

# CRITICAL REMARKS ADDRESSED TO CLIMATE FANATICS AND CLIMATE SCEPTICS

**László SZARKA**

*MTA Research Centre for Astronomy and Earth Sciences, Budapest  
University of West Hungary, Sopron  
szarka.laszlo@titkarsag.mta.hu*

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Since two decades, climate change has been considered as the No. 1 global environmental problem. Its propaganda, but also the debates about the origin of climate change (whether it is man-made or not) have led to ignorance of several simple, but threatening facts. Namely, that mankind requires more and more energy and materials from our finite planet, such as freshwater, raw materials, soil, and we occupy more and more land surface. All these activities have direct and multidimensional consequences in the long term: depletion of resources and saturation of sinks. Various environmental indicators, such as chemical pollution, change in geochemical global cycles, biodiversity loss, are due to the ever-increasing human activity. Climate change is merely one of many possible environmental indicators, and the main problem with it is that it is not exclusively of man-made origin. Therefore, instead of focusing on climate change, it would be advisable to turn our attention to much more burning environmental issues.

*Keywords:* climate change, global problem, sustainability

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## Introduction

*„The World is a very complex system. It is easy to have too simple a view of it, and it is easy to do harm and to make things worse under the impulse to do good and make things better” (Boulding, 1986).*

As it comes from the message of the phrase “*Think global, act local*”, global environmental problems are present at the core of any discussion about regional sustainability issues. It is widely considered that climate change is the most important of all global environmental problems. The purpose of this paper is to convince readers that the No. 1 global environmental problem is the multidimensional degradation of the environment, directly caused by humanity. Climate change is merely one of many environmental indicators, and it is not the most characteristic one. In the climate change paradigm we’ll never find out what the real problem is, and we might continue suggesting false solutions not

only to global challenges, but to a wide range of regional sustainability issues, as well.

As widely known, climate sceptics emphasize, that there is no – or no problem with – greenhouse-based global warming. They support the traditional economy, based on fossil energies. Climate fanatics on the other hand are convinced that greenhouse-based global warming is the only – or at least, the central – environmental problem. They support the so-called green economy, based on alternative energies. They concentrate on the dangers society faces from climate change, and suggest urgent actions that need to be taken immediately, which are refused by climate sceptics. Two books, written by politicians (Gore, 2006; Klaus, 2008) are an excellent illustration of the two sides. The central topic in both books is climate change itself: whether urgent mitigation is needed against climate change or whether it exists at all.

As a geophysicist, I have never doubted the reality of “climate change”, since throughout its 4,5 billion years’ history, the Earth’s climate has been changing continuously. At the same time I think, the term “climate change” has been so much overused (not only by politicians and in everyday discussions, but also in the environmental science), that many other environmental phenomena and indicators have been almost totally ignored. Both climate fanatics and climate sceptics bear responsibility for the fact, that the No. 1 environmental topic is climate change.

Climate fanatics and climate sceptics accuse each other of profit interests. In this paper it is benignly assumed, that both climate fanatics and climate sceptics have the same objective, namely sustainability, i.e. to sustain (and enhance) the creative comforts of humanity, and both sides advertise their own solutions as exclusive.

I show in this paper that it is neither possible for humans to continue without changing the economy, as suggested by climate sceptics, nor is it possible for humans to continue with changing the economy as suggested by climate fanatics. Unfortunately, the problem is the expanding economy itself.

Before reaching conclusions, at first I give a brief summary about the state of the Earth, then some open questions in the climate change science are summarized.

### **The State of the Earth**

In 2012 the Earth is inhabited by 7 billion people (four times more than in 1912). Several simple facts about the state of the Earth are as follows.

*Energy resources*

1. In 2010 global energy demand was twelve times higher than one hundred years ago. (See the series of informative figures by Tverberg, 2012). It means that the world's energy demand is driven by the economic development, rather than population growth. (In more detail: proved oil reserves cover around 40 years of today's demand, strongly concentrated in the Middle East; proved conventional gas reserves are equivalent to 65 years of today's demand; world coal reserves represent about 200 years of today's consumption, with a widely spread geographical distribution of reserves; nuclear fuel reserves are certainly enough for several generations to come (Myers, 2008).
2. It is absolutely necessary to develop alternative / renewable energy options, but it is evident (MacKay, 2008) that the so-called renewable energies are physically not able to satisfy the present energy demand of humans.

*Mineral resources*

3. Nevertheless, no global shortage of non-fuel mineral resources is expected in the near future (Myers, 2008). The only exceptions are the rare earth elements. In several years worldwide demand for rare earth elements is expected to exceed supply significantly (by 40,000 tonnes annually), unless major new sources are found (Fessler, 2009).

*Water resources*

4. More than half of all accessible freshwater resources have come to be used by humankind (Myers, 2008). Superficial waters and most near-surface waters are already polluted, therefore a large part of drinking water (and unfortunately also irrigation water) comes from aquifers. The natural recharge of aquifers is slower than consumption. Aquifer *drawdown* or *over-drafting* and the pumping of – largely fossil – water increases the total amount of water in the *hydrosphere*, which might influence the climate. Large-scale hydrological interactions (as the deviation of rivers, which supplied the Aral Sea), may be directly responsible for regional climate changes. Wada et al., 2010 presented the increasing trends of the total global water demand (which was doubled between 1960 and 2000), the global groundwater abstraction ( $734 \pm 82 \text{ km}^3 \text{ a}^{-1}$  in 2000) and the global groundwater depletion ( $283 \pm 40 \text{ km}^3 \text{ a}^{-1}$  in 2000). According to their conclusion, a large-scale abstraction of groundwater may lead to a sea level rise of 0.8 mm per year, which is about one fourth of the current rate of sea level rise of 3.3 mm per year.

*Soil resources*

5. The mean rates of cropland soil loss may exceed rates of formation by up to an order of magnitude.
6. With the present agricultural methods, the world is likely capable of feeding 9 billion inhabitants, expected for 2040 or 2050, but at the expense of natural ecosystems and biodiversity, soil degradation, and with little room for biofuels.
7. 30-50% of the Earth's terrestrial net primary productivity (NPP) is appropriated by human actions (Vitousek et al., 1986).

*Land use changes*

8. Half of the world's ice-free land surface has been transformed by human action. (The land under cropping has doubled during the past century at the expense of forests, which declined by 20% over the same period (Steffen et al., 2004).
9. Humans are now an order of magnitude more important at moving sediment than the sum of all other natural processes operating on the surface of the planet. The amount of weathering debris that compose continental and oceanic sedimentary rocks provide one such source of information and indicate that mean denudation over the past half-billion years of the Earth's history has lowered continental surfaces by a few tens of meters per million years. In comparison, construction and agricultural activities currently result in the transport of enough sediment and rock to lower all ice-free continental surfaces by a few hundred meters per million years. (Wilkinson, 2005)

*Biological production, biodiversity changes*

10. The extinction of species has accelerated. The loss of biodiversity is appropriated to humans.
11. Humans remove a large part of the primary production not only of the lands, but about one third of the primary production in oceans, too.

*Pollution trends*

12. Local air and water pollution has become (or is becoming) more and more regional, finally global. Overemphasizing the pollution due to one group (namely the so-called greenhouse gases, first of all CO<sub>2</sub>, which is essential to photosynthesis), may lead to ignorance of pollution caused by aerosols, pesticides, fertilizers, accumulating in the global environment. The Food and Agriculture Organisation of the United

Nations observed an amazing increase in nitrogen and phosphorus fertilizer use, and also in the increase of the irrigation area (Table 1).

Table 1

*Total global nitrogen and phosphorus fertiliser use and the global irrigation in 1960 and 2000.*

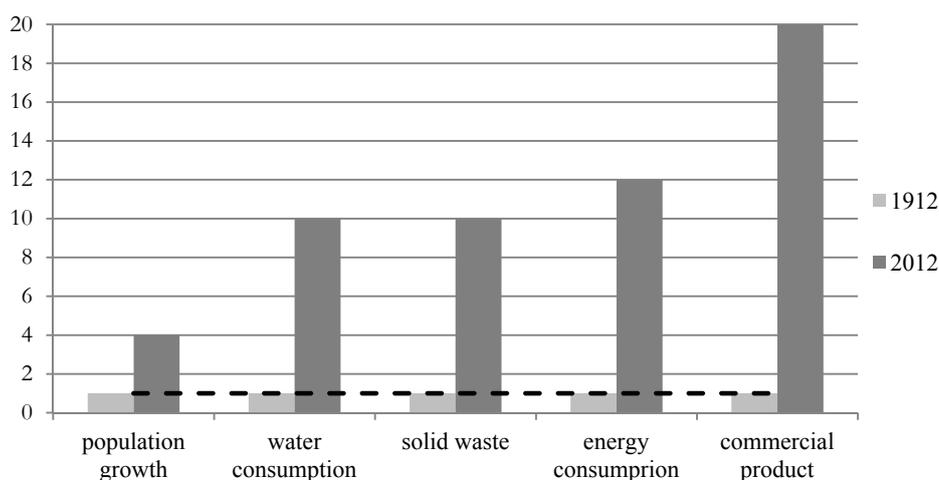
Category	1960	2000
Nitrogen fertiliser use ( $10^6$ tonnes)	~8	~80
Phosphorus fertiliser use ( $10^6$ tonnes)	~10,5	~33
Global irrigation ( $10^9$ ha)	~0,13	~0,26

*Note.* Food and Agriculture Organisation of the United Nations (2002).

13. Waste production is steadily increasing, in spite of re-cycling efforts. Although on very different human time scales (one day, one year, a few decades), each human product will finally become waste.

### Population Growth, Consumerism, and Planetary Boundaries

Energy & mineral & groundwater & soil resources, land use changes, extinction of species and the increasing pollution are strongly inter-related issues. We entered the Anthropocene epoch (Crutzen, 2002; Zalasiewicz et al., 2008), characterized by population growth and increasing consumerism.



*Figure 1.* Growth of population, water consumption, solid waste and commercial products between 1912 and 2012. Estimation by the author.

In spite of the fact, that during the last 100 years the total biomass of humans has been increasing four times (from 125 million tons to 500 million tons, including water), the primary problem is principally not with the biomass of humans: this mass is less than that of some other species (for example the Antarctic krill or the termites). As summarized in Figure 1, during the same 100 years, humans have increased their

- (1) energy consumption twelve times,
- (2) groundwater consumption ten times,
- (3) amount of municipal solid waste at least ten times,
- (4) amount of commercial products twenty times.

The demand for global resources per capita have been increasing at a 2.5-5 times higher rate than world population. Consequently the main driving force is not over-population, but over-consumption. All activities of humans aimed at maintaining (sustaining or even enhancing) their creature comfort need more and more energy and various materials (mineral resources, water, soil, each of which is of Earth origin). The result is the degradation of the environment. The so-called “developed world”, that is the richest 20% of the world’s population consume 76.6% of all goods, while the world’s poorest 20% consume only 1.5% (Figure 2).

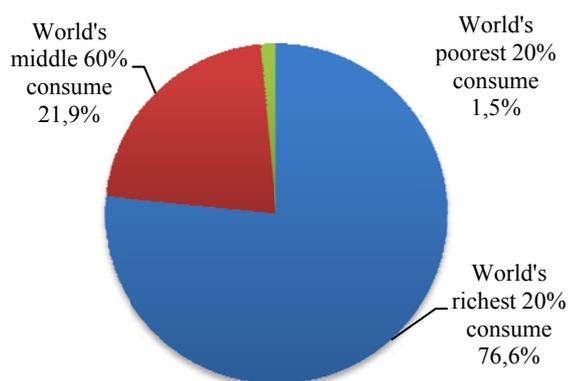


Figure 2. Share of world's private consumption. Data obtained from World Bank Development Indicators 2008.

Humans need energy, freshwater, soil (for food), suitable environment and various raw materials to assure (and even enhance) their creative comfort. These components are structured in Figure 3, on basis of the classification by Smalley (2003), and of the International Year of Planet Earth (Szarka, 2010).

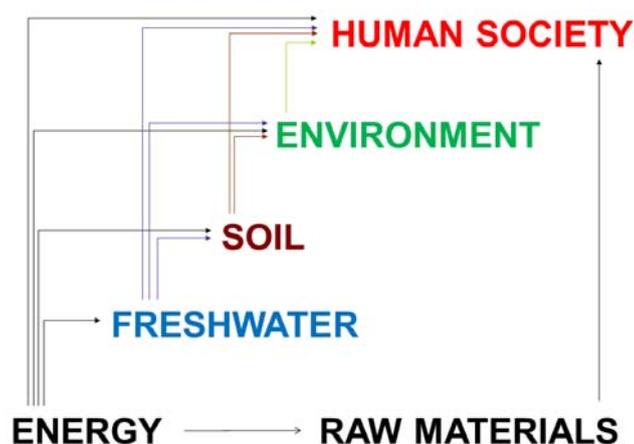


Figure 3. Energy, raw materials, freshwater, soil, environment as the elementary needs to the welfare of human society. Developed by Szarka (2010) based on Smalley (2003) and Dinya (2008).

Table 2

Planetary boundary parameters by Rockström et al. (2009), together with the comments by the author of the present paper (in the right column)

Indicator	Estimation compared to the planetary boundary value=1	Importance order	Man-made or natural?
Climate Change	~1,5	No 3	both
Ocean acidification	~0,75		man-made
Stratospheric ozone depletion	~0,4		man-made
Nitrogen cycle (as biogeochemical flow boundary)	>3,5	No 2	man-made
Phosphorus cycle (as biogeochemical flow boundary)	~0,9		man-made
Global freshwater use	~0,6		man-made
Change in land use	~0,6		man-made
Biodiversity loss	>5	No 1	man-made (mostly)
Atmospheric aerosol loading	not yet quantified		man-made
Chemical pollution	not yet quantified		man-made

Note. (1) nine parameters are of largely or exclusively of anthropogenic origin, but climate change is at least partly of natural origin, (2) change in land use and global

freshwater use is probably underestimated by Rockström et al. (2009), (3) the depleting (limited) earth resources are completely missing from the approach of Rockström et al. (2009).

Rockström et al. (2009) investigated ten environmental indicators (climate change, ocean acidification, stratospheric ozone depletion, freshwater use, biodiversity loss, the global cycles of nitrogen and phosphorus, land-use change, atmospheric aerosol loading and chemical pollution), and compared their present state to the assumed thresholds, called by them as “planetary boundaries”. Unfortunately, Rockström et al. (2009) completely ignored the resources (energy, mineral resources), underestimated the effect of land and freshwater use. In spite of these problems, their approach means a great step, because they put climate change (identified with atmospheric CO<sub>2</sub> content) „only” in the third place (Table 2).

### **Climate Change**

The science of the climate has NOT been settled. The following serious questions are still open.

1. The Earth’s climate is a complex physical system, involving a number of different scientific disciplines, spatial regimes, and feed-back mechanisms, including the oceans, land vegetation, the atmosphere, the cryosphere, space, etc. Climate models do not include many of these physical processes, therefore the present models are insufficient to understand the climate.
2. The term “climate change” is ambiguous. The climate has never been constant during the Earth’s history. Long-term periodic changes in climate are determined by the way the Earth orbits around the Sun, and by the variations in the direction of its rotational axis (Milankovich, 1969), resulting in a quasi-regular saw-toothed time variation of the temperature and the CO<sub>2</sub>, with maximums about 420, 324, 235, 128 thousand years ago, and at present, as it is known from the climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica (Petit et al., 1999). The present warm period lasting more than 10 thousand years is exceptionally long. As long as the Earth continues to orbit around the Sun, a forthcoming cool period in the long term is inevitable.
3. Cooling and warming were the rules, not the exceptions for shorter time intervals (a few thousand years), too, as it is known from historic records

(the Medieval Warm Period in the 11-13<sup>th</sup> century, the Little Ice Age in the 17<sup>th</sup> century, etc.). Those periods are assumed to be connected with cloudiness changes, influenced by particles from space (Friis-Christensen, 2008).

4. Most people (even in science) think that the present global warming is due to the increase in atmospheric CO<sub>2</sub>. The atmospheric CO<sub>2</sub> has been continuously increasing since 1955 (from the start of observatory records), but the global temperature was decreasing for three decades before 1970, which means that CO<sub>2</sub> cannot be responsible for climate change. By the way, at the beginning of the 1970s climate fanatics were worried about a possible global cooling.

Kerr (2009) all the three scenarios of near-future climate change (increasing, decreasing and oscillating around the present level) described as realistic ones. In spite of all aforementioned (and further, here not mentioned) problems, it is easily possible that a large part of the present warming is appropriated to humans, but probably not via the greenhouse gas mechanism (Miskolczi, 2010). The multidimensional human activity (transforming the land surface and the hydrological cycles) may provide alternative explanations for the man-made contribution to the present climate change. For example, the shrinking of the Aral Sea is not a consequence of climate change. On the contrary: such human interactions world-wide (as river diversions in this case) might be one of the causes of man-made climate change.

### **Conclusions**

There are serious environmental problems due to the fact that humanity has reached the planetary boundaries, as predicted by Meadows et al. (1972). At the same time, there are uncertainties in climate science. In the early seventies, when Meadows et al. were working on their book "Limits to growth", in climatic sense, there was a cooling period on Earth. Nowadays, the global climate is thought to be somewhat warmer than 40 years ago, but the main problems, namely the limits to growth are the same, or even greater, since we have crossed the threshold of the Earth's system. It is absolutely irrelevant, how climate changes meanwhile. Climate change is not a central, but only a peripheral question among environmental problems.

My criticism to climate fanatics and climate sceptics is that the global discussion has been diverted from the basic environmental problems to a peripheral one. As long as this is the case, the direct link between human activity and its multidimensional consequences on nature remains masked. The greenhouse-based climate change should not be used as a universal explanation

to everything (as climate fanatics force it) and climate change should not be denied completely (as climate sceptics do).

I think, the No. 1 problem is consumerism, combined with population growth, which is only a secondary problem. The exponential growth on a planet with finite resources cannot be sustained in the long term. The world's richest 20 % consume more than  $\frac{3}{4}$  of the goods. Due to the fact, that nearly half of the Earth's resources have already been used (most of them within the last 100 years), this unsustainable process should be ended somehow. It is completely irrelevant, how the global climate will change within the next 100 years, since we are facing much more burning issues than climate change. If global consumption could be reduced to the consumption of the middle 60% of the world population, the world's global consumption would be reduced to 36,5% of its present value. This simple example shows that it is high time to change the leading paradigm of the economy.

As Kenneth Boulding (1910-1993), a famous economist put it: "*Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist*" (Boulding, 1986).

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