• Selfish genes/biological fitness to cooperation/synergy/altruism?

Self/Selfish/Fitness?

Survival and reproduction of the individual and his kin has for ages been the main if not only sustainability concern for humans. Only a few individuals broadened their horizons and interests to larger areas and longer periods – the kings and priests in recorded history. But, as seen in Altruism/Prosociality

The benefits of working together for a goal that transcended individual survival were clear from early times on (Wright 2000). Already thousands of years ago, Krishna told Arjuna in the Bhagavad Gita: ‘The ignorant work for their own profit; the wise work for the welfare of the world’ (Easwaran 1985). Concern for fellow men and for society is found in many ancient works of philosophy and religion (Armstrong 2006). They offer reflections


Abstract The greatest challenge our generation faces is creating a sustainable future. At the core is maintaining the services ecosystems provide humanity, but our ability to achieve that objective is made more difficult because ecosystems, the biosphere, and the socio-economic system with which they are linked are complex adaptive systems, in which individual agendas translate into global consequences. For management, that introduces problems of the Commons, and of how to achieve cooperation in attaining the best possible solutions for the collective good. At the core are issues of equity, of prosociality, and of the management of public goods and common-pool resources. Progress has been made in addressing these issues, but realism argues that new institutional frameworks will be necessary to create a sustainable future for the global biosphere.

Keywords Sustainability • Equity • Discounting • Prosociality • Public goods • Common pool resources • Commons • Complex adaptive systems
15.2 Outlooks

15.2.1 Sustainable Futures: Urban, Rural, Global

Cities, or more broadly, urbanised regions, are increasingly the centerpieces of the human world. How will a sustainable city look? Upon
15.2.2 The Scenario Approach

The scenario method combines the qualitative aspect of stories (or narratives) with the quantitative of models. Practitioners have given various definitions, for instance:

a scenario is a combination of qualitative story-telling and quantitative modelling, with the purpose to construct and explore with stakeholders different possible futures, each with their own logic.

Geurts 2004). Scenarios are a stepping stone to strategy, which is the art of deliberately recognising major trends, establishing one's own course of action and translating this into practical plans. Part of scenario

For example:

World3 shows, in no uncertain terms, that if the world system continues to evolve with no significant changes, the most likely result is not only overshoot, but collapse, and within another few decades. One possible future, by no means the only one, is shown in Scenario 1.

In this scenario the world society proceeds along its historical path as long as possible without major policy change. Technology advances in agriculture, industry, and social services according to established patterns. The simulated world tries to bring all people into an industrial and then post-industrial economy.

The global population in this scenario rises from 1.6 billion in 1900 to over 5 billion in 1990 and over 6 billion in the year 2000. Total industrial output expands by a factor of 20 between 1900 and 1990, and it does so while using only 20% of the earth's total stock of nonrenewable resources. In 1990
In Scenario 10 people in the simulated world decide on an average family size of two starting in 1995, and they have available effective birth control technologies. They also set themselves a consumption limit. When every family attains roughly the material standard of living of present-day Europe, it says "enough" and turns its attention to achieving other, nonmaterial goals. Furthermore, starting in 1995, this world puts a high priority on developing and implementing technologies that increase the efficiency of resource use, decrease pollution emissions, control land erosion, and increase land yields.
15.4 An Agenda for Sustainability Science

Sustainability science has a more narrow scope than sustainable development. Nevertheless, the list in Table 15.2 is also indicative of the topics to be researched and taught in sustainability science. Most of these

The natural and engineering sciences offer undoubtedly enormous prospects for contributions to a more sustainable future. It is their

We live in physical space and the sciences of ecology and geography contribute in manifold ways to our understanding and organisation of natural and economic, social and cultural space. They are the material


State of the Art and Future of Sustainability Science?

Sustainability science just started, it seems.

Since 1900, a great dream has faded. To many in the West, their civilisation appears to have gone wrong. Much that is unique about it has seemed to turnout to be weakness, or worse...There seems to be little left for the educated to believe in.

The intellectual hegemony of western science has also been buttressed by its sheer size and scale...[and] explains why science is now a major religion, perhaps the religion, of our civilisation....Of course, there are suspicions of the new priesthood.

– Roberts, The Triumph of the West, 1985
Sustainability science: a review, an analysis and some empirical lessons

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Date submitted: 27 May 2010; Date accepted: 11 April 2011;
First published online: 14 June 2011

Table 1 Two branches of sustainability science and their distinctive features. Mode-1 science is completely monodisciplinary and academic in nature, whereas in mode-2 science research is but one component of an extensive process of knowledge production.

<table>
<thead>
<tr>
<th>Science for sustainability</th>
<th>Science of sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode-1 sustainability science</td>
<td>Mode-2 sustainability science</td>
</tr>
<tr>
<td>Monodisciplinary</td>
<td>Interdisciplinary and transdisciplinary</td>
</tr>
<tr>
<td>Highly focused</td>
<td>Broadly based</td>
</tr>
<tr>
<td>Normal science</td>
<td>Post-normal science</td>
</tr>
<tr>
<td>Curiosity driven and problem solving</td>
<td>Critical research</td>
</tr>
<tr>
<td>Academic</td>
<td>Academic and social</td>
</tr>
<tr>
<td>Academic peers</td>
<td>Extended peer community</td>
</tr>
<tr>
<td>Certainty</td>
<td>Uncertainty and ignorance</td>
</tr>
<tr>
<td>Hierarchical logic</td>
<td>Relational logic</td>
</tr>
<tr>
<td>Scientific proofs, unequivocal results</td>
<td>Discursive processes, ranges of options</td>
</tr>
<tr>
<td>Top-down, command and control</td>
<td>Discursive process of opening up and closing down</td>
</tr>
<tr>
<td>Stakeholders affected</td>
<td>Stakeholders involved</td>
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2015 Elsevier Report
Knowledge systems for sustainable development


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Communicated by Susan Hanson, Clark University, Worcester, MA, March 7, 2003 (received for review February 25, 2003)

The challenge of meeting human development needs while protecting the earth’s life support systems confronts scientists, technologists, policy makers, and communities from local to global levels. Many believe that science and technology (S&T) must play a more central role in sustainable development, yet little systematic scholarship exists on how to create institutions that effectively harness S&T for sustainability. This study suggests that efforts to mobilize S&T for sustainability are more likely to be effective when they manage boundaries between knowledge and action in ways that simultaneously enhance the salience, credibility, and legitimacy of the information they produce. Effective systems apply a variety of institutional mechanisms that facilitate communication, translation and mediation across boundaries.

Credibility
The scientific adequacy of the technical evidence and arguments.

Salience
The relevance of the assessment to the needs of decision makers.

Legitimacy
The perception that the production of information and technology has been respectful of stakeholders’ divergent values and beliefs, unbiased in its conduct, and fair in its treatment of opposing views and interests.
Decadence is the subordination of the whole to the parts.

– Oscar Wilde

Whoever in this world overcomes his selfish cravings, his sorrows fall away from him, like drops of water from a lotus flower.

– Dhammapada

He who knows he has enough is rich.

– Tao Te Ching