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# Basic Structures and Political Implications of a Sustainable Welfare Model

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# 1 INTRODUCTION

In recent years, the criticism on gross domestic product (GDP) as a measure of welfare (e.g. at the OECD conferences, at the EU Conference "Beyond GDP" 2007 in Brussels, in the work of the Stiglitz Commission) led to the formulation of a variety of new welfare concepts committed to the principle of sustainable development. Under labels such as "Green Growth", "Zero Growth" and also "Degrowth", various strategies and practical recommendations are under discussion and not only in politics.

A critical review of more than 30 different approaches to welfare measuring already carried out in the course of the within the research project “Cornerstones of an ecologically sustainable welfare concept as a basis for eco-political innovation and transformation processes” funded by the German Ministry of Environment has shown that, on one hand, in most studies it remains unclear which informational bases of the complex links between the ecological, the social and the economic systems were taken into account in the creation of the concept (Meyer et al. 2012a). On the other hand, there is often no explicit statement as to which normative basic assumptions, and particularly environmental objectives, the authors have used for their policy suggestions. Very often, one-sided or even wrong political priorities are set by excluding important effective contexts in an observation based on a partial analysis. As far as the ecological target system is concerned, there is often a one-sided approach which is only focused on the 2-degree climate target (Meyer et al. 2012b & Ahlert et al. 2013).

It may be legitimate for the description of a policy concept not to include an explicit discussion of these fundamentals. However, in the **development** of a concept for political action, a rationally acting environmental policy cannot neglect reflecting on which economic, ecological and social contexts have to be taken into account and on which normative statements its decisions should be grounded. The basic **structures of a sustainable welfare model consist of two sub-models**:

- A **positive model**[1] is needed to provide a description of the “world” with which the effects of the various options for action on the environmental, social and the economic systems can be assessed and which are important for the issue under discussion;
- a **normative model** is also required as a tool for selecting and assessing the options for action in pursuing the desired goal of sustainable welfare development.

These basic structures of a sustainable welfare model must be explicitly worked out and made transparent, so that the conclusions drawn from the research can be understood on the basis of such a model.

[1] In the sense of an empirical or theoretical analytical concept of science, which is based on hypotheses and intersubjectively verifiable results.

The reflections presented here are directly related to the shortcomings identified in the internal synopsis of the project, concerning welfare and "green" growth concepts currently under discussion, and their relationship to the welfare model of social market economy now long-established in the Federal Republic of Germany; these are too simplistic in terms of environmental, economic and social sustainability. Against this background a broader decision model was developed within project (Meyer et al. 2012c; Meyer et al. 2013). This model provides the reference points for the development of a sustainable welfare concept, which can be used as a political action plan in the context of environmental policy.

The development of a normative model for the assessment of alternative courses of action plays a central role in this paper. As first introduction, section 2 (The Basic System Relationships), shows the positive model in a simplified form with the essential links between ecological, social and economic systems as far as they are needed in order to develop the normative decision model. After that, Section 3 discusses the importance of environmental goals and maintains the position that **key environmental goals** cannot be derived from scientific insights only, but need to be developed in discussion with other scientific disciplines and, ultimately, require normative, i.e. ethically, socially and politically based decision-making. Moreover, it is explained that, as a result of the analysis of different welfare approaches, such key environmental goals should be prearranged to socio-economic goals as they must determine the framework for action and mark the fairway of future development towards sustainability.[1] Section 4 (The Decision Calculus) suggests to select an alternative course of political action which does not hurt environmental goals and with which the highest possible level of welfare in society can be achieved. In this context, welfare is considered to be a multidimensional quantity including, besides the supply of goods and income generation, social components such as participation, legal certainty and health etc., as well as the preservation of ecosystems and of common goods. It is argued that the concrete contents of certain aspects of the concept of welfare on one hand, and the weighting of every single dimension of welfare from the viewpoint of the whole of society on the other hand, can not be objectivied. These blurred elements must necessarily be better clarified in the dialogue between science, politics and society; as it is the case with other social concepts (social market economy, sustainable development, Green Economy), they can be gradually defined more precisely. Thus, it is clear that all social groups (associations, churches, trade unions, etc.) should be involved in this discussion. The welfare concept at the basis of political action is characterized by the respective government which won the competition in political and parliamentary discourse, although in federal states like Germany this view has to be extended, so that different welfare orientations are often pursued on parallel tracks or even in competition with each other. In its last part, this article will suggest some conclusions to be used in politics.

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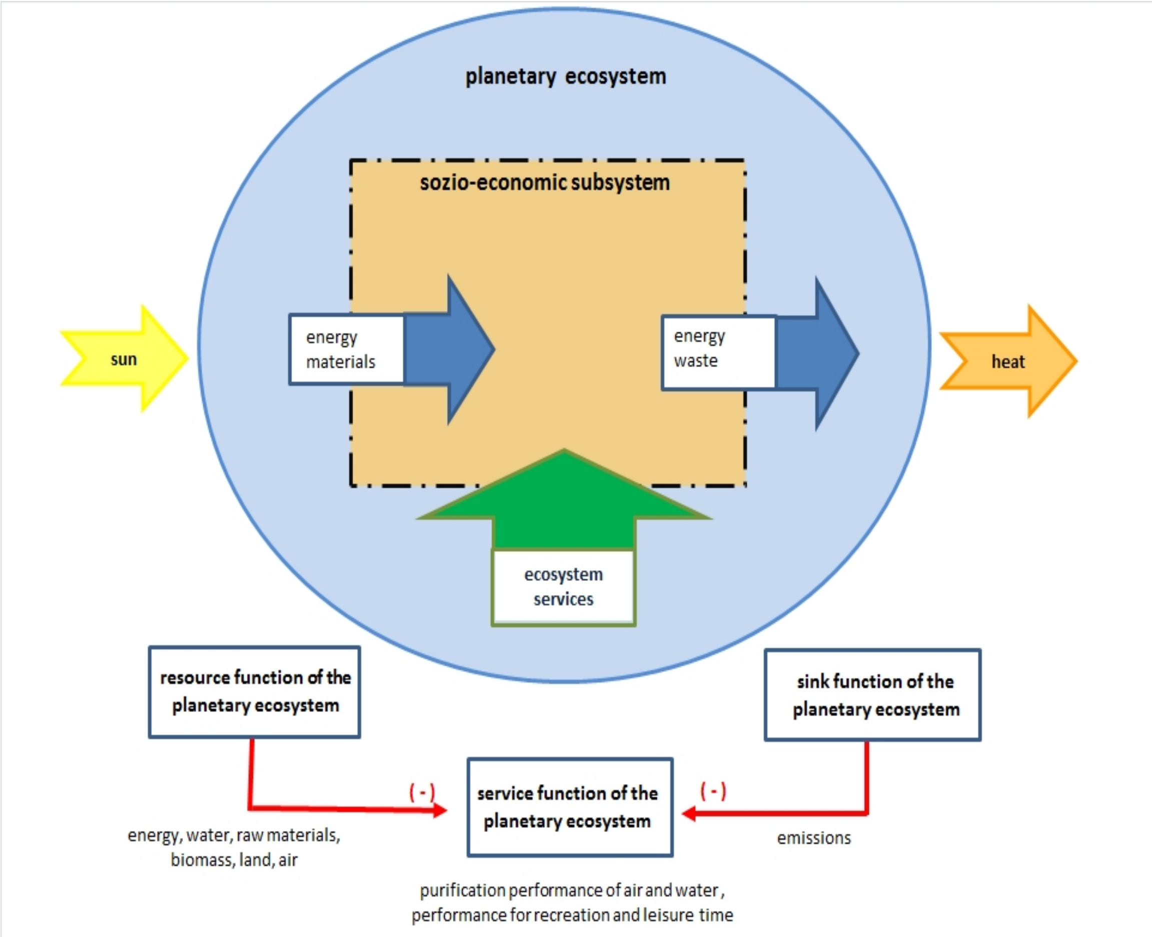
[1] The picture of a boat on a river with a fairway marked by buoys indicates that sustainable development is only possible through free manoeuvring of the vessel of economic and social development within the fairway marked by the guiding buoys. However, the lane is also subject to changes itself, which may also lead to a repositioning of the guiding buoys. (see UBA 2002, S. 40f).

## 2 THE BASIC SYSTEM RELATIONSHIPS

The starting point for all the reflections presented here is the human being as part of nature. The human being uses nature, in that it takes raw materials from it and returns waste to it. Starting from a certain order of magnitude, both interchanges harm the planetary ecosystem, so that the various services that human beings receive from nature and without which they cannot live (the provision of clean water, of clear air and of healthy biomass, protection against hard radiation, recreation in nature etc.), are at risk.

**Figure 1: The socio-economic system as a subsystem of the limited planetary ecosystem**




*Source: own representation.*

These fundamental relationships between the socio-economic system and the planetary ecosystem, as a whole, are reproduced in Figure 1, in accordance with a representation by Daly (1992). The socio-economic system is represented as a part of the larger planetary ecosystem. The planetary ecosystem receives solar energy and emits heat into space. The socio-economic system uses the environment in three relationships:

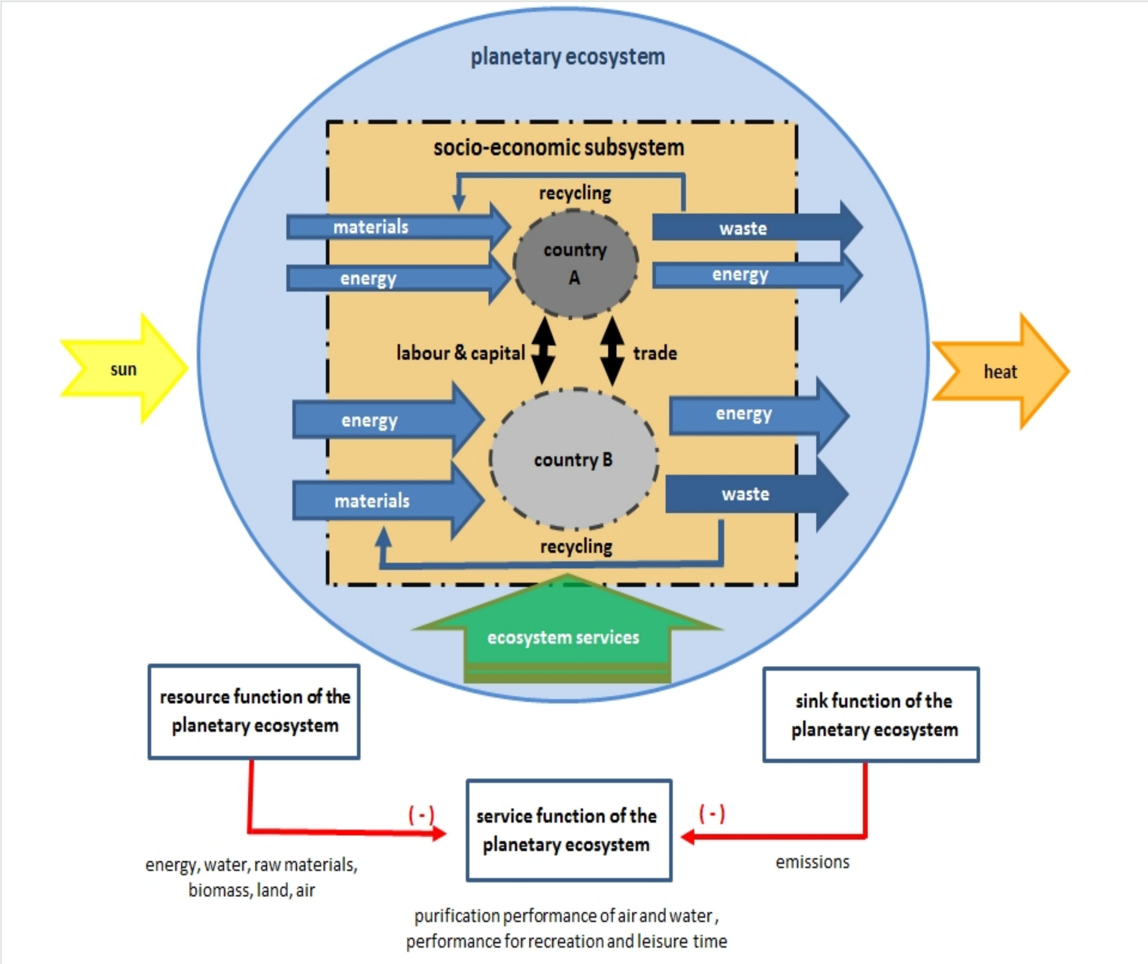
- It takes energy (wind, solar, hydro) and materials such as fossil fuels, metals, non-metallic minerals and biomass from the environment. All this is what we call the *resource function of the environment*. Within the socio-economic system this stream of materials is transformed through energy, labour and capital, into goods, which are consumed by people or used in further production processes (capital).
- The socio-economic system uses the environment as an absorbing medium for used energy and waste, too. In this context, we speak of the *environmental sink function*. Waste includes emissions of gases into the air, as well as solid and liquid waste from industry, agriculture and households.
- The third way in which the socio-economic system uses the environment consists of the fact that the environment provides services such as the cleaning of water and air and recreation for people. Moreover, certain system properties, such as climatic conditions or the chemical properties of seas and soils, or the preparation of a new gene pool, which is only possible thanks to biodiversity, are to be named to this respect. These are indispensable prerequisites for the growth of plants, for the life of animals and for the wellbeing of people. Summing it all up, this is what is called the *service function of the environment* for the socio-economic system.

As a whole, the extraction of raw materials and the returning of emissions negatively affect the service function of the planetary ecosystem - at least starting from a certain order of magnitude. A first in-depth step is depicted in Figure 2. Two major additions have been added to Figure 1:

- On one hand, it is shown that the “waste" material flow can be reduced through recycling. Particularly in the area of metals, but also with regards to building materials and to other non-metallic minerals, there is a considerable potential already being used, at least in part.
- The second expansion of the model accounts for the fact that the socio-economic system is broken up into countries. This distinction is important because environmental policies are made by single countries, although environmental problems are actually global. The single countries are economically interconnected with one another through the circulation of labour and capital, as well as through the trade of goods. Gaining an overview of trade is extremely important because what a country takes from the environment and what a country emits into the environment can only say little about the global ecological effects of the economic activities of that particular country, if it imports goods causing heavy environmental impact abroad. In the case of an isolated observation of one single country, the impacts caused by foreign trade must be taken into account. This is the case, for example, with indicators like "TMR" (total material requirement) and "TMC" (total material consumption). The TMR indicator measures the total annual amount of natural material which is moved by technical means. It is measured in tons per year and shows the amount of renewable and non-renewable resources that a national economy consumes. It also contains the consumption of resources, or the ecological backpack, of all the imported goods of a country (the so called "hidden flows") and takes into account the erosion of fertile soils, too. Although the calculation of these indicators is often burdened with significant data uncertainties, they should not

be ignored, since thanks to their contribution one can avoid drawing completely wrong conclusions: if one does not consider the "hidden flows", a country replacing raw material intensive production by importing the goods associated therewith will show declining raw material consumption, although from a global viewpoint that is not the case.

**Figure 2: Broadened model of the socio-economic system as a subsystem of the limited planetary ecosystem**

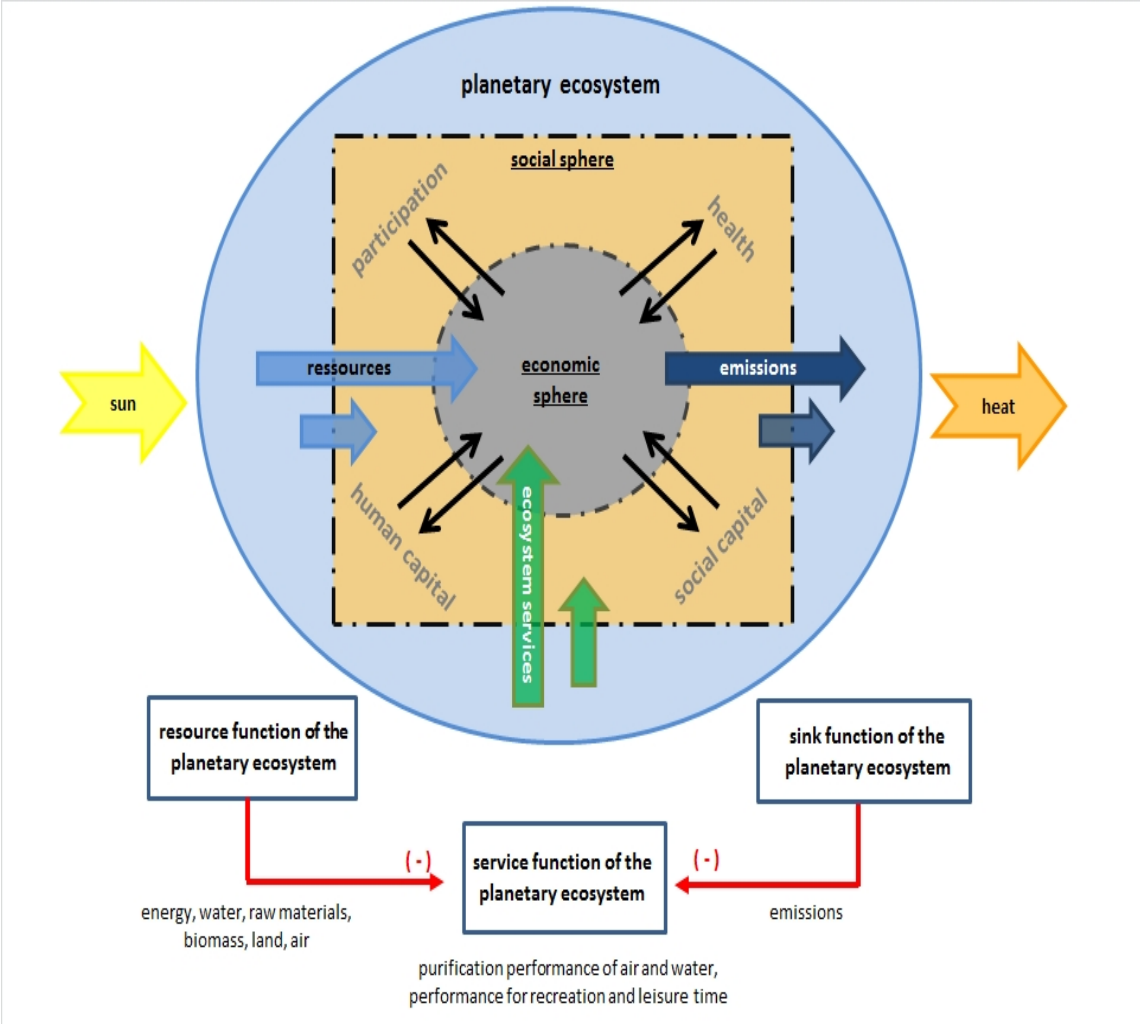



*Source: Own representation.*

Figure 3 below ignores the case just described concerning the differentiation between countries and regions and provides, instead, a breakdown of the socio-economic subsystem in the social and economic sphere. It shows schematically the ecosystem-founded feedback of a socio-economic subsystem represented in a more complex way on the planetary ecosystem.

Figure 3 illustrates the interactions between the central values of the social sphere, such as human and social capital, and the economic sphere. Human capital, which includes the store of knowledge of society but also, among other things, the competence, skills and creativity of its members, is generated, to a decisive extent, by the education system, which is also a component of the economic sphere, and provides performance to the economy. Social capital includes all of social institutions, but also, among other things, social networks and the relationship skills of people as well as their cultural diversity. It is influenced by economic development and acts upon the economic sphere, in turn. The economic sphere, which performs the supply of goods, includes all markets of the economic cycle (goods markets, labour markets, capital and financial markets) with their respective actors (non-financial and financial companies as well as state companies; private non-profit organizations; private households; the state and foreign countries) with their capital stocks or infrastructures in the context of the existing economic system.

**Figure 3: Basic structures of the positive model - interdependence between the economic, the social and the planetary limited ecological spheres**




*Source: Own representation.*

Figure 3 makes it clear that the quantities that characterize the economic and social dimension of the welfare concept (including participation, human capital, health, the supply of goods, economic capital), are not independent of each other; on the contrary, they interact with each other. The activities of the socio-economic system lead to disruptions in the planet's natural capital (biodiversity, climate, acidification of the seas, etc.), which then cause, as a feedback, changes in the services provided by nature to the socio-economic system, thus affecting the social and economic dimension of welfare.

The structures of the quantitative analysis models developed in the research represent knowledge on these relationships. So far, science has usually turned to this task by dividing its work by discipline: the science of ecosystems has worked on the development of ecosystem models, economists have developed more or less detailed socio-economic models which now also explain the withdrawals from nature and the emissions into nature as "pressures" for the situation of nature.

So far, however, there have only been isolated attempts at linking a detailed ecosystem model with a socio-economic model. On a global level, such attempts have so far meant abandoning the depiction of complexity. The UNEP Green Economy Report (UNEP 2011) which used the Threshold 21 World model (see Bassi et al. 2010) must be criticized in this way. An acceptable kind of modelling was achieved with the IMAGE[1] model (Bouwman et al. 2006). In the framework of the EU FP7 project POLFREE[2], two highly complex systems were linked with each other (Meyer 2011): the global ecosystem model LPJmL (PIK) and the global socio-economic model of GINFORS[3] (GWS) - Further research in this area will show whether the coupling of socio-economic models with bio-physical models be possible really only while renouncing complexity.

Even without concrete modelling, environmental policy has to reflect on these relationships, because without such insights an impact analysis of alternative courses of action is not possible. It should be noted that the social, the economic and the ecological system are really understandable only when the various dimensions are depicted together.

The ecological system is usually measured in physical units, the economic system in monetary units, the social system, for example, on the basis of social indicators or in the dimension of time use.[4] Stahmer (2000, 2002) set out a "magic triangle" of social, economic and ecological reporting based on the preliminary work by Stone (1986), describing the economic system in each of the three dimensions. Only then do the important properties of the entire system become clear, as shown in the example of the physical input-output analysis, which represents the economic world in terms of material flows, actually measured by weight in tons. All removal of substances from nature turns, at some point, into the emissions of residues and contaminants into nature. From the perspective of thermodynamics, the economic process is a process of transforming matter at a low level of entropy into matter at a higher level of entropy, used by us as human beings (Georgescu-Roegen 1993, Faber et al 1995). This explains the findings of the physical input-output analysis. Any reduction in the extraction of resources from nature also implies a reduction in the emission of residues and contaminants into nature. However, a reduction in single emissions will often lead to more emissions elsewhere, if the extraction of raw materials is not reduced at the same time.

Stahmer’s reporting system has unfortunately not come to fruition. The physical input-output tables which form a snippet from it, have only been produced for two years (for

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1 Integrated Model to Assess the Global Environment

2 Policy options for a resource efficient economy

3 Global INterindustry FORecasting System

4 For time use as a dimension of the social system cf. Stahmer (2000, pp. 51ff.)

example, Strassert 1999), the socio-economic input-output table based on time use only once.

Therefore, we will need to discuss the relationship between three systems of different dimensions and then use a mix of dimensions as an interface between the systems. Thus, for example, the resources taken from nature must be measured in tons, the economic development in currency units and the social influence in working hours or level of employment. This will be explained using the following example based on the extraction of coal. This is done through the production of a coal mine. There is a close connection between the production of the coal mine as measured in units of currency at a constant price and the physical extraction of coal as measured in tons. The relationship between physical extraction and production in monetary units at constant prices is called the material intensity of coal mining. It estimates how many kilograms of extracted coal correspond to one Euro output performance at constant prices. The output performance of the mining industry in monetary units is part of the System of National Accounts (SNA). The SNA provides the data structure that can be used to estimate the effects of the most diverse economic developments on the production of the mining industry. Using material intensity allows to calculate the related influences on coal extraction in tons. In the same way, the associated effects on employment and on the social sphere can be estimated by taking into account the labour productivity of the mining industry, i.e. the ratio between output performance at constant prices and the amount of labour used (measured by the number of employees or hours worked). The reporting systems now in use do not allow any other approach.

# 3 ENVIRONMENTAL GOALS

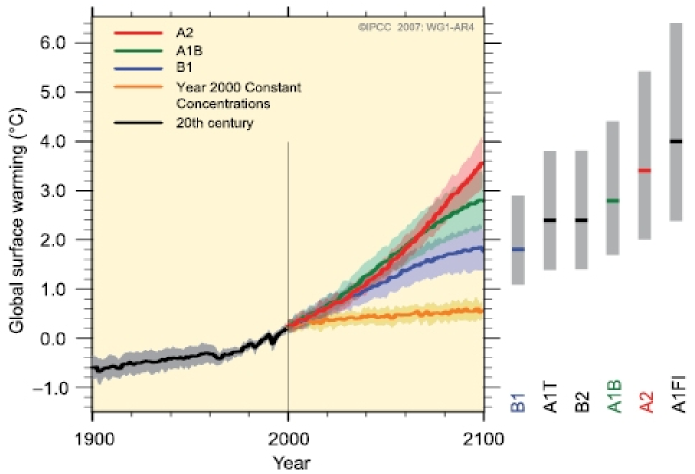
The fact that the extraction of resources from nature and the emission of waste and pollutants into nature jeopardises the service function of the environment is of decisive importance for the planetary ecosystem. In addition, there are a whole series of physical and construction related impacts, ranging from land consumption by way of change of landscapes to the destruction of ecosystems. There is a negative feedback mechanism: the extraction of materials, such as metals and crude oil, often results in serious damage to nature; overfishing threatens the preservation of species; the emission of greenhouse gases dramatically changes the climate; the waste from industry, agriculture and households destroys the balance of ecosystems and affects the quality of soil, water etc., just to mention a few examples.

In the past, the constant growth of the socio-economic system has gone hand in hand with the growth of the consumption of natural resources and pollution, with the consequence that the service functions were accordingly reduced. Figure 3 powerfully conveys the idea that the growth of the economic system must be limited. However, this is not the only option for the future. One can also wonder whether material and energy flows, as well as physical impact on the environment, must necessarily always grow when the socio-economic system grows. This is the question about the decoupling of economic growth and environmental impact.

However, before political concepts and strategies can be considered, the state of the environment that politics should endeavour to achieve has to be clarified. A closer look at Figure 1 shows that the various services that the human kind receives from nature, and without which it cannot live, must be available in sufficient quality and quantity. A corresponding identification and setting of targets is faced with at least two serious problems:

- Firstly, politics must decide on the goals of environmental quality and of actions. The targets for emissions and extraction from nature, which are important for the social actors, are related to the "ecosystem services" of nature in the frame of a highly complex and indirect relationship: namely about changing the functioning of *ecosystems*. From the perspective of ecosystem science, emission targets and resource consumption targets are only indirect targets to this respect. At the core of their approach there are rather targets describing the state of the eco-system. At a *global level*, the concept of “planetary boundaries" by Rockström et al. (2009) is now accepted as the leading approach in examining climate change, the loss of biodiversity, nitrogen balance, the acidification of the oceans, land use, drinking water availability, the destruction of the ozone layer, aerosols in the atmosphere and chemical pollution. Accordingly, the "planetary carrying capacity" has already been exceeded in three important areas of environmental impact: human intervention in the nitrogen cycle, climate change and the rate of biodiversity loss.
- Secondly, the supply of nature’s services to the human kind must be guaranteed not only for today, but also for an indefinite *period of time* in the future.

**Figure 4: Development of averages and ranges for global warming (multi model results for different emission scenarios)**




*Source: IPCC (2007), Figure SPM. 5*

The **example of the climate targets** demonstrates the difficulties mentioned above. Natural science has needed approximately 30 years to investigate the relationship between the emission of climate gases, their concentration in the atmosphere and the average temperature on Earth. In its 4th report, the Intergovernmental Panel on Climate Change

(IPCC 2007) has forecast different paths of climate gas emissions until the year 2100 and the rise in temperature to be expected from each path. Even if global emissions remain at the level of the year 2000, the temperature will increase by 0.6 degrees by the year 2100. Of course, there are other, even more likely, emission scenarios which anticipate an increase in the average temperature on Earth by up to 4 degrees, and in extreme cases by up to 8 degrees (see Figure 4).

The results from this rise in temperature are phenomena such as the rising of sea levels, the acidification of the seas, an increase in the intensity and frequency of heavy storms, a shift of arid areas, etc.; their consequences on the services of nature in certain countries can only be estimated rather vaguely if at all. It is becoming more and more common knowledge that measures and expenses for maintaining the functioning capacity of ecosystems, including the securing of "Ecosystem Services", are not just costs, but investments in the sense of a broader concept of welfare. Indeed, the latter is oriented on the preservation and promotion of ’natural capital’ as the basis of social welfare. This relatively new aspect of environmental policy goals has been recently proven by the international studies on ‘The Economics of Ecosystems and Biodiversity’ (see TEEB 2010), which provided an economic evaluation of the contribution of certain ecosystem services for society, especially in the economies of developing and emerging countries. Germany has decided to carry out a corresponding national balancing (known as “TEEB-D") in the coming years.

In any case, a decision must be made concerning the driving force of this development: the emission of climate gases. Given the uncertainties described and certainly also bearing in mind the realistic possibility of actually achieving the goal, the United Nations and the European Union chose a medium variant with the 2-degree target. This requires a reduction in the emission of climate gases by 2050 to a level that is 85 to 90% below the emissions of 1990 (EU 2011).

The example makes it clear that the integration of research in natural science into the process of developing environmental goals is a necessary, but not a sufficient condition. In the last resort, a political decision concerning central environmental goals must be made with as much support as possible on the part of social participation processes.

Moreover, a broader debate is necessary because, depending on the choice of the tools to be used in emission and resource policies, a **conflict in targets** amongst the ecosystem goals may arise, as the following examples show (see to this respect Meyer 2010, Ekins et al. 2011): an increase in the utilisation of biomass as a fuel can jeopardise the availability of food; the use of vehicles with hybrid engines results in an increase in the extraction and processing of metals per vehicle; the use of nuclear energy reduces emissions of climate gases but bears the risk of accidents, the vulnerability to terrorist activities and causes the burden of "permanent pollution" by nuclear waste.

Conflicting targets are also the background to the following frequently asked questions:

- What are the effects of climate change on the quality of drinking water and of soils in different countries? What are their effects on biodiversity?
- How does a rising concentration of climate gases affects the acidity of the seas and does this change affect fish stocks and the biodiversity of the seas?
- What are the consequences of the developments mentioned above on the services provided by nature?

- What are the additional costs in the production of goods caused by the damage to the quality of soils and water resulting from climate change?
- What do these developments mean for nutrition in a situation of increasing population?

Basically, ecological sustainability means maintaining the functioning of ecosystems and their ability to provide services to the human kind. In this context, the phrase commonly used is ‘the conservation of the "resilience" of natural ecosystems’, which means preserving the ability of ecosystems to recover from external disruptions (Walker and Salt 2006). Because of the inertia of ecological processes, but also on account of the inertia of the socio-economic system in its response to environmental policy measures, environmental policy, i.e. all environmental policies adopted to avoid exceeding ‘points of no return’ or ‘tipping points’, must be oriented to the precautionary principle.

In other words: a decisive element for the importance of emission and resource targets is the fact that many ecosystems are described as non-linear dynamic systems which can lead to the described irreversibilities: the impact on the existing "balance" of a system status caused by polluting emissions and by resource consumption may lead to a new status, no longer revisable, in which human existence is threatened or significantly restricted. Therefore, as a rule, it is inevitable to give central, sustainable environmental goals precedence over socio-economic goals. This conclusion follows compellingly from the perspective of legal ethics, which is intended to exclude the endangering of human existence for future generations, too (Ekardt 2011). Article 20a of the Fundamental Law of the Federal Republic of Germany can be interpreted in this sense. If such a new orientation is omitted, and the trend of certain growth drivers continues unabated, one cannot exclude negative repercussions for the economy, the quality of life and even political stability (see SRU 2012, 15ff).

As a rule, the environmental goals mentioned above are long-term targets which can take decades to be achieved. Except for exceptional circumstances, this opens up the risk that, at least in the short term, there might be a deviation from the fairway marked by the buoys of environmental goals and pointing to the direction of sustainable development. Socio economic “tipping points”, such as the Euro and banking debt crisis, at the moment, often lead to non-compliance with actually necessary environmental target corridors, at least in the short term. Some consider this as being unavoidable, while others think it is a fatal breach of the fundamental principles of a sustainable welfare model, which will lead to a worsening of the socio-economic crisis situation in the long run. In order to mitigate the risk of a long lasting breach to the boundaries which must be respected in order to meet environmental goals, a binding annual monitoring is to be recommended, giving transparent and understandable information to all citizens about the extent of possible deviations.

# 4 THE DECISION CALCULUS

Politics faces a plethora of thinkable tools and measures. Which measures and combinations of measures should be chosen? Are there instructions for the required selection?

The guiding principle of sustainable development is only a framework within which environmental politics can operate as is made very clear by the image of ’ecological crash barriers’ (WBGU 1998) of environmental policies. However, this requires, as already mentioned in Section 3, the derivation of specific environmental goals to be achieved within a predetermined period of time. The question of how the space for maneuvering ‘between the crash barrier’ or (more flexibly) ‘between the central buoys of the fairway of sustainable development’ should be used, and which measures should be taken to achieve the goals, remains open.

In a very general sense, it must be used so as to maximize the welfare of the human kind while respecting the ecological goals. This sounds, at first, as if it were economistic, but there are two reasons why, in fact, this is not at all the case:

- First of all, this formulation requires the dominance of the environmental goals over economic and social goals, the reason for which has been outlined in the previous section.
- Secondly, the term welfare must obviously be understood in a very broad meaning. All factors contributing to determine the quality of life are included: health, social participation, legal certainty, an intact environment and, of course, income as well, to mention only the most important ones. Of course, everyone has own ideas as to why neoclassical welfare economics have problematized the possibility of the aggregation of the individual welfare function towards an overall social welfare function (Bergson, 1938, Arrow et al. 2010, Campbell and Kelly 2002).

Welfare also means the totality of the tangible and intangible components of ‘prosperity’ and ‘well-being’. What components are included in the concept of welfare and with what weight is not objectivisable and therefore always subject to normative specifications. Political parties and other civil society groups have the function to put their own welfare concepts to the vote in the arena of political discourse.

At the latest when decisions of environmental policy or other decisions with an impact on the environment have to be made on the basis of quantified analyses, a weighting of the single components is required so as to estimate the overall effects of measures on welfare.

As a matter of fact, this is done by the government in office, which draws their legitimacy from electoral results or from parliamentary majority. Obviously, it must be considered that, in a federal system, there are different decision making levels involved in the formulation of policies. The decision making process is also influenced by the assessments of the various social groups.

So far, an explicit definition of the components of welfare and their weighting has been missing. To this respect, both science and policy are required to lay the foundations for further clarification. In the whole process of defining welfare attention must be paid to the interactions of scientific, philosophical, legal, economic, social and political knowledge on one hand and the socio-political process of negotiation on the other hand. This process began with the sustainability process and the Brundtland Commission in 1987, and was reinforced by, inter alia, the establishment of the Enquête-Commission ‘Growth, Prosperity, Quality of life - ways towards sustainable economic and social progress in the social market economy’ as well as by the dialogue on the future with the German Chancellor Angela Merkel in 2012.

It appears highly questionable whether a very broad social consensus with regards to the definition of the contents of the welfare concept will ever be possible beyond the consensus documented within the Constitutional Law of Germany. However, this is not necessary either. All that is needed is an explicit discussion on the future social welfare level within civil society, in the political process and in the parliamentary system, which then leads to certain results and compromises in the course of the formation of a democratic will. For this political debate, besides the use of a comprehensive indicator system (so called 'dashboards'), the use of numerically aggregated welfare indicators, such as the National Welfare Index (Diefenbacher and Zieschank 2009, 2012), can be of great help in focusing discussion on the essential issues.

The challenge posed to environmental politics in this debate is demanding for three reasons: firstly, because the concept of social welfare in a pluralistic society is inevitably fuzzy, it evolves in a scientific and social discourse and the weights of the single welfare factors are only objectivisable, to a certain extent, within consensus. Secondly, problems arise because, in some areas, there is no generally binding determination of ecological goals. And thirdly, because often there is still lack in knowledge, information and data that are required in order to evaluate the specific effects of environmental policy measures on the welfare of the people and on the condition of the environment.

# 5 CONCLUSIONS

The information required in environmental politics on the interactions between the social, the economic and the ecological systems can be addressed in this paper only in terms of general principles.[1]

The decision model suggested for the assessment of alternatives in working for a sustainable environmental policy calls for a clear positioning of politics in the following six points:

1. There must be a clear guidance on environmental goals, the compliance with which guarantees the functioning of ecosystems. At national level, the special responsibility for the protection of the environment stems from the definition of the purpose of the State according to Article 20a of the Constitutional Law of Germany. The difficulty lies not only in deriving the national emission and extraction targets, but also with regard to the global ecosystem goals. To this respect, natural sciences need to further explore the complex interactions between different ecosystems over time. Last but not

[1] A more detailed specification of the basic structures of a positive model for analysing the effects of alternative courses of action, as shown in Figure 3, intended for the foundation of an ecologically and socially sustainable national environmental policy at the national level, is included in the final project report.

least, given the uncertainties in the sets of effects and in view of target conflicts among different ecosystem goals, the decision of the political and administrative system and of the social actors remains ultimately indispensable. In this context, the more unknown the relationships between the effects on socio-economic systems and on ecological systems are, in spite of many advances, and the more important is the precautionary principle.

2. A central assumption of the decision model is the framework placing environmental goals over socio-economic goals. The reason for this is that compliance with global environmental goals is a prerequisite for human existence. Since, as a rule, environmental goals are long term goals, taking decades to be achieved, there is a risk, at least in the short term, that environmental objectives might be derogated. To avoid the risk of a permanent damage to ecological carrying capacities, an annual monitoring going beyond the previously established instruments, such as sustainability indicators, should be put in place.

3. The multidimensional concept of welfare must be defined more concretely in its contents. Implicitly existing subjective evaluations on social welfare should be made more transparent in decision making processes, while the effects of decisions should be made more assessable. To this purpose, an objectivisable basis for welfare decisions should be created, and it should be measurable, comparable and modellable. The development of a welfare index complementary to GDP, such as the NWI, is also useful. This paper has been conceived as a contribution to this purpose and as a stimulus to reflection. Both science and politics should lay the foundations for further clarification.

4. A detailed knowledge of the relationships between planetary ecosystems and the socio-economic system remains a constant challenge in the face of processes of change. The Environmental Economic Accounts (EEA) are mainly restricted to a representation of the relationship of socio-economic variables with withdrawals from and emissions into nature. They should urgently be enlarged to form a data system which facilitates the analysis of the interdependencies between socio-economic and ecological systems mentioned above. However, we noticed that the Federal Statistical Office's environmental accounts (UGR) are only slowly moving forwards.

5. To support a more welfare-oriented environmental policy, a sustainable welfare model is also needed, in the last resort. It must be made up of a data-driven computer model lying at the basis of the impact analysis of a normative model for the assessment of alternative courses of action. Whether this is the model proposed here, or a variant thereof, remains secondary. Much more important is the fight for such a welfare model in environmental politics and, finally, the agreement on it.

6. To ensure the political connectivity of a computable welfare model in environmental politics, the modelling should start from the existing system of social market economy and, especially, contain the data from National Accounts and Environmental Accounts, as well as other indicators on the environmental and social situation, so that the single

recommendations for action in environmental politics (among others, measures and instruments) can be better evaluated in the course of impact analyses. The non-quantifiable qualitative aspects can be assessed with the normative decision model, too. Such a procedure would make environmental politics much more integrated than it can possibly be at the present stage.

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