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On Substantiating the Conception of Strong Sustainability

Konrad Ott

1 Historic Review

The idea of sustainability can first be found in 1713 and has since been firmly fixed in German forestry theory. It was later incorporated in the forestry legislation of several countries. During the 19th century, issues of the finitude of natural resources and problems of environmental friendly land use were intensively discussed in Germany. At the beginning of the 20th century, we find a number of proto-ecological guiding visions (garden city, social hygiene, homeland protection (“Heimatschutz”), preservation of natural monuments (“Naturdenkmalpflege”) that supplement the forestry principle of sustainability (cf. Ott 2008a). During the time of the Weimar Republic, these principles were summarized in the comprehensive concept of landscape management (“Landespflege”). After 1970, the paradigm of environmental protection focussing on the central environmental media of water, soil, and air was established in Western Germany.

The term “sustainable development” was coined anew in 1987 by the so-called Brundtland commission (cf. WCED 1987). In this report, we also find the often-quoted definition: “Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs“ (WCED, p. 43). This definition includes a principle according to which every human being has a moral right to satisfy basic needs. Furthermore, the definition includes a principle of intergenerational fairness. According to a less well-known phrasing of the Brundtland report, sustainable development is “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change [...] enhance both current and future potential to meet human needs and aspirations” (WCED, p. 46). This is an enhanced definition adhering to the idea of progress.

On closer inspection, these definitional stipulations constituted a formula compromise of the WCED which disguised many conflicts that arose between the conflicting priorities of economic models of development (“postponed industrialization” versus “limits of growth”), ecological concerns referring to the overexploitation and

destruction of natural systems and social-ethical issues (poverty alleviation, distributive justice, political emancipation in a post-colonial situation, etc). Probably precisely because of its vagueness, the concept called “sustainable development” took hold surprisingly quickly worldwide. Since the Rio Summit of 1992, the idea of a sustainable development has been among the established principles of international environmental and development policy. It entered countless documents and statements. However, this apparently impressive success story went hand in hand with an inflation and loss of contours which were basically already laid out in the compromise formula. Since nobody can directly oppose sustainable development, many stakeholders try to shade the term strategically according to their interests. This extension of the term is associated with a loss of intension because terms with a large scope necessarily lose meaning.

Since the 1990s, it can be observed that the discussion on sustainability shifts into the system of politics as well as into the system of scientific disciplines. The respective logic of different social systems (cf. Luhmann 1984) necessarily leads to different models. In the political system, the so-called **three pillar model** came out on top. This model entails a number of initial advantages for political stakeholders. Hence, the three pillar model is open to affiliations and it gives the system of politics flexibility to connect different programmes and strategies to the idea of sustainability thereby legitimising them.

Here, only a crucial shortcoming of this model is to be named: the three pillar model postulates the equal ranking of the three pillars (economy, social issues, and ecology). In this sense, the model is normative. However, it does not say whether this equal ranking factually exists or whether it would first have to be achieved due to existing, historically explainable imbalances. The popular visualizations of the pillars suggest an existing equal ranking which concerning the ecological dimension may well be doubted with good reason. Therefore, it would be misleading if the three pillar model presupposed an equal ranking as a factual given that would first have to be achieved through sustainability policy (cf. Paech 2006, p. 58). Moreover, the three pillar model is conceptually open for basically arbitrary interpretations of all three pillars. Therefore, it rather counteracts the postulate of equal ranking and runs the risk of becoming a legitimising *juste milieu* concept. Furthermore, in debates it acts as a benchmark for evaluating all other theories of sustainability, including those that were conceptualized in a completely different way. Hence, the concept of “strong” sustainability is often blamed for being only a “one pillar concept” and therefore essentially deficient since two pillars are obviously missing. A closer look at the concept of strong sustainability would uncover the absurdity of such claims.

2 Observation and Participation: A Methodical Remark

The political debate as well as the scientific discourse can be experienced with different basic attitudes, either with the attitude of neutral discourse observers or interested discourse participants. Observers (political scientists and sociologists of science) can assess who said what when and how concerning a topic, and also how framings and networks of stakeholders originate and change over time. Participants, on the other hand, contribute to discourses with which they ipso facto raise certain claims. Hence, politicians can claim to contribute to the progress of a national sustainability strategy by establishing new emphases and, for instance, integrating a biodiversity strategy into the sustainability strategy, as (fortunately) was the case in Germany. In the scientific discourse, contributions were made as well. There are various theoretical drafts claiming to assess more closely the idea of sustainability in a terminological, normative, analytical, and conceptual way. These drafts originated in the academic environment of economy, philosophy, technology assessment, and social sciences. Sustainability theories necessarily operate in areas of overlap and are therefore essentially transdisciplinary (cf. Ziegler/Ott 2011).

3 Contributions of the Environmental Advisory Council (SRU) to the German Sustainability Debate

The SRU does not only observe environmental policy making, but also claims to contribute to the orientation and specific advancement of environmental policy making. In two of its main reports (1994, 2002), the SRU theoretically dealt with the idea of sustainability. In the report (“Umweltgutachten”, UG) of 1994, the SRU builds a bridge between environmental ethics and sustainability which is termed “dauerhaft umweltgerechte Entwicklung”. The terms retinity (interconnectedness) and weighing are prominent in UG 1994. Retinity is understood as an expression of the overall interconnectedness of activities of human civilization with the “carrying” environment and as a principle of action. In my opinion, however, retinity is not a direct principle of action but rather an epistemic principle that compels especially political executives to take into account the effects of their decisions and programmes on natural systems on different time scales.

UG 2002 focuses on the controversy between the competing basic concepts of “weak” and “strong” sustainability. No. 28 of UG 2002 draws the conclusion of this investigation. The multifunctionality of ecological systems, the uncertainty concerning future preferences and the precautionary principle lead to the “policy of keeping the natural capital constant over time”. This policy corresponds to the so-called Constant Natural Capital Rule (CNCR) which can be regarded as the centrepiece of the

conception of strong sustainability. Rules generally are prescriptions that ought to be observed. In this sense, the CNCR is a restriction that is imposed on economic and social development. Therefore, the economic, cultural, and social development can only be regarded as sustainable if this rule is observed at the same time. The rationale as given in UG 2002 is highly compressed. From an ethical point of view, however, the rationale behind such rules are crucial; rules have to be observed only if the justification is convincing (insightful, plausible). Therefore, it makes sense to ascertain the justification of the CNCR. This is to be done in the course of this article.

4 Problems of Justification

The domination of the present over the future is the starting point of the debate. This domination is given through the direction and irreversibility of the passage of time, therefore through a basal non-moral structure of the human existence. During the time bestowed on them, the people living in the present transform possibilities into future reality and thereby change the state of the future world for the better or the worse. A future world beyond our life expectancy is not better or worse for us but for other people whose values, schemes of life, and convictions beyond elementary needs (for air, nourishment, water, shelter, etc.) we can only make assumptions about. Future generations depend on us in a fundamentally different way than we depend on them. Given our current knowledge on the substantial human interventions in natural systems we can no longer naively assume – as in the “classic” belief in progress – that the transformation of present possibilities into future realities automatically benefits future generations.

The common normative starting point of the controversy between the competing concepts of strong and weak sustainability is a comparative-egalitarian standard of a future responsibility. The Economist Robert Solow (1993, p. 180) defines this standard as an obligation “to conduct ourselves so that we leave to the future a generalized capacity to be as well off as we are” (Solow 1993, p. 180). This means that (average) members of future generations should (all in all) not be worse off than those of the present generation. The underlying benefit or welfare concept is to be understood in such a way that everything that can give people some form of satisfaction of their preferences or interests counts as benefit. Negative benefits are unpleasant events of any kind which can range from slight frustrations to intensively experienced pain, evil, suffering, and sorrow. The comparative-egalitarian standard therefore has to take into account the entire balance of positive and negative benefits.

Advocates of both conceptions accept that present generations cannot directly create the fortune of single members of future generations but that their responsibility concerns a fair bequest package of various goods that in all conscience should allow

for future welfare levels to be kept at least constant which includes prevention of suffering. Therefore, a crucial question of the sustainability debate is how many and which natural goods this bequest package should contain.

The main thesis of weak sustainability is that an additive or aggregative conservation of all capital stocks of a society is sufficient for fulfilling the comparative-egalitarian standard of intertemporal responsibility. This thesis implies that natural capital can be reduced at will if investments in other forms of capital are made in return. In this case, the loss of natural capital does not constitute an injustice to future generations (cf. Solow 1974). This substitutability paradigm is deeply embedded in the axiomatic framework of neoclassical growth theory. The main thesis of weak sustainability conceptually implies that more societal and economic states can be dubbed to be “sustainable” while strong sustainability is more restrictive. From this purely conceptual implication one cannot derive that weak sustainability is “more convincing” than its opponent. Any suggestion that “less restrictive” implies “more convincing” is flawed.

In contrast, strong sustainability claims that the set of natural goods should not be reduced or diminished over time but overall kept constant or even increased. This is demanded by the CNCR which concerning its normative status has a hybrid position. This hybrid status results from the fact that the rule has not been enforced and observed over a long period of time. The CNCR on the one hand is a rule which is to be followed, while on the other hand it is a collective goal for a transformation period that is to be achieved. The CNCR is a rule that constitutes a “land ethics” in a specific sense: A land ethics comprises a set of rules and objectives that secure the overall stocks and funds of natural capital with reference to the many resources, services, and cultural values of nature.

For the purpose of justification, a general relation of preference (“x is better than y”) is appropriately specified as “Cx overall is discourse-rationally preferable to Cy”, with “C” being a certain conception of sustainability and discourses being a network of arguments. This relation of preference hence is no relation between private preferences. The preferability therefore has to be evaluated from a perspective being detached from private preferences and referring to a collective long-term interest. Such interests were traditionally termed common good (“bonum commune”) in political philosophy.

The prerequisites of the justification are the following: First of all, there is a competition between theories which, however, cannot be decided on empirical grounds, since sustainability concepts are normative conceptions. Analogies with the competition between sustainability conceptions can rather be found in philosophy and theoretical sociology, e.g. the competition between ethical theories, truth-theories and theories in general sociology. Such a competition between theories should of course not be undecidable and the decision should not be made at random. Therefore, there is no obvious alternative to a discourse-rational evaluation in the medium of a critical

comparison (cf. Neumayer 1999). The question of the adequate or satisfactory depth of justification cannot be answered in advance in the case of a discursive evaluation that includes comparative elements as well as objections, replies, concessions, and the like.

An advocate of the conception of strong sustainability has to assume the following: There “is” a set S of reasons R which individually and especially in combination “speak for” the adoption of the CNCR:

$$S\{R\} : (R_1, R_2, R_3, \dots, R_n) \rightarrow \text{CNCR}.$$

The set S may contain reasons brought forward against the competing approach which should have the potential of invalidating. An advocate of the conception of weak sustainability has the right to endeavour the same.

The ultimate goal of such justification is the adoption and implementation of the overall preferable concept by the political system in the form of a long-term, institutionally well anchored strategy. This political ambition is not presumptuous at all; it equals the claims of all other normative theories such as the theory of justice.

5 Arguments in Favour of “Strong” Sustainability

5.1 A first line of argumentation in favour of the CNCR refers to the confrontation with the concept of weak sustainability. It is based on the ideal of internal criticism. The validity claim that should be met in the medium of immanent criticism reads as follows: The conception of weak sustainability makes dogmatic and uncritical use of contested economic special concepts. The criticism does not refer to these concepts as such because matters of substitutability, discounting, compensability and the direction of technological progress are undoubtedly of great importance for long-term decision-making. The criticism refers much more to the quantifications and models conditioning and operationalizing these concepts.

In the case of the elasticity of substitution between forms of capital, the quantification being used is mostly a Cobb-Douglas function with the figure $\sigma = 1$. In the case of discounting future benefits for evaluating the net present value, the discount rate δ is often determined through the assumed pure time preference and the growth of consumption, i.e. the GDP. That way, future damages are minimized. Remote catastrophes do not affect the net present value very much. In the case of compensation for external effects, the Kaldor Hicks criterion is often applied which states that the benefit from a project only has to be high enough so that the losers could be reimbursed.

These operationalizations are not empirically confirmed at all, partly counter-intuitive to our lifeworld convictions and do not at all correspond to common sense. Partly, they are morally precarious and repugnant (cf. Ott/Döring 2008, esp. chap. 3).

Concerning e.g. the elasticity of substitution of capital stocks, the value $\sigma = 1$ which states that the input of natural resources into production can become infinitely small was (only) called a “best guess at the moment” in an influential article by Robert Solow (cf. Solow 1974). Solow does not say what this “best guess” is based on; therefore, it is at best backed by Solow’s authority. From the point of view of its opponents, this position overlooks the elementary dependencies (reliance) of human activities on a constant beneficial exchange with nature as well as the various cultural values referring to nature. Furthermore, this position is based on a homogenization of all capital stocks which is contested in capital theory.

Concerning the discount rate, it was shown various times that pure myopia might be an explanation of human behaviour but cannot serve as a justification. Moreover, the choice of discount rates highly depends on how one thinks about future scarcities and capacities for problem solving (cf. Hampicke 2003). A general discounting above long-term growth rates is to be discarded. In cases where long-term scarcities are to be expected, a negative discount rate would be appropriate. From the perspective of strong sustainability, the conditions for justifying the discounting of natural capital would first have to be created anew (through investments in natural capital). A more balanced approach to discounting is proposed by Konrad Ott (cf. Ott 2003) and Ulrich Hampicke (cf. Hampicke 2003).

The “Environmental Kuznets Curve” (EKC) is often used as a supplementary model of weak sustainability. However, the status of this curve is unclear. It is not an economic regularity. If advocates of weak sustainability take EKC as a general economic law, they would have to face the objection that EKC is only empirically confirmed for a few environmental pollutants and that an upgrading to a law-like regularity would be a *pars-pro-toto* argumentation.

In summary, the argument for “invalidation” is that the conception of weak sustainability only reaches its aim by quantifying and modelling its key concepts in highly questionable ways. As soon as these dogmatic quantifications are scrutinized in discourse, advocates of weak sustainability often feel compelled to make concessions. These concessions often lead to acknowledging a “Safe Minimum Standard” (SMS) concerning natural capital. However, it is difficult to reconcile this standard with the general substitutability optimism of weak sustainability since it puts a restriction on the aggregative formula. Furthermore, concerning the interpretation of the SMS, it is debatable how safe is safe enough, which might lead to further concessions. If, for precautionary reasons, advocates of weak sustainability asserted the CNCR at this point, they would make a concession which as a consequence proves right the opponent. In any case, the concession of the SMS (or even more restrictions on substitutability for the sake of precaution) is aggravating for weak sustainability.

Weak sustainability is faced with the alternative of either uncritically adhering to dogmatic quantifications of its own key terms or making substantial concessions. Ultimately, this leads to advocates of weak sustainability having to adhere to and at

the same time modify their additive formula. This could prove to be a true conceptual dilemma.

This criticism of substitution optimism ultimately does not leave untouched the entire paradigm the concept of weak sustainability originated in, namely the paradigm of the “neoclassical” welfare and growth theory. Doubts are raised as to whether a paradigm that requires the maximization of the net present value and defines intelligent egoism (maximizing personal utility) as “rational” behaviour is suitable as a basis for intra- and intergenerational justice with some emphasis on fair distribution of goods and fair access to sources of welfare.

5.2 Supporters of strong sustainability have to concede some points. It is to be conceded that the reasons by which CNCR are backed by Herman Daly (cf. Daly 1996) are not very convincing. Daly’s examples for the complementarity of man-made and natural capital (fish and boats, forests and sawmills) cannot be generalized in support of the thesis that natural and real capital are complementary with respect to production. The argument by Ekins et al. also has its flaws: “The important point is, starting from a strong sustainability assumption of non-substitutability in general; it is possible to shift to a weak sustainability position where that is shown to be appropriate. But starting from a weak sustainability assumption permits no such insights to enable exceptions to be identified“ (Ekins et al. 2003, p. 168). This argument would only be substantive if weak sustainability is based in a theoretically more fundamental way on the Cobb Douglas function than strong sustainability is set on the CNCR, meaning that there is a deep asymmetry concerning the possibilities to make concessions. This, however, is not the case. Choosing any of the two concepts leaves the possibility to make concessions.

5.3 A first substantial argument in favour of strong sustainability refers to the specific properties of natural capital. It says that natural capital must not be subsumed under a homogenous general stock of capital. Phrased in an Aristotelian way, the contemplation of natural capital is not a question of the *genus proximum* but the *differentiae specificae*. These properties concern the status of many forms of natural capital as collective goods or primary values, the multifunctionality of many ecological systems (e.g. forests, marshland, grassland), their retinity which makes a separation into goods worth conserving and those dispensable difficult if not impossible. Moreover, specific relationships between “stocks” and “flows”, the often existing relation of complementarity with man-made capital and the diverse services the value of which we would only fully be aware of on their failure (e.g. pollination by bees). The specific properties of living funds (so-called renewable resources) should not be taken for granted but should be paid close attention. Living beings are nested funds having intrinsic capacities for reproduction and ecological resilience. One of the greatest conceptual flaws is to treat living funds as if they were stocks that might be diminished efficiently.

5.4 Another argument in favour of the CNCR is that nature does not only deliver resource inputs for production but is connected in various ways to human experiences that go way beyond the sphere of human existence which can be represented by production functions (input → production → consumption → waste). In the “Millennium Ecosystem Assessment”, these experiences are represented in the category of cultural values. However, this category needs a stronger ethical differentiation (cf. Ott 2007, 2010). In a nutshell, this category includes

- nature aesthetics in its different forms (contemplative, corresponsive, imaginative; cf. Seel 1991) and historical expressions (from romanticism to contemporary LandArt);
- recreation in nature extending to forms of bodily-mental recovery (“salutogenesis”);
- familiarity with and safety in the native landscape (“Heimat”, “ethics of place”);
- (biophilic) fascination with living organisms and systems;
- spiritual approaches to some sort of sacred items and occurrences in nature to which is alluded with different religious codes.

The many different individual accentuations embedded in differing cultural lifestyles change nothing about the importance of this cultural sphere of nature. Speaking in ethical terms, the cultural values of nature constitute a “deep” anthropocentrism (cf. Ott 2010) which is compatible with different solutions of the demarcation problem. Elsewhere, I have argued that a step even beyond sentientism might be reasonable (cf. Ott 2008b).

The importance of nature for a meaningful human existence can hardly be monetized appropriately. Contingent valuation studies show that at least in Western societies the demand for nature is higher than the present supply (cf. Degenhardt et al. 1998). This counts as an economic argument in favour of the CNCR and even of the additional rule of increasingly investing in natural capital in the future.

5.5 Certainly, we can at present not know future preferences, values, convictions and therefore the specificity of future individual welfare functions. An extension of our benefit functions into the future is not permissible. The question arises which conception of sustainability takes this uncertainty more seriously. It would be “misplaced concreteness” to rely on narrative evidences (“My children are only interested in their Game Boys.”) in this point. Furthermore, we do not know the future marginal benefit of an additional unit of consumer goods and the future importance of the cultural importance of nature. From such “ignoramus”, it cannot be concluded that the future benefit functions will be fundamentally different from our own and that they will well adapt to a denaturalized, highly artificial world. There are two ways to deal with this uncertainty: One can either refer to basic needs and furthermore add the argument that e.g. through the research on the biophilia hypothesis of Edward O. Wilson (cf. Wilson

1984) we learned that human beings have an anthropologically anchored biophilic inclination. Therefore, one attempts to reduce uncertainties through plausible assumptions (“There is high confidence that they will like nature too”). The other strategy takes these uncertainties seriously up to the possibility that future human beings might take pleasure in either an existence as hunters and gatherers, shepherd nomads, subsistence-oriented village communities, or an existence spent mostly in virtual-artificial worlds. Why should we exclude the possibility that many future persons might prefer Thoreau-like lifestyles or like to perform nature-restoring activities (to the ethics of restoration, cf. Ott 2009)?

Both strategies lead to similar results. If the biophilia hypotheses were true, it would be anthropologically fatal to reduce natural capital. Presupposing a comparative-egalitarian standard, taking the uncertainties seriously implies the strategy of option conservation as a form of future responsibility (cf. Hubig 1993). The aim of conserving options speaks in favour of the CNCR. In this sense, strong sustainability is the more liberal conception (cf. Weikard 1999). I would like to add an argument that refers to environmental education. The UNESCO organized a decade of “Education for Sustainable Development” (ESD). This decade has the aim of introducing and circulating the idea of sustainability in the pedagogic system of society and as a consequence in the values and convictions of the younger generation. The ESD process only rarely explicitly addresses the controversy between strong and weak sustainability, but implicitly it rather advocates stronger versions of the sustainability principle. Various authors emphasize the importance of nature education within the scope of the ESD. It would be strange if educational policies promoted ESD while economic policies operated on the basis of weak sustainability. Given that pedagogic efforts should have been successful, this bifurcation between pedagogical ideals and the ways our “fabric of society” works would lead to the result that a generation of young adults in the phase of raising their own children would be confronted with a situation where natural goods would have further declined. Therefore, we would counteract our own pedagogic efforts and thereby likely create future frustrations, disappointments, sensations of failure, and even anger. Observing the CNCR is more coherent with ESD.

5.6 The next argument in favour of strong sustainability refers to a criterion of risk assessment that is usually presented in the form of a four-field matrix. It is always a question of which action would be better in the face of the fact that it is always possible that one errs empirically. We can formulate the following uncertainties as hypothesis that might prove to be either true or false:

- the elasticity of substitution of natural capital is high (Solow’s “best guess”: $\sigma = 1$);
- future generations will not be interested in the cultural dimension of nature;
- the biophilia hypothesis is wrong;

- future generations will not adopt the values that are presented to them by environmental education.

The question is how “bad” it would be to have acted on the basis of hypotheses that might prove to be false. Any answer to this question presupposes that the comparative-egalitarian standard is taken seriously. If in a future world, the substitution optimism of weak sustainability should prove to be true and if future generations honestly preferred computer games, museums, cinema, virtual reality, etc. to nature experiences, we would have acted too cautiously by observing the CNCR. How much this possibly excessive caution would cost us crucially depends on how strong observing the CNCR would benefit us. With low opportunity costs and a high present relevance, it would still be wise to accept the CNCR. People who already have adopted deep anthropocentrism will not face opportunity costs in preserving, conserving, and restoring nature.

In the opposite case, however, the situation would be different. If the elasticity of substitution were small, the biophilia hypothesis were true and nature experiences highly benefited future generations, one would have strongly violated the comparative-egalitarian standard by implementing weak sustainability. Therefore, advocates of weak sustainability should accept a burden of proof for imposing a risk to posterity which might result from present misapprehensions and dogmatic stipulations in economic models. If the verity or falsity of our hypotheses can only become evident in the future, we better should choose a minimax strategy which ensures the comparative standard for future generations even if we committed certain errors. The vague expression “not compromising the ability of future generations” in the WCED definition could be overtaken by this minimax strategy. If so, this expression has been “grounded”.

5.7 Another argument refers to a thought experiment of generalizability. At first sight, this thought experiment seems to be unproductive since everybody can welcome the generalization of one’s most favourite concept. At this point, however, the advocate of strong sustainability can point out the “Nauru case”, i.e. the case of a (probably irreversibly) ecologically devastated Pacific island which according to the model of weak sustainability, the so-called genuine savings (cf. Atkinson et al. 1997), temporarily was the most sustainable country in the world. The thought of a future Planet Earth as a globalized “Nauru” evokes repugnancy, horror, and disgust in advocates of “strong” sustainability. Advocates of weak sustainability have to develop a convincing reply, e.g. by saying that the “Nauru case” constitutes an anomaly but not a falsification. Or they might paint a generalized Nauru-like world as a nice and decent techno-garden with much wealth and entertainment for all.

5.8 The last aspect refers to arguments which are invoked against strong sustainability. These arguments refer to (a) unavoidable substitution processes, e.g. in the case of

fossil fuels, (b) the presumed static of the nature image, (c) the extreme opportunity costs of the implementation of this conception, and (d) the objection that “strong” sustainability is morally indifferent towards the problem of poverty and would in all conflict situations rather protect species and wilderness areas than fight human misery (cf. Beckermann 1994).

Concerning (a), it is correct that the stocks of fossil fuels *stricto sensu* cannot be kept constant over time but can only be depleted by any form of utilization. The option value of these resources (e.g. crude oil in the chemical industry) and the limited assimilation capacities of natural sinks (atmosphere as CO₂ storage) speak for using these stocks very sparingly and substituting them with renewable resources during the period of time when they are consumed. Here, proponents of strong sustainability have to face a problem of substitution but they solve this problem well. If non-renewable resources are to be potentially substituted by renewable ones, this requires – apart from the development of renewable energy sources – to keep the stocks of nature as a whole in good condition. This speaks for the CNCR. Precisely at the point where advocates of strong sustainability have to concede that there must be substitution processes with respect to non-renewables, this backs the CNCR concerning self-renewing biotic funds.

Concerning (b), it is indeed important to deliver the discourse on natural capital with insights and concepts of ecology. Strong sustainability accepts that living creatures and natural systems are in a state of dynamic change. The first step entails giving up the idea of a homogenous stock of natural capital. Talking about a network of heterogeneous stocks in different relations to one another is much more appropriate. The conception of nature used in this context does not at all refer to nature untouched by humans (“wilderness”) but extends a long way into the stocks and funds of cultivated natural capital. The CNCR and the rule of investing in natural capital allow various possibilities to undertake shifts on this “scala naturae”. Observing the CNCR is supposed to revitalize and restore the natural world as a whole. Concerning this, restoration ecology can theoretically and practically contribute (cf. contributions in Zerbe/Wiegleb 2009).

Concerning (c), there are numerous studies showing that at least prosperous societies can afford a transformation towards “strong” sustainability. The opportunity costs of the goals of strong sustainability are moderate. The point is not about societal opportunity costs but rather about economic power. The demands of strong sustainability on industrial societies are certainly higher than the requirements resulting from the conception of weak sustainability. These demands, however, should not be interpreted as unacceptabilities. Demanding something can also mean thinking that a person is capable of a creditable achievement. Strong sustainability is over-demanding neither economically nor politically. In its different reports on the spheres of activity of climate and energy, agriculture and nature conservation, mobility and traffic, marine

conservation, etc, the SRU has argued that ambitious goals can be achieved with moderate costs and sometimes with economic welfare gains.

Concerning (d), it is not at all clear from the outset which conception of sustainability fares better under the stipulation of reducing or eliminating absolute poverty and misery. In this respect, the problem of poverty would first have to be discussed in more detail. For instance, it would have to be discussed which effects the climate change that is substantially caused by the rich countries has on vulnerable populations. At this point, I would like to let this issue go with the following solution: On the ethical-normative level, both conceptions come out in favour of alleviating and mitigating poverty. However, they differ in the strategies since weak sustainability primarily relies on economic growth and free trade as measures of choice, while strong sustainability favours a more complex strategy which encompasses “convivial” economic management, strengthening of local economic relationships, and alternative forms of agriculture (“permaculture”) and does not even rule out redistributions and land reforms. Strong sustainability is even more realistic insofar as poverty in many regions of the world cannot be simply eradicated but should rather be alleviated. Poverty and misery, quality and standard of live would have to be distinguished in any case. Be that as it may, the disagreement between the two conceptions is not of ethical but of political and strategic nature.

Both camps might agree on the following statements: The phenomenon of poverty is extremely complex and cannot be blamed on environmental and nature conservation. The economic globalization of the past two decades only reduced absolute poverty if an extremely low poverty threshold is defined (\$1.25 purchasing power parity per day) (cf. Robeyns 2005). The traditional development aid with an annual volume of roughly \$100 billion was unable to eliminate absolute poverty, either. Many poverty-related problems arise in the wake of urbanization, forceful appropriation of natural resources, civil wars and forced migration, the withdrawal of traditional land use rights and communal use, the spread of HIV/AIDS, etc. In the light of this, both camps should stop the polemic accusations that the opposite conception led to misery and suffering.

6 On How to Conclude

Let us now endeavour a presentation of the argumentation so far brought forward in ordinary language which takes a first step in the direction of an argument in formal language. The arguments presented above are now turned into premises. The details of the single arguments are abstracted away but remain present in the background. Therefore, the premises are not just arbitrarily chosen axioms but they have resulted out of arguing. The crucial claim of strong sustainability becomes the conclusion that

is supposed to be “derived” (“inferred”) from the premises or, less strictly put, it becomes a reasonable result whose status is closer to a judgement than to a proof. The argument presents itself as follows:

- (1) invalidating arguments against weak sustainability (accusation of dogmatic operationalization against weak sustainability);
- (2) implicit or explicit concessions of weak sustainability (e.g. SMS);
- (3) argument of the specific features of natural capital (multifunctionality, retinity, teleonomic structure, status of collective goods);
- (4) argument of the cultural importance of natural capital (aesthetics, recreation, home, fascination, spirituality);
- (5) argument of taking seriously the uncertainty concerning future preferences; auxiliary argument of environment and nature education (ESD);
- (6) argument from risk assessment under the comparative-egalitarian standard (better err on the side of caution, minimax strategy, shift of the burden of proof);
- (7) thought experiment of generalization of both weak and strong sustainability (gut and repugnant feelings against a “world” of weak sustainability);
- (8) reply to objections (substitution of fossil fuels, ecologic and evolutionary dynamics of natural system, low opportunity costs);
- (9) *based on this (hence, thus)*: the CNCR should be adopted as general rule for policy-making.

Perhaps, not all premises are needed to reach the conclusion. If one does not share the repugnant feelings entailed in (7.) one might drop (7.) and, nevertheless, accept the conclusion in (9.). If so, the conclusion seems overdetermined. Logicians do not like such overdetermination since they prefer to reach a conclusion with the most parsimonious set of principles. This ideal of parsimony is not binding for ethical and political reasoning. Personally, I feel more comfortable (insured) with an abundance of premises.

This is the state of the conclusion for the time being. It is of course not “beyond all doubt” but it would be a false ideal to ask for certainty. If a more pragmatic concept of justification is taken as a basis (cf. Ott 2005), the depth of justification reached here can be regarded as being appropriate.

7 Result and Consequences

Let us suppose one accepts this justification and adopts (9) and thus the CNCR. The known management rules join in SRU 2002. After that, one can elaborate a system of rules supplementing the CNCR and specifying it with regard to different forms of natural capital. In any case, a prudent addition would be an investment rule applying

to such countries where many stocks of natural capital were consumed and destroyed in the past. The countries of Central Europe are among these countries. Therefore, modern environmental policy should be recognizable as a policy of both the preservation of natural capital and investments in these funds of natural capital which became scarce. The CNCR is a rule of conservation and as such a prohibition against further deterioration; the investment rule is to be understood as a mandate for improvement and restoration. The prohibition for deterioration in environmental issues is by now widely accepted in Germany in the interpretation of Article 20a of the German constitution. The mandate for improvement and restoration certainly leaves a wider scope for political decision-making.

This set of rules is still rather abstract and in need of specification towards goal systems in the different spheres of activity of environmental policy. SRU has always advocated a goal-oriented approach as a conceptual progress in environmental policy making. In its main and special surveys between 2002 and 2008, the SRU concretized the concept of strong sustainability for the different issues and assigned goals (climate change, nature conservation, water, soil, oceans, traffic, agriculture, biomass cultivation). Within the general conception of strong sustainability, observing the rules and reaching the goals are to be procured in such a way that reaching the goals reasonably strengthens the assumption that the rules have been observed.

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