Social Philosophical Aspects of Sustainability

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Abstract
The paper discusses the social philosophical aspects of sustainability from multidisciplinary – historical and logical – viewpoints. The analysis shows that a sustainable community may create a relationship with nature and also its human environment that is more harmonious than that of an unsustainable society. Sustainable societies must solve an optimization problem, namely they must avoid the exploitation of nature, as well as its underuse. In opposition to common knowledge, sustainable societies cannot be self-sufficient (autarky); indeed, they must be open societies able to maintain sustainable commerce with each other. Any other alternative may only give a less satisfactory answer to the problem of exhaustible and scarce natural goods.

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Introduction

The paper discusses the social philosophical aspects of sustainability from multidisciplinary viewpoints. In the first part of the study I analyze the problem of sustainability based on the concept of carrying capacity with help of ecology and the history of ideas. Here I emphasize historical aspects, while in the second part of the study I will present an analytical examination of the world of sustainable societies by the construction of a philosophical model.

1. Historical approach

1. 1. An ecological view

Natural ecosystems can be characterized by various parameters, such as stability, species richness, organic matter production, or carrying capacity, which are harmoniously related to each other. Ecology does not

employ the concept of sustainability; the concept nearest to it is carrying capacity. The carrying capacity of a biological species in an environment is the population size of the species that the environment can sustain in the long term, given the food, habitat, water and other necessities available in the environment. *Carrying capacity demonstrates the maximum number of individuals that the environment can support without significant negative impacts to the ecosystem.*

The shaping of the number of population (P) depends on the conditions of birth (B) and death (D), modified by the degree of migration (M):

$$P = (B - D) \pm M.$$

The carrying capacity of an environment may vary for different species and may change over time due to a variety of factors, including: food availability, water supply, environmental conditions and living space.

Each population exerts an *ecological load* on the ecosystem, in proportion with the number of its individuals, as the consumption and way of life of the individuals is basically identical. If the carrying capacity of an ecosystem is exceeded by overpopulation, there will be insufficient resources and one or more species will decline until an equilibrium, or balance of nature, is restored. Similarly, if the number of species in an environment is less than the carrying capacity, the population will tend to increase until it balances the available resources.
Factors that limit the potential production of population include: disease/parasites, starvation, predators, pollution, accidents, old age, hunting.

Sub-human species try to make maximum use of carrying capacity by two ideal typical reproductive patterns: exponential r and logarithmic K strategic reproduction, as shown in Figure 1.

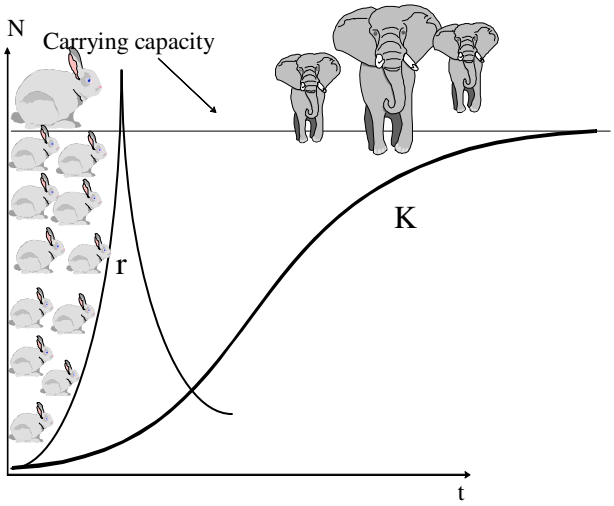

Fig. 1. r and K strategic species and carrying capacity

In the case of a typical r strategic species the number of individuals and the ecological load of the population following high reproduction significantly exceeds the carrying capacity of the territory for the given species. This is called overshoot, and it is followed by the drastic decrease of the number of individuals. In contrast, the number of individuals in a K strategic species grows at a slower pace, while it adjusts to the value of carrying capacity. That is, carrying capacity limits the ecological load of all sub-human species, regardless of whether they follow strategy r or K. It is unconceivable that the ecological load of a population should *persistently* exceed the pertaining carrying capacity of the given territory.

1. 2. Carrying capacity in the case of humans

The key problem from a philosophical point of view is whether or not to consider the concept of carrying capacity valid for individual human communities and via them for mankind as a whole. If the answer is affirmative, then the extensive growth of mankind has its natural limits; but if it is negative, then we deny the existence of such limits. Clearly, this is one of the basic questions of modernity. Let us see first the reproductive curve of mankind in relation to this.

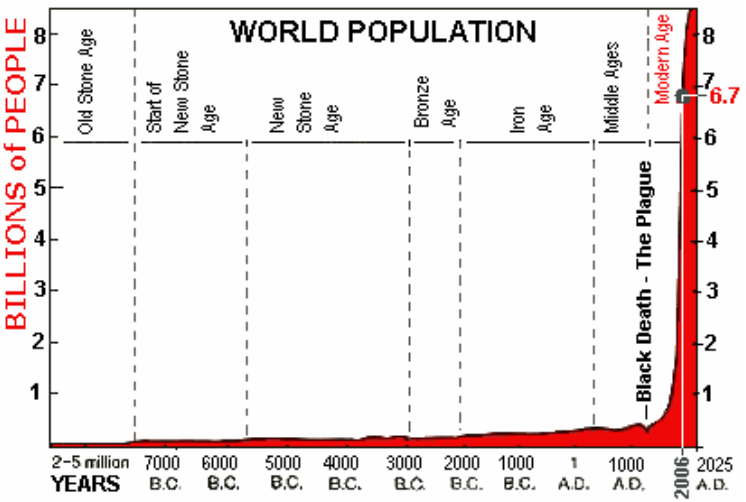

Fig. 2. The reproductive curve of mankind in the course of history
From: "World population: Toward the Next Century"[1]

This is a unique reproductive curve, as it does not follow either of the two strategic patterns r and K, at least to this day. At best, it corresponds to the increasing line of r strategic reproduction without its decreasing line. Referring to the past, the population curve of mankind basically describes an exponential line, which can be divided into at least three stages. The first stage lasts until the end of the Old Stone Age, during which the size of the population hardly increases. The next stage lasts until the end of the Middle Ages, during which the size of the population grows in a linear way. Finally, with the advent of the 17th century, the modern age follows, with a boom in population growth. The degree of the change is also shown by the fact that in the course of the last 400 years the population curve has turned from almost horizontal to almost vertical.

Erazim Kohák (1977) in his famous article also differentiates between three basic ways of production and associated concepts of

[1] Population Reference Bureau, 1994
<http://wilderdom.com/images/WorldPopulationGraph.jpg>

nature: hunter-gatherer, agricultural-farming, and industrial societies.[1] It is clear that the two kinds of distinctions are logically interconnected; that is, the linear growth of the size of population corresponds to the beginnings of the passage to agricultural-farming economy, while the boom in population growth started with the advent of industrial societies.

1. 3. Hunter-gatherer communities

At first, for several million years, the number of *Homo sapiens* only grew slowly, parallel with continuous migration, while the number of individuals on a given territory was constant. The man reproduced as any K strategy animal species. At this time human communities practiced a *hunter-gatherer* type of culture. Analyzing these communities' concept of nature, Kohák states that the forces of nature were all-powerful and magical for the man, worshipped as sacred, as shown by the *polytheism* of natural religions. The man saw himself as part of nature, subordinated to, and defenceless in front of it. Humans perceived natural goods as gifts, for which they presented sacrifices. The basic formula of man-nature relationship in that age is as follows:

- NATURE: an all-powerful, magical (not knowable), divine whole
- MAN: part of nature, subordinated and defenceless

Hunter-gatherer people have a twofold relationship to nature: they relate to it as to the sacred, and as to the profane, to employ Mircea Eliade's differentiation.[2] In contemporary secular terminology, we might say that natural entities worshipped as sacred had an *intrinsic value*, while other (profane) entities of nature only had an *instrumental value*. Environmental ethics regards this distinction as decisive. The most important question of the literature on environmental ethics is the difference between *instrumental* and non-instrumental, that is, *intrinsic* values.[3] An object has an instrumental value if it subserves the accomplishment of some other goal. In contrast, the intrinsic value of an entity lies within itself – and not only in its utility. An entity possesses an intrinsic or immanent value, if it is good in itself, regardless of human

[1] Erazim Kohák, "Varieties of Ecological Experience", *Environmental Ethics* 2 (Summer, 1997): 153-171.

[2] Mircea Eliade, *The Sacred and the Profane: The Nature of Religion*, translated by Willard R. Trask, (New York: Harper Torchbooks, 1961).

[3] Andrew Brennan and Yeuk-Sze Lo, "Environmental Ethics", *The Stanford Encyclopedia of Philosophy* (Fall 2008 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/fall2008/entries/ethics-environmental/>.

value judgment.[1] If a natural entity possesses intrinsic value, then, *prima facie*, it entails an ethical responsibility to all ethical agents to preserve this value.

This means that in hunter-gatherer communities a *complicated value system* is formed in relation to natural entities, as far as they differentiate between natural entities which possess intrinsic value and are therefore defendable (e.g. sacred regions and animals) and those which do not possess intrinsic value, and therefore can be instrumentally utilized. In addition, hunter-gatherer communities strongly limit the growth of population, consumption, and economy, that is, the community's environmental load.[2] That is, the environmental load and efficiency of hunter-gatherer communities is low. The restrictive nature of this culture is congruous with the fact that these communities live in a naturally and ecologically limited space. It is only this way that these communities can adapt to the low carrying capacity that nature may provide for them. Consequently, a hunter-gatherer society can be characterized by two concepts: *sustainability* and *low efficiency*. Such a community is sustainable because its environmental load is permanently lower than the carrying capacity of the supporting territory, and at the same time the society is weak, the quality of life is low.

1. 4. Agricultural-farming communities

Approximately *10000 years* ago (at the end of the Old Stone Age) there is a change in the reproduction curve, and since then the population growth has been somewhat higher. This is the time of the passage of human communities from a hunter-gatherer culture to an agricultural-farming culture; that is, this point marked the advent of production in an economical sense. (Agriculture in its simplest form first appeared about 12,000 years ago in the Middle East.[3])

It has been the opinion for a long time that traditional agricultural cultures are always sustainable, and unsustainability is a feature of industrial societies alone. This is not true, since contemporary archaeology has revealed several cultures which overloaded and

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[1] Joseph R. des Jardins, "Instrumentális, belső és eredendő értékek" (Instrumental, intrinsic, and original values), translated by Barbara Bércesi, *Cédrus*, http://schneiderpeter.netkey.hu/tabulas/cedrus/index1.html

[2] Paul R. Ehrlich and John P. Holdren, "Impact of Population Growth", *Science* 3977 (1971): 1212 – 1217.

[3] Gerald G. Marten: Human Ecology - Basic Concepts for Sustainable Development. Earthscan Publications. 2001

destroyed their environment, leading thus to the collapse of that particular society: e.g. Maya civilization (AD 600-800), Easter Island civilization (AD 400-1600), or the Anasazi of south-western North America (AD 900-1200).[1] Therefore environmental crisis and the collapse of civilization has been possible ever since the formation of agriculture.

According to Kohák, the agricultural-farming type economy is an intermediate situation, inasmuch as the man is not as defenceless in front of nature as in the previous type, but he does not yet rule it as much as in industrial societies. I note here that Quinn sharply differentiates between pasturing and agricultural cultures. He considers the former sustainable (Leavers), and the latter unsustainable (Takers).[2] At any rate, it is this age when production in an economical sense begins, as a result of which the carrying capacity of certain territories displayed a sudden growth. The most important natural entity for these communities is the land and the animals, with which they have contradictory relations. The farming-pasturing man regards the land and the animals as his property, while also as his living and live fellow workers. Nature is a *fellow* worker which needs to be respected, understood, and cared for, as a blood relative. In this worldview it is not nature directly which has divine characteristics, but the god who creates nature.[3] Monotheism is a natural consequence of this worldview. The transitory status of man is also proved by the fact that the man is a being superior to nature, while subordinated to god. This relationship can be characterized as follows:

- GOD: an all-powerful and absolute force
- MAN: a good shepherd/master, who is proprietor and caretaker at the same time
- NATURE: property and fellow worker at the same time

The above scheme is well characterized by the basically agricultural culture of the Christian society of medieval Europe. The Bible reads: "And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth."[4] In this concept man stands above all other species, because it is only man (created to the image of God) who has a soul. According to Thomas Aquinas, since non-

[1] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, (New York: Viking Penguin, 2005).
[2] Daniel Quinn, *Ishmael*, (New York: Bantam/Turner, 1992).
[3] Kohák, "Varieties of Ecological Experience", chapter 3.
[4] Genesis 1: 28. (KJV) http://www.kingjamesbibleonline.org/Genesis-Chapter-1/

human beasts were intended for the use of man, man may kill or use them any time without committing any unlawfulness.[1] It was White who first called attention to the degrading and instrumentalizing Jewish-Christian concept of nature.[2] White also emphasizes of course, that in addition to this main trend, there are also concepts in Christianity (see those of St. Francis of Assisi, for example) that attribute an intrinsic value to the powers and entities of nature as well. Luc Ferry also stresses that medieval European thought was also characterized by the respect for nature (see Medieval animal trials, Motherland, the limitation of mining, etc.).[3]

1.5. Industrial societies

Beginning with the 16th century, the slow population growth was replaced by a faster one. This age marked the beginning of modernity with its keywords: science, technology, and industry. All these led to the industrial revolution of the 18th century. Another important characteristic of this age was colonization. In the last 50 years the pace of population growth increased, and as a result the number of the population doubled.

The thinkers of modernity perceived the possibility of "man's rule over nature" by industrial production, and the scientific technology as its prerequisite. The culture rapidly growing in population, necessities, and consumption desires was highly in need of such a possibility. Knowledge is power, said Francis Bacon, and with this confession, opposing the scholastic tradition of Christian philosophy, he freed the way for modern natural sciences. He depicted the miracle of a scientific-technological civilization in his utopian novel, *The New Atlantis* (1626), in which the citizens of a future state live in happiness and satisfaction due to the state's developed industry and scientific agriculture with steam engines, airships, and telephone. The progress towards the utopia of heaven on earth as represented by Bacon has become one of the central ideas of modernity.

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[1] Thomas Aquinas, *Summa Contra Gentiles*, Book 3, Chapter 112. (rpt. Notre Dame, Ind.: U. of Notre Dame Press, 1975. 5 vols. Trans. Anton C. Pegis et al. 1955).

[2] Lynn Townsend White, Jr., "The Historical Roots of Our Ecologic Crisis", *Science*, 3767 (1967): 1203-1207.

[3] Luc Ferry, *The New Ecological Order*, translated by Carol Volk, (Chicago: The University of Chicago Press, 1995), Introduction.

According to Descartes, the entities of the created world can be divided into two classes: to objects which only possess the substance of extension (*res Extensa*), and to man who also possesses the substance of intellect (*res Cogitans*). Animals are thus merely mechanical structures (automatic), which only possess an instrumental value. The man as a rational animal (*animal rationale*) is only part of nature in its animalic (bodily) nature, while his specific difference – his intellect – makes him superior to nature. It is the mission of man to rule over his own body and the material world. There is a need of a new type of philosophy, one which will "make ourselves be masters and possessors of nature".[1]

The philosophers and economists of the Scottish Enlightenment consider that nature is plentiful, invaluable in itself, and useful if worked: "Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be handed in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange of it."[2] "To which let me add, that he who appropriates land to himself by his labour, does not lessen, but increase the common stock of mankind: for the provisions serving to the support of human life, produced by one acre of enclosed and cultivated land, are (to speak much within compass) ten times more than those which are yielded by an acre of land of an equal richness lying waste in common."[3]

For the industrial society nature is always mediated by some kind of machine. This is how nature as a whole becomes raw matter locked in within a defined framework, deprived of all its intrinsic value and meaning, ready to be exploited. For the man who exploits it, nature is neither sacred, nor alive, nor an organic whole, but merely a set of lifeless things, the source of raw matter and the repository of unnecessary waste.[4] The main wave of modern economy also contains no consideration which would in the least measure refer to natural limits. The ruling concept of economy distinguishes between a minimum of

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[1] René Descartes, *Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Sciences. 1636*, Translated by Laurence J. Lafleur, (Indianapolis: Bobbs-Merrill, 1964), Vol.1, Part 6, 142-143.

[2] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Book One, Chapter IV, Of the Origin and Use of the Money (http://www.adamsmith.org/smith/won-index.htm).

[3] John Locke, *Second Treatise on Government* (1690), §37. http://www.let.rug.nl/~usa/D/1651-1700/locke/ECCG/govern05.htm

[4] Kohák, "Varieties of Ecological Experience", chapter 4.

three factors of production (nature, labour, capital), and supposes that these are limitlessly replaceable. This concept results in the view that the destruction of natural goods can be replaced by labour and capital. Ecological economy rejects this view. The basic man-nature relationship in this culture is as follows:

- MAN: not part of nature; superior to nature; able to rule over nature.
- NATURE: not sacred; inferior; mechanism; can be ruled; plentiful; is only useful if worked; raw matter.

According to the so-called modern Western way of thinking that has been shaping since the 17th century there are no external natural limits for mankind. Mankind is continuously advancing towards a heavenly status of happiness, where welfare is of such a degree that any human needs are instantly satisfied. Historians of ideas have claimed that the thought of continuous progress towards secular happiness and the idea of development and growth were initiated in the Early Modern age (Bacon, Descartes), then enforced in the 18th century with Locke and Condorcet, and further developed with positivism and Marxism.

For the Western man growth and progress is not only a metaphysical construction, but also a primary experience. For a couple of hundred years mankind has been exponentially growing in almost all its quantitative parameters: population, consumption, GDP, etc. Modernity considers this to be society's normal way of operation, therefore the slowing down or absence of growth is perceived as an abnormal situation and critical condition.

1.6. From environmental crisis to environmental paradigm

It was in the 1970s that the public opinion had to confront the problematic side of the modern instrumental concept of nature (the Baconian utopia). Let us only think of the exaggerated use of pesticides,[1] deforestation, or the extinction of species.[2] The first report of the Club of Rome (1972) offered a radical answer to the increasing problems of ecology and environment, claiming a finite and homogeneous world system in which continuous growth is impossible (zero growth). The subsequent reports of the Club of Rome have also led to similar conclusions.

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[1] Rachel Carson: *Silent Spring* (Boston: Houghton Mifflin, 1962, Mariner Books, 2002).

[2] Paul R. Ehrlich, Anne H. Ehrlich: Extinction: *The Causes and Consequences of the Disappearance of Species.* (New York: Random House, 1981).

These reports and recommendations were completely contrary to the growth-centrism of Western thinking, and appalled the public opinion as well as the political elite. Professionals tried to bridge this dichotomy, and this led to the appearance in international literature of the expression "sustainable development".[1] According to the definition of the Burtland report, sustainable development is a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[2]

According to the formulation of Herman Daly, sustainable development is reaching permanent social welfare without growth exceeding ecological carrying capacity.[3]

As formulated in the Report of the Conference of the World's Scientific Academies: Sustainability is the satisfaction of mankind's present needs, simultaneously with the preservation of the environment and natural resources for future generations.[4]

According to present considerations, sustainable development reclines on three pillars: social, economic, and environmental; all three must be taken into account in the process of drawing up various development strategies and programs, as well as in concrete measures and actions. Sustainable development as a general strategic goal has "entered" the documents of world conferences and organizations, as well as the action programs of national governments.

At the same time, according to many environmentalists, the concept of sustainable development has lost its original meaning, essentially becoming an acceptably "green" formulation for permanent economic growth. The troubles around this expression possibly point to an initial problem: namely, that the concept of "sustainable development" claims the achievement of something which is not achievable for certain. There is no reason to assume from the very

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[1] Lester B. Brown, *Building a Sustainable Society*, (New York: W. W. Nothorn and Co., 1981).

[2] Gro Harlem Brundtland et al., *Our Common Future*, 1987. http://www.ace.mmu.ac.uk/eae/Sustainability/Older/Brundtland_Report.html

[3] Herman E. Daly, *Steady-State Economics*, (San Francisco: W. H. Freeman and Co., 1977).

[4] Mohamed Hassan, "Transition to Sustainability in the Twenty-first Century: The Contribution of Science and Technology – Report of the World Conference of Scientific Academies held in Tokyo, Japan, 15-18 May 2000", *International Journal of Sustainability in Higher Education* 1 (2001): 70-78.

beginning that development (that is, the permanent growth of social welfare) and sustainability ("the preservation of the environment and natural resources for future generations") can be interconnected. Therefore, hereafter I will only use the concept of sustainability.

American R. Van Potter (1971), who coined the term *bioethics*, was the first to connect the question of ethics to the fate of mankind.[1] Potter's original concept of bioethics as a global integration of biology and values was designed to guide human survival.[2] The "preservation of mankind" as an ultimate ethical principle also receives a key role in the thinking of German philosopher Hans Jonas. Traditional ethics in his view – in relation to the scope of traditional technology – did not extend to nature and to humans living at a distance from the actor in space and time. However, ever since the 17th century, the advent of modern technology, our power has increased to such an extent that it has changed the nature of human action as a result. This must open up the new dimensions of ethical significance, such that the canon of traditional ethics has not reckoned with. To his mind, the maxim of all ethical action reads: "'Act so that the effects of your actions are compatible with the permanence of genuine human life'; or expressed negatively: 'Act so that the effect of your action are not destructive of the future possibility of such life'; or simple: 'Do not compromise the conditions for an indefinite continuation of humanity on earth'".[3]

An important development of the 1990s is the appearance of the concept of the "ecological footprint".[4] This concept can be used for measuring the degree of sustainability (or unsustainability). The *ecological footprint* represents the amount of biologically productive land and sea area humans need to sustain themselves and absorb the corresponding waste in the context of a given level of technological development. Mankind's per capita average ecological footprint covers

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[1] Van Rensselaer Potter, *Bioethics, Bridge to the Future* (Englewood Cliffs, NJ: Prentice Hall Inc., 1971).

[2] Peter J. Whitehouse, "The Rebirth of Bioethics: Extending the Original Formulations of Van Rensselaer Potter", *The American Journal of Bioethics* 3(4)2003: W26-W31.

[3] Hans Jonas, *The Imperative of Responsibility: in Search of an Ethics for the Technological Age* (Chicago: The University of Chicago Press, 1984), 11.

[4] Mathis Wackernagel and William Rees: *Ökológiai lábnyomunk* (Budapest: Föld Napja Alapítvány, 2001). In original: *Our Ecological Footprint: Reducing Human Impact on the Earth* (Gabriola Island, B. C., Canada: New Society Publishers, 1996).

an area of 2.7 global hectares, while it should only mount to 2.1 global hectares, assuming equal division. That is, we exceed the Earth's biocapacity by roughly 30%.[1] Naturally, the overshoot of biocapacity cannot carry on for ever, but it is necessary that mankind's environmental load returned to the level of biocapacity. The question is, however, whether the decrease of environmental load will be carried out in an organized way by humans themselves, or by nature in its own brutal way.

The greatest difference between the paradigm of modernity and the "greens" is with respect to future expectations. Modernity thinks that the man-nature relationship will continue to be exactly as it has been in the past 400 years, therefore growth will continue to characterize our civilization, and the regress deriving from the nature of capitalism will only be transitory.

In contrast, the "greens" emphasize that the Earth is a finite system, and it is impossible for a sub-system in this system of limited natural capacity, namely mankind, to grow unlimitedly in its physical parameters. What is more, they consider that the extensive growth of society has already come to an end, because the society has reached, and indeed exceeded the limits of earthly systems. It is originally impossible to rule over nature, technology carries unpredictable risks, and the nature possesses an intrinsic value. "Any living being is related to all the others, and any life form is valuable, regardless of the kind of value it carries in the eyes of humans".[2]

Therefore the "greens" think that the future will definitely differ from the past 400 years. One of the possibilities is that mankind will succeed in limiting its own population growth, consumption, and technical development harmful for the environment, that is, in limiting its environmental load and creating a sustainable society. The other option is that the global environmental crisis as a result of natural limits will be followed by the collapse of civilizations.

At present, the ideologies of modernity (growth) and sustainability (non-growth) are equally prevalent, and this does not only mean that the information is unclear and human ambitions are contradictory, but also that the hundreds-of-years-old values of modernity have become critical. In what follows, I do not wish to

[1] Living Planet Report 2008, p. 27. http://assets.panda.org/downloads/living_planet_report_2008.pdf

[2] *A Föld Charta* (Earth Charta) http://www.rec.org/magyariroda/foldcharta/index.html

directly argue for the "green" paradigm; instead, I will analyze the possibilities to understand the relationship of societies on the basis of this concept.

2. Logical Analysis

The following analytical examination places the problem of sustainability in a wider social philosophical context. I will define a simple hypothetical world, and examine the characteristics of sustainable and unsustainable societies within this world. For the sake of simplicity, I will only concentrate on qualitatively different, clear end points (sustainable or unsustainable, static or dynamic, open or closed communities, etc.), and disregard all the possibilities in between. Furthermore, I will start from assuming that one society consists of one ethnic group; and I will also disregard the question that the claim of nature's intrinsic value is always grounded by religious or secular (ethical) considerations. The analysis shows that a sustainable community may create a relationship with nature and also its human environment that is more harmonious than that of an unsustainable society.

2. 1. Concepts and definitions

(i) Consider a planet with finite size, consisting of *isolated islands* and a *continent*. The rich ecological systems and natural goods of the planet last until the end of times – by themselves. These natural systems are only threatened by the rational being that inhabits the planet: man. Human communities do not simply live in nature, but they live from nature, that is, they need natural goods and services for their existence and development. Natural goods are very different from the point of view of economy. Firstly, there is a basic difference between natural goods in plentiful and restricted amounts. Obviously, one only has to care for the management of goods existing in restricted amounts. For early human communities restricted both in population number and efficiency, natural goods can be regarded as plentiful. For modern human communities with a growing population and great efficiency, natural goods can be scarce.

Secondly, there is a significant difference between *localized* (restricted to a territory) and *delocalized* (not restricted to a territory) natural goods. It is generally true that localized goods are found in *stocks*, while delocalized goods provide some kind of *ecological service* for the man (e.g. air to breathe, water to drink, adequate temperature).

The man can better perceive and manage the diminishing or corruption of localized, stock-like goods, than that of delocalized, service-type goods.

Thirdly, there is a well-known difference between *renewing* and *non-renewing* goods. A sustainable economy obviously cannot rely on non-renewing goods, since they will run out sooner or later, and pile up their wastes as well. In the case of renewing natural goods it is worth making a difference between *capital*-type and *interest*-type goods, where the value of the latter depends on the value of the former. Interest-type natural goods can be used forever without diminishing the value of *natural capital* proper, and thus biocapacity. Hence it results that a sustainable society can only use the *interest* of renewing natural goods. In contrast, the use of capital-type natural goods will diminish the natural capital itself, and the natural interest with it as well, also reducing biocapacity. This is the practice of unsustainable societies.

As the man cannot increase the natural capital, the following paradox will prove to be true. In the short run, the natural interest ensures a much lower profit than the use of the capital itself. However, in the long run the situation is reversed. It should be noted that the short and long runs must be understood in the historical perspective of the community, and not the individual being. This makes the acceptance of the culture of a sustainable society quite difficult in modernity, which always emphasizes the individual. From the individual's viewpoint the social interest in the long run means irrational responsibilities and limitations. Keynes' famous saying is a good formulation of the matter: "The long run is a misleading guide to current affairs. In the long run we are all dead."[1]

(ii) People live in different communities (societies). Communities ensure the natural capacity necessary for them by occupying a territory of a determined size, where they dispose of the use of the available biocapacity in a sovereign way. There is thus a sharp difference between the (private, internal) territory occupied by the community, and the (foreign, external) non-occupied one. The former is the territory of the community, and the biocapacity it contains is the *domestic or internal biocapacity*, while the latter is *foreign or external biocapacity*.

(iii) Any community has a specific *ecological load*, which is naturally increasing. This derives first of all from the natural pace of

[1] John Maynard Keynes: *A Tract on Monetary Reform*, chapter 3, (London: Macmillan, 1924).

population growth, then also from the natural human ambition that everybody wants to live increasingly well. The natural growth of population, welfare, technology, and the environmental load in general can only be withheld by a very restrictive (negative) culture. Early human communities were characterized by such cultural specificities. In opposition to this, modern culture does not only enable, but directly supports the natural desire to growth.

The biocapacity of any territory can be characterized by the concept of *carrying capacity*. It is important to differentiate between the carrying capacity (the maximum sustainable number of individuals) and the actual number of individuals, that is, the potential and actual value of the carrying capacity. Unfortunately in the case of human communities the concept of the carrying capacity is difficult to apply, because its value greatly depends on the average consumption and the technology used, as well as on voluntary exchanges.

The biocapacity of a territory can be characterized by the concept of the *ecological footprint* as well. In this case a difference should also be made between the *maximum* and *actual* ecological footprint. The first shows how a given biocapacity can be ideally transformed into a territory size, while the second shows the size of the ecological footprint of the community living there. It is clear that the maximum ecological footprint (as a capacity) may differ from the size of the actual territory; it may be much higher if the given territory is productive and contains several types of natural resources; or lower in the contrary case.

(iv) According to my viewpoint nature is a special factor of production, a potential turned actual in the process of production by labour and capital. That is, the essence of production is that the man transforms the originally given biocapacity (BC) with the help of labour and capital – into social-economic goods (SG). This concept can be paralleled to Aristotle's corresponding idea that the matter is pure potentiality shaped by action.

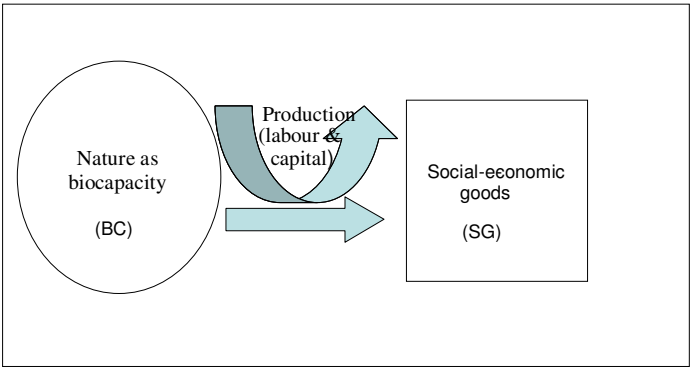

Fig. 3. The transformational model of production

Therefore any (material-economic) value is potentially contained in nature, and it is the task of production to actualize (socialize) this potential value. Production is thus not the creation of value, but "only" the transformation of pre-existent values, as Schumacher has put it: "man is not a producer but only a converter".[1] If there is a rich supply of natural goods, than the amount of the social-economical goods produced is only determined by the amount of labour and capital. In this case the theory of labour value is valid, provided we consider capital also as (dead) labour. (For instance, if there is an infinite amount of fish in a lake, then the amount of the fish caught is defined by the live and dead labour expended). If the supply is scarce, then all three factors are equally present in the amount of produced social-economical goods, as taught by the theory of the replaceability of productive factors. (For instance, if the amount of fish in a lake decreases, then the amount of the fish caught is defined by all three factors alike). If the natural supply is very scarce, then it only serves for the production of a limited amount of social-economical goods. In this case the amount of the social-economical goods produced is much smaller as compared to the results of the theory of the replaceability of productive factors. (For instance, if there is no more fish in a lake, then it is impossible to catch any more fish, no matter how much labour or capital we expend on fishing). It is obvious therefore that in the case of plentiful and restricted natural goods

[1] Ernst F. Schumacher, *Small Is Beautiful: Economics As If People Mattered*, (New York: Harper Perennial, 1989), 52.

the transformational model of production leads to different results than the theory of the replaceability of productive factors.

Moreover, difference should also be made between actual social-economical goods (SG) and social-economical capacity (SC). The former is the actual transformation, while the latter is an ideal way of transformation, which shows the amount of social-economical capacity that can be gained in a sustainable way from a given biocapacity in conditions of maximal efficiency.

The above concepts – maximum carrying capacity, ecological footprint, and social-economical capacity – all characterize the biocapacity of a given territory, albeit in different ways: the carrying capacity in a number of individuals, ecological footprint in territory, and the social-economical capacity in economical goods. The concepts of actual carrying capacity, ecological footprint, and social-economical goods can also be understood in parallel with the previous ones, as measuring the amount of the actual environmental load. On the basis of these, the problem of sustainability can be grasped in various concepts and measurement units.

(v) Economy has three basic systems: *hunter-gatherer economy*, *agricultural economy*, and *industrial economy*. The following can be assumed about hunter-gatherer economy: – low efficiency and environmental load; – it only makes use of renewing natural interest; – it exists within the limits of natural carrying capacity. It results from this that hunter-gatherer communities cannot harm their natural environment. At the same time, these communities only make use of a small amount of their own biocapacity, with low efficiency. Therefore these communities must respect and preserve nature, and limit their environmental load the most.

Agricultural communities can be assumed to have a medium efficiency and environmental load, and they can increase their carrying capacity. This culture has less respect to nature, increasingly regarding it as property. In addition, this culture enhances reproduction and limits consumption and technological development, therefore having a contrary effect to its environmental load. This society may cause local environmental crisis.

Industrial societies can be assumed to have a high efficiency and environmental load, and they can significantly increase their carrying capacity. This culture has no respect for nature, regarding it exclusively as property. This culture does not limit at all the community's environmental load. This society may cause global environmental crisis.

A society is *sustainable* if it only carries out sustainable transformations, which do not result in the decrease of the value of biocapacity. An important condition of sustainability is that the community restricts its environmental load, and this is only attainable by communities which form a complicated value system in connection with natural entities. They differentiate between natural entities with an intrinsic value (*sacred*) and natural entities without intrinsic value (*profane*). Sacred natural entities receive absolute protection in the community, meaning that the members of the community have *religious-moral responsibilities* towards them. The community relates in an *instrumental* way to profane natural entities. Sustainable societies must solve an optimization problem, where they may commit two kinds of mistakes. The first mistake is to exploit nature's biocapacity, and jeopardize thus the long-time preservation of the community. The second mistake is for the community not to exploit its entire biocapacity, and thus become less efficient than it could ideally be. Obviously, the first mistake is fatal when compared to the second one.

A society is *unsustainable* if it carries out unsustainable transformations as well, which may lead to the decrease of the value of biocapacity. It is important to see that this value may decrease not only in the case of domestic, but also in that of foreign or delocalized natural goods. Unsustainable societies strive to make use of maximum biocapacity (in the short run). (That is, they maximize, and not optimize). This society does not limit its environmental load, and regards all natural entities as profane, relating to them in an *instrumental* way. In the case of unsustainable societies the value of biocapacity is permanently decreasing, and this leads to *environmental crisis*; without a social turn, the value of biocapacity lowers to zero, and the society collapses. The environmental crisis can be *local*, affecting a given territory, or *global*, affecting the whole planet.

(vi) A society is *static* if its relevant parameters are unchanged in time. A static society is necessarily a sustainable society as well. This is easily understandable, since parametric values necessarily change in an unsustainable society, which is consequently not static.

A society is *dynamic* if its relevant parameters (biocapacity, carrying capacity, ecological footprint, economic potential, population, consumption, technology) change in time. Based on the change in time, a difference should be made between development, characteristic of a sustainable society (sustainable development), and growth, decline and collapse, characteristic of an unsustainable society. "(D)evelopment

without growth beyond environmental carrying capacity, where development means qualitative improvement and growth means quantitative increase." [1]

Development occurs if the value of biocapacity is unchanged (does not decrease), and the values of important social parameters (population, welfare, environmental load, etc.) only change *slowly*, whether increase or decrease. Development is a characteristic of dynamic sustainable societies.

In contrast, unsustainable societies change rapidly in time. These communities do not limit their population and consumption, and do not protect their natural resources, that is, they grow rapidly both in their efficiency and environmental load. At first, the central feature of these communities is *continuous growth*, and considering that they also transform the natural capital into economic and social capital, in this flourishing period they are extremely powerful. At the same time, the value of biocapacity used by these societies is continuously decreasing, and this will eventually lead to the lowering value of social parameters.

A difference should be made between culturally and economically open and closed societies. A society is culturally closed if it only follows its own traditions. In contrast, a society is culturally open, if it takes account of other society's experiences as well besides its own traditions.

I consider an economy *economically closed* (self-sufficient or autarchic) if it only transforms its own biocapacity into social-economic goods. Considering Liebig's Law of the Minimum, a closed economy can only make use of a fragment of its own biocapacity. According to this principle, biocapacity may be used to the proportion of the most limiting natural factor. A closed economy may be sustainable or unsustainable, as it may equally contain sustainable or unsustainable transformations. At the same time, closed societies are prone to sustainability due to several reasons. For people living in a closed economy it is obvious that their fate depends on the existence of their own (home) biocapacity. The local destruction of biocapacity can be felt much easier than the destruction of biocapacity in distant areas or on a global level. Closed economies experience the scarcity of natural goods much sooner than open economies. Since closedness and unsustainability

[1] Herman E. Daly and Kenneth N. Townsend (eds.), *Valuing the Earth: Economics, Ecology, Ethics*, (Cambridge, Mass.: MIT Press, 1993). http://dieoff.org/page37.htm

are mutually exclusive in the long run, societies must make their choice relatively quickly.

I consider an economy *economically open* if it ultimately makes use of foreign biocapacities as well besides its own biocapacity for its well being. (Let us not forget that according to the transformational model of production there is some kind of biocapacity lying behind any social-economical goods.) Open economies may avoid the limitations deriving from Liebig's Law of the Minimum. That is, an open economy will face natural limitations much later than a closed economy. An open economy may be sustainable or unsustainable, as theoretically it may contain both sustainable and unsustainable transformations. At the same time, open economies are more prone to unsustainability due to several reasons. The fate of the community does not only depend on local, but also on foreign goods, and thus the (assumed) importance of local biocapacity is lower. The destruction of biocapacity in foreign countries is hardly perceivable for the community in question, and is often completely unimportant. An open economy makes use of delocalized natural goods to a greater extent than a closed economy. An unsustainable society can last much longer as an open society than as a closed society.

In short, I call a culturally and economically closed community a *closed society*, while a culturally and economically open community an *open society*. Both social conditions are stable, although an open society is much more harmonious with human nature than a closed society. Therefore open societies are much more likely to be *democratic*, while closed societies are *autocratic*, as Popper has already called attention to.[1] Theoretically there are *uneven societies* which are open in one respect and closed in another, but this causes a *situation of instability* which is likely to get stabilized in one direction or another.

For an open society there are only two (pure) possibilities to gain new natural resources: voluntary exchange and aggressive gain. However, these two methods greatly differ. First of all, exchange can only be applied if at least one more party is willing to take part in it, and it only works in an optimal way if there are enough parties willing to take part in it. The universal means of exchange, *money*, makes exchanges technically easier. As opposed to exchange, aggressive gain does not need the cooperation of the other parties. Secondly, closed societies are not in need of exchange, they are not willing to exchange. This is not a

[1] Karl Popper, *The Open Society and Its Enemies* (London: Routledge, 1945).

hindrance for aggressive gain. Thirdly, a society which wishes to take part in an exchange system must possess some valuable and plentiful natural or social goods that it can offer in exchange. This is not necessary in the case of aggressive gain. Fourthly, the expenses of voluntary exchange are proportionate and calculable, while the expenses of aggressive gain are disproportionate and incalculable. A militarily strongest party can obtain the goods it needs from a weaker party with low expense (social sacrifice); aggressive gain between equally powerful parties implies very high expenses; while it cannot practically be applied in case of a more powerful party. Fifthly, free exchange is mutually profitable, but it ensures outstandingly high profit for none of the parties. The parties taking part in exchange recognize each other's rights and interests from the very beginning, seeking a collective solution for the scarcity of natural goods. In contrast, aggressive gain is only profitable for one of the sides, that is, a superpower may obtain an outstanding profit. The aggressive party does not recognize the rights and interests of the other party, therefore it seeks a partial solution for the scarcity of natural goods.

It derives from those said above, that voluntary exchange may lead to mutually profitable conditions, a stable balance accepted by all parties, and sustainable with decreasing expense. In opposition, violence based on aggressive getting will never lead to a mutually profitable condition, and even with the set-in of an unstable military balance, its maintenance will always require huge expenses (arming competition). It is obvious that from the point of view of sustainability, exchange is a good way of acquiring external resources, while aggression is a bad way.

(Aggressive societies) Every aggressive society expands only until it meets another aggressive society. In the world of aggressive societies military power receives central attention, insofar as ethnicities more powerful than their neighbours may conquer new territories, while ethnicities less powerful than their neighbours may lose their territories. The increase of military power goes hand in hand with environmental loading, and thus ultimately with the loss of sustainability, or the growing degree of unsustainability.

The competition of aggressive societies may lead either to the formation of a *military balance*, or to the victory of one single *superpower*. However, there are several factors which hinder the formation of one single *superpower* or *super-empire*. The increasing size of the empire raises the expenses of power maintenance, while the proportion of the ruling ethnicity decreases, bringing about ethnic

tensions. Societies based on aggressive getting spend extremely high expenses for military purposes, therefore the possibility of voluntary exchange gradually gains more ground.

(Commercial societies) As mentioned before, voluntary exchange has several preconditions, two of which are worth noting again: (a) the decrease of the proportion of economically closed (self-sufficient) societies, (b) the effacement of aggression in open societies. A paradox of this situation is that aggression has an important role in keeping back closed societies, which will later become the main hindrance of voluntary exchange.

It is important to stress that difference should also be made within the category of voluntary exchange between sustainable (good) exchange and unsustainable (bad) exchange. Bad is the exchange which results in the decrease of biocapacity, whether domestic or foreign, localized or delocalized. It is relatively easy for a community to recognize the destruction of biocapacity localized on a domestic territory, and to act in its defence. It is a more serious problem if an economy – exactly by exchange – causes the destruction of resources under the sovereignty of another society. This problem is almost unmanageable in the system of territorial sovereignty. Naturally, it is true that every society is responsible for the natural resources localized on its own territories. However, if there are great differences between the efficiency and welfare of different societies, it could easily lead to situations when poor countries cannot defend the localized natural resources on their territories from their own short-term interests, as well as from the influence of rich, foreign countries also in need of those resources. The exhaustion of delocalized natural resources that every society considers at the beginning free pray means an even greater problem.

In conclusion, it can be stated that the ideal solution for mankind would be a world system built on the voluntary and sustainable (good) exchange of open and dynamic sustainable societies. All other alternatives are worse than this: they either do not make optimal use of natural resources, or are unsustainable.

2. 2. Conclusions

2. 2. 1. Island-type societies

An (isolated) island necessarily forms a closed society, significantly limited by Liebig's Law of the Minimum. The population of an island meets its natural barriers relatively soon, therefore it must create a strongly limiting culture with a relatively low efficiency. This

negative cultural effect suppresses any form of growth, consequently leaving no room for development. Thus a static society is formed, which makes use of the island's biocapacity at a level much lower than the optimal. At the same time this closed, sustainable and static society will prevail forever. Any other kind of form of society will collapse relatively rapidly on an island.

For example, in theory an island may contain a dynamic, unsustainable society as well. This by definition continuously consumes its own natural resources and biocapacity, and as a result it grows rapidly at the beginning, and this effect may theoretically be related to the effect of development deriving from efficiency, making society even more dynamic. However, this society will soon have to face Liebig's Law of the Minimum, which physically limits all further growth. In conclusion, this society will have to choose relatively quickly between static sustainability and dynamic collapse.

(i) What happens if the islands are not completely isolated (quasi-isolated)? Firstly, let us assume that there is communication between the islands. This offers a theoretical possibility for culturally open societies to be formed on the islands. Thus they receive one more "resource" for development and dynamic changes, and may get one step closer to the optimal use of nature. It is questionable, however, whether these basically static societies are able to become culturally open societies.

(ii) What happens if free exchange is possible among the island societies along with communication, while aggressive gain remains impossible? This is of course a very improbable situation, since where voluntary exchange is possible, aggressive gain is also possible. Anyway, island societies will have all possibilities to use the biocapacity at their disposal in an optimal way. As mentioned before, this is best ensured by the voluntary and sustainable exchange of dynamically developing sustainable and open societies.

2. 2. 2. Life on the continent

Compared to islands, the case of continents is more complicated inasmuch as there are always cultural influences to react to, while cultural closure is of course a reaction as well. Furthermore, the beneficial effect of exchange and the harmful effect of aggression are simultaneously present, influencing the life of any society, all the more so as even a closed society is exposed to external aggression. Clearly, aggression and military power play a central role on a continent. Let us

depart from the fact that in the beginning every society on a continent is closed, static, and sustainable.

2. 2. 2. 1. The world of sustainable societies

(Closed societies) Closed, static, and sustainable societies have no reason to be aggressive or merely interact with their neighbours. In this case societies are just as clearly delimitated as island societies.

(Culturally open societies) What happens if a culturally open society is formed in this world? This society is able to learn from the others. Thus, it is capable of coming up with better solutions for problems occurring in a society – stabilization of the population, limitation of life standards, division of environmental friendly and destructive technology, etc. Therefore culturally open societies develop better than closed societies, and thus openness itself serves as a better pattern for the other societies. This way all societies of the continent become culturally open in time.

(Open societies) Cultural openness however always implies the possibility of economical opening. Open economies are able to free themselves from Liebig's Law of the Minimum, considerably raising thus the quantity of social-economical goods they can produce. In theory, the acquisition of the lacking goods necessary may happen by aggressive getting or voluntary exchange. At first, however, aggressive gain is much more likely, as it requires much less pre-existing conditions than voluntary exchange. This places military power in the forefront, which is directly proportional with the number of the population and technical development. Therefore the societies which prefer military solutions will encourage population growth and technical development regardless of their long-term effects on the environment. That is, the environmental load of these societies increases by leaps, and they will sooner or later use their sustainable character.

The following must be taken into account with the encounter of aggressive yet open, and peaceful yet closed societies. An open society uses its biocapacity at a much higher level than a closed (and self-sufficient) society, therefore its efficiency and consequently its military power is much higher as well. As a result, a more powerful open society also affects a weaker closed society in a military way: it either simply takes away its natural resources, depriving the weaker society of the basis of its existence, or the weaker party also tries to acquire a similar military power, which is only possible if it also transforms into an open and

aggressive society. That is, after a while there will only be aggressive and open societies on a continent.

2. 2. 2. 2. The world of unsustainable societies

Sustainable societies are slowly transformed into unsustainable societies because of the centralization of military power. They are mainly characterized by permanent growth. Closedness and permanent growth are mutually exclusive, therefore permanently growing societies are also open.

What happens with a growing and unsustainable society on a continent? First of all, it is clear that provident societies do not wait for the set-in of environmental crisis, but they try to ensure the necessary natural resources for themselves while they are still thriving. The necessary natural resources may be acquired in this case as well by aggressive getting or voluntary exchange. For various reasons, aggressive getting is also dominant at first.

(i) Unsustainable societies are much more powerful while they thrive than sustainable societies. This fact alone may lead to an identity crisis of sustainable societies, because a part of the elite (the so-called progressives or modernizers) urges the imitation of unsustainable patterns, in opposition with the other part of the elite (the so-called traditionalists) who hold on to traditional values. As a result, sustainable societies may at times turn into unsustainable societies by themselves as well. This is what we call the *trap of unsustainability*. On the other hand, the developing societies with greater military power are inclined to act violently against other sustainably developing societies with less military power. The reason for it is that the more powerful party may acquire the goods it needs in an aggressive way with lower expense than by voluntary exchange. This means that sustainable societies will disappear from the continent, since the ethnicities which lead a sustainable way of life will either disappear or try to get similar military power, by which they will inevitably change into unsustainable societies. The continent is thus occupied by aggressive, growing, and unsustainable societies. Every aggressive, growing, and unsustainable society extends until it meets another unsustainable society with similar power.

(ii) But what happens with similarly powerful, aggressive, growing, and unsustainable societies? We may rightfully think that the expenses of aggressive gain are no longer affordable, therefore these may lead to the formation of the peaceful world of free and voluntary exchange. Unfortunately however, there is no such option, since

unsustainable societies are characterized by a basic ecological deficit. They make use of more biocapacity than what they dispose of, and at the same time they continuously use up this biocapacity. As a result, voluntary and value-proportionate exchange is no solution for unsustainable societies: they can only deal with one-sidedly profitable getting or "exchange". I emphasize here that in theory there are several transitional phases between voluntary exchange and aggressive getting. One such phase is when the more powerful party is involved in an one-sidedly profitable ("aggressive") exchange with a weaker party.

To conclude, the community of sustainable societies is permanently at war, permanently decreasing the biocapacity of the planet. War and military aggression or their threat lasts until the formation of a global environmental crisis. In this ultimate global environmental crisis the world system based on unsustainable societies will essentially face the same problem as previously did the communities living in isolated conditions. However, the task is not local now, but it appears on a *global* level, since it is the totality of societies that must become sustainable. These societies are faced then with a decision: they either go on with their aggressive and unsustainable form of life, or giving it up, they make way for a free and sustainable commerce between sustainable societies. From the point of view of this transformation, the state of the military situation is not immaterial. Mankind can much easier become sustainable under one single superpower, because it can avoid thus the trap of sustainability and the relative advantage of unsustainability. In the case of the transformation of several, similarly powerful military communities (federative system), special attention must be given to these problems.

Translated by Emese G. Czintos