Noah's ark or world wild web? Cultural perspectives in global scenario studies and their function for biodiversity conservation in a changing world

Beumer, Carijn; Martens, Pim

Published in:
Sustainability

DOI:
10.3390/su2103211

Publication date:
2010

Document Version
Publisher's PDF, also known as Version of record

Sustainability **2010**, *2*, 3211-3238; doi:10.3390/su2103211

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Review

Noah's Ark or World Wild Web? Cultural Perspectives in Global Scenario Studies and Their Function for Biodiversity Conservation in a Changing World

Carijn Beumer [1,*] and Pim Martens [1,2]

[1] International Centre for Integrated assessment and Sustainable Development (ICIS), Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands

[2] Department of Sustainability Sciences, Leuphana University Lüneburg, Scharnhorststr. 1, 21335 Lüneburg, Germany; E-Mail: p.martens@maastrichtuniversity.nl

* Author to whom correspondence should be addressed; E-Mail: Carijn.Beumer@Maastrichtuniversity.nl; Tel.: +31-43-388-3943.

Received: 1 September 2010; in revised form: 14 September 2010 / Accepted: 8 October 2010 / Published: 14 October 2010

Abstract: In this paper, we review the Intergovernmental Panel on Climate Change and the Millennium Ecosystem Assessment Scenarios and their assumptions on biodiversity conservation, using a framework based on the cultural theory (CT) perspectives. We explored an adaptation of the CT typology and the significance of some underrepresented worldviews for discussions on conservation in a changing world. The evaluation of the assumptions on biodiversity conservation in the scenario studies and storylines adds to our understanding of the socio-cultural dimensions of biodiversity loss in a changing world. It contributes to an understanding of the worldviews underlying the complex debates on biodiversity conservation and sustainable development. Making such assumptions and world views explicit will help policymakers and conservationists discuss the diversity of conservation strategies in the face of uncertainty.

Keywords: global scenario studies; cultural perspectives; biodiversity conservation; ecosystem services

---

1. Introduction

Recently the Convention for Biological Diversity released the Global Biodiversity Outlook 3, reflecting on the failed target to reduce global biodiversity loss in 2010 [1]. In the Outlook it is stated that "urgent action is needed to reduce the direct drivers of biodiversity loss" [2]. This conclusion seems to be clear and unanimous. Nevertheless, the specific goals and means to address biodiversity loss are divergent and there seems to be a lack of integrated discussion. What is more specifically meant by "reducing global biodiversity loss" is not yet made very operational and remains rather vague and fuzzy. On the level of approaches, biodiversity conservation is a pluriform concept. In practice it contains many different strategies ranging from park management and ecological network development to the storage of seed material in artificial cryospheres and cloning. We believe that there is a lack of coordination and integration between all the various means to achieve the goal of reducing biodiversity loss. Therefore, a discussion should be started on the basic assumptions and ethical principles underlying these approaches and on how they relate to each other. The ethical reasons *why* we would choose for a post-modern version of Noah's Ark or for a World Wild Web of connected habitat structures instead, or the more practical issues of *how* such diverging strategies could be combined to develop a robust conservation strategy, remain rarely discussed issues until now.

We will demonstrate the need for a more integrated discussion by a review of two Global Assessments (GA) of which we took the scenario studies as our subject for analysis: the Intergovernmental Panel on Climate Change Special Report on Emissions Scenarios (IPCC SRES) [3] and the Millennium Ecosystem Assessment (MA) [4]. We analyzed the IPCC and the MA scenarios because: 1. They display a socio-environmental context of biodiversity loss; and 2. their analysis accumulates insights for the development of more specific biodiversity scenarios, which do not yet exist in the context of a global integrated assessment. Global Scenarios for Biodiversity Conservation will play an important role in the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) [5], which was given a green light in June 2010 in Busan.

In the analyses of the IPCC and the MA scenarios we reveal some cultural perspectives apparent in their storylines. The aim of this exercise is to make the worldviews and ethical principles underlying their narratives more explicit in order to stimulate integrated discussions and to ease the task of building bridges between science, policy and society [6-8] in order to support biodiversity conservation. We used the perspectives presented in Cultural Theory (CT) [9,10] as a framework for our analysis. We explored some adaptations of CT by working out three existing but scarcely used worldviews. By analyzing the two scenario studies using CT, we would like to open a door for discussion on the value of the CT perspectives framework for stimulating an integrated discussion in the field of biodiversity conservation.

2. Methods

For our review we selected the IPCC and MA scenarios, two significant assessments which implicitly discuss changes in global biological diversity. We chose to focus on the qualitative, written text of the scenarios for our analysis. For a proper analysis of the IPCC studies we also used information on climate change in the quantitative IPCC scenarios, in order to make up for some lacking information about environmental change in the qualitative IPCC scenario narratives.

The chosen scenarios do not explicitly mention biodiversity and ecosystems in a conservation framework; they do discuss them in the broader context of sustainable development. Scenarios are built according to variable drivers of change. Significant drivers of environmental change mentioned in various scenario studies are globalization, climate change, human population growth, socio-cultural and political stability, decentralization of authority, economic development, energy use, infrastructure, technological innovation and urbanization. Direct pressures generally mentioned in relation to changes in biodiversity are fragmentation, land use change, resource use and pollution [4,11-15]. Nearly all of the drivers and pressures are human induced. The IPCC and the MA scenario studies integrate the social, ecological and economic domains in their storylines. In addition to the scenario narratives, we selected one document (or chapter) from each GA that discusses biodiversity and ecosystem services. We did this in order to be able to compare the outcome of the scenario narrative perspective(s) with the perspective of the scenario study group. We called this additional GA document the "key source". The results of the analysis of this key source are useful because they give us an indication of the actual (real) worldview(s) of the sustainability discourse. The key source results were utilized to mirror the results of the scenario analyses. We used a Cultural Perspectives Axis (CPA) (see Figure 1) as a framework for an in depth deductive qualitative content analysis of both types of narratives [16-18].

Content analysis is a set of procedures in order to transform non-structured oral or written information into a format that allows analysis. Qualitative content analysis has an established reputation in health sociology and its popularity has increased in other fields of research [16,17]. It focuses on the characteristics of language as communication and pays attention to the contextual meaning of "text" [16,19]. The method facilitates analysts in making structured inferences about the characteristics and meaning of the material [18]. Qualitative content analysis in brief can be defined as a "research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" [16].

In preparation of the scenario analyses, we carried out a literature study to explore the cultural perspectives on biodiversity and conservation. The studied literature contained texts ranging from conservation practice, ecological theory, evolution theory, sustainable development and philosophy. We also included newspaper articles to our literature assessment starting in 2007. The goal was to compile a general working list of key words and phrases of the CT worldviews in relation to assumptions about biodiversity and conservation strategies. Based on the resulting list, we decided to explore an adaptation of the existent cultural theory perspective descriptions by Thompson *et al.* [9] by reflecting on some existing perspectives in the classical CT framework that are usually neglected in studies using CT as a framework but abundant in the assessed literature. Through this reflection we were able to refine the perspectives list (see Box 1) and we developed a tentatively revised CPA (see Figure 1). The gained key assumptions, words and phrases were categorized and labeled according to the CT perspectives. The perspectives were colored blue (hierarchist), green (egalitarian), yellow (individualist), purple (fatalist), red (autonomous) and orange (dynamic integrator). The labels were used to code units of the texts of the scenario narratives and the selected key documents. We numbered the paragraphs of the texts and in a process of close reading we coded words and phrases assigning weights related to the frequency of their occurrence and to their intensity. The frequency was counted by giving weights to the title, the subtitle and to single words. When these elements represented a certain perspective, they were given a weight of 1 point. The occurrence of a few terms

together, connecting a line of words representing one of the perspectives, were given 2 points. A full paragraph colored in a certain perspective was given 5 points. Sometimes words or phrases can reflect more perspectives at the same time. In such cases we double or even triple-coded the fragments with the corresponding perspective colors. When one phrase was coded in three (or even more) colors, we added an orange line in the margin to refer to the dynamic integrator (see Box 2). Weighing the intensity of meaning was also accomplished by coding the text margin with a perspective color when the intensity occurred to be strong. Intensity coding requires the analyst to recognize more subtle connotations of the text [18,19]. This process of analysis remains largely subjective [19].

Box 1. Perspectives map.

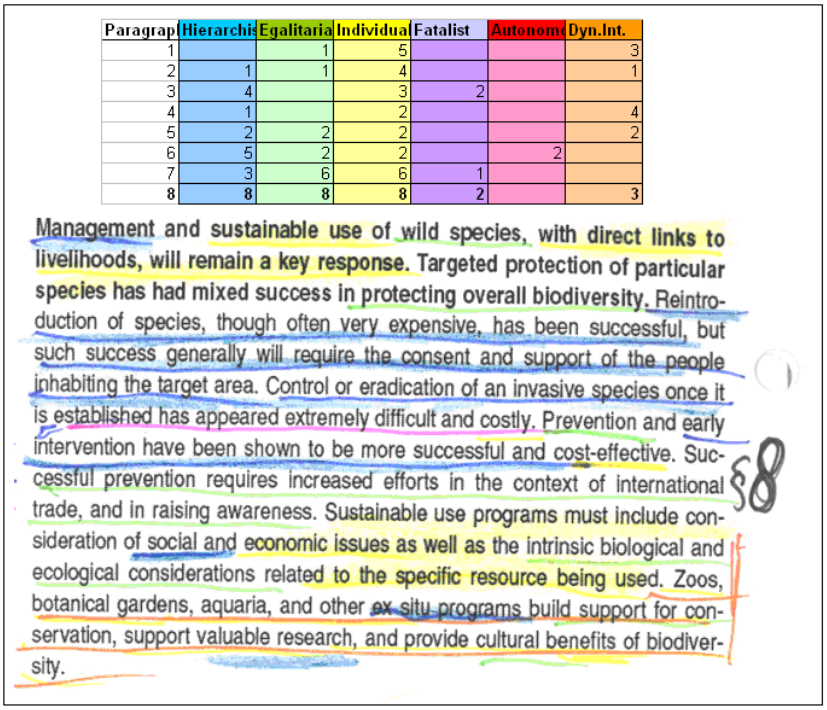
Perspective	Hierarchist	Egalitarian	Individualist	Fatalist	Autonomous/Mystic	Dyn. Int.
Worldview General						
Basic Assumption Nature	Nature is robust within limits	Nature is fragile	Nature is robust	Nature is capricious.	Nature is sacred	Nature is dynamic
Basic Concept Nature	Nature is wilderness (to be tamed)	Nature is Life and Beauty	Nature is a resource	Nature is hazardous and capricious	Nature is Sacred	Nature is a complex dynamic system
Nature Ideal	Safe Environment	Wilderness	Treasure	***	Paradise	Healthy Dynamic Ecosystem
Human Nature	Human nature is ignorant and needs education and rearing	Human nature is intrinsically good, but can be corrupted	Human nature is neither good, nor bad but opportunistic	Human nature is unpredictable, more hostile than friendly	Human nature is spiritual, essentially good and devine	Human nature is complex and dynamic
Nature Behavior	Isomorphic Nature: Perverse/tolerant	Ephemeral Nature/vulnerable	Nature Benign & Resilient	Nature Capricious	Giving	Nature complex and dynamic
Human-Nature Relation	Human stewardship/ dominion over nature	Participation in nature	Nature is Resource for human benefit	Nature reigns humanity: human subordination	Nature mirrors divinity and gives life	dynamic and reciprocal relationship
Authority	Hierarchy	Equality	Market	Anarchistic	God'	The Flow'
Management priority	Political and social stability	Protection of the weaker	Prosperity	Why bother?	Harmony	Dynamic Balance
Directing Principle	Law/Legislation	Fairness	Needs/Preferences	Subconsciousness	Love	Dignity
Cognitive Faculty	Rational thinking	Intuition	Impulse	Emotion	Sensuousness	Consciousness
Knowledge Epistemology	Empiricism & Expertise	Art & Poetry & Lay/Indigenous Knowledge	Experimentation & Innovation	Agnostic	Meditation & Prayer & Intuition & Verstehen	Integrated Assessment
Philosophical Tradition	Classic	Romanticism	Enlightenment	Fatalism	Mysticism	Postmodernism
Risk Approach	Risk Aversion	Risk Accepting	Risk Seeking	Coping	Retreat from risk	Risk anticipating
Strength	Orderliness	Progressiveness	Optimism	Perserverance	Strong Principles	Openness
Pitfall	Dogmatism/Bureaucracy	Idealism	Exploitation/Egoism	Nihilism/Pessimism	Fanatism/Extremism	Vagueness/Chaos
Allergy	Vagueness/Chaos	Exploitation	Bureaucracy	Optimism	Nihilism	Dogmatism
Ethical Philosophy	Natural Order/Virtues	Deontology/Social Justice	Utilitarianism	Relativism	Responsibility for the Divine in Nature	Pluralism
Ethical Principle	Right is Good	Justice	Freedom	Destiny	Care	Life
Moral standing	Anthropocentric	Inclusive	Anthropocentric	Relative	Ecocentric	Holistic
Moral incentive	Being a virtuous person	Causing no harm	The greatest good for all	Destined	Spiritual connectedness	Respect for life
General Value Discourse	Instrumental value	Intrinsic value	Use/non-use value	***	Spiritual value	Plural values
Values Society	Human well-being	Equity and Equality	Development	Survival	Spiritual Growth	Respect
Values Nature	Stability	Nature Preservation	Growth of Resources	Survival	Pristinity	Evolution
Management style	Control	Prevention/Precaution	Adaptation	Coping	Retreat	Integration

The aim of the qualitative review was to reveal the assumptions underlying the scenario studies and the scenario storylines. Making these assumptions more explicit will help policymakers and conservationists to discuss the development of flexible and robust solutions for future biodiversity and

ecosystem management, based on the trends and the needs of our complex and changing socio-ecological system.

We checked the reliability of our assessment by cross checking our results with two research assistants who carried out the same coding process. The gained weights were assembled and calculated in a prepared excel sheet and the numerical results were transformed into a graphic table (see Figures 2−5). This coding process resulted in the visual percentages of perspectives per scenario narrative and of the key documents.

Box 2. Coding example of ma key document paragraph 8.



Paragrap	Hierarchis	Egalitaria	Individua	Fatalist	Autonom	Dyn.Int.
1		1	5			3
2	1	1	4			1
3	4		3	2		
4	1		2			4
5	2	2	2			2
6	5	2	2		2	
7	3	6	6	1		
8	**8**	**8**	**8**	**2**		**3**

3. The Challenges of Conservation in a Changing World: Uncertainties and Assumptions

Biodiversity "includes diversity at levels from genetic diversity within species-to-species diversity to landscape diversity" [11]. Two important aspects of biodiversity are its quality and its quantity. The quantity can be expressed in terms of the size of the population, the abundance of different species, as well as the surface area and number of ecosystems in an area [20]. Quality (or integrity) relates to the genetic diversity and the vitality or resilience of a species, ecosystem or natural area [21].

Conservationists and policymakers are facing challenges of an unprecedented magnitude. Biodiversity loss is growing from a local and regional issue to a global concern. Urbanization, intensive agriculture and infrastructure are fragmenting ecosystems and landscapes, threatening the means of existence for many species, populations and genetic diversity. Production and consumption of an expanding global human population are mounting the pressures on natural resources and the biosphere. The main factors impacting biodiversity are related to demographic, cultural and socio-economic developments [1]. The threats differ per region [11]. Climate change is a major factor putting additional pressures on the already "weakened" natural system [13,22]. The question is how

resilient our ecosystems are in order to sustainably deal with these combined, largely human induced pressures [23].

However, the question of resilience has to be seen broader than from a conservation ecology perspective alone [21,24]. Socio-cultural, ethical and economic factors play an important role in the sustainable conservation of biodiversity and of ecosystem services [25]. Conservation practices aiming to counter environmental degradation often seem to oppose economic development and as such often delicate, difficult and time consuming trade-offs are being made, resulting in slow progress on the urgent issue of halting biodiversity loss [26]. The complex global developments ask for innovative and integrated approaches for conservation in order to stimulate the creation of more sustainable pathways into the uncertain future [20]. In order to gain insightful discussions on what such approaches may entail, an increased level of awareness of the worldviews, assumptions and ethical perspectives underlying biodiversity conservation and management strategies is required.

The global scenarios can be seen as a tool for policymakers and conservationists to stimulate discussion on the development of transition pathways to stop biodiversity loss in a changing world. The storylines can "help to think through uncertainties about the future and make decisions that are robust to a variety of possible outcomes" [23]. Many conservationist and policymaking eyes are turned towards these global scenario studies in order to plan for sustainable development and biodiversity conservation. In the analyzed scenario narratives, underlying assumptions and worldviews are rather implicit. This makes it difficult to grasp the social and cultural side of the choices, management styles and policy-practices that may influence our future pathways. This lack of explicitness might also affect the consistency of the scenarios and as such affect the robustness of the practical strategies developed with the scenarios in mind [27].

Three important current uncertainties for biodiversity and ecosystems can be identified: 1. How resilient are ecosystems by nature? 2. How resilient are ecosystems under human pressure? 3. Can ecosystem goods and services be substituted by alternatives? [21,23]. These uncertainties together lead to the following central question: How much (anthropogenic) change can ecosystems cope with before important services are lost? [28]. When ecosystems are considered to be vulnerable, thresholds are easily crossed and the ethical principle of precaution [29] is regarded to be the most promising management style. This also accounts for the assumption that ecosystems are complex structures characterized by non-linear dynamics [21]. There is not much time to be lost in learning from trial-and-error. When ecosystems are considered to be relatively resilient, it is assumed that human behavior will have less impact and that many anthropogenic environmental problems will be reversible and manageable. The ethical approach of this view is based on "keeping the natural order by law", but there is more time to learn from mistakes. Nature can be regarded as irrelevant under the assumption that the goods and services ecosystems provide can be substituted by technology. According to this view, we are inventive enough to be able to synthesize or augment the ecosystem services relevant for our survival and well-being [23,30]. This is a rather utilitarian view.

These views on ecosystem resilience correspond largely with the ways to perceive nature as outlined in Cultural Theory (CT) [10,31]. This theory "puts culture at the center of the explanation of social life" [32]. In line with the theory, the organization of social relations can be divided into four different basic patterns, namely: (1) egalitarianism, (2) hierarchy, (3) individualism, and (4) fatalism [10] (see Box 1). These four organizing principles tend to "produce different ways of perceiving

(human) nature, and the policy prescriptions that follow from that" [10]. In the egalitarian perspective, ecosystems are considered to be fragile. "Ecosystems resilient" shares similarities with the hierarchist worldview. The third assumption of the irrelevance of ecosystems is a relatively vigorous reflection of the individualist perspective of CT (see Box 1). The fourth, fatalist, perspective of CT will be discussed in more detail below, together with the autonomous and integrator perspectives. Cultural Theory shows a holistic picture of worldviews, cultural biases and their corresponding management styles by including commitment to social units (group) and institutional authority, such as role differentiation, rules and regulations (grid) (Figure 1). The "level of social stratifications and group solidarity are determining factors of collective action and behavior" [10]. Awareness of the "cultural perspectives" based on this axis, is increasingly regarded valuable in discussions concerning complex issues related to sustainable development.

The CT typology integrates both rational choice theory and post-structuralism [10]. Rational choice theorists assume that societies and cultures are fundamentally the same because they consist of human beings who share the same basic needs. Post-structuralists share the view that every person, culture or community is inherently unique. CT is based on the notion that although cultures do differ, they do not differ endlessly [10]. In this paper we discuss some inconsistencies in the way CT is usually presented and used. With a revised Cultural Perspectives Axis (CPA; see Figure 1), we experimentally explored the perspectives on biodiversity and conservation in the scenario narratives.

4. Reflecting on Cultural Theory Perspectives

Analyses usually limit the range of perspectives discussed to the individualist, egalitarian and hierarchist quadrants. However, the grid and group axis has space for three other perspectives. "Fatalism" and "Autonomy" are inherent to classical CT, but are usually neglected because they do not represent active management styles [31]. We argue that, in discussions on biodiversity conservation and sustainable development, these perspectives do matter, but need to be represented differently. The third perspective, discussed by Verweij *et al.* [10] as a "clumsy solution", has not yet been regarded as a perspective on its own account, because it dynamically and eclectically integrates aspects of all the other perspectives. We propose that the "clumsy perspective" has the right of existence as a distinct perspective and we will illustrate that in the context of the rising significance of post-modern science [33,34].

The way Verweij and his colleagues [10] position the fatalist perspective on the grid/group axis is not consistent with the actual fatalist worldview. Because the fatalist regards nature and man capricious and untrustworthy, he has gained a place on the "low group" quadrant. This seems plausible. Nevertheless, the fatalist's management response is: "why bother?" [10]. As such, high stratification (institutional authority, role differentiation, rules and regulations) does not make sense for the fatalist at all. Rules and regulations are rather a waste instead of proving effective. Nevertheless CT categorizes the fatalist on the "high grid" quadrant. Because of the indifference and passivity of the fatalist, we propose to re-position this perspective on the zero-point of the grid/group axis and give him more "voice" in discussions and analyses at the same time. Although he has a non-active pessimistic character, he does play an important role in the field of conservation and sustainable development: he stimulates other groups and individuals to think about the unpredictable side of nature

and about the practical and ethical consequences of inaction. He motivates active attitudes in others by annoying them with his passive antagonist style. The fatalist sees biodiversity loss as a (natural) and determined process that can't be stopped. Darwinist conceptions of "survival of the fittest" are linked to the notions of chance and coincidence [35,36]. Trying to minimize changes in biodiversity therefore is regarded as a futile effort. The fatalist perspective can also be connected to the determinism represented in some religious worldviews where the future is controlled by God's will [37].

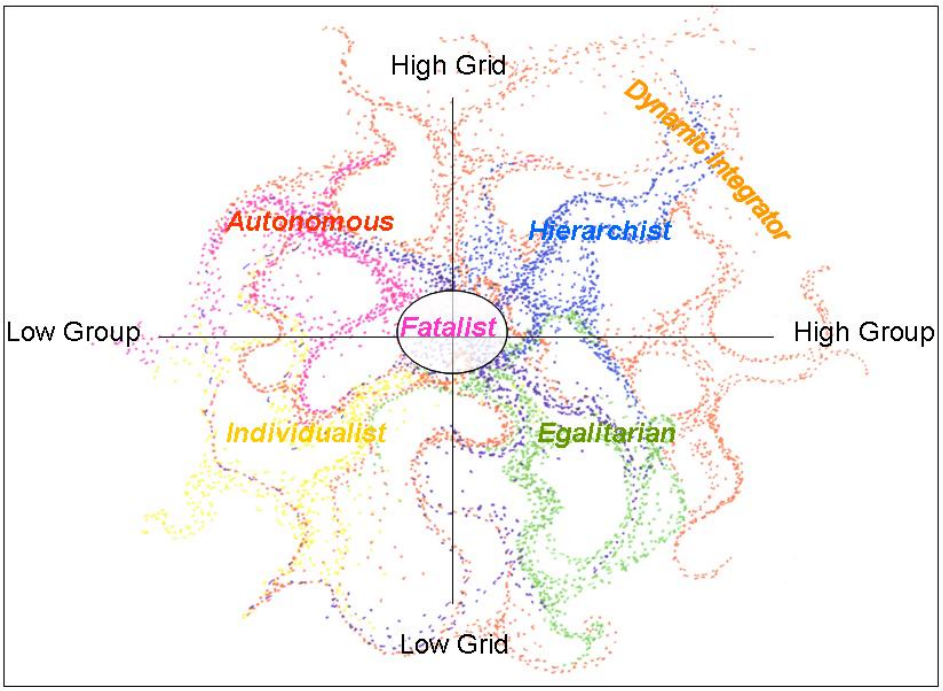
The autonomous perspective, which is also called the "hermit" in CT, fits better into the "low group-high grid" quadrant than the fatalist does. We use the term "autonomous" for this perspective because it does not include the negative connotations of anti-social personalities connected to the term "hermit". We visualize the autonomous as someone who tries to stay independent, distances himself from "group-think" and avoids sticky social units. His management style is a "sustainable retreat" [38]. CT represents the retreat of the autonomous as passive, and therefore the autonomous perspective is hardly mentioned in papers discussing policy and management issues. We argue that retreat is active instead. The retreat of the autonomous originates from his strong ethical perspective: strong norms and values (often based in spirituality) about how to live life make him actively withdraw from a society that in his eyes is corrupted by materialism. He can be seen as an activist in the private sphere. He shares much of the values of the egalitarian, but his management style opposes the egalitarian action approach based on stimulating social participation and common action grounded in solidarity. Living better by consuming less originates from voluntary individual motivation [39], regardless of what other people tend to think about it. The autonomous tries to tread lightly on the ecosystem and minimize his ecological footprint. He finds inspiration in Buddhist and Franciscan oriented philosophies of compassion and simplicity. Examples of the autonomous in society can be found in the "downshifting" and "voluntary simplicity" movements [39]. Conservation is to consciously leave nature in peace and undisturbed by human interference.

Another point of evaluation of the CT perspectives brings us to the "clumsy solutions" as discussed by Verweij and his colleagues [10]. We regard it valuable to claim a place on the grid/group axis for "clumsiness" as a distinct perspective. Verweij describes clumsy solutions to complex problems as "those institutional arrangements in which none of the voices […] is excluded, and in which the contestation is harnessed to constructive, if noisy, argumentation" [10]. Clumsiness can be seen as the core of CT, because it "is an effort to outline which combinations of interests, norms, perceptions, time horizons, strategies and emotions prevail in which particular social settings" [10]. Clumsiness bonds to social units when necessary, but also listens closely to the fatalist, it holds the values of the egalitarian and the autonomous high and it considers technological solutions for specific problems just as feasible as a retreat in other areas.

This eclectic, or holistic approach to problems in our eyes reflects post-modern thinking which is rather post-structuralist in nature and sees a plurality of possible "truths" and solutions to management problems. Society and established policy and (conservation) science regimes are still used to more structuralist modes of management [40]. The holistic approach is rather "new" in Western science and policy practice, and is still on a transition pathway from being a niche to becoming the new paradigm [40,41]. As an infant, the agent of the holistic approach sometimes clumsily stumbles while running through all the perspectives and their plurality of management options [42]. In time the clumsy agent becomes more skillful in his dynamic attitude and the clumsiness fades. Therefore we rather

prefer to call him the "dynamic integrator". He brings a new dimension of motion and dynamics to the grid and group axis, which can be seen as a "strange attractor" (see Figure 1) showing emergent patterns of collaboration, alliances and alienation between the other perspectives. *Panta Rhei* (everything flows) is his device. The dynamic integrator holds value to the notion of evolution, but sees it in a different light than the "blind and undirected" [36] way of the fatalist conception of evolution. Evolution is "portrayed as a form of discontinuous change characterized by emergent properties that take on an intrinsic quality with respect to the object(s) (…) involved. Causal leaps, not continuous development, characterize (…) evolution" [43]. The dynamically occurring patterns of perspective changes and perspective combinations are represented by the multi-colored dynamic and dotted clouds of the attractor in Figure 1.

Figure 1. Cultural perspectives axis.



The integrator belongs to the advancing subculture of relatively independent individuals who are called Cultural Creatives [44]. He is not always understood—sometimes considered vague—by representants of the other perspectives, because he does not seem to fit inside any box. As a scientist, he is often confusing for other professionals and disciplinary scientists because he acknowledges the "myth of objectivity in science" [45]. He recognizes implicit values, norms and subjectivity of human choices in scientific research [34,46-48]. The integrator is inspired by postmodern science, especially by chaos and complexity theory. He believes the complex web of nature can never be fully understood and grasped [49]. Nevertheless, this is no reason either to be passive, relativistic or to behave "unethically". Ethical decisions in his view depend on the contextual situation. The integrator weighs the circumstances using both conscious cognitive reasoning processes *and* his moral intuition before taking any ethical approach or action [50]. In his eyes there is a plurality of ethical options: "Although no single approach provides all the right answers, we need them all" [37]. In the tradition of the French postmodern philosopher Lyotard, the integrator assumes that constructing fixed new (grand) narratives,

or meta-narratives [51] is an illusionary pathway. Therefore, any conservation approach should be flexible and adaptive to new insights and emergent situations [52]. Considering these approaches, the dynamic integrator in action can often be discerned in the field of integrated assessment for sustainable development and sustainability science. With respect to biodiversity and ecosystem services, the dynamic integrator aims to get the protection of nature out of the "conservation niche" [15].

5. The Scenario Analyses

We used the proposed perspective axis with the repositioned worldviews for our exploration of the scenario studies. "A scenario is a story, told in words and numbers, concerning the manner in which future events could unfold and offering lessons on how to direct the flow of events towards desirable pathways and away from undesirable ones" [53]. Scenarios are used in the field of conservation and policymaking as a "framework for developing more resilient conservation policies when faced with uncontrollable, irreducible uncertainty" [54]. The question about which pathways are desirable and which ones are not, are colored by the cultural perspectives and ethical standpoints we inhabit and the way we are able to bring the variety of perspectives together to workable solutions for our urgent problems.

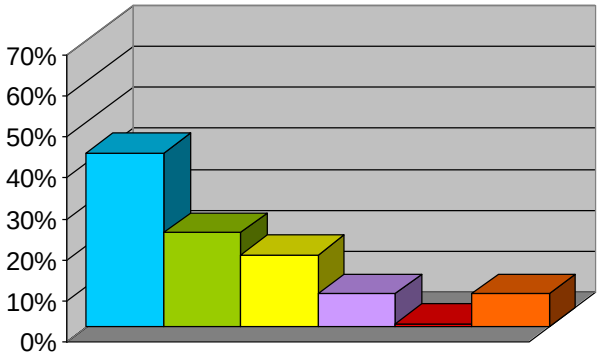
Instead of predicting the future, scenario studies help to outline the uncertainties of a complex and dynamic world [53,55,56]. In the last few years a number of other global scenario studies have been carried out in order to scientifically depict the environmental uncertainties of our changing global system. The Global Biodiversity Outlook 3 [2] and the Global Environmental Outlook 3 and 4 [57,58] include prospects for future biodiversity—although their scope is usually broader and not specifically targeted on biodiversity. The scenarios developed by Sala's group [13] focus on biodiversity merely from an ecological point of view. What the majority of global scenarios have in common is the aim to bridge the gap between scientific knowledge and policymaking. In our post-modern age, scientific knowledge and practice are undergoing a change of character. Instead of telling "The Truth", scientists increasingly acknowledge their task to show the uncertainties of a dynamic and complex world [33] while at the same time recognizing that the stakes are high and the issues they are dealing with are urgent [34,46]. When decisions on such issues have to be made they should be at the same time flexible and robust [7]. They have to take into account a wide range of possibilities [23] and a long term perspective. Additionally, a strong social basis has to be created carrying the decisions; containing a plurality of stakeholder perspectives on the problem; and possible solutions. This involves complicated ethical discussions as well, about the values of nature [57,58]; about what choices are to be made; and about what these choices mean in the short and long term. Accumulating these elements, the loss of biodiversity and ecosystem services can be accounted to such "wickedly" complex problems [52].

5.1. The IPCC Scenarios

The analysis of the IPCC scenario storylines are complemented to the text of the *IPCC Technical Paper on Climate Change and Biodiversity* [22]. The analysis of this technical paper discloses a narrative with a generally hierarchist perspective (43%, see Figure 2). Especially the first part of the document, describing the possible changes and the relations between climate and biodiversity, is

largely hierarchist. The underlying assumption is that change is something which has to be controlled. The focus in the document is on expert knowledge, scientific research data and the modeling of data in order to be able to develop policies to mitigate and adapt to the potential impacts of climate change on biodiversity and the impacts of changing biodiversity on the climate system.

Figure 2. IPCC Technical Paper on Climate Change and Biodiversity [22].



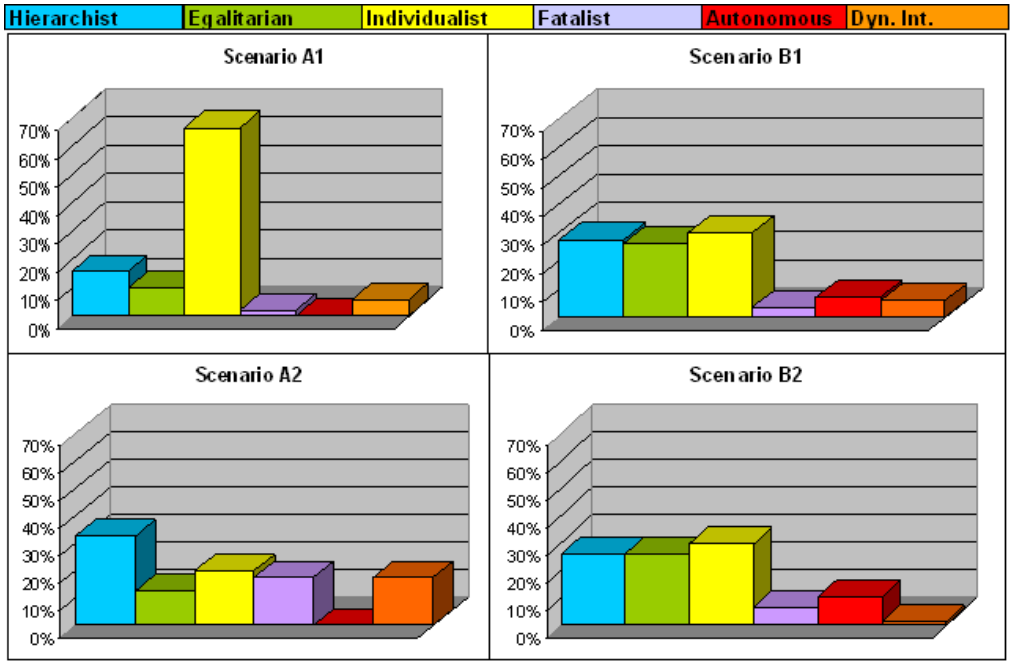
With 23% of the egalitarian perspective apparent in the scenario, it can be said that the authors assume the ecosystem to be relatively vulnerable. The "precautionary approach" is regarded as a valuable choice available for the "enhancement and preservation of natural protection" [22]. When human society is discussed, most attention is paid to participation of local communities in developing countries and to their dependence on wildlife and the ecosystem services biodiversity provides. This feeds to the assumption that management strategies of developing policies and regulations to control changes that may affect human livelihood, are seen as the best "precaution". Nevertheless it is often implicit that many changes cannot be stopped or controlled, which accounts for a reflection of the fatalist (8%). Lack of knowledge and data is seen as the main reason for failing environmental protection strategies (hierarchist). Knowledge is largely lacking due to the complexities of the natural system (dynamic integrator: 8%). Controlling policies go along with opportunities in technological development, especially in alternative energy uses and more efficient agriculture (individualist: 18%).

Biodiversity is mainly regarded valuable with regards to the ecosystem services it provides for human well-being, subsistence and (economic) development (individualist). In some occasions the loss of ecosystem services and biodiversity functions such as pest control can be compensated with other species or with artificial innovations (individualist), but this is regarded as expensive at the same time and possibly causing new problems such as pollution or new pests; a fatalist standpoint. The autonomous perspective, indicating that individuals should retreat from activities that could disturb biodiversity or ecosystem services, is hardly represented in the document (1%). The dynamic integrator, although not very often explicit, has a strong say with relation to conservation: "Conservation of the broadest possible range of ecosystems requires that natural ecosystem dynamics continue" [22].

The IPCC scenario narratives all display a strong representation of the individualist perspective. This is interesting especially because the technical paper presents only a modestly individualist worldview. The egalitarians score higher there. This seems to imply that the working group foresees a change to a more individualist world in any of the scenario storylines [59].

A1: The A1 scenario in our view could be renamed the "Utility Treasure". It projects a change in global temperature between 2.4 °C and 4 °C between 2090 and 2099 relative to the period of 1980–1999 and a sea level rise of 0.20 m to 0.59 m in the same time periods [59]. The A1 scenario offers an unfavorable perspective for the pressure on biodiversity. When we consider the main driving forces of biodiversity change, we see that the population will rise to more than eight billion people in 2050, after which it slowly declines to seven billion. Economic growth is the strongest of all scenarios, which will lead to a significant increase in the consumption of natural resources and energy. Technological improvements, in combination with the high levels of income, result in a considerable improvement in communication and transportation facilities. These developments will put significant pressure on both the quantity and quality of biodiversity. Although the A1 scenario projects almost no changes in total land use, it is very likely that many pristine natural areas with a large degree of biodiversity will be converted into man-made areas. Probably, new natural areas will be created but these will have significantly less biodiversity, as they require time to restore.

Figure 3. IPCC SRES scenarios.



The narrative of A1 is strongly individualist (67%). Economic growth is seen as the main driver of development and technological innovation making resources more accessible. Some communities, though, could be excluded and income growth could go hand in hand with an increased pressure on the global commons (egalitarian, 10%). The hierarchist perspective (16%) in this storyline is represented by the emphasis on a change from "conservation of nature" to "active management of natural and environmental services". The focus on ecosystem services shows the potential of natural resources for human and economic development, which is again rather individualistic. It is believed that ecological resilience can be increased through taking a proactive approach which is made possible through economic growth combined with active management of the global resources. Nature is regarded a "utility treasure" and in such a world conservation strategies are implemented through technological innovation for more efficient, cleaner and sustainable resource use.

In this predominantly individualistic world another fitting approach to biodiversity conservation would be putting monetary values on ecosystem services [25,60]. Combining biodiversity conservation with economic benefit by "internalizing the externalities" [25] would enable an individualistically minded global culture to preserve, and perhaps even enhance, ecological resilience. A risk of this approach is that the ethical side, the existence values or intrinsic values of wild biodiversity [37] and ecosystems are overlooked, which could lead to a simplification of nature and a loss of natural resilience. This risk is also identified in the TechnoGarden scenario of the Millennium Ecosystem Assessment.

B1: We would propose to rename B1 "Efficient Combinations". B1 and B2 present rather similar graphics, with strong and almost equal hierarchist, egalitarian and individualist assumptions. With 1.8 C projected temperature rise and 0.18−0.38 m sea level rise; the B1 scenario narrative shows least changes in climate and sea level. B1 offers a more favorable perspective for biodiversity. A sharp reduction in arable farming and cattle breeding acreage is expected, coupled to a strong increase in productivity. After a slight reduction in tropical rain forests world-wide, there is an increase in the second half of this century. Natural ecosystems are less affected, both in quantity and quality. The estimated temperature increase is not particularly high, resulting in less pressure on biodiversity than in the other scenarios, and the pressure from population growth is considerably lower. Furthermore, a lot is done to improve ecological capital. The speed with which such a transition to a balanced development takes place determines the reduction of threatening factors and prospects for biodiversity.

The egalitarian perspective (26%) is found in the high level of environmental and social consciousness of B1. This is brought about by clear evidence and by education of the impacts of natural resource use on the ecosystem and on human life on Earth (hierarchist: 27%). Resource friendly lifestyles, founded on autonomous and egalitarian worldviews, are based on clean technologies, accounting for a strong individualist percentage of 30%. Parallel to that, strengthened institutional cooperation shows a hierarchist favor for regulation, whereas a reduced level of (meat) consumption and a trend of dematerialization demonstrate the share of the autonomous perspective (7%) in the B1 society. Combinations of investments are made to achieve a more sustainable world: improved efficiency of resource use, research and development, incentive systems, increasing equity, developing social institutions and environmental protection measures (dynamic integrator: 6%). B1 combines technical and global organizational change with individual footprint reduction. Conservation efforts are grounded in strategies of low-impact agriculture—a hierarchist-autonomous combination—along with the maintenance of large wilderness areas (egalitarian-autonomous) and tightly controlled (sub) urban development (hierarchist).

Climate change and sea level rise will have the least impact on biodiversity in this scenario. It seems to be a promising scenario for sustainable development; interestingly representing people (hierarchist), planet (egalitarian-autonomous) and profit (individualist) percentually on an almost equally balanced level. For conservationist this would imply a necessity to work trans-disciplinarily and to increase awareness of the potentials of a pluralistic but integrated global approach to conservation.

B2: B2 could be called "Local Techno-Management". This scenario narrative (2.4 °C temperature rise and 0.20 to 0.43 m sea level rise) differs from B1 because of the decline of international institutions and global strategies to address environmental problems. A world unfolds in which the

approach to social, economic and ecological problems is primarily a local one. In such a future world, the pressure on natural system is greatly reduced, due to high average educational levels and the high degree of organization within communities. As a result, energy and material-efficient techniques can be developed. The regional differences are also very large, so that a global trend in biodiversity is difficult to estimate.

There is a strong focus on "group" via regional, local and community based governance (egalitarian 26%) in addition to technical solutions (individualist 30%). High educational levels are pursued and regional environmental policy and land use management lead to success in the management of some transboundary environmental problems (hierarchist 26%). The scenario narrative shows a rather individualist discourse when discussing the decline of international cooperation and of uneven investments in technology development for energy, also resulting in some fatalist discourse (6%). The autonomous perspective is, with 10%, the highest in this scenario compared to the other scenarios, pointing to low levels of car dependency, low (meat) consumption, reduced environmental pressures due to a transition away from the use of fossil fuels in a predominantly hydrocarbon based global energy system. The dynamic integrator is relatively absent in the B2 narrative. Conservation according to this storyline may work when policies are decentralized and technological innovations on community level join forces with individual responsibility and footprint reduction.

It could be said that through the strong emphasis on local and regional social and technological regulations, protection of nature and the environment receives a high priority. As a result, the availability of natural acreage could increase and the loss of species could be brought to a standstill. Nevertheless, sea level rise and climate change will impact biodiversity more in this scenario. This might indicate that in order to stimulate sustainable development and protection of ecosystems and biodiversity, global institutional approaches and regulations, complementary to local communitarian solutions, may be desirable additions to a B2 world.

A2: The A2 storyline, which could be renamed "Fundamental Differences", represents a differentiated world. It has the most diversified perspective and has the highest projected rise in temperature (3.4 °C) and the highest sea level rise (0.23 to 0.51 m). An important characteristic of the A2 scenario is a continually growing human population that is expected to reach a total of almost 15 billion in 2100. This will significantly increase demand for cultivated land (agricultural and municipal areas) and related transportation infrastructures. Although economic growth is limited, the total consumption of natural resources will be considerable. The main focus will be on regional and local culture in an extremely heterogeneous world. Initiatives to preserve global natural resources are more difficult to implement regionally.

The prospects this scenario presents for biodiversity are not very encouraging: sharply increasing demand for food, water, energy and land will result in a significant loss of natural ecosystems and species. Therefore, the quantity of biodiversity will be substantially reduced. The same can be estimated for the resilience of ecosystems. The relatively low level of economic growth may result in slower improvements in production methods and thus greater pressures on the quality of biodiversity (e.g., through pollution and locally high uses of pesticides).

The A2 narrative shows a rather hierarchist (33%) controlling society but it is described in a rather individualist discourse. Economic, social, institutional and technological developments are kept under regional control. Mobility has decreased which also reduces the spread of innovation and ideas.

Environmental problems are regionally and locally dealt with (egalitarian 13%). The dynamic integrator scores highest in this scenario (18%) compared to the other three. Diversified problem solutions and the increasing acceptance of cultural diversity and fundamental differences between people contribute to this percentage. Nevertheless, this seems contradictory in a world tending to protect local and even national interests, which is better reflected in the fatalist percentage of 18%. Economic growth is hampered by protectionist trade blocks. Not much is said about environmental values, policies or protection, which accounts for the relatively low egalitarian and autonomous percentages. Environmental concerns are related to agriculture and food production on local and regional scales.

Biodiversity will be under pressure in this scenario. The plurality of local approaches with a lack of real (global) integration and coherence and a lack of environmental concern does not seem to lead the world to a path onto sustainable development. This outcome is comparable to the world described in the Order from Strength narrative of the Millennium Assessment.

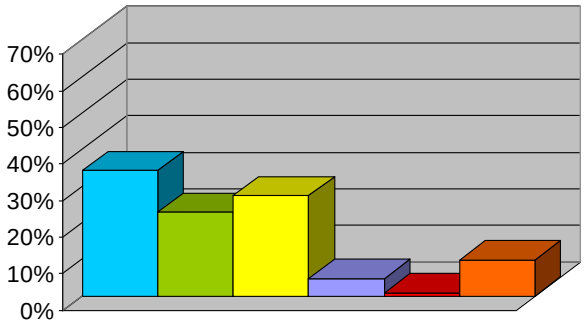
5.2. The Millennium Ecosystem Assessment Scenarios

For the analysis of the Millennium Ecosystem Assessment (MA) storyline perspectives, we used the four scenarios from Chapter 8 of Ecosystems and Human Well-being: Scenario: Findings of the Scenarios Working Group [61]. We selected Chapter 5 of the Assessment of Policy Responses [62] as the key document to identify the overall MA perspectives on biodiversity and conservation. The assessment of policy responses shows a predominantly hierarchist perspective (34%). Much emphasis is put on the need of scientific research and the necessity of increased knowledge of complex biodiversity relations in order to design effective policy responses. In this document, the hierarchist is accompanied by the individualist (27%) and by the egalitarian (23%). The other three perspectives are relatively unvoiced. Although emphasis is put on combining strategies for sustainable conservation, the dynamic integrator scores relatively low because it only becomes explicit in the later pages of the document.

The basis assumption of McNeely and his colleagues is that protecting our vulnerable global biodiversity is essential (egalitarian). The intrinsic value of biodiversity (egalitarian) is mentioned ([62], p. 122), but, foremost, biodiversity is seen as crucial to sustain our human well-being and subsistence (hierarchist). It also provides for a wide range of goods and services for pharmacy and industry (individualist). In spite of the egalitarian basic assumption of the authors, their discourse is rather utilitarian. “User needs” and “option values” are mentioned implicitly and explicitly throughout the document. In the view of the authors the major opportunity to effectively protect biodiversity is to move away from protection, based on the assumption that human activities negatively impact biodiversity, species and landscapes. This implies a move away from the strong ethical perspective of the autonomous. The “negative” supposition that we have to “retreat” from actions that impacts the biosphere, should be redirected towards a “positive” view on the current and future value biodiversity has for human subsistence, well-being, and for continuing economic growth. The “ecosystem services” delivered by species and landscapes to us and our businesses should become the central point of departure for conservation. In this way, the corporate sector will become engaged in conservation,

which is seen as a necessary condition for conservation to become successful. At the same time the so called conservation community will "accept that business has a role to play in the debate" [62].

Figure 4. Ecosystems and Human Well-being: Findings of the Scenarios Working Group [62].

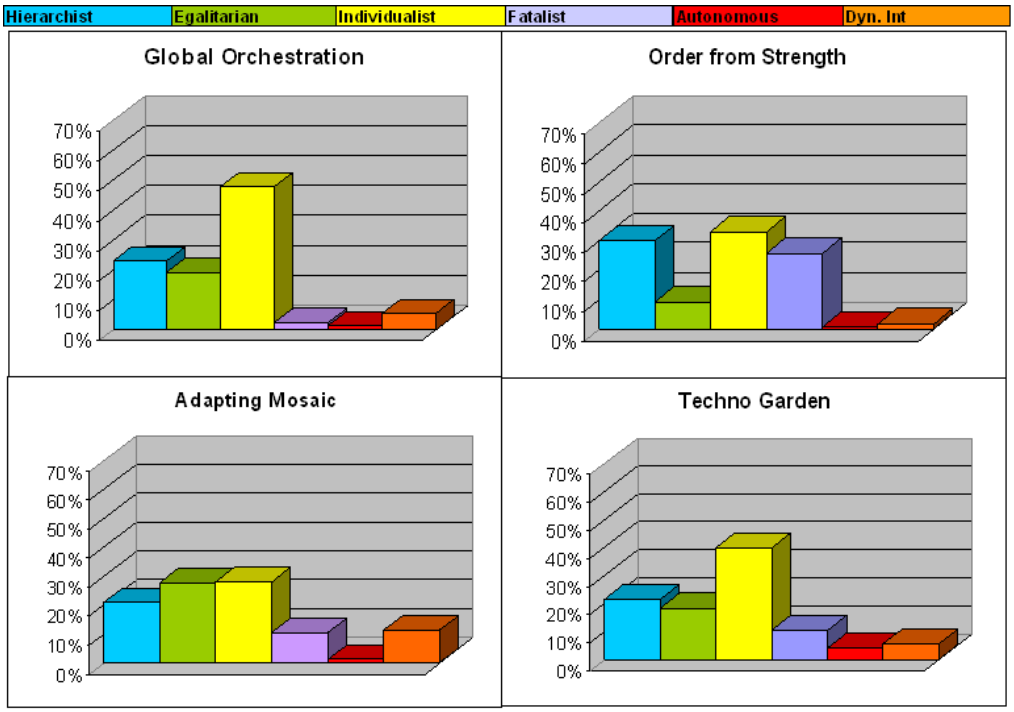


Nature is implicitly seen as a resource. This utilitarian point of view is not debated in the document. It is seen as the key to effective conservation, if combined with the egalitarian assumption that nature is vulnerable. Starting with Costanza's well-known article in Nature [26] this approach is increasingly popular in business, for example in the Cradle to Cradle movement [63] and in academic debates [25,60,64,65]. Nevertheless, the "technology" side of the individualist coin is rarely mentioned by the authors. This is in contrast to the scenario storylines; in some of them technological developments are outspokenly present. Because of the vulnerability of nature, the engagement of business in conservation should be backed up, complemented and stimulated through policies concerning biodiversity and ecosystem services on all levels. To help improve and implement such policies research priorities should be directed towards a better quantification of biodiversity values [62]. This again contributes to the hierarchist percentage.

Other main conservation responses are discussed in the document as well: much attention is given to protected areas and to "native" species within such areas. This type of widespread *in situ* conservation regards "nature" as specific wild or semi-wild places where typical endemic, often iconic, species ought to reside. In the context of climate change linking up protected areas in networks [24,66]. This is becoming a well-established approach for conservation as is shown for example in the expanding Natura 2000 Network of the European Union [67,68]. Nevertheless, such networks are hardly discussed by McNeely and his colleagues. Protected area management of specific habitat sites combines egalitarian precautionary principles with hierarchist policy and control strategies. Complementarily to protected areas, the authors discuss the relevance of integrating biodiversity conservation into regional planning and into the agriculture, forestry and fishery sectors. This is called "mainstreaming", which refers to the hierarchist connotation of the strategy of developing defined "regimes". Mainstreaming is also linked to considerations regarding the empowerment of local communities. These should become better enabled to maintain their basis for subsistence, customs and traditional cultivation techniques. This reflects egalitarian "group" ethics. Notably, "local communities" often refer to smaller social structures in developing countries and not so much to societies of industrialized nations or regions. Good governance is also mentioned in this context, combining egalitarian and hierarchist principles.

Another strategy discussed by the authors is the improvement of international cooperation through multilateral environmental agreements. These strategies need better monitoring and controlling mechanisms in order to enhance compliance, showing the high grid inclinations of the hierarchist. Education and awareness raising principles are discussed in the context of non-formal (egalitarian) educational programs provided by "museums, zoos aquaria, botanical gardens, field study centers, protected areas educational and interpretative programs, and ecotourism" [62]. Although "communication, education, and public awareness provide the link from science and ecology to people's social and economic reality" [62], the egalitarian minded work of large NGOs such as WWF, IUCN or Greenpeace, or of art and broadcasting is not explicitly mentioned in this context, whereas NGOs find a place in some of the scenario narratives.

Figure 5. The Millennium Ecosystem Assessment scenarios.



The assumption that we live in a predominantly individualist world is also reflected in the four MA scenario storylines. In all of them the individualist perspective scores highest, with the exception of the "Adapting Mosaic" scenario. There the egalitarian and the individualist score the same (both 28%). The MA scenario storylines are remarkable for their detail, the plurality of drivers of global change used as variables (important ones are population growth, economic and technological development, habitat change, various ecological uncertainties, the level of global integration and of environmental awareness) and for their evolution through time. Especially the latter feature protects them from pinpointing them down to one-dimensional worldviews, which again, makes the CT framework a useful instrument for analysis, because it allows for flexible perspective combinations.

Global Orchestration (GO) narrates about a world of "reactive individualism". It shows an overall individualist world (48%), striving for economic and technological growth. Remarkably, it more or less resembles the A1 scenario of the IPCC. The distribution of perspective percentages and the

perspective content are alike in both storylines. The main difference between the two scenarios is that in GO the notion of ecosystem services is not taken up as an approach to ecological dilemmas [69].

In GO cultural and economic globalization are increasing and economic growth allows for "smart policies and technological solutions" [69] to fix ecological and socio-cultural problems. An increased awareness of the risks of globalization stimulates the governance systems to become more transparent and participatory, which meets a combination of increased egalitarian (19%) and hierarchist (23%) sentiments on the functioning of power. The growing global connectedness and the appraisal of cultural variety are also slightly reflected in the dynamic integrator (6%). Nevertheless, the increased transparency and possibility for participation in the democratic system appear to be largely window-dressing. The real power seems to be in the hands of large multinationals. People in the storyline are quite comfortable with that, because they benefit from the prosperity and they hardly see the environmental degradation, because problems are backed up by technological fixes (individualist).

Nature in this scenario is regarded resilient within limits (hierarchist) but this is mainly related to the fact that people have a strong belief in technology and in economic growth as the answer to all inconvenience (individualist). Nevertheless, responses in this scenario are rather reactive, directed towards controlling occurring problems. This can be seen as a hierarchist tendency. Technology may fix, but lessons are learned slowly. Due to the successes of economic growth and technological development environmental issues, such as climate change or biodiversity loss, are "more or less ignored" [69].

Egalitarian or autonomous assumptions on the intrinsic value of nature and biodiversity are hardly discussed or present in the global orchestration society. The loss of biodiversity becomes apparent in the decreased fertility of highly intensified and industrialized agricultural land, of the decline in food variety and genetic diversity due to the patents claimed by many large multinational companies and of a decline in natural controls on diseases and pests. Chemicals and fertilizers where used in combination with low levels of environmental protection. The environmental pitfalls of the individualistic world become apparent when the storyline unfolds towards 2050. They are approached with hierarchist strategies based on controlling the course of events in order to maintain human well-being which would be at stake by that time. In this individualist world, many ecosystems collapse. Concern about the loss of ecological knowledge (hierarchist) is growing only slowly due to human inventiveness. But the costs of restoring previous ecosystem services and functions have become high. Moderately, human activities become greener, but still, solutions are sought in technology and control. Changing consumption patterns, behavior, or mind (autonomous values) and egalitarian counter movements are not much discussed in the storyline.

It becomes more apparent that many cost-effective (pro-active) opportunities for conservation of ecosystems were lost in this individualist colored world. Ecosystems, for example, seem to be rather disregarded in the course of time of this storyline. The role of ecosystems dynamics and interdependencies only becomes evident after ecosystems collapsed. Conservation in this scenario focuses on species and genetic diversity. Conservation of this species/genes-related diversity is based on "preserving representative examples in parks and museums" [69]. This can be seen as a combination of hierarchist control with a touch of individualist optimism about the future, where ecosystems seem to be largely irrelevant. The establishment of gene-banks containing wild varieties of

crops and seeds shows the predominantly individualist management style with the aim to control availability of genetic material for the future.

Order from Strength (OfS) shows a highly compartmentalized world moving into a downward spiral of increasing fatalism (26%). The picture of this scenario is quite similar to A2 of the IPCC. The major difference is that in OfS a "clash of civilizations" [70,71] seems to take place, whereas in A2 a respect for different cultures prevails, which accounts for a higher percentage of the dynamic integrator, whose perspective is virtually absent in OfS. The OfS storyline is characterized by an inward focus of national states as a response to experienced threats and instabilities caused by globalization processes. The implementation of strong national security policies and the control of state borders become the paradigmatic response to feelings of insecurity and the economic crises occurring everywhere in the world, which shows a fatalist-hierarchist spiral: the fatalist feeling that such problems can't be countered, results in an increased demand of strongly hierarchist control policies, which again fuels the fatalist perspective of a world running down and out of control.

The individualist pillar of this storyline results from the belief in technological fixes, but just as in the GO scenario, approaches to deal with environmental problems are reactive (hierarchist). Because global environmental problems, such as climate change, air pollution and biodiversity loss are also, often unsuccessfully, dealt with locally, a global decline in ecological quality takes place. The fatalist feeling that nature is capricious and cannot be controlled or protected seems to be the basic assumption of this narrative. Local environmental policies do exist but are only secondary on the agenda, because of urgent social and economic threats. National security prevails, often at the cost of environmental security. In developing countries agriculture expands vastly. Forest products are increasingly harvested in order to stimulate earnings and to maintain income. These developments result in an increased loss of species and ecosystems are pushed beyond their capacity to produce. The only light point in the downward spiral is that climate change is moderate because people all around the world were forced to live simpler lives. People with an autonomous perspective hardly exist in this fatalist world, just as there is least space for egalitarians in this scenario because altruism, solidarity and ethical behavior are seen as inconsistent with the paradigm of individual interests and survival of the fittest.

Conservation approaches are fragmented and directed towards securing natural resources for local peoples. Often conflicts arise over the distribution of the resources. Nature is being valued for its services, but many services can be substituted or repaired by technology (individualist). Recreational, cultural and existence values of biodiversity are considered a luxury for affluent nations. Some representative samples of ecological systems are maintained for as long as the reservists do not hamper economic development. The discourse of the scenario narrative is clearly pessimistic over the course of events that take place in OfS. For conservationists this unfolding world might be a worst case scenario, because there is hardly any proportional environmental awareness despite the occurring global devastation.

Adapting Mosaic shows a world of "egalitarian opportunists". Comparing Adapting Mosaic (AM) to the IPCC scenarios, conceptually it shares the most with B2. Like B2, AM shows a world where new partnerships are made between civil society, NGOs and business, resulting in relatively high egalitarian (28%) and individualist (28%) percentages of perspective. There is a strong emphasis on learning about socio-ecological systems through adaptive management, which is based on balancing people, planet and prosperity on local and regional scales, a typical feature of the dynamic

integrator (11%), which in this scenario scores highest of the Millennium Assessment scenarios. Pro-active approaches to maintain the balance are encouraged by participatory and adaptive types of governance, which combines an egalitarian sense of community with hierarchist management approaches. The fundamental differences between AM and B2 are the percentages of autonomous perspective (higher in B) and of the dynamic integrator (higher in AM).

Nature in Adapting Mosaic is seen as vulnerable (egalitarian), but there is also humility with regards to the unexpectedness of some of her processes. This does not result into fatalism and fear, but more into integrating the egalitarian and autonomous sense of respect. People are aware of the importance of biodiversity and ecosystems for the services and functions they provide for human well-being and economic development (individualist), but nature is also valued intrinsically (egalitarian/autonomous) and as a part of local and cultural identity (egalitarian). The AM storyline is one of so called "glocalization" [69], integrating local and cultural values into the progressive dynamics of globalization (dynamic integrator). Learning about socio-ecological relations is facilitated by modern communication technology, which combines egalitarian values with individualist drive for progress. There are large investments in human capital and knowledge.

Conservation is based on adaptive management on local levels. The adaptive and locally varied approaches to conservation increase much of the resilience of ecosystems. Reformations in agriculture towards a larger share of organic food increase the quality of much of agricultural landscapes. NGOs in AM function as expert lobby groups. Their egalitarian ideals become institutionalized and professionalized. Nevertheless, local measures of environmental management do not seem to help solving problems with the global commons. Therefore, deterritorialized [72] expert networks are developed to better manage these commons. For some commons though, like ocean fisheries tragedies that have already occurred due to failed experiments and the learning process only having come too late. This is reflected in the relatively high fatalist percentage (11%). The AM world evolves into a mixture of successes and failures in different world regions.

Reflecting on the meta-discourse of the AM narrative, we see a Scenario Working Group which is rather optimistic about the chances for biodiversity and ecosystem services in this scenario, accounting for their high egalitarian and individualist perspectives. This is also reflected in the analysis of McNeely *et al.* [62]. The hierarchist share of their worldview is reflected in the overall assumption that environmental problems should also be tackled through strong international institutions and cooperation. This discourse is also discernible in the B2 scenario of the IPCC.

TechnoGarden (TG) is a world where a combination of technology and market oriented institutional reform aims to improve the reliability of ecosystem services. The discourse of the scenario is strongly individualist (40%), but in a much more pro-active manner than Global Orchestration. In contents TG is similar to the IPCC A1 scenario. The fundamental difference between these two scenarios is the strong emphasis on technocratic regulation and control. The underlying assumption of TG is the belief that the environment is basically vulnerable, but resilient if managed right. "Managing right" in this scenario refers to transforming the market towards a global trend of "natural capitalism" and designing policies to stimulate the agricultural sector to focus on ecosystem services instead of focusing on pure crop production all over the world (hierarchist-individualist).

Global economic integration is increasing in TG. Ecosystem services provide many opportunities for designing new property rights and trading systems. This results in the increase of multifunctional

landscapes, better regulation of the global commons through treaties and strong international institutions, and economic profit at the same time. TG combines egalitarian (18%) ethics of natural protection with the more individualist notion of the utility opportunities of nature. This results in strong pro-active market based environmental regulation, founded in merging hierarchist (22%) and the individualist perspectives. At the same time, business, states and individuals are encouraged to adjust their practices and consumption patterns to lower impact levels (autonomous, 4%).

To improve ecosystem services, many investments and activities take place in the field of eco-engineering and biotechnology. Especially in rapidly urbanizing areas, spatial planning is centered on applying innovative eco-technologies and improving ecosystem services in cities in order to counter ecological and health problems in densely populated regions. Because of the sometimes occurring unintended consequences of such technologies, strict testing and regulating programs are implemented, accounting for the strong hierarchist demand for controlling unexpected events in this storyline. In the field of conservation ecological egalitarian minded restoration projects, which aim to re-wild landscapes and ecosystems, are competing with designer ecosystems.

Although the discourse of this scenario narrative is rather optimistic about TG, it questions, in an egalitarian minded way, whether intensive technocratic management of ecosystem services is wise [69]. The authors try to rebalance the individualist optimism with a reminder of the need of hierarchist regulation which should be aimed at the priority of protecting the natural resilience of the global environment. Because of the market driven emphasis on increasing the provisioning services of ecosystems in this scenario, ecosystems were simplified, biodiversity and wilderness declined. In a world like TG, ecosystems will become less resilient in nature, vulnerable to disruption and management failures, and, most of all, have become dependent on continuous human management. The lesson for conservationists from this technocratic scenario is: had there been more attention to monitoring the technology and its effects on natural ecological balance and feedbacks, much of biological diversity and natural resilience could have been spared. This is a fairly hierarchist statement.

6. Discussion

We can estimate that the worlds of the B1 scenario group, Adapting Mosaic and TechnoGarden, show the most promising prospects for conservation. This is also reflected in the meta-discourse of the narratives [73,74]. As it comes to evaluating the sustainability conception of the two GSS, their discourses—both in the key documents and in the scenario narratives—reveal a tendency towards weaker sustainability [75]. Although the basic assumptions of the scenario studies seem to be rather egalitarian, founded on the fragility of natural resilience, they share a preference for a relatively individualist management style, with a focus on the question of how to implement innovative, often techno-economic strategies through policies and governance. Solutions based on individualistically tainted economic approaches (ecosystem services) have a high occurrence in the scenario storylines and the key documents of the two GSS. The culturally advancing movement of consumption reduction, creative individuals (autonomous) was hardly touched upon. Perhaps this is related to the fact that this concerns a movement of independent individualist actors rather than a policy discourse. In our view, this movement should not be neglected in narratives outlining possible future pathways of biodiversity protection. The autonomous way represents a decrease in the use of natural resources and pressure on

biodiversity and ecosystem services in a direct manner. In order to see the value of the autonomous perspective for biodiversity conservation though, we have to step outside the conservation ecology box [15].

Additionally, we expected to find a higher percentage of the dynamic integrator perspective in the narratives we analyzed, especially in the key documents which are developed in the trans-disciplinary context of integrated sustainability assessment. The relative low percentage of the dynamic integrator, can be attributed to the dominating representations of the individualist and hierarchist worldviews. This observation, in combination with the other observation that the GSS represent "weaker sustainability", might lead to a discussion on how "sustainable" the GSS are in themselves. It could be questioned whether the scenarios are able to really inspire thinking outside the box or whether they largely compromise the status quo of existing regimes while outlining possible future pathways.

Another question related to the issue of the "sustainability" of the scenarios is whether certain combinations of perspective could exist in real life. Some scenarios seem to be inherently dystopias to each other, such as the individualist and the egalitarian perspective. As we found scenarios where both of these perspectives were strongly represented, it could be questioned whether such scenarios are realistic representations of "dynamic integration" or whether they are actually merely a cognitive dissonance. In our view the perspective combination of the egalitarian and the individualist could prove to be a valuable contribution to sustainable development and biodiversity conservation, whilst there is a clear balance between entrepreneurship and ethical consciousness. Therefore, we consider such a perspective combination as potentially sustainable as well. However, there is the risk of becoming blind-focused on the economic benefits of ecosystem services and of insufficiently valuing ecological integrity and the intrinsic and existence values of biodiversity and ecosystems. This might result in the decline of natural resilience and a dependency of ecosystems on human management. More research and discussion on the practical feasibility of combinations of inherently conflicting worldviews would be valuable in our view. The optimism surrounding the three "most sustainable" scenarios lies both in the way the world system unfolds, but also in the pro-activeness of approaches and in a relatively high level of environmental awareness.

If the world unfolds into one of the other less optimistic directions, conservation may become a greater challenge. Awareness raising activities might become priority number one in order to change people's basic assumptions about nature and their relation to it. Without having people, policymakers, businesses, civil society on the side of realizing the importance of global biological diversity, any considerable effort to conserve species, ecosystems or landscapes will be a calling in the desert. Changing peoples' minds and hearts [76] takes time if we do not want to impinge on values of freedom of thought and lifestyle [77].

Another observation we made in our analysis, is that MA scenarios come closest to showing interlinkages and interdependencies of the various cultural perspectives by describing changes in approaches, strategies and lifestyles due to the course of events in a time frame towards 2050. Nevertheless, the awareness of such interlinkages remains rather implicit in the storylines. This vagueness around the influence of the change of patterns of basic assumptions in combination with the detail of description of events, results in storylines which are unlikely to unfold. The risk of such scenario storylines is that they are considered too complex to be guiding principles. Making the basic assumptions more explicit could counter the impression of vagueness of these narratives.

The IPCC scenarios are much more static and more homogenous than the MA scenarios. This makes them easier to understand on the one hand, but on the other hand they demonstrate less explicit awareness of developments through time, the complexities of socio-environmental dynamics, and their background in the ever shifting various cultural basic assumptions. Especially in the complex, dynamic and heterogeneous field of biodiversity conservation, static narratives could become counterproductive.

If scenario narratives are to function as a tool for policymakers and conservationists to help develop sustainable future conservation pathways, discussion should be stimulated on the question as to what makes a scenario storyline useful for decision makers? What is the right balance between static simplicity and dynamic complexity of the storyline? To what level can uncertainties and unforeseen events be pronounced without making the storylines unlikely? What is the right balance of explicitly presenting various basic assumptions, worldviews and ethical perspectives directing the course of events without assuming a completely "makeable" world? In other words: how can scenario-narratives be best designed in order to be effective tools for fruitful discussion in the context of conservation policy and planning? These questions become especially relevant in the process of designing specific global biodiversity scenarios.

In a pluralistic and globalizing world, it becomes increasingly important to be aware of the variety of worldviews and management styles that complement and compete with each other to achieve the "good cause". In our view a consistent part of the reason why the 2010 Biodiversity Target of the CBD [1] has not been reached, is the lack of awareness of the various cultural perspectives among well-intentioned policymakers and conservationists. In principle, an ethical debate seems to be going on, without much explicit awareness of the basis of the ethical claims and arguments that are used by the different stakeholders. Global success for sustaining future biodiversity and ecosystems highly depends on successful communication, trust and understanding of conflicting and converging worldviews [78]. Not only between stakeholders with divergent stakes and perspectives on various scales, but also between conservationists and policymakers pursuing the same goals, but with different means and intentions.

Perceptions, images of the future and cultural repertoires are no molecules in the void. They are generated and reproduced in countless daily interactions and practices of a plurality of actors. In order to map possible transition pathways towards a more sustainable future of planet Earth, we need to integrate awareness about the basic assumptions that influence our practices into our scientific, professional, private and policy practice. While taking social, ecological and time uncertainties into account, we need to be very clear on *what* we want and *why* we want it. If we aim to envision our future, we also have to become better aware of the various basic assumptions and values that underlie such visions. The Global Scenario studies we evaluated, which are two major ones of their kind, do not explicitly show such a (self-) consciousness. In our eyes, this complicates the challenge to apply the scenarios as a fruitful discussion tool for concrete robust policy and conservation practice.

7. Conclusions

In this paper we used an exploratively adapted version of cultural theory to assess the basic assumptions of nature and management styles in the IPCC and the MA scenario studies. Conservation of global biological diversity in a changing world formed the context of the assessment. We consider

cultural theory as a useful tool in assessing the underlying assumptions and dynamics of both textual discourses and (policy) practice. In this regard, we explored the relevance of some CT perspectives (fatalist, autonomous and dynamic integrator) which are usually neglected in assessments, for the field of biodiversity conservation in a changing world. Whereas these ethically based perspectives are abundant in the studied literature, we found them weakly represented in the GSS. More specifically we expected especially the dynamic integrator to be more present in the typical integrated assessment documents of the IPCC and the MA.

Assessing the cultural perspectives of the GAs provides fuel for discussing the design and the appearance of contents of global scenarios, in order to be effective discussion tools in the hands of policymakers and conservationists. We propose that awareness of the socio-cultural assumptions about nature and management styles underlying the scenario narratives should be made more explicit in order to stimulate constructive discussions on how we visualize proceeding towards a more sustainable world full of biological diversity. This is especially relevant when developing specific scenarios for global biodiversity. It can be said that the problem of biodiversity decline is not just an environmental problem; it is largely a socio-economic problem and on a deeper level it can be assigned as an ethical-cultural problem. Perhaps, with biodiversity, this is even more so than with other environmental problems [78,79]. For conservation this implies that in order to become really effective, the protection of biodiversity needs to get out of the preservation niche [15]; conservation should be defined more broadly. Therefore, we propose it is necessary to include all the diverse perspectives on biodiversity and conservation into loss-reducing strategies. Awareness of the importance of biodiversity should trickle down into daily consciousness and practice on all levels, from civil society, to education, media, scientists, policymakers, large corporations, NGOs and conservationists. We need to become more aware of the various underlying basic assumptions about nature, because they define our relation to biodiversity and ecosystems. They determine the practices we undertake in order to both increase our well-being and to conserve our biosphere. If we are more aware of basic assumptions, we will be better able to determine whether we wish to take the pathway of saving species and genes in a postmodern version of Noah's Ark or whether we see more future in a World Wild Web of connected habitat structures.

References

1. *Convention on Biological Diversity*; UNEP: Rio de Janeiro, Brazil, 1992.
2. *Global Biodiversity Outlook 3*; Conventionon Biological Diversity: Montreal, QC, Canada, 2010.
3. *Special Report on Emissions Scenarios*; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2000.
4. *Millennium Ecosystem Assessment. Ecosystems and Human Well-Being: Health Synthesis*; Corvalan, C., Hales, S., McMichael, A.J., Eds.; World Health Organization: Geneva, Switzerland, 2005.
5. *Busan Outcome: Third* ad hoc *Intergovernmental and Multi-Stakeholder Meeting on an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*; UNEP: Busan, Korea, 2010.

6. Valkering, P.; Tabara, J.D.; Wallman, P.; Offermans, A. Modeling cultural and behavioural change in water management: An integrated, agent based, gaming approach. *Integr. Assess. J.* **2009**, *9*, 1-28.
7. Valkering, P.; Offermans, A.; Van Lieshout, M.; Rijkens, N.; Van der Brugge, R.; Haasnoot, M.; Hans, M.; Van Deursen, W.; Beersma, J.; Buiteveld, H.; Volleberg, K. *Inspelen op Verandering. Naar een robuuste en flexible strategie voor waterbeheer. Eindrapportage voor de pilotstudie Perspectieven in Integraal Waterbeheer*; ICIS; Leven Met water: Maastricht, The Nertherlands, 2008.
8. Offermans, A.; Haasnoot, M.; Valkering, P. A Method to Explore Social Response for Sustainable Water Management Strategies under Changing Conditions. *Sustain. Dev.* **2009**, DOI:10.1002/sd.439.
9. Thompson, M.; Ellis, R.; Wildavsky, A. *Cultural Theory*; Westview: Boulder, CO, USA, 1990.
10. Verweij, M.; Douglas, M.; Ellis, R.; Engel, C.; Hendriks, F.; Lohmann, S.; Ney, S.; Rayner, S.; Thompson, M. Clumsy solutions for a complex world: The case of climate change. *Public Admin.* **2006**, *84*, 817-843.
11. *Global Biodiversity in a Changing Environment: Scenarios for the 21st Century*; Chapin, F.S., Sala, O., Huber-Sannwald, E., Eds.; Springer-Verlag: New York, NY, USA, 2001.
12. *Global Biodiversity Assessment*; Heywood, V.H., Ed.; Cambridge University: Cambridge, UK, 1995.
13. Sala, O.; Chapin, F.S.; Armesto, J.J.; Berlow, E.; Bloomfield, J.; Dirzo, R. Global biodiversity scenarios for the year 2100. *Science* **2000**, *287*, 1770-1774.
14. Duraiappha, A.K.; Naeem, S. *Ecosystems and Human Well-Being: Biodiversity Synthesis*; Corvalan, C., Hales, S., McMichael, A.J., Eds.; World Resources Institute: Washington, DC, USA, 2005.
15. Spangenberg, J.H. Towards integrated long-term scenarios for assessing biodiversity risks. *Revista Internacional Sostenibilidad, Tecnologia y Humanismo* **2006**, *1*, 91-101.
16. Hsieh, H.F.; Shannon, S.E. Three approaches to qualitative content analysis. *Qual. Health Res.* **2005**, *15*, 1277-1288.
17. Elo, S.; Kyngas, H. The qualitative content analysis process. *J. Adv. Nurs.* **2008**, *62*, 107-115.
18. *Content Analysis: A Methodology for Structuring and Analyzing Written Material*; United States General Accounting Office: Washington, DC, USA, 1989.
19. Holstein, A.A.; Gubrium, J.F. Context: Working It Up, Down, and Across. In *Qualitative Research Practice*; Seale, C., Gobo, G., Gubrium, J.F., Silverman, D., Eds.; Sage: London, UK, 2004.
20. Martens, P.; Rotmans, J.; de Groot, R. Biodiversity: Luxury or necessity? A scenario approach to explore future biodiversity patterns. *Glob. Environ. Change* **2003**, *13*, 75-81.
21. Folke, C.; Carpenter, S.; Walker, B.; Scheffer, M.; Elmqvist, T.; Gunderson, L.; Holling, C.S. Regime shifts, resilience, and biodiversity in ecosystem management. *Annu. Rev. Ecol. Evol. Syst.* **2004**, *35*, 557-581.
22. *Climate Change and Biodiversity—IPCC Technical Paper*; Gitay, H., Suarez, A., Watson, R.T., Dokken, D.J., Eds.; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2002.

23. Cumming, S.G.; Alcamo, J.; Sala, O.; Swart, R.; Bennet, E.M.; Zurek, M. Are existing global scenarios consistent with ecological feedbacks? *Ecosystems* **2005**, *8*, 143-152.
24. Hagerman, S.; Dowlatabadi, H.; Satterfield, T.; McDaniels, T. Expert views on biodiversity conservation in an era of climate change. *Glob. Environ. Change* **2010**, *20*, 192-207.
25. TEEB. *The Economics of Ecosystems and Biodiversity for National and International Policy Makers: Summary: Responding to the Value of Nature*; UNEP: Bonn, Germany, 2009.
26. Costanza, R.; D'Arge, R.; de Groot, R. The value of the world's ecosystem services and natural capital. *Nature* **1997**, *387*, 253-260.
27. *Scenario Innovation. Expeciences from a European Experimental Garden*; Asselt, M.V., Rotmans, J., Rothman, D.S., Eds.; Taylor and Francis: Leiden, The Netherlands, 2005.
28. Carpenter, S. Ecological futures: Building an ecology of the long now. *Ecology* **2002**, *83*, 2069-2083.
29. COMEST. *The Precautionary Principle*; World Commission on the Ethics of Scientific Knowledge and Technology: Paris, France, 2005.
30. Goklany, I. Technological Substitution and Augmentation of Ecosystem Services. In *The Princeton Guide to Ecology*; Levin, S., Ed.; Princeton University: Princeton, ME, USA, 2009.
31. Thompson, M. Cultural Theory and Integrated Assessment. *Environ. Model. Assess.* **1997**, *2*, 139-150.
32. Mamadouh, V. Grid-group Cultural Theory: An Introduction. *GeoJournal* **1999**, *47*, 395-409.
33. Best, S.; Kellner, D. *The Postmodern Turn*; Guildford Press: New York, NY, USA, 1997.
34. Funtowicz, S.; Ravetz, J.R. Science for the Post-Normal Age. *Futures* **1993**, *25*, 739-755.
35. Vaughan, M. Introduction: Henry Bergson's Creative Evolution. *SubStance* **2007**, *36*, 7-24.
36. Mesoudi, A. Foresight in cultural evolution. *Bio. Phil.* **2008**, *23*, 243-255.
37. DesJardins, J. *Environmental Ethics. An Introduction to Environmental Philosophy*, 4th ed.; Thomson Wadsworth: Belmont, UK, 2006.
38. Lovelock, J. *The Revenge of Gaia: Why the Earth is Fighting Back—and How We Can Still Save Humanity*; Allen Lane: Santa Barbara, CA, USA, 2006.
39. Jackson, T. The Challenge of Sustainable Lifestyles. In *State of the World 2008. Innovations for a Sustainable Economy*; The Worldwatch Institute: Washington, DC, USA, 2008.
40. Loorbach, D. Transition Management: Governance for Sustainability. Prepared for the *Conference for Governance and Sustainability: New Challenges for the State, Business and Society*, Berlin, Germany, 30 September–1 October 2002.
41. Kemp, R.; Loorbach, D.; Rotmans, J. Transition management as a model for managing processes of co-evolution towards sustainable development. *Int. J. Sustain. Develop. World Ecol.* **2007**, *14*, 78-91.
42. Valkering, P. *Toddling "long the River Meuse. Integrated Assessment and Participatory Agent-Based Modelling to Support River Management*; Ph.D. Thesis; Universitaire Pers Maastricht: Maastricht, The Netherlands, 2009.
43. Palmquist, S. Emergence, Evolution, and the Geometry of Logic: Causal Leaps and the Myth of Historical Development. *Found. Sci.* **2007**, *12*, 9-37.
44. Ray, P.H.; Anderson, S.R. *The Cultural Creatives: How 50 Million People Change the World*; Harmony Books: New York, NY, USA, 2000.

45. Mikulecky, D.C. Causality and complexity: The myth of objectivity in science. *Chem. Biodivers.* **2007**, *4*, 2480-2491.
46. Funtowicz, S.; Ravetz, J.; O'Connor, M. Challenges in the use of science for sustainable development. *Int. J. Sustain. Develop.* **1998**, *1*, 99-107.
47. Lakoff, G.; Johnson, M. *Metaphors We Live by*; University of Chicago: Chicago, IL, USA, 1980.
48. Latour, B. *Wetenschap in Actie. Wetenschap en technici in de maatschappij*; Bert Bakker: Amsterdam, The Nertherlands, 1988.
49. Beumer, C.; Huynen, M.; Martens, P. Finding Paradise in a Complex Web: The Inter-Relation of Biodiversity, Ecosystems and Human Health. In *Reconciling Human Existence with Ecological Integrity*; Westra, L., Ed.; Earthscan: London, UK, 2008.
50. Steiner, R. *The Philosophy of Freedom—The Basis for a Modern World* Conception; Rudolf Steiner: East Sussex, UK, 1964.
51. Lyotard, J.F. *La Condition Postmoderne. Rapport Sur le Savoir*; Minuit: Paris, France, 1979.
52. Grosskurth, J. *Regional Sustainability. Tools for Integrated Governance*; International Centre for Integrated Assessment and Sustainable Development (ICIS), Maastricht University: Maastricht, The Nertherland, 2009.
53. Gallopin, G.; Hammond, A.; Raskin, P.; Swart, R. *Branch Points: Global Scenarios and Human Choice*; A Resource Paper of the Global Scenario Group; Stockholm Environment Institute (SEI): Stockholm, Swizerland, 1997.
54. Peterson, G.; Cumming, G.; Carpenter, S. Scenario Planning: A Tool for Conservation in an Uncertain World. *Conserv. Biol.* **2003**, *17*, 358-366.
55. Van Notten, P. *Writing on the Wall: Scenario Development in Times of Discontinuity*; Dissertation.com: Boca Raton, FL, USA, 2005.
56. van Asselt, M.; Rotmans, J.; Rothman, D.S. *Scenario Innovation. Experiences from a European Experimental Garden*; Taylor & Francis: Leiden, The Netherlands, 2005.
57. UNEP. *Global Environment Outlook 3: Past Present and Future Perspectives*; Earthscan: London, UK, 2002.
58. *Global Environmental Outlook 4. Environment for Development (GEO4)*; UNEP: London, UK, 2007.
59. *Special Report on Emissions Scenarios*; Intergovernmental Panel on Climate Change: Geneva, Switzerland, 2001.
60. Büscher, B. Derivative Nature: Interrogating the value of conservation in "Boundless Southern Africa". *Third World Q.* **2010**, *31*, 259-276.
61. *Ecosystems and Human Well-Being: Scenarios*: *Findings of the Scenarios Working Group*; Carpenter, S., Pingali, P., Bennett, E., Zurek, M., Eds.; Island Press: Washington, DC, USA, 2005.
62. McNeely, J.A.; Faith, D.P.; Albers, H.J.; Dulloo, E.; Goldstein, W.; Groombridge, B.; Isozaki, H.; Marco, D.E.; Polasky, S.; Redford, K.; Robinson, E.; Schutyser, F. Biodiversity. In *Ecosystems and Human Well-being: Policy Responses*; Chopra, K., Leemans, R., Kumar, P., Simons, H., Eds.; Island Press: Washington, DC, USA, 2005; Chapter 5, pp. 119-172.
63. McDonough, W.; Braungart, M. *Cradle to Cradle: Remaking the Way We Make Things*; North Point: New York, NY, USA, 2002.

64. Nunes, P.; van den Bergh, J. Economic valuation of biodiversity: Sense or nonsense? *Ecol. Econ.* **2001**, *39*, 203-222.
65. Norton, B.G.; Noonan, D. Ecology and Valuation: Big Changes Needed. *Ecol. Econ.* **2007**, *63*, 664-675.
66. Rodrigues, A.; Andelman, S.; Bakarr, M.; Biotani, L.; Brooks, T. Effectiveness of the global protected area network in representing species diversity. *Nature* **2004**, *428*, 640-643.
67. Jongman, R. Nature conservation planning in Europe: Developing ecological networks. *Landscape Urban Plan.* **1995**, *32*, 169-183.
68. Bishop, A.P.; Warren, L. Protected for ever? Factors shaping the future of protected areas policy. *Land Use Policy* **1995**, *12*, 291-305.
69. Cork, S.; Peterson, G.; Petschel-Held, G.; Alcamo, J.; Alder, J.; Bennet, E.M.; Carr, E.R.; Deane, D.; Nelson, G.C.; Ribeiro, T. Four Scenarios. In *Ecosystems and Human Well-being: Scenarios*; Concheiro, A.A., Matsuoka, Y., Hammond, A., Eds; Island: New York, NY, USA, 2005; Chapter 8, pp. 223-294.
70. Nederveen-Pieterse, J. *Globalization and Culture*; Rowman and Littlefield Publishers: Lanham, MD, USA, 2004.
71. Huntington, S.P. The Clash of Civilizations? *Foreign Aff.* **1992**, *22*, 22-49.
72. Scholte, J.A. *Globalization: A Critical Introduction*; Palgrave: New York, NY, USA, 2002.
73. Hyland, K. Persuasion and context: The pragmatics of academic metadiscourse. *J. Pragmatics* **1998**, *30*, 437-455.
74. Ifantidou, E. The semantics and pragmatics of metadiscourse. *J. Pragmatics* **2005**, *37*, 1325-1353.
75. Robinson, J. Squaring the circle? Some thoughts on the idea of sustainable development. *Ecol. Econ.* **2004**, *48*, 369-384.
76. Corcoran, P.B.E. *Toward a Sustainable World: The Earth Charter in Action*; KIT Publishers: Amsterdam, The Nertherlnds, 2005.
77. Sen, A. *Development as Freedom*; Anchor Books: New York, NY, USA, 1999.
78. Posey, D.A. *Cultural and Spiritual Values of Biodiversity—A Complementary Contribution to the Global Biodiversity Assessment*; United Nations Environment Programme: Nairobi, Kenya, 1999.
79. Erez, M.; Gati, E. A dynamic, multi-level model of culture: From the micro level of the individual to the macro level of a global culture. *Appl. Psychol.—Int. Rev.* **2004**, *53*, 583-598.