

Sustainable humanosphere in global history

How do we place the recent experiences of Southeast Asia into a global context, when considering relationships between industrialization and environmental sustainability over the long run? In this brief essay, I frame this question within the context of a large-scale Global COE program 'In search of Sustainable Humanosphere', which was initiated by the Center for Southeast Asian Studies (CSEAS), Kyoto University (2007-12). In this research program we use the term 'humanosphere' to refer to the environment in which humans live, and we consider the conditions under which a humanosphere has been sustainable. We define the humanosphere as an integrated whole made up of the geosphere, biosphere and human society (chart opposite). Our interests concern the effects of human interventions on the basic sustainability of the earth, and the extent to which industrialization has been responsible for changes.¹

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The evolution of humanosphere

The key assumption here is that the humanosphere is governed by a logic that underpins the three different spheres. The geosphere emerged first, followed by the appearance of the biosphere, and finally human society. This sequence is important in the sense that human society has been dependent on the existence of the preceding spheres. We took the assumption that the logics that drive each sphere are different and largely independent from each other.

Firstly, the earth, especially the tropics, receives heat in the form of energy from the sun, and circulates it to the rest of the earth through atmospheric and hydrologic circulation. This basic logic of the geosphere, which drives the distribution of heat energy, remains unaltered by human intervention. The effects of climate change (the rise of temperature, sea levels, etc.) are perhaps the most obvious man-made disturbances, but their impact has been primarily felt on the biosphere and human society, rather than on the logic of the geosphere itself.

Secondly, the logic of biosphere, centered around the existence of life and its reproduction, has also been at work for a very long period of time, and is an essential ingredient for the sustainability of the humanosphere. Demonstrating the distribution of solar energy, a large amount of biomass is stored in tropical rainforests, which house a rich variety of species. This biodiversity has been increasingly threatened by globalization, but remains the basis of global food chains on which humans depend for their subsistence. It is well known that Southeast Asia is a particularly important testing ground for this aspect of global sustainability.

Finally, the logic of human society, especially the idea that members of society should respect their right to *live and care about and for each other*, has been behind the survival and expansion of human society, in spite of disruption from violence, war and other conflicts, as well as discrimination by race, gender and class. It is expressed in humans' ability to hold and expand a large population under local resource constraints and the constant threat of infectious diseases. Yet on the other hand, human actions are based on subjective judgments and are often accompanied by unintended consequences, and add to the unpredictable nature of environmental sustainability.

Components of humanosphere

Historically the humanosphere has served three specific needs. Firstly, the survival of individuals is a fundamental function of the humanosphere. In hunter-gatherer societies the basic survival strategy was to secure food, water and energy (typically biomass), and for people to protect themselves from natural disasters, infectious diseases and other threats (from animals and other human communities). The space that provided such a condition consisted of the humanosphere, and the idea of creating a segregated settlement and a site of production separated from the natural environment (typically arable land), which came later, did not eliminate the significance of individuals' survival against natural and other human threats.

Secondly, humans formed institutions, typically around the household or the family to help the survival of others, which enabled them to give birth and rear children more easily. This was the basis for reproduction and expansion of human society, although the latter was not always intentional. Securing food and caring for the members of families (from children, to the old and the sick; from physical, to mental and social needs) required a systematic and social thinking about how to meet human needs within different stages of the life-cycle. Thus the sharing of social values among communities, such as respecting the presence and dignity of others and caring for them, became important requirements of a sustainable humanosphere.

Thirdly, a separate area of the humanosphere developed where humans secured 'subsistence': food, clothing and habitats. The agricultural revolution, based on the earlier successful domestication of crops and animals, is said to have marked a transition into an era of densely settled human communities. In a settled society both production and consumption became more sophisticated, and both fertility and mortality probably increased as a result of more frequent pregnancies and the emergence of a disease pool within human settlements. Meanwhile, the division of labor within local society developed through the growth of exchange. Power became concentrated in the city, and became increasingly central to the state. The 'economic' and 'political' spheres became spatially larger and more visible. Subsistence, however, consists of only a part of the humanosphere; a sustainable humanosphere is a condition that meets all described components of the logics driving the three separate spheres.

The fossil-fuel-based world economy

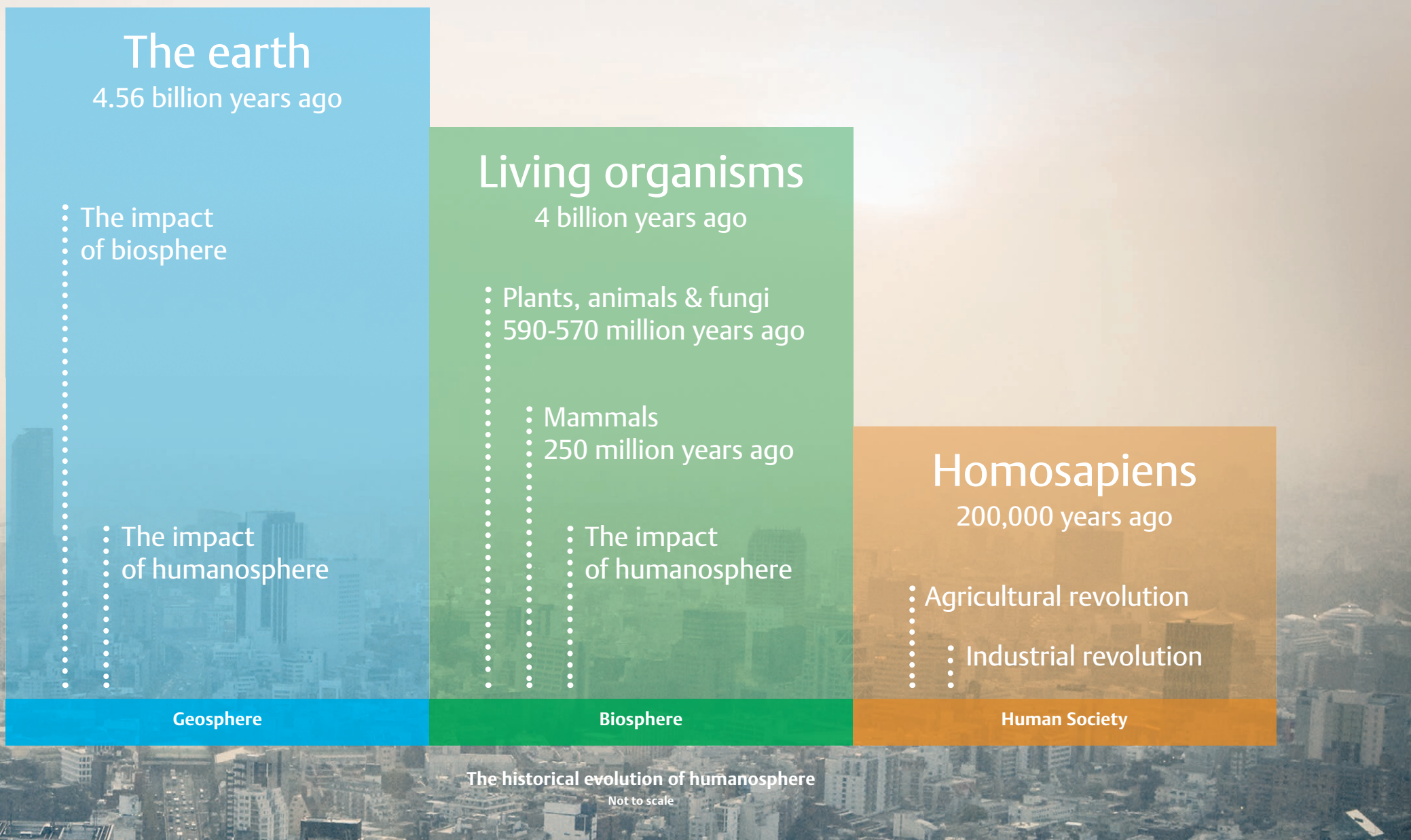
Society is 'humanosphere-driven' when the path of economic and political development is consistent with the logic of nature, especially with the logic of the geosphere (energy and material circulation, movement of water and air, etc.) and the logic of the biosphere (the conservation of the eco-system with appropriate food chains and biodiversity).

Until 1800, population growth did not cause major problems for environmental sustainability, if we define it in terms of whether nature was basically governed by the forces of the geosphere (smooth energy and material flows are maintained in accordance with the circulation mechanisms of the earth) and the biosphere (eco-systems and food chains function by incorporating human interventions rather than vice versa). Humans depended on their labor to produce food (on arable land) and energy was derived from biomass (mainly forest-derived), as well as from other humans, animals, water and wind. Burning biomass was the basic technology for heating and lighting, as well as for clearing the land.

However, a massive increase of the use of fossil fuels (especially coal and oil) since the industrial revolution fundamentally altered the relative importance of the geosphere and biosphere, as the balance between geosphere-derived and biosphere-derived energy sources dramatically changed. Capital-intensive industrialization, the use of steam engines and the development of railways and steamships, increased the ability of human society to exploit natural resources and transport them to the centers of industrial production and mass consumption. The emergence of the fossil-fuel-based world economy increasingly demolished geographical and environmental barriers to trade, and plantations and mines were opened up across the non-Western world. Thus the relative autonomy of the local environment, on which local societies had depended for resources, progressively diminished. As world population and GDP grew, this trend persisted leading to deforestation, environmental deterioration and climate change.

Today, the commercial value of land- and forest-derived products in world trade is much less important than that of fossil fuels. Biomass remains an important source of fuel in developing countries (it is often a vital source for local community livelihoods), but it is in relative terms much less valued today than two centuries ago. In this respect, the world economy has become much less organic, more

Above: Smog over Tokyo. Photo reproduced under a creative commons license courtesy of flickr.



urbanized and globally connected through man-made materials, transport and infrastructure. The main agent of this change was global industrialization. Land frontiers were exhausted, and population growth became increasingly dependent on modern industry and services. The long-standing relationship between humans and the biosphere, which had been the basic mechanism of sustaining local populations was broken and replaced by an invisible web of contacts through trade and technological and institutional transfers, without a recognized method of evaluating their environmental consequences.

The great divergence

In this way, the course of human society diverged significantly from the previous pattern of the human-nature interface. The development path changed from humansphere-driven to productivity-driven. In England and other parts of Western Europe, societies became increasingly concerned with the rise of labor productivity and the improvement of living standards during the early modern period, while in East Asia there emerged a powerful concern for sustaining and raising land productivity to provide for a vast population. But neither the use of coal in England nor extraordinary population growth in China had a decisive impact on global history before the diffusion of industrialization and its effects were felt worldwide. The impact of fossil fuels on the structure of the world economy was so great that the direct interactions between human society and biosphere have become rather peripheral to global resource and energy security issues, as we see them today.

However, this divergence has not been a linear, inevitable course of human history. By the early modern period, in East Asia, land was scarce relative to population, and labor-intensive technology and labor-absorbing institutions developed. When Japan, China and other parts of East and Southeast Asia industrialized a little later than Western Europe did (starting in Japan in the late 19th century and spreading across the region after WWII), the region created a labor-intensive industrialization path.² By and large, the region depended on biomass for its energy needs much more than Western Europe did during its period of industrialization. It also had a tendency to choose energy-saving technology and relatively less energy-intensive industries.

The West also eventually directed its attention to energy intensity. Prior to the two Oil Crises of the 1970s, heavy and chemical industrialization (with military industries leading energy-intensive technological innovation), saw a large rise in the energy usage of the leading powers (the United States and the

Soviet Union), while many countries under the labor-intensive path maintained steady levels. However, there was a remarkable convergence after the 1970s, through the reduction of intensity in the United States and Western Europe, as well as in China, and eventually the (former) Soviet Union. The traditional distinction between capital-intensive industrialization and labor-intensive industrialization became skewed to some extent, as the focus on energy-saving technology began to dictate the direction of global technological innovation. It is therefore possible to suggest that the global industrialization path began to shift from an energy-intensive one to an energy-saving one. Looking back, the two centuries of an energy-intensive industrialization path as a whole may be seen as a great divergence from a more balanced, environmentally sustainable path.

Of course, the story of energy intensity is only part of a larger narrative of the establishment of a global environmentally-sustainable path. It must include a change in the relative importance between geosphere-derived and biosphere-derived (and clean) energy sources, a fuller respect for the logics of the geosphere and biosphere (e.g., the development of science and technology should be directed more clearly towards sustainability concerns), and the reorganization of human society in accordance with sustainability needs demanded by nature. When such a perspective is established, industrialization will be accepted as a truly positive agent of global history.

Southeast Asia

In 1950, most countries of Southeast Asia were exporters of primary products par excellence. By the end of the 20th century, the ASEAN 4 became exporters of labor-intensive manufactured goods and importers of capital-intensive manufactured goods. Following the lead of South Korea and Taiwan, a rapid shift to export-oriented industrialization took place in the 1970s and especially in the 1980s. The share of their GDP derived from manufacturing output and employment rose rapidly with time lags and variations. Throughout this process, deforestation and other environmental degradation induced by industrialization and globalization have been a serious concern for both local communities and environmentalists. More recently, deforestation has also attracted attention in the context of climate change.

So, to return to the opening question, did Southeast Asia figure badly in comparison to the historical experiences of other regions in these respects? In contrast to advanced Western countries, which used coal for household-use from

early on, the ASEAN 4 used a lot of biomass energy for non-commercial use during the process of industrialization, in addition to exporting forest and plantation products. These resources were used, often without concern for environmental sustainability. Meanwhile, the use of commercial energy (coal, oil, natural gas and electricity) increased, but energy efficiency (measured in terms of commercial energy consumption divided by GDP) of the ASEAN 4 and Singapore has on the whole remained reasonable. A combination of these factors, however, was insufficient to meet the rapid growth of energy demands, and Southeast Asia's imports of oil from outside the region have steadily risen. In other words, in energy and resource use terms, the region is becoming less and less self-sufficient.

In none of these respects does Southeast Asia's performance look particularly extraordinary, once the rapid pace of transformation is taken into account. What is unique is that, after all that has happened, the region is still endowed with a remarkably rich biomass and unparalleled biodiversity. Parts of rural Southeast Asia remain humansphere-driven rather than productivity-driven. Whether or not we can establish the notion that environmental sustainability must be the basis of economic development in the long run is a big challenge both for the region and for the world at large. The answer to this question will determine the future of Southeast Asia, and eventually the shape of human development in the region and the world.

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Notes

- 1 This essay is mainly based on Sugihara, K. 'Nettai Seizonken no Rekishiteki Shatei' [The Tropical Humansphere in Historical Perspective] and 'Kaseki Shigen Sekai Keizai no Koryu to Baiomasa Shakai no Saihen' [The Emergence of a Fossil-fuel-based World Economy and the Reorganisation of the Biomass Society], both in Sugihara, K., Wakimura K., Fujita K. & A. Tanabe (eds.) 2012. *Koza Seizon Kiban-ron: Vol. 1, Rekishi no Nakano Nettai Seizonken: Ontai Paradaimu o Koete* [Lectures on Humansphere: Vol. 1, The Tropical Humansphere in Global History: Beyond the Temperate Zone Paradigm]. Kyoto: Kyoto University Press.
- 2 Austin, G. & K. Sugihara (eds.) 2013. *Labour-intensive Industrialization in Global History*. London: Routledge.

Southeast Asia's resource management will be a vital testing ground for global environmental sustainability.