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Social Evolution of Humankind as an Integral Part of the Evolution of the Biosphere

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Abstract

A theoretical reconceptualization of social evolution is proposed in order to construct the principles for socio-economic governance that can expand the resilience of global systems that in turn determine the world's carrying capacity for the human population. The Big History approach shows how world societies are in a transition phase that can be explained using evolutionary laws with the understanding that the development of human civilization is considered as an integral part of the evolution of the Earth's biosphere.

Keywords: *Big History, anthropocoenosis, biocoenosis carrying capacity, demographic imbalance, demographic transition, ecosystem carrying capacity, Flynn effect, macroecological approach, social evolution, sustainable development, urban millennium, youth bulge.*

Introduction. The Need for a Socio-Evolutionary Understanding

Since Thomas Malthus first published his *Essay on the Principle of Population* in 1798, the problem of the overexploitation of accessible resources by humans has bothered intellectuals, philosophers, and scientists alike. Unfortunately, in the 20th century these intellectual speculations were often misinterpreted by political thinkers, since theoretical explanations affect the choice of principles that guide decision-makers and, hence, the direction of political development. This ideological misunderstanding among political actors increased the difficulties in the governance of human socio-ecological systems.

To facilitate the communication among the involved parties, in 1968 the Club of Rome was founded. It is an informal association of independent but influential personalities from politics, business and science – men and women who are long-term thinkers and interested in contributing in a systematic interdisciplinary and holistic manner to the betterment of the world. The Club of Rome members share a declared concern for the future of humanity and the planet (Meadows 1972).

In 1972 the report *The Limits to Growth* (*Ibid.*), a computer modeling of unchecked economic and population growth with finite resource supplies, was presented at the Club of Rome. In that report it was argued that the limited store of non-renewable resources forces global civilization into a transition to re-organize the contemporary resource consumption model. This provided the basis for the call for sustainable growth and as such that has characterized commentary and economic development since then.

But the global socio-economic model has changed little since that time even in the face of resource consumption growing unabated. Then, in 2004 *The Limits to Growth: The 30-year Update* was presented by Donella Meadows, Jorgen Randers, and Dennis Meadows. In this work it was shown that the time of turning to a model of 'sustainable development' had already passed at least to prevent catastrophic overexploitation. However, Dennis Meadows *et al.* (2004) argued that humankind still had an opportunity to increase resilience in the face of accelerating change, *i.e.* to increase the ability to cope with change.

Even if despite the warnings of the authors of *The Limits to Growth: The 30-year Update*, the political-economic steps that were taken achieved little to change the path of growth-based development, there has in fact been a shift of public opinion in the Western world and hence motivation for scientific research in the relevant fields of geography, environmental sciences and ecology has increased. The scientific achievements made between the publications of the two books were arguably actually underestimated by Meadows *et al.* (2004). That work has made the expansion of the socio-economic system's resilience more realistic, provided our socio-evolutionary understanding can be brought to bear on this effort, we argue here. We assume that without closer attention to the laws of evolutionary ecology and evolutionary psychology the specific increase of system resilience may not be achieved. But this requires an application of a Big History approach (on this approach see, *e.g.*, Christian 2005a, 2005b; Spier 1996, 2005, 2010; Hughes-Warrington 2005; Carneiro 2005; Nazaretyan 2005; Snooks 2005; Markov, Korotayev, and Grinin 2009; Grinin, Carneiro, Korotayev, and Spier 2011; Grinin, Korotayev, and Rodrigue 2011).

An Evolutionary View of Social Development

In a seminar which was held at the Stockholm Resilience Center in 2012, Lance Gunderson, a Beijer Institute of Ecological Economics Fellow, reminded the audience in his presentation *Learning by Doing*[1] (see also Holling, Gunderson and Light 1995) of the importance of experimenting, developing alternative visions and to recognize opportunities in sustainable natural resources man-

[1] URL: http://www.stockholmresilience.org/21/research/research-news/11-13-2012-learning-by-doing.html.

agement. He called for a new theoretical reconceptualization of the social evolution theory to build the principles for socio-economic governance that can expand the resilience of global systems that determine the world's carrying capacity for the human population.

However, carrying out the social experiments on the scale required in reality is costly and potentially indeterminate, let alone entailing the risk of meeting public resistance. This, however, can be avoided. By now the history of humankind has accumulated enough empirical data, especially during the 20th century, so that the theoretical reconceptualization that Dr. Gunderson is looking for may be carried out just by analyzing a 'Big History'.

The development of human civilization seen with a Big History lens brings focus to the interrelations between local demographic density and local ecosystem carrying capacity. Excess of local habitat carrying capacity switches on the population's density autoregulation mechanisms, evolutionary biology tells us (Diggle *et al.* 2007). There are three in particular – migration to some new area, mass suicides of a Lemmings' type effect, and exploration of new ecological areas, *i.e.* ecological specialization.

While migration is no longer an option for human populations, at least from a global perspective, and clearly mass suicide has to remain off the agenda, then implementation of the third alternative will require deep relevant changes in social and economic organization. Specifically, the values and ideas that both motivate the policy goals and that have to be uppermost in the minds of the public and the media must reflect an evolutionary view. In other words, this reality is a Cognitive Policy for Socio-Economic Development which the following article presents in an attempt at the theoretical reconceptualization that Dr. Gunderson is looking forward to having in place.

Demography and Evolution

Demography (*i.e.* population density, gender and age structures) strongly affects the pattern of social and economic organization. Many observers consider that demographic imbalances are the main reason for the intensification of armed conflicts in the modern world. Here it is assumed that trends of modern conflicts cannot be regarded outside the context of the evolution of global human population and hence, the evolution of the global ecosystem. Globalization, urbanization, and economic development together with the development of appropriate means of communication are regarded here also as integral parts of the evolution of social structures and behavioral patterns.

Simultaneously, globalization, urbanization and economic development significantly increase demographic imbalance. This imbalance seriously impedes the process of the transition to the next evolutionary stage.

Till now there is no single term for this new pattern of society – some researchers call it the Informational World, others – the postmodern society.

However, it would be more logical to call this newly developing era 'after-postmodernism'. The transition to this type of society is the key for solving the overpopulation problem within the context of the future global Earth ecosystem evolution. It would not be possible to facilitate this process without working out and applying sensible natural science based methods of social engineering – in other words, without initiating a Marshal Plan at a global scale, as Sergei Kapitza recommended to the Club of Rome (Kapitza 2006).

Therefore, a new vision of the widely discussed relation between fertility and socioeconomic development is presented in this paper.

The Hypothesis

To understand and interpret the mechanisms driving social evolution, the hypothesis is put forward that the development of human civilization is an integral part of the evolution of the Earth's biosphere. That means social development is affected by various identifiable factors and processes just like the evolution of other social species. These biological species are co-integrated in one global ecosystem, the biosphere. The evolution of their populations' density follows a certain pattern of balancing energy and matter budgets throughout the system. Hence it may be assumed that the species, *Homo Sapiens*, is integrated within ecosystems from local to global scales and thus follows the same pattern.

Population Growth

With the *Gapminder Project*, Rosling *et al.* 2005 explained why ending poverty – over the coming decades – is crucial to stop population growth and argues that only by raising the living standards of the poorest with humanitarian aid and by increasing the child survival rate would it be possible to limit the population level at 9 billion people by 2050. But the question remains, to what extent development aid can change the underlying social pattern and thus change human 'mindsets'?

Rosling is not alone. Global overpopulation and related processes of population aging and demographic imbalances are considered to be the central global problem by many scholars (*e.g.*, Magnus). The term 'youth bulge' was coined by the German social scientist Gunnar Heinsohn in the mid-1990s to identify the excessive share of jobless young people in the general population. That term has gained greater currency in recent years, for instance, thanks to the work of American political scientists Jack A. Goldstone and Gary Fuller, who in 1995 introduced the term 'youth bubble', and in Europe by the work on demographic imbalance of Si Frumkin. It has been observed that when the share of 15 to 29 year olds makes up more than 30 per cent of the population, violence tends to increase (Beehner 2007).

Thus, the inflation of youth populations contributes to increasing population density in human aggregations, and hence the shrinking of individual secu-

rity space. That reduction of individual space increases stress, and hence it causes an increase of unavoidable intraspecific aggression. In modern societies that pressure of aggression is heavily suppressed with material appeasement and institutions that enforce social conformity. This constant internal suppression feeds psychological stress which leads to different psychological and behavioral disorders and perversions.

One of the mechanisms that human societies have evolved for self-preservation from these disorders is to channel that increased aggression outwardly. Currently many demographic experts speak of the threat of this deep imbalance for the sustainable future of humankind. However, according to the data of the Department of Economic and Social Affairs of the United Nations, the growth of the general population is slowing down and is expected to reach a peak in the near future (UN 2014). But social and age structures are changing too due to increasing longevity and the consequences of increasing longevity affecting the economic development of an increasingly older and more unproductive population.

The changes in the gender roles of females as well as the level of female education together with the spreading of birth control methods significantly influenced the Total Fertility Rate in developing countries (Martine 1996). Aside from those cultural and sociological reasons, there is also a simple biological explanation equally affecting non-human populations.

The modern market-based and mobile society model is based on competitive principles and so is the source of constant stress for individuals which affect reproduction rates. For instance, research into reproductive activity in mice populations showed that the increased stress that pregnant mice experienced affects the reproductive activity of their offspring (Christian and LeMunyan 1958).

Many observations have indeed noted the negative correlation between individual well-being and low birth rates (Diener 2000; Bradshaw *et al.* 2007; Sellström and Bremberg 2006). But it would not be possible to find the solution to a specific demographic imbalance without understanding the reasons of that observed correlation, although this should not be realized outside the process of general evolution of the Earth's biosphere. If the stress levels have increased evolutionary processes, then we see a transfer from a K-strategy of the affected populations' reproduction to an r-strategy (Kondratyev 2004). However, species do not only differ in reproductive strategies. The resistance of their social complexes to the mid-level fluctuations of the surrounding environmental conditions differs a lot. The r-strategy species are called opportunistic species. These species usually start the succession process of invading and inhabiting new habitat area. The results of their activity transform living conditions in these areas into those accessible for the species of the next stage, more environmentally robust K-strategists. The outcome of the biological reproduction of such popu-

lations is high, but later the outcome of total biological production slows down. The communities occupying a given habitat would reach a plateau, at which the incoming and outgoing energy-matter flows are more or less balanced and the sustainable existence of the community is limited only by some sharp change of surrounding conditions. It may also be slightly shifted by the results of species life activity. However, in this perspective the systems will remain in dynamic equilibrium as a whole.

Demographic Transition

For this purpose, considering a reproductive strategy in response to the surrounding conditions, allows the analogue with respect to human population evolution to be constructed and to predict a sequence of consecutive formations which differ from each other by memetic structure. We should thus consider in detail the problem of demographic imbalance and demographic transition.

In the beginning of the demographic transition the total fertility rate (TFR) decreases. This can be observed in Western countries, *i.e.* in the More Economically Developed Countries (MEDC), and also in Europe. The experts of the Max Planck Institute for Demographic Research even call this decrease in fertility 'lowest-low fertility' (Costa-Font *et al.* 2008). At first sight these observations show that fertility is negatively correlated with well-being. Many hypotheses have been put forward to explain this decrease in fertility such as the changes in female social life, female education, crises of the family, *etc*. However, the phenomenon of falling fertility has been observed worldwide, while in the MEDC countries experts now speak of the 'end of lowest-low fertility' (Goldstein *et al.* 2009). In this article the authors compare the total fertility rate (TFR, the average number of children that would be born to a woman over her life time), for several European and South-West Asian countries. In the end of the 20th century, *i.e.* in the 1990s, these countries experienced serious declines in TFR, called by some researchers the 'lowest-low fertility period' (Kohler *et al*. 2002). However, recent data confirms that the relationship between fertility rate and wellbeing has turned backward within the first decade of the 21st century. The authors emphasize that this has occurred due specifically to sensible state social policies that were introduced**.** However, this phenomenon is still quite new. To explain the occurrence of these 'sensible state social policies', various explanations were put forward, ranging from economical to cultural-political ones.

The above mentioned studies and in particular the works of Gunnar Heinsohn demonstrate that the process of demographic transition is highly risky (Korotayev *et al.* 2011). And following Heinsohn's recommendations, would just increase those risks connected with the demographic transition and youth bulge.

To understand the inherent reasons of this transition, biological laws can be applied to demographic data which reveals the main problem of social evolution. The problem of population blow-up is simply a direct consequence of demographic imbalances. Beside the increase of intraspecific aggression levels, there is the second, more serious threat raised by the Club of Rome – of exceeding the Earth's ecosystem carrying capacity – which means that at some point in time the non-renewable resources will run out, and people would have neither room to live nor resources to use to support life. Competition would severely increase and lead to resource wars, thus turning sub-populations against each other resulting in the 'survival of the strongest'. A terrifying prospect.

This Malthusian forecast is actually just one of a number of rising problems. However, as stated, in the developing countries despite the population blow-up, the total fertility rate is falling as a whole. The global human population is now experiencing a demographic transition which would reach a peak by the middle of the 21st century.

This actual transition rate differs a lot over the world. As a consequence, this makes the population structure in various countries very imbalanced. It has been found that this imbalance brings new problems (Kapitza 2006; Ediev 2001). The data from this work confirms the imbalance between the birth rates of the MEDC and the developing countries. This observation raises the question of its relationship to the level of a given country's development. Are the MEDCs indeed losers? Let us consider this question in more detail to understand the reasons of this imbalance.

In the past 300 years, there has been an increase in the number of innovations in the fields of science, technology, medicine, and in business management. At the same time, the corresponding social circumstances gradually evolved too, leading to a form of social evolution. Critical to both processes were the growing fertility rates and the falling incidence of child mortality. In the 20th century the autocatalytic changes in surrounding conditions accelerated so much that disruption of the processes of social evolution became evident. In the most rigid state systems, for example in Russia, this resulted in revolutions, while the rest of the world also became embroiled in dramatic change through two World Wars and a Great Depression. Even the 'sexual revolution' of the 1960s – although it was not so bloody – was part of this systemic rebalancing of social systems.

The social pattern of these modern states evolved step-by-step from the traditional societies that preceded them. The traditional pattern of societies is characterized by a rather steady social class stratification with low mobility of people. The most important factors for demography are high mortality rate, high birth rate and correspondingly low life expectancy. The transition to the Industrial Age led to the development of new means of production, followed by

increased urbanization. Thus, the structure of the market-based society had to become more flexible in order to function. As a result, against the background of many failed attempts and crises, the modern Western-style democracies developed, and the social structures in those countries adapted correspondingly.

While the traditional state was based mostly on the use of natural resources – mainly agricultural resources in the past – these states fundamentally evolved as social structures due to the innate human problem-solving power and drive to improve its living conditions in those states, or in evolutionary perspective, due to human 'foraging activity'.

And due to geographical separation of these fragments of population – named sub-populations below – distinctive behavioral patterns formed among their members. Behavioral patterns are formed mainly in the time of childhood and adolescence – in other words, we mean here imprinting. The differences that evolved aggravated misunderstanding among sub-populations often provoking conflicts. We assume here, that it may be regarded as an analogue to interspecies struggle in the course of ecological allopatric specialization. So, in the course of sociocultural development within each of these separated sub-populations a unique social mindset developed (Valsiner and Van der Veer 2000).

However, since these different patterns are not innate, they are open to change if certain efforts are made. The work of the *Earth and Environmental Sciences Program* (New York) has demonstrated that. Cindi Katz (1998) considered social reproduction and the production of space, place, and nature; the consequences of global economic restructuring for everyday life; the politics of knowledge; children and the environment; the intertwined spatialities of homeland and home-based security; the changes in social structure and behavioral patterns of use of natural resources in an educational agriculture project in the Sudan. She also analyzed the reasons why these changes caused little resistance in local communities. Unexpectedly, she found that individual interests turned out to be more powerful than those held in the name of the traditional commune, in particular the call for preserving the traditional structure of the local commune. While stress increased for individuals with the many changes in the structure of local life, few people were looking backwards, because the project significantly increased their quality of life, independently of traditional social structures, social change became possible.

Unfortunately Katz pays little attention to the resistance from the higher levels of the local social structure. Their authority has a large influence on the behavioral patterns in such sub-populations, explaining resistance to changing the traditional modes of life.

The Threat of Violence in the Urban Millennium

According to the UN Report *State of the World Population* (Salas 1981), the year 2007 was the year when the majority of the human species would be living

in towns or cities, for the first time in history. This is referred to as the arrival of the 'Urban Millennium' or the 'tipping point'. In regard to future trends, it is estimated that 93 per cent of urban growth will occur in developing nations, with 80 per cent of urban growth occurring in Asia and Africa.

The beginning of the new millennium was also the tipping point for mass communication, as the Digital Age began. By now there is a lot of factual confirmation that many political breakdowns were strongly facilitated by the development of electronic means of information exchange. Due to this information exchange, human horizons broadened significantly – people who used to be considered distinct sub-populations were involved in diverse and significant information exchanges with the rest of humankind. It can be argued that as a result social systems of the subpopulation are unable to maintain resilience, *i.e.* capability for change. Probably, this led to the collapse or transformation of many autocratic states which were more or less isolated in the past.

The changes to living conditions are like environmental change and will precede the corresponding changes to social pattern. The adaptation of behavioral patterns coalesced into a social mindset that must follow this, even if the abandonment of the traditional mindset is very stressful for commune dominants and hence can be rather risky for any society. The traditional mindset of the privileged and dominant state citizens can be expected to underlie the state apparatus power, cementing their social position and causing resistance to change or poor resilience and hence heightened risk. Such an apparatus is naturally predisposed to preserving the social mindset shared by citizens and to prevent that mindset from changing. Thus, state structures will naturally be resisting change from the outside arriving as conflict or as foreign culture. Simultaneously, that stress at the individual level can easily result in violence, *i.e.* an increase in interspecies aggression.

In order to reduce the increase in the level of violence, its nature has to be understood as resulting from the rise of social stress levels due to the transition of societies from the traditional pattern of resource consumption, social structure, and mindsets. Given the inevitability of this process, the general evolutionary rules of any maturing ecosystem therefore must be taken into account.

The Importance of Foraging Activity

Until the 20th century, high child mortality rates were normal. A high fertility rate compensated for and ensured a slow but gradual population growth. Meanwhile, science and technological innovations grew as an expression of human foraging or Searching Activity (Rotenberg 2009). Foraging activity is common for any living species with a feedback response and evolved together with the animal nervous system. As *Homo sapiens* developed, foraging activity integrated with human cognitive activity. Together, these became the human

ability to alter human surroundings in favor of current requirements necessary for survival.

The merging of foraging activity together with cognitive analytical activity made possible science and technical innovations. The level of human development depends not only on the individual brain physiology but also on the individual socialization and the level of education. To suppress this activity would mean to suppress further development of humankind. That is the strongest argument contra the evolutionary trend of human eusociality. The evolution of eusociality for other social animal species had been considered by Andersson, and the results of the studies look very interesting (Andersson 1984).

However, this may not apply to human evolution. Following that way of evolution proactively would require significantly decreasing the individual 'foraging' activities of a society's members, but that activity is still required to meet the constant changes in surrounding conditions. And these changes are autocatalytic, *i.e.* sustained through the result of human cognitive activity.

All such innovations have occurred, since they were driven by economic conditions and resulted in social developments in those countries where evolution could take place. The determining conditions include not only living conditions but also the social structures as, for example in the Most Economically Developed Countries (MEDC) – in other words, in those countries with a stable state pattern, which developed on the ground of modern economic systems, together with regulated markets. Hence, the population of those countries experienced correspondingly gradual changes. Both those processes, *i.e.* fertility and child mortality rates, stayed more or less in balance. This long-term development period gave the social structures in these advanced countries enough time to adjust to changing conditions.

The initial assumption made here was that the global human population is an integral part of the Earth's biosphere and hence follows an evolutionary pattern characteristic of populations. Thus, the widely discussed problem of overpopulation and *Limits of Growth* would be expected to be resolved soon simply because the laws of evolutionary ecology are now affecting this global population at the social organization level. As the social structure becomes more complex, the total fertility rate reduces, repeating the evolutionary sequences of K- and r-reproductive strategies of living forms in the course of colonizing new biotopes.

This hypothesis is confirmed by laboratory data, obtained in research of the genetics of behavior and the neurophysiological influence of stress on reproductive behavior and fertility rate among populations of laboratory rats (Rhen and Crews 2002). The research into human reproductive medicine confirms that fertility is falling (Auger *et al.* 1995). So it was seen that the Total Fertility Rate (TFR) in the MEDCs in the 20th century was falling (Waugh 2003).

Since human fertility/mortality/longevity figures are strongly affected by other factors of the sociocultural environment, it is not easy to distinguish social and biological factors and to determine the main causes. However, the experiments on rat populations allow distinguishing the reproductive behavior from the influence of social factors (Holson *et al.* 1991). These experiments prove the key role of prenatal maternal stress level during pregnancy on their further reproductive behavior.

This research confirms the purely neuroendocrine character of this effect. However, at the social level or organization this factor becomes seriously affected by other factors, those that depend on state social policy, *i.e.* on the anthropogenic factors. Again the experiments on laboratory rats allowed the estimation of the degree of influence of anthropogenic factors (Popova *et al.* 2011; Amstislavskaya *et al.* 2004). However, the birth rate depends not just on sexual behavior but also on the individual fertility rate, and most importantly on male sperm quality. An analytical review showed the consistent gradual decreasing of male sperm quality in recent decades (Carlsen *et al.* 1992; see also Irvine 1997).

Female fertility is also decreasing under the influence of stress. The relation of stress and fertility is now widely discussed in many corresponding public sources (*e.g.*, Braverman 2012; Rodriguez *et al.* 2012). This data from reproductive medicine confirms the intrinsic reasons for reproduction decreasing under the influence of stress. The authors assume that those innate reasons are determined by the ecological conditons of the environment that sustain environmental carrying capacity. However, this does not mean any deliberate activity of this complex subject-object system. It is not animated (*i.e.*, this complex has no free will). That activity is just the result of the interaction of numerous components interrelated by the endless number of complex feedbacks, which follow the main evolutionary law of complication increasing complexity. This complex system makes it impossible to make a definite fixed forecast. However, it is possible to work out some general strategy based on the probabilistic crisis analysis. The authors assume that in order to work out a general strategy, the motivation of people has to be considered more closely, and this cannot be done without taking into account evolutionary ecological – or macroecological – trends.

Since human behaviour is the result of the interaction of both biological and social components, the social factor must be considered to asess people's drive to reproduce. As this motivation strongly depends on the social environment, and the social environment in its turn is determined by measures being taken by the state.

The current article confirms the purely innate nature of declining fertility along with the increasing complexity of social structures, which provides for the enlarging of ecosystem carrying capacity. This increase of social complexity imposes ‘unnatural’, artificial requirements on individuals' social behavior.

Together with the abnormal increase in population density, which is especially high in urban areas, stress levels increase as well. This stress increase leads to numerous socio-psychological effects, related with the changing social roles of family partners and gender social status. All those factors decrease fertility potential and result in the significant decline of TFR.

However, the most crucial example of declining fertility in tandem with increasing population density is observed in experimental populations of laboratory rats, animals that have no signal inheritance at all. Unlike rats, in human society the fertility rate is determined by both the intrinsic ability of conception and the people's motivation, which is socially determined. The latter depends on the social environment and on signal heredity as well.

All the above makes the authors come to the following conclusion: the social evolution of human beings is an integral part of the Earth-Biosphere evolution. This system follows the same pattern of evolutionary population ecology in which the prevalence of r-strategy species changes to K-strategy species. This happens together with an increase of system complexity. And the latter is unavoidable, as it provides for the increase of human habitat carrying capacity.

A Transition to the Anthropocoenosis

When the 20th century was well under way, a transition into a new stage had begun. By this stage of evolutionary development the activity of human societies determined the direction of energy and matter exchanges in the global biosphere complex. This stage may be called the *anthropocoenosis*, an interactive community of living organisms centered on humans (Scott 1996).

In the current essay the authors suggest choosing a macroecological approach to the study of the cognitive development of social structures and policy. The macroecological approach allows considering particularly the evolutionary factors that influence the motivation of a social group's behavior. In modern social circumstances the changes of public moods – in other words, the changes in individual motivations – are manifested in powerful social trends and are realized in international political agendas.

In the course of the evolution of human civilization, the heterotrophic nature of *H. sapiens* stimulated economic development. This has made the economy in the MEDCs move from those based on agriculture, or other forms of natural resource use, to the industrial production of economic goods. So stateled social patterns had to change from traditional modes to the social patterns of industrial society. This process was burdened by many conflicts – local and international, revolutions of various kinds, and the two World Wars, in particular. The development of social patterns of less industrially developed countries was different, however, as generally traditional social patterns were more resistant to change of external conditions.

The Imbalance in the Development Level of Global Human Civilization and the Demographic Transition

Given that the ecosystem carrying capacity for the human population depends on the productive activity of humans that may be significantly increased by industrialization. The productive activity of humans occurs together with increasing levels of urbanization and shift of people employed in economic production from agriculture to industries first and to services later on. According to the UN Conference on Trade and Development, in 2012 the share of services in world economics has increased to 70 per cent, while the agricultural share decreased from 10 per cent in the developing countries to less than 3 per cent in the MEDCs. This shift in economics occurs together with the process of urbanization. This shift from agriculture to industrial production marked the beginning of modern times. The next shift, the current one, is characterized by an increase in the share of the services sector in economics and marks the transition to the next stage of social and economic development. This stage is called the *Innovation Economy* (Scott 1996) and is defined by an economic doctrine that reformulates the traditional model of economic growth so that knowledge, technology, entrepreneurship, and innovation are positioned at the center of the model rather than seen as independent forces that are largely unaffected by policy. At this stage the economic demand for non-renewable material resource gradually decreases, and innovation economics becomes the main human resource for economic development (Holling *et al.* 1998).

While change in external conditions is followed by changes in social pattern, the rate of adaptation of new behavioral patterns – described as social mindsets further on – varies due to different factors that social science addresses. Radical change of the traditional mindset is very stressful and simultaneously risky. However, that transformation is the only way to avoid a catastrophic mode of population density autoregulation that evolutionary processes impose (Haidt 2007).

So, employing this rationale in order to overcome that developmental imbalance together with avoiding the threats described in the *Limits to Growth*, the crucial factor is an updating of the traditional community model.

Towards a New Community Model

A low individuality level is the most crucial feature of a 'Hive Psychology' that describes the important behavioral patterns of all social species. *H. sapiens* is clearly an ultra-social species. Hence, it can also be expected to be affected by the Hive Psychology effect. Prof. Jonatan Haidt considers in his work the questions of Hive Psychology and its effects on human socio-psychology, particularly its relation to happiness and religion (Haidt *et al.* 2008). He emphasizes the crucial moments for achieving 'public happiness' are not some divine, some

spiritual ideas, but rather the common interpretation of Hive Psychology used in 'mass ritual'. These mass rituals are also typical for any authoritarian state or a totalitarian ideology, for mass rituals strongly facilitate the individuality of the human mind being undermined and hence crowds of different peoples uniting around their leaders and falling under the Hive Psychology effect.

The most severe and intractable conflicts are taking place right at the border of two social patterns – the traditional pattern and the modern one – as they meet each other. The social mind of the traditional communities is effectively less fit, that is in evolutionary terms, than is the social mindset of the MEDCs, to meet the uncommon social changes of this new milieu that intensifies the links within these groups and also increases the Hive effect.

Under the current conditions of constantly increasing population density in the developing countries, Hive Psychology then favors the so called Suicidal Lemming effect (Chitty 1996). Hence the increase in wellbeing associated with social traditions would not guarantee that the population growth rate would decrease.

Another convincing case-study is the example of changes in Russian demography. They show that the correlation between wellbeing and birthrate may as well be inverse at times. In Russia the general mortality rate – not just that of children – exceeded the birth rate for a long period of time. The wellbeing of Russians after the USSR collapse fell significantly. However, instead of rising, the birth rate fell too, so nowadays Russia is gradually depopulating with the low rate of 0.465 per cent (CIA 2010). In order to fight that threat, the government in 2007 launched a federal program for reducing child mortality and increasing the wellbeing of females in connection with the number of children a female can raise. But the conclusion of Rosling's report suggests that these steps would reduce the birthrate instead. However, for the first half of 2009, the index of infant mortality decreased by 10 per cent and simultaneously the birth rate for the same period increased by 4.7 per cent.

Still, using a Big History approach, another evident example is the difference between North and South Korea. Both countries are populated by the same people with historically the same traditions, mindsets, *etc.* but have been strictly separated about 60 years ago under contrasting ideological regimes. Now the income of the North Korean people is much lower than that in the South Korea, but the population growth rate is just slightly higher than its neighbor (0.398 per cent *vs* 0.25 per cent according to the *CIA World Factbook* of 2010). And this is despite all the efforts of the North Korea government to control this aspect of their demographics.

The infant mortality rate there is very high, with 50.51 infant deaths per 1000 birth, while in South Korea it is just 4.25 deaths per 1,000 births. With Rosling's assumptions that would also strongly contribute to the increasing birth rate. However, it does not help the North Korean government to overcome

its rival significantly with respect to fertility rate. Even the strict state control over the distribution of contraceptive means proved unable to increase the population fertility rate, while the day-to-day stress, people are experiencing, is extremely high anyway.

Popular authors often claim that the access to female education, independence, and the contraceptives in the Western countries has led to a decrease in fertility rates. However, the example of North Korea shows that at least access to education and contraceptives are sufficient for the fertility rates to drop. Contraceptives are available in North Korea, but they are distributed under strict state control, and hence they are not easy to get. Cultural input could also be expected to play a role.

First, with the use of statistical data from published sources, we are going to look at the correlation between infant mortality rate and the birth rate. The data analysis proves that the relation between infant mortality rate and birth rate is not that direct. For instance, in Israel the infant mortality rate is very low, 4.17 deaths per 1,000 live births, but the total fertility rate (TFR) is 2.72 children per woman in general (CIA 2010). Among Haredi Jews the TFR is very high. For Ashkenazi Haredim, the TFR rose to 8.51 in 1996 from 6.91 in 1980. The figure for 2008 is estimated to be even higher. TFR for Sephardi/Mizrachi Haredim rose from 4.57 in 1980 to 6.57 in 1996. Israel infant mortality rate is one of the lowest in the World. So, apparently the influence of infant mortality rate on the birth rate is also not that critical.

This does point to the important influence of cultural background on the fertility rate. However, further on it will be shown that the cultural background is not that crucial as it may have seemed at the first sight.

Let us return to the Korean examples to clarify the reason for declining fertility rate. Apparently the stratification of production forces in the society – and hence the social patterns of this country – are more important for the birth rate than the infant mortality.

The distribution of workers in the economy in North Korea is the following: 37 per cent of people are working in agriculture and 63 per cent – in industries. In the meanwhile in South Korea only 3 per cent of people are working in agriculture, 39 per cent – in industries and 57.5 per cent – in the services sector. So, the community sectoral stratification in North Korea is in fact much more archaic and restrictive than that in South Korea. Even so, the TFR is still very low. Why?

In the example of both Koreas, we have previously already regarded and excluded the influence of the female education, contraceptives access, and even the common folk's cultural origin. The only factor that remains to be considered is individual stress level.

This scenario is also confirmed by demographic data from China, Singapore, and Taiwan. Despite comparable cultural origins, their fertility rates differ

a lot. However, in China there was the impact of strong state control, so these data are not valuable without thoughtful analysis.

So neither cultural factors nor fertility rate are that crucial for to cause a decrease in population growth.

Possible Reasons for the Decrease in Population Reproductive Rates in the Most Economically Developed Countries

So, in summary, we have found that the increased economic wellbeing of populations was the result of economic development and corresponding social evolution from the traditional community social patterns. Simultaneously, as the economy grew, the citizen's wellbeing grew as well. This economic growth was caused by industrialization. Industrialization also caused increasing urbanization. Urbanization makes peoples live in naturally abnormal living conditions, in high density aggregations and in other highly abnormal conditions of life style. Both industrialization and economic growth all lead to a higher level of psychological stress. That general stress increases due to the increasing level of urbanization (*i.e.* living in abnormal stressful conditions) leading to a general deterioration in human reproductive function, which seems to have dropped considerably during the past 4–5 decades even without any means of contraception. This process has created circumstances in which individuals constantly encounter challenges, both social challenges and those from new environmental conditions. And that stress causes a significant decrease in fertility rates at the same time as longevity increases.

The assumption that change in population autoregulation mechanisms are influenced by the increase of within-population stress is confirmed by the results of research on reproductive activity in experimental mice populations of the Laboratory of Behavioral Neurogenomic of the Institute of Cytology of the Siberian Department of the Russian Academy of Science, which proves that the increased stress that is experienced by pregnant female mice affects the reproductive behavior of their offspring. Aside from those experimental results, there is a set of similar experimental confirmations of the effects of the relationship between negative stress and reproduction for human beings that studied male sperm quality under stressful conditions (Clarke *et al.* 1999).

There are also other factors that affect social and mindset adaptations. For instance, the developing countries that have not had enough time for social and mindset adaptation, have seen important instances of a ‘Youth Bulge’. Professor Heinsohn, a historian and economist at the University of Bremen in Germany, argues that wars, insurrections, contemporary and historical terrorism, and internal violent insurrections are the result of a surplus of 15- to 29-year-old men in the total population (see also Urdal *et al.* 2006).

It is important to take into account that 'youth bulges' may result in rapid economic growth, but their occurrence may also risk the possibility that adaptation of social patterns may not follow pace. Navaneetham (2002) described how this was historically manifested in South and South East Asia where a demographic transition has given these countries an opportunity for economic development.

This means that in the case of providing only humanitarian aid, the child mortality rate in the developing countries would fall much faster than mindsets of the populations of those countries could adapt. So those population would still be increasing instead of falling. For instance, if 30 years ago a woman in these developing countries had 6 babies and 3 of them – 50 per cent – died as infants, currently she might have only 4 children, but modern child mortality rates would ensure that at least 3 of them – or even all 4 of them – would reach adulthood. This would simply increase that 'Youth Bubble', which is considered one of the main reasons for civil conflicts after the Cold War (Cincotta *et al.* 2003).

Therefore, increasing well-being alone that is not accompanied by a corresponding social and mindset development would only make the situation worse. So we can come to the following conclusion: traditional mindsets and the provision of humanitarian aid while increasing child survival rates alone would contribute to the prevention of overpopulation without stressful psychological changes. Insisting on preserving 'indigenous, unique' archaic social and mindsets as well as that of traditional communities, would risk making the situation significantly more difficult.

However the archaic mindset – or the mindset of the commune-oriented traditional society member –is very hard to overcome without any efforts from subduing side of this process and also with no required assistance from the leaders of social evolution. Due to many quite natural psychological reasons people normally cling to their habitual traditions (Aronson 2003).

Solving the overpopulation problem is thus not possible without changing the archaic mindsets in place, or in other words – without the social mindsets of traditional community members adapting.

This means it would not be possible without the transmission of fragments of various subpopulations, characterized by traditional community patterns into this global population with its updated mindset.

However, it is easier to say than to do. The unavoidable necessity of that transition raises many questions. The current work can give no answers – not only for moral reasons but simply because it is impossible within the scope of such multi-factored and complex problem. But it does suggest a strategy to adopt. The main challenge here for the subpopulations in question is to preserve sustainability while remaining able to change at a social level. But how could that be achieved, using a macro-ecological perspective?

The populations of MEDC's experience an extreme level of narcissism and a seemingly unlimited will to individual autonomy – due to the very nature of the modern economic model. But as discussed above, this strongly contradicts the flow of the process of social evolution. This Market Autocracy, *i.e.* the 'invisible hand of the market' of Adam Smith, may be one of the most powerful reasons causing the reverse Flynn effect in the MEDC. The Flynn effect is the substantial increase in average scores on intelligence tests recorded all over the world. It was measured in 1949, 1974 and 1991. However, the consequent investigations in some MEDC countries showed unexpected reverses of this effect. So in the United Kingdom, tests carried out in 1980 and again in 2008 show that the IQ score of an average 14-year-old dropped by more than two points over this period. However, children aged between five and 10 saw their IQs increase by up to half a point a year over the same three decades. Professor James Flynn (2009), the author of the latest study, believes the abnormal drop in British teenage IQ could be due to the youth culture having 'stagnated' or even dumbed down. Teasdale and Owen (2008) report intelligence test results from over 500,000 young Danish men, tested between 1959 and 2004, showing that performance peaked in the late 1990s, and has since declined moderately to pre-1991 levels. In another study on young adult males in Denmark (2009), they found that there was a modest increase between 1988 and 1998, but a modest decrease between 1998 and 2003/2004. The difference was approximately 1.5 IQ points in both cases.

But that relative decrease of the mind control over free will results in the flourishing of asocial behavior among the young population of MEDC countries. We assume that the reverse of the Flynn Effect occurred due to the same Market Autocracy effects. The market offers and social politics of modern states remove the negative limit for random allocation of human intellectual ability. Simultaneously, the excess of market offers together with the progress of marketing technologies strongly decrease people's Searching Activity. If the Searching Activity is not required to ensure normal living over an extended period of time it either decreases or focuses on non-material matters of highly private, individual understanding. That affects the selection of goals for cognitive activity, which may be the reason for the Flynn effect reverse and for superstitions flourishing.

The reverse of the Flynn effect means that the social mind control over people's motivation decreases. People's mindsets become more governed by media and advertising, and simultaneously social behavior becomes more asocial.

Unfortunately these effects are thoroughly intermixed with the ritual understanding of religions. The current conditions or globalization lead to a 'crisis of sovereign states' and thus competing non-state self-identification gains more influence. The most evident parameter people of various social development

levels use for self-identification is the ritual parts of religion, and especially those with extremist tendencies.

Conclusion: Towards a Science-based International Politics

In order to be sustainable, social patterns have to remain both able to adapt to change while keeping an internal equilibrium. That is a fundamental requirement of any system, but especially of the biological ones, which apply to macro-ecological systems.

But as the individualization of behavior grows more extreme, so does behavior subordination which obstructs social mind development. Realizing this problem alone would not help provide the transition described above, but it does offer an understanding that can facilitate working out specific and sensible steps to overcome it. We assume here that the real way to solve this problem is not only by providing humanitarian assistance. It would rather require specific assistance in adapting social mindsets. This step would require the sensible and deliberate efforts by social leaders.

The resistance to an evolutionary transition would come from many sources – as, for instance, from powerful mass psychology factors and also from established political interests. People benefiting from preserving a given situation can normally be found at the top economic level of developing countries.

The growth of asocial behavior has made some Western philosophers even look back to the commune-oriented traditional lifestyles and look for some way of returning the values of those lifestyles. However, all the previous discussion proves that it would be hardly possible, – if not just disastrous – under modern conditions.

So despite all these problems, there seems no other way to solve the problem of enlarging the global biocoenosis carrying capacity than the transition from a narcissistic market autocracy to an evolutionary goal, which is developing social mindsets for modern populations. And that conclusion increases the importance of natural science-based social engineering by political leaders during the current transition.

The transition to the 8^{th} threshold of Big History started in the second half of the 20^{th} century along with the transitions in international trade and communication means. This article shows that this development is an integral part of the Earth-biosphere system evolution. The upcoming 9^{th} threshold is also a part of that evolution.

However, the carrying capacity of the Earth-biosphere system is still limited by the planet's boundaries. To provide further ecological specialization and the evolution of social mindsets that allow a demographic transition, a system

of obligatory social feedback has to be developed to sustain the balance between various social groups and countries that make up the global population.

The most important conclusion from the above is that the sustainability of the Earth will depend on the deliberate actions of human leaders, by taking into account the general rules of the evolution of our biosphere.

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