

Contents

Introduction	1
Chapter 1. Why is sustainability science needed?	8
1.1. The challenge of decoupling growth from the exploitation of natural resources ...	13
1.1.1. Weak sustainability compared to strong sustainability	14
1.1.2. Beyond eco-efficiency: the challenge of absolute decoupling.....	16
1.2. The challenge of social equity for sustainable development	20
1.3. Bridging the gap between science and society	23
Chapter 2. Principles of sustainability science	26
2.1. Strong sustainability as the normative foundation of sustainability science	28
2.1.1. Defining the ethics of strong sustainability	29
2.1.2. The task of operationalizing the ethical framework	30
2.2. An integrated perspective on socio-ecological systems	33
2.2.1. Navigating complex socio-ecological interactions	33
2.2.2. Building integrated frameworks of analysis	35
2.3. A transdisciplinary research organisation for sustainability science.....	36
2.3.1. Addressing situations of irreducible uncertainty, multiple values and high stakes	37
2.3.2. An illustrative model of a transdisciplinary research process	38
Chapter 3. Learning from transformative science approaches for sustainability....	40
3.1. Rethinking natural resources and ecosystems management in integrated ecological and economic systems	41
3.1.1. The pathology of the conventional mono-disciplinary approaches to Natural resources and ecosystems management	42
3.1.2. Ecological economics as a transdisciplinary research effort for integrating complex economic and bio-physical system dynamics	45
3.1.3. Global science partnerships to address global environmental change	48
3.2. Rethinking growth for the transition to strong sustainability.....	52
3.2.1. GDP as the largest information failure in the world	54
3.2.2. Integrated and multi-criteria assessment methods for sustainability accounting	57
3.2.3. Post-Keynesian perspectives on the financial crisis: beyond value neutrality and the marginalisation of systemic risks.....	60

/. .

Contents

3.3. Addressing democratic choice in socio-technological transitions.....	66
3.3.1. From firm level innovations to sustainability transitions	68
3.3.2. The contribution of Veblenian evolutionary economics to addressing long-term historical processes of innovation	72
3.4. Beyond interdisciplinarity: the need for strong sustainability ethics within a transdisciplinary organisation of the research process	75
3.4.1. The role of ethics of strong sustainability and stakeholder involvement in sustainability science	75
3.4.2. Sustainability research in economics	77
Chapter 4. Implementing transdisciplinary research partnerships	90
4.1. Improving environmental health through community-based epidemiological surveys	95
4.2. Overcoming deadlock in silvo-pastoral management through participatory modelling	99
4.3. Enabling the social economy through community-university research partnerships in Canada	103
Chapter 5. Building institutional capacity for sustainability science	107
5.1. Overcoming disciplinary inertia in the development of sustainability science.....	107
5.2. Major institutional barriers for the development of sustainability science....	110
5.2.1. Incorporating sustainability into higher education institutions.....	113
5.2.2. Strengthening the sustainability science community.....	116
5.2.3. Developing long-term transdisciplinary research in sustainability science...	118
5.3. An institutional reform program for sustainability science.....	120
5.3.1. Capacity building measures at universities and other higher education Institutions.....	124
5.3.2. New tools for programmatic research funding.....	126
5.3.3. New research networks and institutions.....	128
Conclusion	134
 <i>Glossary</i>	
a. <i>Glossary of key concepts</i>	136
b. <i>Glossary of key technical terms</i>	140
References	142
Index.....	165