

Nonlinear Whole Ecology, Change of Entropy, Hypercycle, Talent Ecology and Chinese Cultural-Social Ecology

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ABSTRACT

Ecology is closely related to the rise and fall of human society. First, we propose the nonlinear whole ecology and its four basic rules. Second, entropy plays an important role in ecological economics, and the cycle of resources and the general recycling economy cannot be a single increase process of entropy, we research possible entropy decrease. Third, in order to achieve sustainable development, society must realize the recycling economy. We study the applications of hypercycle in ecology, and corresponding equations of ecosystem. The key factor in the cycle is the conversion of waste. Fourth, we propose the talent ecology, which studies the relations among talent and circumstances (esp., the social circumstances), and search its three basic principles. The base of talent is education. The mechanism of the academic development is freedom. The aim is innovation. The talent ecology must encourage the academic diversity. Fifth, the structure-function-result mode of ecosystem is proposed. Sixth, we discuss the recycling ecosystem of traditional Chinese agriculture, and Chinese cultural-social ecology.

Key Words: ecology; human society; entropy; recycling economy; hypercycle; talent; traditional Chinese agriculture; structure-function-result mode.

INTRODUCTION

Ecology takes the mutual relations between human society and resources and environment as a whole. The material basis of the sustainable development of human society comes finally from nature. The human existence continuously reduces useful resources, and increases wastes. The survival and development of human society are greatly stressed from these two aspects. Usual ecology is typically an open system and also an irreversible process of entropy. The once very glorious Babylon civilization, the Habala civilization of India and the Maya civilization of America were destructed due to human ecological environment. These are the profound historical lessons of human society.

Mathematics is a powerful and important tool in modern ecology and environment science [1,2]. Based on the synergetic equations [3,4], we derived different models of population dynamics, and various simplified results and their ecological meaning by the qualitative analysis theory of the nonlinear equations. The ecological synergetics promulgates deeply a complex nonlinear relation between competition and cooperation on different species. Further, we searched the general nonlinear evolutionary equations of ecosystem, and the human crises and our outlets [5].

Any ecosystem is gradually formed and evolving. Its long existence must form a self-organized dissipative structure [6,7]. An important order parameter for the sustainable development of human society is the transformation of waste and the circulation of resources. In this paper, we propose the nonlinear whole ecology and its four basic rules, and the talent ecology, and discuss entropy and hypercycle in ecology, the structure-function-result mode of ecosystem, and Chinese cultural-social ecology, etc.

NONLINEAR WHOLE ECOLOGY AND ITS BASIC RULES

Based on the inseparability and correlativity of the biological systems and human body, we proposed the nonlinear whole biology [8,9] and the nonlinear whole medicine [10].

We start from the two main basic features whole and nonlinearity of ecology and combining the general nonlinear theory, and propose the nonlinear whole ecology, and its four basic rules: First rule: The inseparability exists always among different fields and different levels in various ecological systems, which determinates to the ecological whole.

Second rule: Various ecological systems possess generally interaction and nonlinearity, which include from molecular ecology, autecology, plant ecology, animal ecology to biodiversity, evolutionary ecology, ecosphere, and so on. Their descriptions are necessarily nonlinear mathematics. Corresponding equations all are nonlinear, and possess chaos and fractals, etc.

Third rule: A basic property of any ecological systems as an open system is this system and its environment must be a whole, and forms environmental ecology. Usual environment may be regarded as a boundary condition of the system, but it and the ecological systems have often various nonlinear relations.

Fourth rule: Ecology studies the relations between living things and their natural and social environments. This derives necessarily the totality, nonlinearity and ecological complexity. It is related to behavioural ecology, coevolution, cultural ecology, social ecology and human ecology. Four rules are a whole, and are closely related each other, such as, environmental economics, etc. Because of ecological complexity, their description must apply the nonlinear theory with the interaction terms. In ecological systems the structural complexity or the compositional complexity will produce and forms the functional complexity and causal complexity [11].

ENTROPY CHANGE IN ECOLOGICAL SYSTEM

Entropy plays an important role in ecological economics, and provides a theoretical basis for limiting economic growth. This has also caused some discussion [12-14]. Smith, et al., studied economics, ecology and entropy [15]. Jørgensen discussed a pattern as integration of ecosystem theories [16].

Recently, Harte proposed the Maximum Entropy Theory of Ecology (METE), which has extensive influence in ecology [17,18]. For the coupled human and natural systems (CHANS), sustainability can be defined as a set of feasible and reasonable flows, including materials, currency, information, energy, personnel, etc. This can combine the social-ecological hydrodynamics [19]. Based on review of information theory, Mayer, et al., provided a theoretical framework for dynamics of feedback in CHANS, and proposed an exponential

combination based on information that can effectively provide information about sustainability objectives, especially when it comes to critical feedback in CHANS [20].

Ecology and evolution are often studied separately, and researchers focus only on one aspect of information or entropy: molecular variation, species variation, etc. Information on all these aspects can be seen in a larger, unified framework, and have nested levels, such as molecules, individuals, populations, species, and ecosystems. It is known in ecology that macroscientists study combinations of different species, while microevolutionary biologists study variations in genetic information within the species, such as DNA and epigenetic modifications. The two different modes of change, although the methods sometimes vary very differently, but, are determined by the same four basic processes of innovation, propagation, motion, and adaptation. This is the common basis for ecology and evolution. Sherwin discussed the four basic processes, where entropy or information methods can be applied uniformly to the analysis and prediction of ecology and evolution [21].

The general development equations in ecosystems are [22]:

$$\frac{dX_i}{dt} = k_i X_i [N_i - \sum_j \beta_{ij} X_j] - d_i X_i + F_C(\{X_j\}) + F_R(\{X_j\}) + F_M(\{X_j\}, \{X_j^e\}) \quad (1)$$

Here the first item on the right is the saturation term, and the nonlinear functions F_C, F_R describe the competition rate and the regulation rate, etc. This can be related to the social-ecological hydrodynamics [19].

There is no doubt that the second law of thermodynamics is a great contribution to the development of science, and applied widely many aspects. Rifkin, et al., proposed that entropy is a new world view that governs everything, [23]. But, the second law of thermodynamics as science must necessary research some new discussions. It is known that the basis of thermodynamics is the statistics, in which a basic principle is statistical independence [24].

We proposed that when there are various internal interactions and fluctuations in isolated systems, statistical independence no longer holds and the corresponding entropy has not additive properties, hence the possibility of entropy decrease exists in the isolated system [25,26]. This can not only be applied to many aspects of science and society [27-32], and some examples are calculated quantitatively [26,29].

For systems with internal interactions, we proposed a universal formula for any isolated system [26]:

$$dS = dS^a + dS^i \quad (2)$$

It is symmetry with the formula:

$$dS = d_i S + d_e S \quad (3)$$

in the theory of dissipative structure. From this we derived a complete symmetrical structure on change of entropy:

$$\text{Entropy} \rightarrow \begin{cases} \text{increase.} \\ \text{decrease} \end{cases} \rightarrow \begin{cases} dS = d_i S + d_e S. \\ dS = dS^a + dS^i. \end{cases} \quad (4)$$

Here entropy decrease may be the dissipative structure for an open system, or be the internal interactions for an isolated system [26]. Further, we obtained the total formula of entropy change for any natural or social system is [29,31,32]:

$$dS = dS^a + dS_+^i - dS_-^i + dS_i + dS_e^+ - dS_e^-. \quad (5)$$

When

$$dS^a + dS_+^i + dS_i + dS_e^+ > dS_-^i + dS_e^-, \quad (6)$$

entropy increase $dS > 0$, the system tends to disorder. When

$$dS^a + dS_+^i + dS_i + dS_e^+ < dS_-^i + dS_e^-, \quad (7)$$

entropy decrease $dS < 0$, the system tends to order. Both differences are determined by the input negative entropy flow in open system and the internal attractive interactions in isolated system $dS_e^- + dS_-^i$

The universal rule of this theory is that nonlinear internal interactions reach self-organization, entropy decrease and order. It can have different levels: material, chemistry, biology, individuals, society, and ecology, etc.

The same energy flow input a system, the technological innovation can greatly reduce the entropy increase. ET includes energy, ecology and environment technology. Technological innovations may be different dyes for solar energy, mechanical structures of wind energy generators, and batteries of electric vehicles, etc.

The improvement of urban management level, such as garbage classification, has important ecological significance. This is the process of entropy decrease. Cities, as an ecosystem, must be an open dissipative structure, so as to exist. But, some systems may be as an isolated system, such as the whole ecosystem or black box, the system inputs the same and get different energy, from high entropy to low entropy, to achieve entropy decrease. Big data and datalism is creating more information, of course more redundancy.

HYPERCYCLE AND ECOLOGY

In 1971 Manfred Eigen proposed the hypercycle theory, which is a scientific theory on the relations between protein and nuclei acid, and on the origin of life, and discussed self-organization of matter and the evolution of biological macromolecules [33,34]. It is in order to model prebiotic evolution governed by the Darwinian principles of competition between species and mutations, and leads to a new level of evolution. Here cooperative behaviors are reflected by intrinsically nonlinear reaction mechanisms. Further, the hypercycle is a principle of natural self-organization, and it as a beautiful form is a tool [34] not only in biomolecules, and may be widely applied to many fields. In the hypercycle each cycle as a whole has self-

enhancing growth properties, and their cooperative behaviours are reflected by intrinsically nonlinear reaction mechanisms, and the dynamics is described by a system of coupled nonlinear differential equations, for example, mechanism of enzymatic together catalysis, whose cycle at least with three elements (Fig.1) and an extension of hypercycle evolution principle (Fig.2) [34].

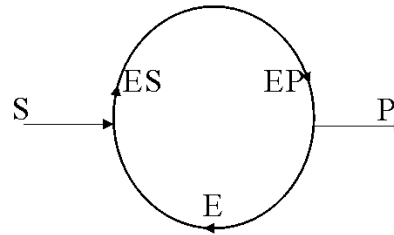


Fig.1: Mechanism of enzymatic together catalysis

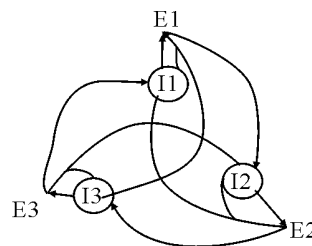


Fig.2: Extension of hypercycle evolution principle

We apply the graph theory to the hypercycle theory. Here the graph $G=(V,E)$, in which V is point set and E is border set. Such the hypercycle can be defined by a degree of connectivity, which is bigger, corresponds to higher hypercycle [35]. Dieckmann, et al., searched the geometry of ecology and simplifying spatial complexity [2]. Butler, et al., discussed permanence in ecosystems [36-39].

It is known that hypercycle is able to evolve towards optimized functions due to inner coupling and synergies. Moreover, the organization of hypercycle is stable, because of the inner nonlinearity, and its selection advantage is the whole property, so it can mathematically show that the hypercycle has an extremely high symmetry and the corresponding stability. The generalized hypercycle structure is a very typical form of existence.

One directional change system is a line increase process. The complete cycle is a circle, and corresponds to a zero carbon emission system. The current recycling economics is mainly the cycle of three elements from resources to products and wastes, and latter changes renewable resources. Generally real ecosystems can be described in Fig. 3:

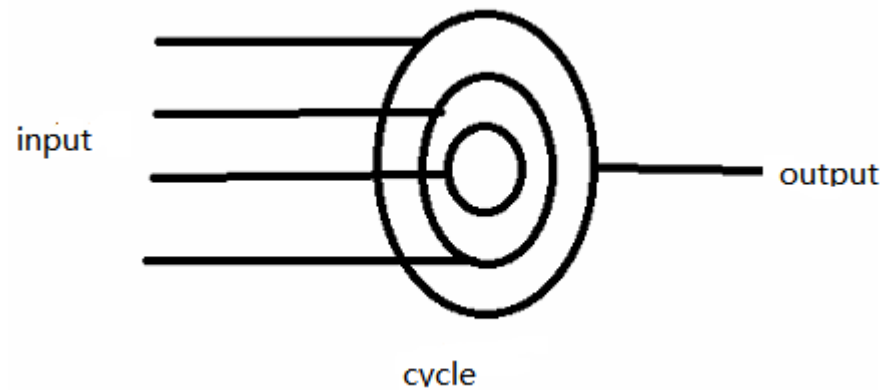


Fig.3 Recycling ecosystem

For the substantially invariant input, the circle radius of cycle is larger, the less waste the output.

The rational application and transformation of various resources and the proper disposal of waste are the most basic problems. Human society has living, food and clothing, comfort and other different levels of living conditions. The levels are different, and the specific values of the various indicators are also different. The mathematical basis of recycling economics should be combined, and can be hypercycle. Various small cycles form large cycles. Therefore, we can apply and develop the hypercycle and its theory.

According to the recycling economics of the sustainable development, the resources must be the recycle structures. The simplest mode is to develop the industrial reclaimed wastes, and form a cycle of three elements on product and consumption and reclaimed waste. The usual economics is inextricability for the recycling economy.

The ecology and environment are very complex and huge nonlinear systems, which easy to cause the butterfly effect in chaos. From this we can derive a conclusion: large-scale transformation of nature must be very careful. Its negative effect is probably insurmountable for scientific and technological progress. For example, at present, we should focus on the construction of small and medium hydropower stations, and large hydropower stations are easy to change the climate, geological structure, and even cause earthquakes.

At present, it has been recognized that both natural resources and social resources are two indispensable elements of the existence and development of human society. Various kinds of natural resources are interdependent, and mutually restricted, and they are whole. Resource economics studies the economic and quantitative relations between human, resources and the environment, and in the process of material cycle and energy transformation. This is an emerging combination of natural science and social science. Resource economics applies the optimization method to design the scheme of resource utilization, and uses production functions, linear planning and other mathematical methods for qualitative and quantitative analysis. Its goal is to develop and utilize resources economically, rationally and effectively.

This combines environmental economics, which also needs to consider the input-output funds and benefits, manpower and employment, etc. Currently only environmental pollution is discussed. But, combined with aesthetics we should consider the harmony of the whole environment. Further, the diversity of human society as whole can combine the environment, ecology and culture. For example, after food and clothing are basically solved, a main index of social development is the degree of civilization. This is much more than just an economic problem. In short, the economy and the ecosystem should be symbiotic and reciprocal relations. Hypercycle as a higher level of cycle with a self-organization can describe the self-selection, self-catalytic, self-replication mechanism of the system by nonlinear equations [34]. In the selection dynamics it is consistent with molecular evolution, and the simplest system can be described by the evolutionary differential equations of the mutual coupling:

$$\frac{dx}{dt} = (A_i Q_i - D_i)x_i + \sum_{k \neq i} w_{ik} x_k + \phi_i \quad (8)$$

Hypercycles can evolve to a more complex degree and level through a similar gene replication and specialization process [34]. Cramer believes that hypercycle theory has the most fundamental importance for understanding the evolutionary mechanisms of biological development [11]. Under certain conditions, hypercycles can act as isolated system.

For ecological system S, we may simplify the hypercycle equation (8) to:

$$\frac{dS}{dt} = F(E, G) + f(M, R_i) - W \quad (9)$$

Here free energy F is of the system input, and is a function of energy E and goods G, and M is management, R_i is the conversion rate of the resource, and W is the output waste. The general solution of this equation is:

$$S = \int [F(E, G) + f(M, R_i) - W] dt \quad (10)$$

$$\delta S = \delta \int_{t_1}^{t_2} (F + f - W) dt$$

This corresponds to the principle of least action. The key factor in the cycle is the waste conversion rate (R), whose size corresponds to the radius in FIG. 3.

If $dS/dt=0$, the system is stable. For general cases of (9), the system evolves. For the constant F, $f=0$, so $S = (F - W)t + C$, and the system will increase over time, the waste accumulates and becomes overwhelmed.

Assume that the simplest $f = M(aR_i^2)$, when R_i is very big, which corresponds to the circle with a large radius in Fig. 3. If the system generates waste $W \rightarrow 0$, $S = (F + f)t + C$. The input energy is preferably clean, renewable, etc. For agriculture, the problem of pesticides and fertilizers is difficult to transform.

Assuming that the system variable is proportional to S, the equation (9) can also develop to:

$$\frac{dS}{dt} = [F(E, G) + f(M, R_i) - W]S \quad (11)$$

This is also a simplify result of Eq.(1). Its general solution is:

$$S = C \exp\{[F(E, G) + f(M, R_i) - W]t\}. \quad (12)$$

Further, ecosystems can be developed into a variety of nonlinear equations and equations, such as Lotka-Volterra models may describe lengthen and extinction each other in the ecosystem, etc.

TALENT ECOLOGY

When we stroll at Vienna, the atmosphere of music is filled, from street playing to puppet shows, from scale of the music festivals to the introduction of tourist sites. From the 19th century to the beginning of the twentieth century, Gottingen as a holy place in the field of mathematics and physics in the world was not only full of academic atmosphere, but scientists are also generally respected by whole city. Cavendish Laboratory and Copenhagen all had a strong academic atmosphere; contrarily, this formed a stronger academic environment. These are all fascinating.

In talent research, G. Mosca of Italy from 1900-1923 and V. Pareto in Switzerland from 1900-1916, and H.D. Lasswell at Chicago University from 1936 to 1952 searched outstanding talent. By the ecologic method, we propose the talent ecology, which studies the relations among talent and circumstances (esp., the social circumstances), and research three basic principles on the talent ecology:

1. The principle of environment control. The environment determines the value orientation of the whole society and the situation of talents. There are several limiting factors on talents: First, talents should be able to survive. Second, developing talents must provide a certain information flow and capital flow, so may create a good environment within an appropriate scope. Third, the theoretical achievements must be published, and useful sciences must be applied for certain places. Fourth, bigger progress must be encouraged, supported and recognized by the society. Light, temperature and water are three basic factors for land ecological environment; light, temperature and salinity are three basic elements for marine ecological environment. Saline land is hard to have a good harvest. Free academic atmosphere, information and capital seem to be the three basic elements of talent ecological environment. Of course, this never denies individual efforts.
2. The principle of interconnection and holism. Talent ecology is related to big social ecology and cultural ecology. In longitudinal aspect, four different levels (genes, individuals, groups, society) are inseparable. In the long review, any level is important. Talent ecology should not only study the part, but also study the whole. This is similar to the rule of integrative levels in ecology proposed by Feibleman in 1954. More generally, talent ecology involves the social-economic-talent system. Three aspects cooperate with each other, and talents can flourish and develop.
3. The principle of quality determined by quantity. This is a statistical law. From talent to funds, we must have a certain number to lead to a higher quality. Talent ecology is a pyramidal structure. Good social environment, the popularization of education and scientific knowledge, certain number of magazines and books, different schools, theoretical diversity form the number pyramid, energy pyramid, information pyramid, and finally lead to the quality pyramid. In pyramid the lower layers are various

foundations, and the upper layers are different levels of talent. But, if structure of the pyramid is not naturally formed, and artificially determined, especially by officials or fake scholars, then the result must be extremely unsatisfactory, even false and poor people. Such it points out that it is best to have several pyramids, namely, different schools.

These three basic principles are the general laws. There are also some inferences: a few talents are only fluctuation phenomenon. The cultivation of talents has time lag. The total talent ecology includes: its own parts, such as genetic genes, education; and environment part, including living and material environment, working environment, academic (democratic and free discussion, and different schools) environment, social environment, etc. In short, an ecosystem should be formed to support, encourage and respect talent, and not to suppress or combat talent and new ideas.

The base of talent is education. The mechanism of the academic development is freedom. The aim is innovation. Only popularizing education and academic freedom can produce high-quality talents and constantly innovate. The competition between talents must be fair and equal opportunities. The biggest purpose of talent ecology is to obtain the maximum protection and support for talents, and thus to achieve the maximum talent output (including both quality and quantity). The talent ecology must encourage the academic diversity.

Talent ecosystem can have different structures, functions and other aspects. The system can be big or small, different talent ecosystem can form a virtuous cycle: democratic discussion, complement each other, help mutual and common development. It is a basic law of ecology that the development of communities leads to the development of biology. Only forming different schools can promote the great development of science and essential major innovation. Further, in the talent ecosystem the models of different schools combine each other and develop to form the complementary models, from this can better lead to co-evolution. A good talent environment must allow, support and encourage academic diversity. This is necessary for freedom of academic atmosphere, and is a good way to discover talent and promote scholarship. It is similar to the biological diversity. Without the academic atmosphere of free and democratic discussion is difficult to have more originality. Only academic advocating and encouraging different schools can lead to competition between each other.

Although capital and material are the basis of good talent ecosystem, scientific atmosphere, a kind of love, reverence and devotion to science is not directly proportional to money! This is true for ancient and modern of world.

Talent ecology can apply mathematical methods and models, and describe by the known equations of population dynamics, for example, the relations between environment and talent by Lotka-Volterra model; the relations between different schools by competing models; and the synergy in the same talent ecosystem with each member power amplified due to each other by the symbiotic model:

$$\frac{dM}{dt} = rM\left(1 - \frac{M}{k + aN}\right) \quad (13)$$

$$\frac{dN}{dt} = rN \left(1 - \frac{N}{p + bM}\right) \quad (14)$$

Talent is always a few, but they are inseparable from the ordinary people and form a social unity together. Talents have different fields and levels, and have their own expertise, their own advantages and disadvantages, and even their own paranoia. They should be tolerant, cannot seek perfection. This is a common sense. All people are equal in politics and personality, but there are differences in ability and strengths. It is also common sense. Giving full play to the talents and the expertise of everyone, by using their strengths, and avoid their weaknesses, it is the best choice for a good society and its development.

STRUCTURE-FUNCTION-RESULT MODE OF ECOSYSTEM

Structural functionalism is an important theory in modern sociology [40-43]. Social structure is organized set of social relationships in which members of the society or group are variously implicated [44]. Turner investigated systematically the structure of sociological theory [45]. Neofunctionalism is a self-critical stand of functional theory that seeks to broaden functionalism's intellectual scope while retaining its theoretical core [46].

Based on various social structures and combining structural functionalism and neofunctionalism and the structure-conduct-performance (SCP) mode proposed and developed by E.Mason, J.Bain and F.M.Scherer, we proposed the structure-function-result (SFR) mode of sociology [35]. Now we extend it to ecology, and forms the structure-function-result (SFR) mode of ecosystem (Fig. 4), in which the structure of system determines the system function and the evolution mechanism, and feedback modifies structure. Three can be represented by three Borromean rings (Fig.5) in topology [47,19], in which united they stand, divided they fall. This is also a pattern of some ternary systems.

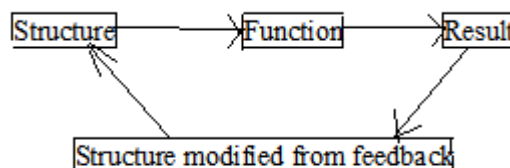


Fig. 4. The Structure-Function-Result (SFR) mode of ecosystem

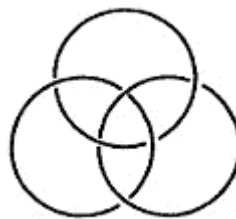


Fig. 5. Borromean rings

In modern sociology there are the evolutionary theory, the conflict theory, the exchange theory and interactionist, etc [45]. They may belong in different dynamics. We researched the social thermodynamics and the social hydrodynamics [48,19]. These can all be applied to ecosystems.

Usually ecosystems have two characters: one is stability, the other is evolution and development. Both correspond to the dynamics and dynamics of system, respectively. The structure determines the elastic mechanics and elasticity of the ecosystem. Only the elastic coefficient can be introduced phenomenally, and assuming that the generalized Hooke law holds: within the elastic limit, each stress is a linear homogeneous function of pure strain. This can describe the changing adaptation to the environment. The elasticity of the system is greater, the self-adaptive and restorative are also stronger. If the elasticity is small, the ecosystem is easier to collapse, and the species is easier to perish. For example, the panda's body and food structure make it endangered.

Usual real ecosystems have certain nonlinear characteristics: self-organization, self-repair, fractal forms with self-similar structures, etc. And limit cycle may only appear in nonlinear systems [22]. The ideal ecosystem should have the stability and hypercycle [33,34] characteristics. This is most typical of the bee and ant populations.

The cycle of resources or the general recycling economy cannot be a single increasing process of entropy. We proposed structure-function-result mode for the same ecosystem, feedback and management levels are internal interactions in the system that may be entropy decrease. For a certain short time, if the system acts as isolated system, the second law of thermodynamics must be modified and developed [25-32].

ECOLOGICAL CYCLE SYSTEM OF CHINESE TRADITIONAL AGRICULTURE AND CHINESE CULTURAL-SOCIAL ECOLOGY

A well-known economist A. Marshall said, using a certain area of the earth's surface is a basic condition for people to do anything [49]. Thus a fundamental problem of sustainable development is land and agriculture. In China some ancient ecological countryside has formed the complete cycle system of agriculture-mulberry-raise-fishery [35]. This is paddy field planting rice, planting mulberry on the ridge, fish in the water. It raises pigs by agricultural and sideline products, pig manure as fertilizer of field. Mulberry leaves raise sheep, with sheep manure as fertilizer of mulberry; mulberry leaves raise silkworm, with silkworm manure and snail water grass feed fish, and fish manure as fertilizer of mulberry.

Its important foundations is the use of farm manure, mainly stable manure, human manure and urine, vegetation ash, green manure, and mud manure, etc. Its character is by local materials, low cost. It may increase the soil organic matter and improve the soil structure. The organic fertilizer is recycling. This has achieved sustainable development for thousands of years, and may be a model of sustainable development in world agriculture.

Further, the Chinese traditional house is grass as top and soil as walls, which are also easier to return to nature. Land produces food, men manure as fertilizer of land. Clothes are cotton, living in the house of grass-soil-wood structure, and they can be used as fertilizer, and back to the land. Of course, the modern agricultural cycle can also add biogas, hydropower and other new technology. In China the fertility of land has not diminished for thousands of years. Moreover, the Dujiangyan (都江堰) and the Yuanyang terrace (元阳梯田) in Yunnan as two World Cultural Heritage Sites have existed for more than 2200 and 1400 years, which are also the adaptability

of river and mountain environment. They are all the structure-function models in ecology, and may be the typical sustainable developed models for world.

It is a poetic recycle:

Fallen flowers are not merciless and useless(落红不是无情物)

They transform manure, and enrich flowers(化作春泥更护花)

Based on the traditional Chinese culture of Yi, Taoism, Buddhism, Confucianism and so on, we proposed the Chinese culture-social ecology [50], and explore the way to resolve the human crises. *The Book of Changes* is the first book in the world to discuss the relations between human and nature. The ternary meanings of the core on Yi are change, invariance and simple. Base of Yi theory is endless and sustainable development. But, human must follow the eternal law, and the invariant way of nature. This is the most basic and simple truth, and the reason for the formation of all things in the universe, and their changing and evolutionary laws.

The Book of Changes said: Yi began familiar with anxiety and calamity. "The superior man, when resting in safety, does not forget that danger may come; when in a state of security, he does not forget the possibility of ruin; and when all is in a state of order, he does not forget the disorder may come. Thus his person is kept safe, and his states and all their clans can be preserved." Yi theory can be applied to the resolution of human crises. Yi is a simple life, change is easy to follow the fate of heaven, and invariance is the human ideal and mission.

The multi-layered Tai-Ji Diagram [51] may be the relations between people in a group; in society it is the relations between law and virtue; in a country it is the relations between the people and the officials; in the world it is the relations between different countries, and between different nationalities and different beliefs, etc. The largest range is the relations between human and the natural environment. Both must live in harmony each other in order to be symbiotic and sustainable development. Therefore, we proposed a social sustainable developed pattern, in which the social progress, the economic development, the science and technology, the education and the environment complement each other [52]. It is the promotion-restraint on Five-Elements model, and is also useful concept for ecological field. Its complete mode is the unification field of human-nature in Chinese traditional culture.

Good society has made people better and advanced. Bad society makes people worse and degrades. Good society can be good education and sound rule of law. Chinese traditional culture emphasizes morality: Ren (Humanity, Benevolence,), Yi (Justice, Righteousness), Li (Etiquette, Propriety), Zhi (Wisdom), Xin (Faith, Sincerity) and so on. They go beyond times, and request to constitute various social orders, and moral actions as behavior criterions restrict emperors, officials and total society. Existence of moral system is a certain extent restriction for emperor power. It is the thought basis of super-stable structure of Chinese traditional society [53]. When the autocratic system of emperors is abandoned, and replacing the dynasties by democracy, a new super-stable structure can be formed. Although our behavior is limited by society, our thoughts are free and optional, and the pursuit of truth, goodness and beauty is beyond the control of external environment [54]. This is also one of the ten sociological perspectives [55].

Combining the multi-layered Tai-Ji Diagram [51] and whose three-dimensional spatial radius can be enlarged and change associated with higher-level development. Human hope existence and development, ecology must be cycle. From the Tai-Ji Diagram and the multi-layered Tai-Ji Diagram with two elements to three elements and five elements [52], they are all cycle.

In Chinese traditional culture, the most perfect ideal society and future mode is that nature and human are completely harmonious, in which human and nature and environment coordinate each other to form a virtuous cycle of endless life, and finally reach the highest state of the unity of nature and human, the unity of matter and mind, no life and no death, and the world forever.

SUMMARY

In a word, ecology is closely related to the rise and fall of human society. 1. Human society must promote the cycle and hypercycle of resources and waste, and keep the ecosystem stable and sustainable. 2. We need introduce new materials, new information and so on, so that conducive to the ecosystem, and enhance the benign development of the ecosystem. 3. We should optimize and improve the management level in order to entropy decrease and strengthen the ordering of the whole ecosystem.

In the face of various ecological and social crises, we should vigorously advocate less desire, frugality and financial management, magnanimity and contentment. This kind of happiness view and values cannot only enhance people's morality, save and use resources effectively, alleviate the crises between human and environment, but also resolve the conflict between different civilizations, so that to realize the pure land of the world, and achieve the harmonious world and permanent peace.

We believe that pursuing truth, goodness and beauty can guide that human tend to a fine noble ideal society, and enter into higher civilization and more harmonious society [54]. The macroscopic aspect in the bigger space-time scope, era, heroes, the modern science and society, the increasingly rational human mutually may promote and determine the human destiny and the evolution trajectory together.

In modern society, the lofty thought of carrying forward Chinese traditional culture has the function of inspiring people to pursue the best realm in an ideal. Confucianism emphasizes benevolence, Buddhism emphasizes love, Mohism emphasizes both love, combined with the fraternity of western civilization, based on Chinese culture-social ecology, and combined with modern science, we can construct the model of harmonious development of man and man, man and nature, and resolve all kinds of crises. Our world can be a society of peace, harmony, mutual help, mutual respect and mutual love. Human decision-making will shape the future of our world.

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