea ........................................................................................ 553
Report on the Global Environment Competitiveness of Kuwait ...... 557
Report on the Global Environment Competitiveness of Kyrgyzstan ........................................................................................ 561
Report on the Global Environment Competitiveness of Latvia ...... 565
Report on the Global Environment Competitiveness of Lebanon .... 569
Report on the Global Environment Competitiveness of Lesotho .... 573
Report on the Global Environment Competitiveness of Libya ....... 577
Report on the Global Environment Competitiveness of Lithuania ........................................................................................ 581
Report on the Global Environment Competitiveness of Luxembourg ........................................................................................ 585
Report on the Global Environment Competitiveness of Macedonia ........................................................................................ 589
<table>
<thead>
<tr>
<th>Page</th>
<th>Report on the Global Environment Competitiveness of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Madagascar</td>
</tr>
<tr>
<td>89</td>
<td>Malaysia</td>
</tr>
<tr>
<td>90</td>
<td>Mali</td>
</tr>
<tr>
<td>91</td>
<td>Mauritania</td>
</tr>
<tr>
<td>92</td>
<td>Mauritius</td>
</tr>
<tr>
<td>93</td>
<td>Mexico</td>
</tr>
<tr>
<td>94</td>
<td>Moldova</td>
</tr>
<tr>
<td>95</td>
<td>Mongolia</td>
</tr>
<tr>
<td>96</td>
<td>Morocco</td>
</tr>
<tr>
<td>97</td>
<td>Mozambique</td>
</tr>
<tr>
<td>98</td>
<td>Myanmar</td>
</tr>
<tr>
<td>99</td>
<td>Namibia</td>
</tr>
<tr>
<td>100</td>
<td>Nepal</td>
</tr>
<tr>
<td>101</td>
<td>Netherlands</td>
</tr>
<tr>
<td>102</td>
<td>New Zealand</td>
</tr>
<tr>
<td>103</td>
<td>Nicaragua</td>
</tr>
<tr>
<td>104</td>
<td>The Republic of Niger</td>
</tr>
<tr>
<td>105</td>
<td>Nigeria</td>
</tr>
<tr>
<td>106</td>
<td>Norway</td>
</tr>
<tr>
<td>107</td>
<td>Oman</td>
</tr>
<tr>
<td>108</td>
<td>Pakistan</td>
</tr>
<tr>
<td>109</td>
<td>Panama</td>
</tr>
<tr>
<td>110</td>
<td>Paraguay</td>
</tr>
<tr>
<td>111</td>
<td>Peru</td>
</tr>
<tr>
<td>112</td>
<td>Philippines</td>
</tr>
<tr>
<td>113</td>
<td>Poland</td>
</tr>
</tbody>
</table>
114  Report on Global Environment Competitiveness of Portugal .......... 697
115  Report on Global Environment Competitiveness of Qatar ............. 701
116  Report on Global Environment Competitiveness of Romania ......... 705
117  Report on Global Environment Competitiveness of Russia .......... 709
118  Report on Global Environment Competitiveness of Saudi Arabia ................................................................. 713
119  Report on Global Environment Competitiveness of Senegal .......... 717
120  Report on Global Environment Competitiveness of Serbia .......... 721
121  Report on Global Environment Competitiveness of Singapore ...... 725
122  Report on Global Environment Competitiveness of Slovak .......... 729
123  Report on Global Environment Competitiveness of Slovenia ....... 733
124  Report on Global Environment Competitiveness of South Africa ................................................................. 737
125  Report on Global Environment Competitiveness of Spain .......... 741
126  Report on Global Environment Competitiveness of Sri Lanka ....... 745
127  Report on Global Environment Competitiveness of Sudan .......... 749
128  Report on Global Environment Competitiveness of Sweden ......... 753
129  Report on Global Environment Competitiveness of Switzerland .... 757
130  Report on Global Environment Competitiveness of Syria .......... 761
131  Report on Global Environment Competitiveness of Tajikistan ...... 765
132  Report on Global Environment Competitiveness of Tanzania ....... 769
133  Report on Global Environment Competitiveness of Thailand ...... 773
134  Report on Global Environment Competitiveness of Togo .......... 777
135  Report on Global Environment Competitiveness of Tunisia ......... 781
136  Report on Global Environment Competitiveness of Turkey ......... 785
137  Report on Global Environment Competitiveness of Turkmenistan ................................................................. 789
138  Report on Global Environment Competitiveness of Ukraine ....... 793
139  Report on Global Environment Competitiveness of the United Arab Emirates ................................................................. 797
140  Report on Global Environment Competitiveness of United Kingdom ................................................................. 801
Contents

141 Report on Global Environment Competitiveness of the United States ................................................................. 805
142 Report on Global Environment Competitiveness of Uruguay ......... 809
143 Report on Global Environment Competitiveness of Uzbekistan ...... 813
144 Report on Global Environment Competitiveness of Venezuela ...... 817
145 Report on Global Environment Competitiveness of Vietnam ......... 821
146 Report on Global Environment Competitiveness of Yemen .......... 825
147 Report on Global Environment Competitiveness of Zambia ........... 829
148 Report on Global Environment Competitiveness of Zimbabwe ...... 833

Appendix ......................................................................................................................................................... 837

Postscript ....................................................................................................................................................... 841

References ...................................................................................................................................................... 845
Report on Global Environmental Competitiveness
(2013)
Hongwen, S.; Maoxing, H. (Eds.)
2014, XXXI, 846 p. 437 illus., Softcover
ISBN: 978-3-642-54677-8