Haiqiao TAN **G**

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School of Resources and Geosciences,
China University of Mining and Technology
221116 Xuzhou, P. R. China
tan3893@163.com

GEOETHICAL APPROACH

TO THE DEVELOPMENT IN EARTH 3.0

Abstract

Based on an analysis of different development modes in the history, the focal point of the presentation is put on the geoethics foundation for the social-economic development in Anthropocene. Dujiangyan Irrigation System in Sichuan and Lingqu Canal System in Guangxi, China, constructed more than 2200 years ago, could be seen as the best example in Earth 1.0 (pre-Industrialization), while the Emscher System in Ruhr Region, Germany, as the best example in Earth 3.0 (post- Industrialization). For the developing countries, like China (mid-Industrialization), it is of the first importance, to consider the social-economic development from a geoethical viewpoint, in particular, to adapt to the global climate changes.

Key word: Geoethics; Development; life-support system; Anthropocene; Earth 3.0

1. Introduction

After thousands years of struggle with the nature for existence and a hot pursuit for prosperity, human society has entered new stage, named Earth 3.0 (J. Rennie, 2008), in which we have to face and address a series of problems caused by industrialization and urbanization. In principle most of us agree with the idea for sustainable development. But in fact, neither resource shortage nor the warning of global warming could stop the unsustainable social-economic development on Earth, especially in the developing countries, like China. It should not be difficult to understand that no country will let his people swimming outside the “lifeboat” (G. Harden, 1974), while seeing the people from comparatively rich country living on a “lifeboat”. It would be unfair, to forbid poor country building his own “lifeboat”. So it may be said without fear of exaggeration that development is an inevitable issue for both rich and poor countries. Without such development most of us would still have to stay in the primitive slash-burn cultivation stage. As a matter of fact, “man, physical, intellectual, and moral, is as much a part of nature, as purely a product of the cosmic process, as the humblest weed” (T. H. Huxley, 1894). That means there is only one “lifeboat” for population close to 7 billions on the unique habitable planet with nine life-support systems (Rockström, J. et. al., 2009; F. Pearce, 2010), which serves all kinds of lives, including the strongest human and “the

humblest weed". For the safety of the lifeboat, we have to very carefully regulate our behaviors with relation to the Earth system, including recognition of human's place in the nature, determination of goals, dimension, methods, and costs for the development. Because of the dependence of social-economical development on nature resources and its increasing impacts on the whole Earth system, all of us, poor or rich, have to face a common problem: geoethics. As a new discipline proposed by V. Němec in 1991, geoethics has mainly covered "ethical problems and dilemmas in the fields of geology, mining activities and energy". It is unnecessary to go into detail about the importance of resources for development. But it is another matter for the discussion about geoethics. On the one hand, geoethics is crucial to the decision-making for sustainable development. On the other hand, geoethics is a relatively new concept. Little has been discussed about its importance for social-economical development and practical approach is needed to make geoethics more acceptable. Details about the approach will be discussed in next sections.

2. Anthropocene: Rethinking the Industrial Revolution

Anthropocene was an off-the-cuff word coined in 2000 by Nobel prize-winning atmospheric chemist Paul Crutzen, but has been turned to a widely used geological term. It is reported that the International Commission on Stratigraphy, ultimate adjudicator of the geological time scale, is taking a formal interest. As mentioned by J. Zalasiewicz (2008), four major phenomena supporting the proposal of Anthropocene includes changes to physical sedimentation, carbon cycle perturbation and temperature, biotic change, and ocean changes. The main reason behind these changes is the human impacts since the start of the Industrial Revolution, in particular, the exploitation of coal, oil, and gas, which make the world-wide industrialization possible. As reported by R. R. Britt in an article published in 2008, "Humans force Earth into New Geological epoch." Even the ecological rehabilitation could not compensate the human's disturbance to the earth system: "Like the river, it looks the same from the outside, but it is different from the original" (Bernstein R., 2006).

In comparison with 4.6 billions years history of the Earth, Anthropocene epoch is but an episode. Nevertheless, it is in this epoch that human civilization has developed to its peak. Thanks to the modern science and technology out of Industrial revolution, we can almost see anything at any scale; we can go anywhere we want, up to the space or down to the deep ocean. Up to now, most of us are still proud of human's success of the struggle with nature and enjoying the results of industrialization. To certain extent, the industrial revolution has greatly improved human's life quality. And this improvement further encourages the trend of consumerism, not only in rich countries but also in relatively poor countries. Life-style rooted on resource consumption in rich countries is blooming. As early as in 1864, thirty years before the publication of Huxley's "Evolution and Ethics", an American scholar G. P. Marsh paid attention to the negative impacts of human's activities on nature in his book "Man and Nature". Unfortunately, few of us recognize, or will recognize these man-made impacts. Facing increasing global climate changes, man would rather believe the strength of technology than natural power.

As a matter of fact, human's impacts on the nature began much earlier than industrial revolution. Archaeological evidence has shown that coal mining began in China as early as in Neolithic period. From the viewpoint of geoethics, what human got from the industrial revolution are changes of the way man thinks and the way man works. Industrial revolution has not only strongly strengthened the capacities of human's four limbs and five sense organs, but also extremely expanded human's faith that man can conquer the nature and technology can solve any problem. Because of seeking quick success and short-term gain, more and more natural way has been replaced by artificial way: organic fertilizer has to make way for chemical one; ecological methods have been replaced by pesticides. The speed and strength of the human impacts on the earth could match, even exceed, those caused by the natural geological force in earth history. All the four phenomena mentioned above come from the way man thinks and works. One of the essential features of Anthropocene is the long-term co-existence of human and nature. Human will never be the master of nature. In this context, the proposal of Anthropocene not only means a new geological term for the latest part of Holocene, but also the need for regulation of human's behaviors, first of all, the need for rethinking of the Industrial Revolution. Why did the industrial revolution happen? What is the goal of development? What did the industrial revolution bring to human and to nature? Are there any limits for the social-economic development? If yes, how to defined them? Are the life-supporting systems really to rehabilitate? How could human realize the sustainability? By means of modern technology or back to nature?

3. Development in Earth 3.0

To answer the questions mentioned in former section it is useful to recall the track of social-economic development. The development of human society is a continuing process. For the people living in modern society, slash-and-burn cultivation looks ignorant and backward. But it was an inseparable and impassable stage of social development. Just like agriculture society laid the foundation for industrial society, modern information society is based on the industrial society. It's undoubted that the human society has entered a new stage of development: Earth 3.0. But it does not mean that we all could have and enjoy the prosperity of 2.0. Just the opposite, there exist still some people who live on slash-and-burn cultivation; there are still a lot of people who live in poverty. The first one of the Millennium Development Goals (MDGs) of UN is to eradicate extreme poverty & hunger. Each country has its own development history, and is at a certain development stage. In terms of geoethics, to realize sustainable development we need appropriate approach that should be adaptable to the development stage and natural conditions.

According to J. Rennie: "Earth 3.0 is thus the new way forward that we need to establish, one with all the prosperity of 2.0 but also the sustainability of 1.0". "The right solutions will address both environmental problems and concerns about economic development rather than sacrificing one for the sake of the other." In principle the definition and solution to the development in Earth 3.0 is acceptable. Emscher Project performed in the famous coal mining region Ruhr, Germany, could be seen as a good example for such

development in Earth 3.0. The whole river system Emscher covers a total area of 865 km² and has been used for wastewater transport for more than 100 years as a consequence of extensive coal mining activities. The whole project puts the ecological question in its center and aims at to give nature back to the river Emscher. “After 2014 the whole river Emscher (total catchment 865 square-kilometers) will be transporting clean water again. To reach this target, it will be necessary to build a large 51 km long, underground sewer from Dortmund to Dinslaken, through a densely populated conurbation”(Figure 1, Althoff, H et.al., 2006). For this rehabilitation project a EUR-450-million-loan contract was signed on July 20, 2011.

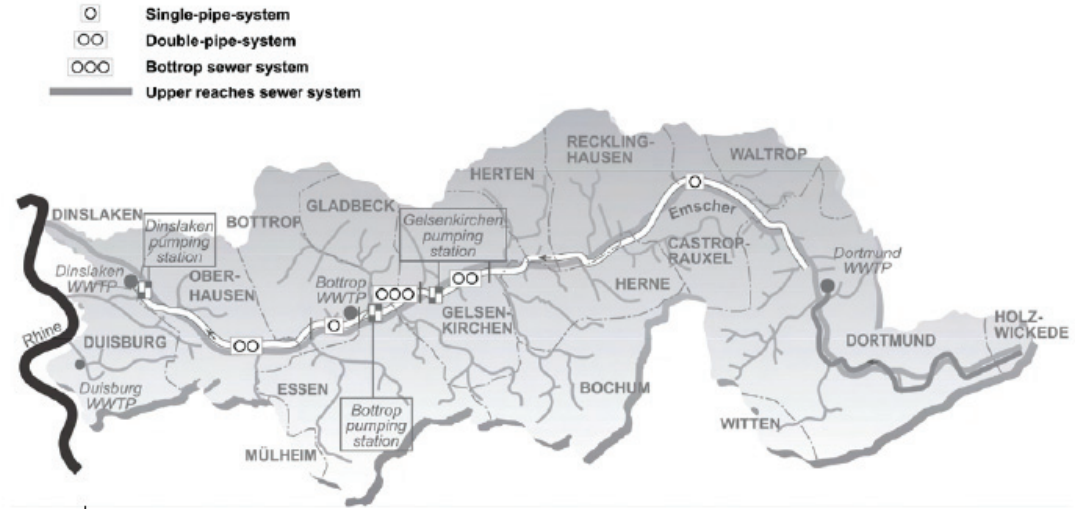

Figure 1: The Emscher-sewer and its catchment

It is worth to note that rehabilitation of a river system costs not only a lot of money but also much time. The recuperation and multiply of an eco-system is a slow process. It needs much long time. Rehabilitation of a river system, like the Emscher Project, could make the water clean again, maybe in several years. But recuperation of the riparian ecosystem will last tens even hundreds of years. As reported by Bernstein R., the famous Rhine River gives us a good example for such rehabilitation process: "The Rhine itself is not the Rhine of yore” and “the salmon are not exactly the salmon that used to flourish before”. Therefore the development in Earth 3.0 should be on a long-term framework and centered on the recuperation and multiply of eco-systems. Co-existence of both the natural and artificial water course represents a mark of the development in Earth 3.0.

4. Geoethical Approach

Unlike the traditional ethics with focus on the relationship between individuals or groups in human society, geoethics mainly deals with the regulations of human behaviors relating to the Earth system. As stated by T. H. Huxley (1894), “the limits within which this mastery of man over nature can be maintained are narrow”. Current researches also show the existence of the safe operating space for humanity (J. Rockström, 2009). So it is obvious that human, as a part of nature, could not do whatever the human likes，even though we have mastered the modern science and technology. Maybe our predecessor

living in Earth 1.0 was not aware of such limits. Most of their behaviors aimed at the simplest living conditions. Nevertheless, the sustainability of the social-economic development in this stage was not fortuitous but out of the faith “in awe of nature”. The Dujinagyan irrigation system in Sichuan, China and the Lingqu canal in Guangxi, China, could be taken as the best examples for such sustainability. Both of them were built in Qin Dynasty, more than 2200 years ago and are still in use today. What we should learn from these old projects is the way to realize long-term coexistence of artificial and natural system. This is what we are going to discuss here: geoethics approach to development of human society, which could still be used for reference in Earth 3.0.

First of all, the faith “in awe of nature” should be kept in mind, which serves as the geoethic foundation for development in Earth 3.0. We have to recognize clearly that the Earth system is a complicated and integrated open system. Both human activities and natural processes belong to the cosmic process. In comparison to our predecessor in Earth 1.0 we have got some modern science and technology. But to really understand the Earth system on which we live, we still have a long way to go. That’s why we can not stop, even predict exactly, the happening of most natural hazards, like Earthquakes, Tornados, Sandstorms, and so on. Industrial revolution did not make us clever than our predecessor, especially in dealing with the nature. What we have known about the responses of Earth system as a whole to the impacts resulting from human activities is too little, at least not more than our predecessor. In this case, we should not get in the way of natural system. When involving a river system, for example, like Dujiangyan irrigation system, we should not block the way for river flowing rashly.

Secondly, human is one member of the Earth system, just like the humblest weed. One important criterion for Human’s behavior should be the compliance with the natural rules. For a river system, flowing is one of its vital signs. In the Dujiangyan irrigation system water from Minjiang River is used for human’s irrigation, but it does not block the flowing way of Minjiang River. So does the Lingqu Canal, it uses water from Xiangjiang River for human’s transportation, but does not block the flowing of Xiangjiang River. It is imaginable what would happen, if these man-made systems simply blocked the natural way for river flowing 2200 years ago.

Thirdly, being a shareholder, not a master of nature. Sharing natural resource with other members of Earth system should be a basic geoethics principle for human’s behaviors. As the great philosopher Lao-tzu said: “The Way of heaven is to benefit others and not to injure. The Way of the sage is to act but not compete.” Each member of the Earth system has the same right to share natural resources, such as air, water, and soil. Along the Minjiang River for example, the whole riparian ecosystem is dependent on it. And human’s living has countless ties with this ecosystem. One mystery for the success of Dujinagyan project and Lingqu canal system is not the complicated science and technology, but the proper dividing structures for sharing the river water, like the Fish Mouth in Dujinagyan (Figure 2) and Plough Share (Figure 3). Thanks to Fish Mouth in Dujiangyan, for example, “40 percent of (Minjiang) river’s runoff goes into the inner

river in flood season, 60 percent into the outer, and vice versa in dry season."

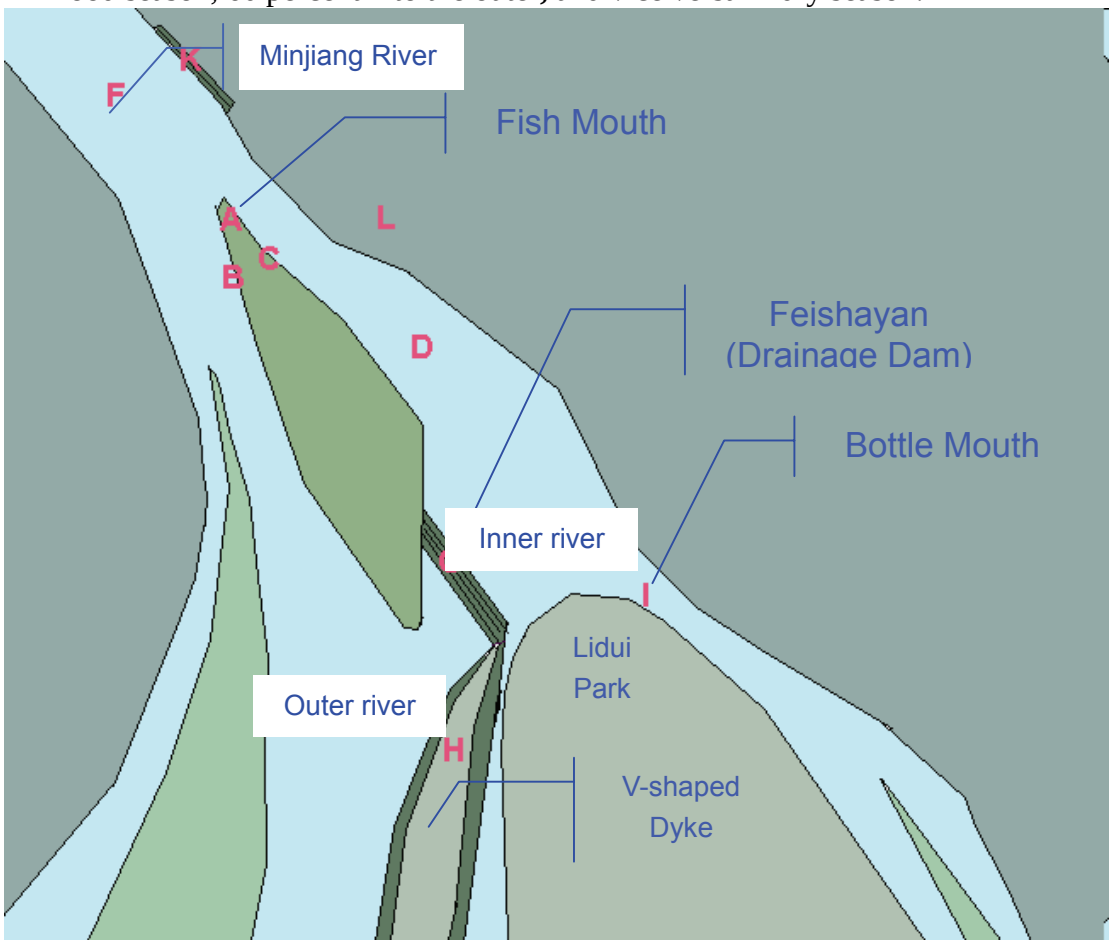

Figure 2: Sketch map of Dujiangyan Irrigation system in Sichuan, China

Figure 3: Sketch map of Lingqu Canal system in Guangxi, China

Last but not least, minimizing the alien components should be the material foundation for sustainable development. According to Huxley (1894), “The tendency of the cosmic process is to bring about the adjustment of the forms of plant life to the current conditions; the tendency of the horticultural process is the adjustment of the conditions to the needs of the forms of plant life which the gardener desires to raise”. Natural selection is irresistible. All man-made systems has as the same tendency as the “horticultural process” designed by the “gardener”. Archaeological evidence has illustrated that local materials, including trees, pebbles and so on, were used for the construction of Dujiangyan and Lingqu canal systems. Unfortunately most of us have to live in a man-made environment. From pesticides to chemical fertilizer, from food additives to air purifier, our daily life has been apart from the natural state further and further. Human’s dependence on man-made materials has changes the whole Earth system on which all flora and fauna live.

5. Conclusions

On the basis of the discussion about development in Earth 3.0 and the comparative analysis of the current Emscher Projects in Ruhr region, Germany as well as the 2200-year-old Dujiangyan irrigation system in Shichuan and Lingqu canal system, in Guangxi, China we could draw some important conclusions as follows:

(1) Because of the impacts of human activities, the whole Earth system has been entered Anthropocene, the self-regulation capacity of the system is on the verge of collapse. So regulation of human’s behaviors is become the task of top priority;
(2) As an integrated part of cosmic process, the social-economic development is inevitable for both rich and poor countries. Key to the development is to transform consumerism to sustainability;
(3) “In awe of nature” should be the geoethical foundation for the sustainable development in Earth 3.0, not only for human society, but also for the whole Earth system;
(4) Compliance with natural rules, like water flowing in a river system, is the most important criteria for regulating human’s behaviors. Any development mode should not act in defiance of the rules;
(5) Like humblest weeds, human is not the master of nature, but a “shareholder” of the Earth system. Each shareholder should act in the way “to benefit others and not to injure”; reduction of the dependence on the alien materials should be the material foundation for sustainable development.

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