CURRENT VIEWS OF GLOBAL CARRYING CAPACITY

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Summary

While supporting the existence, development, and progress of humankind, our common earth has seen various environmental problems such as sharp increases of population, soil erosion, global climate warming, the greenhouse effect, exhaustion of the ozone layer, global land degradation and desertification, damage to biodiversity and species extinction, and environmental pollution. At the same time, human society itself experienced large gaps in prosperity between the developed and developing countries, local disputes caused by conflicts between nationalities, exhaustion of rare natural resources, modes of production that pollute the environment, irrational modes of consumption, etc. Against this background, people have started to pay attention to the issue of global carrying capacity, that is, whether the earth we hold in common can support human existence and sustainable development. The key to the issue is whether

human activities have broken through the threshold of the carrying capacity of the environment and resources.

This article is a brief introduction to current views on natural resources, population, the environment and environmental protection, the carrying capacity of natural resources, present economic and cultural situations in the developed and developing countries, and sustainable development. Some relevant knowledge on international organizations and their major activities is also included.

1. Current Views of Global Carrying Capacity

While supporting human existence, development, and progress, our common earth has been experiencing various environmental problems such as sharp increases of population, soil erosion, global climate warming, the greenhouse effect, exhaustion of the ozone layer, global land degradation and desertification, damage to biodiversity and species extinction, and environmental pollution. At the same time, human society has experienced large gaps in prosperity between the developed and developing countries, local disputes caused by conflicts between nationalities, exhaustion of rare natural resources, modes of production that pollute the environment, irrational modes of consumption, etc. Against this background, people have started to pay attention to global carrying capacity, that is, whether the earth we hold in common can support human existence and sustainable development in the future. The key to this is whether human activities have broken through the threshold of the carrying capacity of the environment and resources.

2. The Global Social, Economic, and Cultural Situation

While discussing global carrying capacity, we should first discuss the global social, economic, and cultural situation. As global society, economy, and culture develop, so the problem of global carrying capacity emerges and has begun attracting attention throughout the world. A complex, inseparable relationship exists between them. They have strong interactions, being source and result alternately. This situation will continue along with the development of humankind.

2.1. Economic Differences

Countries throughout the world are at different stages of development. According to the level of economic development, they can be divided into developed and developing countries. The developing countries account for 75% of the total population, 67% of the total land area, and 78% of the total countries in the world.

The economic pattern of current society is that the economies of the major developed countries are still predominant in the world economy, but a multi-polar pattern of the

economy is continuously developing to lay an economic foundation for the multi-polarization of world politics. The major reasons are that:

- It is impossible for any country to monopolize the broad area of hi-tech industry, which provides all countries with vast scope for development;
- The forming of regional economic blocs gives impetus to world economic multi-polarization. The countries of the European Union (E.U.), Association of South East Asian Nations (ASEAN), and the North American Free Trade Area (NAFTA) have removed trade barriers in their respective regions, which is helpful to the growth of regional economies;
- Transnational corporations and large enterprise groups have enhanced the development of world economic multi-polarization.

The U.S. dominated the world economy from the end of World War II to the end of the 1960s. After 1970, the world economy became more multi-polar as the economies of the U.S., Europe, Japan, and Germany strengthened. Since the end of 1980s, the forming of world regional blocs has speeded up with the E.U., NAFTA, and the Asia-Pacific Economic Cooperation Conference (APEC) the three regional economic groups greatly influencing the world economy.

As we move into an age of a knowledge economy, developing countries are confronted with both severe challenges and development opportunities. The prerequisites for developing the knowledge economy are:

- The full development of an industrial economy;
- Strong capability for knowledge and technical creation;
- A society that respects both knowledge and talent.

Hence the major challenges faced by developing countries in developing a knowledge economy are that:

- They are not yet fully industrialized;
- Rare natural resources are mostly under the control of developed countries;
- Most developing countries have not developed a society that respects both knowledge and talent.
- The opportunities for developing countries are that:
- They have a broader margin for hi-tech development;
- Developing countries need smaller investment for many areas, which gives them the opportunity for narrowing the gap between them and developed countries;
- The cultural heritage of developing countries will play a role in the knowledge economy; and
- Developing countries have a greater margin for improvement than do developed countries in the intellectualization of economic and management policy making.

Therefore, they have more space for improving the standard of economic policy making and management.

It will take quite a long time to narrow the gap between the developing nations and the developed countries. No obvious changes will be seen in a short time. Relations between the two are still focused on control and anti-control, interference and anti-interference. The function of economic sanctions and embargoes will be increasingly limited. Economic cooperation between developed and developing nations, over a certain period of time, is focused on setting up free-trade zones. However, this will be promoted very cautiously with an eye to lessons drawn from past experience. The establishment of a new international economic order is an evolutionary process. The position of developing countries in both the world structure and international affairs will gradually improve.

2.2. Cultural Differences

Culture describes the unique lifestyle and a whole set of existing type of a certain human group. World culture has developed through primitive cultures, the ancient Greek and Roman slave-owning cultures, Oriental culture including feudalism, Chinese culture, and modern capitalist Western culture, etc. There will still be cultures in the future. However, the culture of the information age has distinct characteristics:

- Culture can be transformed into technology in the knowledge economy. The future society will be a developing economy based on human cultural aggregation that can make direct use of cultural achievements as a key to industrial development.
- Culture will also become an industry. Along with social and economic growth, human cultural consumption will be greatly increased, which will form a large cross-border and comprehensive market so as to allow culture to become a new industry equal to information and telecommunication.
- The culture of the future society will be a rational culture.
- The culture of the information age is a multinational traditional culture. It can by no means be a solely English culture. At present, human society is a combination of multinational traditional cultures and science and technology. Without Indian cultivation techniques and handicraft, without Arabian counting methods and astronomy, without Chinese inventions such as gunpowder, the compass, papermaking and printing art, the present culture would not exist. A multinational traditional culture benefits not only the information age indirectly, but also hi-tech computers, hi-tech biology, and software technology in particular. Therefore, the culture of the information age is not a single culture abandoning other cultures, but a mixture and a development of multinational traditional cultures.

The exchange between and mix of different cultures will produce a new culture, so as to promote cultural development. The first cultural exchanges in human history were those in Egyptian slave culture, Persian culture, Indian culture, Chinese culture, Greek

culture, and Roman culture, the result of which was the prosperity of ancient Greece and Rome, the peak of the slave-owning period.

The second were the cultural exchanges of various ethnic groups of the feudal Sui and Tang dynasties in China and the exchanges between Chinese culture and the cultures of Korea, Japan, and Southeast Asia that formed the highly developed Chinese feudal society and culture. The third great exchange was in the capitalist period along with the colonial expansion and world market pioneering that resulted in a global cultural exchange and formed modern culture. Today, information technology, the global information superhighway and communication network, the opening up of various countries and economic globalization will see another great cultural exchange that will push humankind into a new and higher period of development: world culture of the knowledge economy age.

With the end of the Cold War, cultural difference and confrontation has gradually become one of the major causes of regional conflict. Many wars have been about national and religious conflicts. Most were caused by dominant states using cultural conflicts to promote and propagate their own cultural values, social systems, and views of human rights.

2.3. A Comparison of Production and Consumption between Developed and Developing Countries

The international division of labor is a major pattern of economic connections between countries in the world. It decides the main modes of productions of both developed and developing countries and their positions and roles in globalization.

The basic structure of the contemporary international division of labor is that;

- Economically developed countries produce manufactured goods, while underdeveloped countries produce primary goods.
- The same division exists between newly emerged industrialized and developing countries.
- In the light of this international division of labor, developing countries are mainly engaged in the production of labor-intensive and resource-intensive products, while developed countries mainly produce technique-intensive and intelligence-intensive goods.

The international division of labor affects nations differently. It makes developing countries markets of industrial products and supply bases of raw materials for developed countries to solve their problem of insufficient demand and lack of raw materials. Relying on industrial manufactured products with high added value, developed countries are in an advantageous position. However, most of them rely on

imports of agricultural and light industrial products. The international division of labor creates a very unitary economic structure whereby developing countries are capable of producing only labor-intensive products and exporting primary products. In such a disadvantageous position, it is very hard for developing countries to get rid of poverty and backwardness. There is a high content of intellectual products in developed economies while developing countries look to using up their rare natural resources for economic growth, which is harmful to the environment. On the other hand, the international division of labor also speeds up the industrialization of developing countries and increases employment.

In future, developing countries will be in a more disadvantageous position:

- The developing countries will lose their original advantage of low income.
- The technical gap between developed and developing countries is continuously expanding and developing countries will rely more on developed countries.
- The exports of developing countries will still give first place to primary and labor-intensive products, and developing countries will remain in a position of making a loss in commodities exchanges with developed countries.
- Developing countries are not capable of changing their production pattern of exhausting natural resources. Therefore, their economies are not sustainable and will lose out in long-term economic development.

Major differences between the production patterns of developed and developing countries are intellectual contents, technical content, and added value of products. The high content of intellectual and technical products in developed economies gives high added value to their products. According to OECD estimations, intellectual products account for 50% of GDP in developed countries. That is obviously too high. It should be around 20%. The technical content of the products of developing countries is considerately lower than that of developed countries. Developing countries produce primary products with low added value by consuming their rare natural resources and polluting the environment the most. Therefore, in terms of both the international division of labor and environmental conditions, developing countries are in a disadvantageous position. Their pattern of production is unsustainable. At present, the knowledge economy is revealing clues. Developing countries should grasp this precious opportunity to promote the knowledge economy by positively developing hi-tech industry.

There is a significant difference between developed countries and developing countries in the mode of consumption. The major factors influencing the mode of consumption are level of income and mode of production as evaluated by Engel's coefficient, which is used as the main measure to divide developed and developing countries in consumption. With undeveloped economies and low incomes, about 60–80% of income in developing countries may be used for purchasing food, and even the total income

may not be sufficient for purchasing food with adequate nutrition in most areas of Africa. Therefore, consumption in developing countries is "survival." In contrast, with a high level of economic development and excellent social security systems, the expenditure on food in developed countries accounts for as little as 10% of income, far beyond the stage of simply having enough food and clothing. Therefore, the mode of consumption in developed countries has gone from material consumption to cultural consumption such as tourism and recreation, or "luxury." However, developed countries generally stimulate production by consumption, that is "doing their utmost in production and consumption," with a considerable proportion of disposable goods consumption, thus greatly wasting and exhausting rare natural resources. Therefore, the high consumption in developed countries is based on the low consumption in developing countries. If the world's seven billion people consumed energy and resources at the same level as the Western countries, 10 globes would be needed to satisfy their requirement. This mode of consumption is unscientific and unsustainable.

3. Carrying Capacity of Natural Resources

Natural resources are the material basis for human existence and development and can be used to create utilization value and affect productivity. They belong to a system, cannot be regenerated, and are distributed unevenly spatially. They are divided into ten major kinds—soils, water, forest, mineral resources, grassland, ocean, climate, species, energy, and tourism—with water resources and land resources the parent resources. Water resource usually means fresh water resources, which have the properties of cycling and flowing. Land resource is an integrated natural resource, including the natural types and also utilization of land. There is some overlapping between energy and mineral resources. Tourism resources include both natural landscape and human landscape.

In addition, there are also multiple classification methods of natural resources according to their distribution on the earth, uses in production and human lives, limits to use, the steadiness of quantity and quality, etc. In sustainable development, the limit to use is mainly used to classify natural resources as renewable and non-renewable resources. The former are those that can be used in circulation to some degree and can be renewed, such as water, climate, organisms, etc.; they are also called "non-exhaustible" resources. The latter are those that cannot be renewed, such as minerals, and are also called "exhaustible" resources. Natural resources of various kinds exist relatively independently in nature, each with own characteristics, but they are also mutually interconnected to constitute an organic entity, that is, the natural system. The ecosystem is a major functional unit of nature whose structure and functions evolve over time. The fact that substances and energy in ecosystems continually change and have a tendency to dynamic equilibrium is known as ecological equilibrium. Ecological equilibrium is a basic condition for normal reproduction of organism and human existence.

The degree and focus of development and utilization of natural resources differs at different stages of human development and at different levels of productivity. With the enhancement of productivity, the focus of development of natural resources has shifted from the renewable resources of the agricultural economy, such as climate, water, organisms, etc., towards the non-renewable resources of the industrial economy, such as mineral resources. But the quantity of non-renewable resources on the earth is limited. For example, the world's total reserves of copper already identified is 270 million tons, but annual global consumption is 7 to 8 million tons, which means the supply of copper will last for only 30 to 40 years. Known oil resources will last for only about 75 years, even with newly found reserves and enhancement of efficiency in use. Unlimited demand and limited resources has stimulated research on resource carrying capacity.

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Biographical Sketch

Jisong Wu is director-general of the Department of Water Resources and Hydrology, Ministry of Water Resources of the People's Republic of China. He was also vice chairman of the sixth World Conference of Science Parks (Australia, 1998), a professor at Northern Communication University, and has a doctorate in technology economy. He has been a counselor for the Chinese delegation to UNESCO and visited more than 50 countries and regions, accumulating plentiful knowledge and experience in the environment and natural resources. He was the first person to introduce the concept of the knowledge economy to China, and has published several books and more than 100 articles in English, French, and Chinese about scientific research, management, and the knowledge economy. Dr Wu's main Publications are *Comparing the Expertise for Decision Making and Management of R&D between Developing and Developed Countries* (in English; UNESCO, 1986); *Where Does the Information Highway Go?* (Chinese Railway Press, 1994); *New Cells of 21st Century Society: Science Parks* (Shanghai Science and Education Press, 1995); *The World Through Chinese Eyes: 50 Countries and Regions I Have Visited* (4 volumes; Beijing Science and Technology Press, 1998); *New Trends of the 21st Century Society: The Knowledge Economy* (Beijing Science and Technology Press, 1998); and *The Knowledge Economy: Theory, Practice, and Application* (Beijing Science and Technology Press, 1999). Since 1986, Dr Wu has published more than 100 articles about the intelligence economy, the knowledge economy, and hi-tech industrialization in major publications throughout the world, 14 of these articles in Beijing-based newspaper *The People's Daily*.