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Challenges for Sustainable Development and Its Legal Response in China: A Perspective for Social Transformation

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Abstract: With rapid development since the 1970s, China is entering a period of social transformation, which not only creates favorable conditions for sustainable development but also presents new challenges. The transitional period in China is a stage in which two types of social transformation coexist, the first is the social transformation from agricultural society to industrial society; the second is the transition from industrial society to postindustrial society. In this process of social transformation, new challenges arise for sustainable development in China. In the first layer of social transformation, we respond to the challenges presented by the social transformation through the establishment of basic principles of environmental law, legal enforcement mechanisms, basic legal regimes and so on. In the second layer of social transformation, the advent of a risk society raised new challenges to environmental law, including that of adjusting the function of environmental law, strengthening the precautionary principle, diversification of implementation mechanisms, and development of the preventive function of legal regimes. In order to better respond to these challenges, we should proceed with the following aspects: improve the legal functions of environmental law, including guaranteeing public security, ecological security and the coordination of multiple interests; expand and develop the content of the principle of prevention, and replace the polluter pays principle by the causer responsibility principle; combine administrative measures with economic incentives, and while setting government as the main executive body, effectively operate public participation mechanisms; expand the scope of environmental impact assessment of projects, and establish planning environmental impact assessment, build up and improve information disclosure system, and establish environmental risk assessment system and green tax system.

Keywords: social transformation; sustainable development; environmental law; challenges; response

1. Introduction

After 40 years' rapid development, China is entering a period of social transformation. This transitional period in China is a stage in which two types of social transformation coexist. The social transformation from agricultural society to industrial society has not been completed. In addition, with the promotion of industrialization, comes the risk society. Economic development, social progress and environmental protection are facing unprecedented challenges. Development and implementation of a sustainable development strategy is the key to addressing these challenges. In order to further promote sustainable development, economic, social, legal, and other means need to be developed and promoted according to the actual situation in China. Among others, environmental law plays an important role in promoting sustainable development. How does environmental law respond to the new challenges and requirements posed by social transformation to sustainable development? The legal philosophy, principle, enforcement mechanism and regime need further development and innovation in order to respond to the specific challenges of social transformation to sustainable development.

2. Social Transformation in China

In China, social transformation refers to the transition of the society from a traditional model to a modern one, or the process of transformation from a traditional society to a modern society. It means the transformation from agricultural, rural closed semi-closed traditional society, to the industrial, urban and open modern society [1]. Characteristics of Chinese social transformation include the following aspects: (1) The marketization and industrialization : in the transition from planned economy to market economy, great achievements were attained in China's industrialization, and economic growth mode changes from extensive production mode to intensive production; (2) democratization of politics: the process of democratization is further accelerated, the rule of law has been gradually promoted as well; (3) diversification of social actors: social actors in China start to differentiate, stepping from the state-dominated system to the dynamic enterprises, NGOs, and the public.

The transformation period in China is a stage in which two types of social transition coexist. The first is the social transformation from agricultural society to industrial society; and the second is the transition from industrial society to postindustrial society (marked by risk society). Like other countries, the first background issue for China is that it enters the risk society under the structural precondition that the whole world is facing a global risk society. The second background issue is that China entered the risk society (the second modernity) when realizing industrial modernization (the first modernity) [2]. Unlike developed countries, China encountered the risk society without the realization of the first modernity [3]. The various problems of social transformation should not be completely addressed. As a latecomer modern country, environmental problems in China are structural, complex, and condensed, namely a variety of environmental and resource problems that occurred gradually in western industrial countries during the process of industrialization exploded within the past three decades along with the

rapid social and economic development in China, which brought dual challenges of environment and resources crises in both industrial society and postindustrial society, and it also means that the level of difficulty in responding to and solving environmental and resource issues is much higher than in western countries [4]. Therefore, China's law shall have the inherent specificity and the feature of the compatibility of traditional and modern.

From the viewpoint of legal sociology, the law is the regulator of social relations, and it is the product of response to and regulation of society, the change of society will inevitably lead to changes of the law. The advent of the risk society is bound to bringing about the chance for sustainable development, and at the same time it is an opportunity to bring about change and transformation [5]. Under the premise of social transformation, the development of environmental law in China should achieve the goal, which not only meets the requirements of industrial society to sustainable development, but also deals with the challenges brought about by the risk society to environmental law. So how to respond to the new challenges and requirements posed by social transformation to sustainable development is the significant problem that China needs to seriously confront and solve.

3. The First Layer of Social Transformation and Development of Environmental Law

China is still in the first stage of social transformation, *i.e.*, the process of change from an agricultural society to an industrial society, and industrial development is the main content of this phase. Currently China's industrial development has made great progress, and it has created favorable conditions for sustainable development.

3.1. Contents of First Layer of Social Transformation

The first layer of social transformation and industrial development in China has the following elements:

3.1.1. Rapid Economic Development

At present, China's economic development has made remarkable strides, through decades of rapid development; sum GDP in China now ranks number two globally. In terms of its economic pattern, China's economy changed from an agriculture-based economy into a structure in which the industrial economy is the main body, supplemented by the service economy, and having characteristics of the knowledge economy. At this stage, because the starting level in China is relatively low, especially the weak industrial foundation and technology standard, social and economic development in China is a long way behind the conditions of western countries. In order to pursue rapid economic development, we constantly increase the exploitation, utilization and investment of natural resources, and the rapid development of industrial society is built at the expanse of destroying the ecological environment. In the late industrial society, the industrial development that damages the environment cannot adapt to the requirements of the development of productive forces, and depletion of some resources and energies is unable to support the operation of the original development pattern. As to economic structure, China shifts from production-oriented society to consumer society.

3.1.2. Accelerating Social Development

An important aspect of social development is the development of society itself. Along with the development of society, there has been a proliferation of new social actors. In China's transition from an agricultural society to an industrial society, more and more people shift from the original agricultural sector to industrial sector, or service sector, and the income level has been greatly improved. Society changed from a single society into a pluralistic and multilayered one. Since the reform and opening up policy, China's social and economic factors, organizational forms, employment patterns, interests and way of distribution have been increasingly diversified, and the people's ideological activities have been more independent, selective, changeable and differentiated. At the same time, along with the increasingly rich social supply, people's thought, work and life pursuit shows the characteristics of a pluralistic society. In this process, people's needs of their own living and social development continue to increase. In order to better meet the needs of the people and social development, China's market economy has been developing a variety of resources [6].

3.1.3. Development the Rule of Law

The core of contemporary Chinese social transformation is to develop from the non-market economy to the market economy, and establish a complete socialist market economy system. Since the foundation and indicator of industrial civilization is a market economy. In this process, the development of a market economy requires good rule of law and social order. Therefore, along with the development of China's market economy, promoting the rule of law is an important element of the transition from agricultural society to industrial society. In this regard, China has actively developed and enforced a lot of laws to promote the development of market economy. In this process, based on the experience and lessons from foreign countries, we day by day recognize the necessity and urgency of establishing an environmental legal system. With the accelerated industrialization process and development of the market economy, resource use intensity continuously increases, resulting in both pollution issues such as water pollution, air pollution, waste pollution and ecological damage problems including land quality degradation, shrinking forests and grassland, wetlands loss, biodiversity loss *etc.* In order to combat these problems and promote sustained development, we have formulated, promulgated and implemented a number of laws, regulations and other normative legal documents, including the basic environmental protection law—the “Environmental Protection Law of the People's Republic of China (1989)”, which has played a huge role in promoting economic development, social development and environmental protection.

3.2. Current Status of China's Environmental Law

Current conditions and social situations are important foundations for the law-making and implementation processes. Social change and law have mutual influence on each other. In the process of industrialization, problems of environmental pollution and ecological damage have been increasingly prominent, and we are required to take positive measures to control these corresponding matters. The law is an important tool to regulate these issues. At this stage, the development of China's environmental law is mainly reflected in the following aspects.

3.2.1. Establishment of Basic Legal Principles

Legal principles are important guiding ideologies to guide the law making and enforcement activities, reflecting the characteristics of certain fields of law. In the process of industrialization, the basic task of China's environmental law is to control environmental pollution, and prevent ecological damage. Thus, in this stage, the basic principles of environmental law are established to focus mainly on environmental protection and prevention of environmental pollution. Corresponding basic principles mainly include the coordinated development principle, prevention principle, and polluter pays principle.

3.2.1.1. The Coordinated Development Principle

The coordinated development principle refers to the overall planning, parallel implementation, coordinated promotion of environmental protection, economic construction and social development, in order to realize unification of economic benefits, social benefits and environmental benefits [7]. That is to say, in order to realize the sustainable development of society and the economy, when making decisions we must coordinate the development of three pillars—environment, economy and society—rather than focusing on only one or two of them [8]. The principle of coordinated development not only ranks first in the basic principles of our environmental law, and has the leading function to other principles, but also it is the basis of all the principles of environmental law.

3.2.1.2. Prevention Principle

The Environmental Protection Law (for Trial Implementation, 1979) makes a comprehensive general requirement of protecting natural resources, preventing pollution and other public hazards. The prevention principle was established as one of the main principles of environmental law. The prevention principle is the abbreviation of “giving priority to prevention, combining prevention with control, and achieve comprehensive management”. The principle has been reflected in the provisions of the “Environmental Protection Law” and other relevant laws; it has a guiding role in relevant environmental legislation, law enforcement, and judicial action, while it also influences all behaviors related to the environment. In practice, prevention principle is often regarded as the damage prevention principle Chinese laws and regulations. In accordance with this principle, Chinese laws and regulations established several legal regimes, such as environmental impact assessment, the environmental standards system, and the licensing system. In practice, these regimes have played a positive role.

3.2.1.3. Polluter Pays Principle

The polluter pays principle requires that the polluter shall pay for the damage caused by environmental pollution and the cost to treat the pollution. People who utilize resources shall make economic compensation, an exploiter of environmental resources shall have the obligation to provide protection to natural resources, and organizations and individuals who damage environmental resources shall bear the responsibility to recover and treat the damages. The Environmental Protection Law (for Trial Implementation) stipulated the principle of “He who pollutes, pays”; and then in 1989, the “People's Republic of China Environmental Protection Law” changed it to the “polluter pays”,

which stipulated that the polluter shall bear the responsibility for treating the pollution that has already occurred. The polluter pays principle explicitly stipulates the polluters' responsibilities through mandatory and normative provisions. It requires the combination of environmental protection and people's economic interests and other interests, to ensure the smooth achievement of environmental protection. The polluter pays principle emphasizes that the loss caused by environmental pollution shall be borne by the polluters, and cannot be transferred to the state or society [9].

3.2.2. Establishment of Legal Enforcement Mechanism

In the process of industrialization, the contradictions between economic growth and environmental issues have become increasingly prominent. China gradually recognizes that the old model of high input, high consumption, and high output has to be eliminated, and China must pursue intensive economic growth [10]. For this purpose, China relied mainly on administrative and regulatory mechanisms which have strong characteristics of the planned economy in order to ensure sustainable development. Even though some specific economic instruments were adopted, such as an effluent charge system, and its main function is to raise funds for pollution control of key sources. Due to the very low charge, those instruments could not effectively urge enterprises to take measures to control pollution [11]. The government is the only executive body in the process of social and economic development and environmental protection. The main task of environmental protection is borne by the government. At this stage, environmental protection mainly focuses on pollution control, especially restrictions and licensing [12]. Most law enforcement mechanisms established at this time are administrative and mandatory.

3.2.3. Establishment of Basic Legal Regimes

3.2.3.1. Environmental Standards System

An environmental standards system is one of the basic regimes of environmental law. It has played an important role in protecting the ecological environment, preventing environmental pollution, energy conservation, emission reduction and promoting economic, and social sustainable development. According to China's Environmental Protection Law (1989) [13], as well as in the actual operation of this regime, China's environmental standards are mainly based on pollution standards. Through legal confirmation, scientifically determined technical standards and indicators turn into environmental standards, which become legally binding and mandatory, and thus one of the most important types of measure for environmental protection. In the process of social transformation from an agricultural society to an industrial society, the main focus is to promote economic development, social construction and to improve people's living standard. At this time, the main content of environmental standards is environmental quality standards, among which the most important is the minimum quality standards. The main task of environmental standards is to protect the environment from pollution and ecological damage. In this stage, China's environmental standards system is mainly based on pollution standards, and the environmental pollution standards system is also generated based on it. The environmental standards system is one of the important legal systems that guide China's environmental protection work.

3.2.3.2. Environmental Impact Assessment System

The Environmental Protection Law (for Trial Implementation) provided the environmental impact assessment report system for the first time in 1979. In 1986, China promulgated the Administrative Measures for the Environmental Protection of Construction Project and in 1988 promulgated the “Regulations on Construction Project Environmental Protection Management”, which made modifications, additions to the scope, content, procedure and legal liability of the former provisions on EIA and established several related provisions, and at last established a complete environmental impact assessment system. Meanwhile, in order to further implement the strategy of sustainable development and promote the coordinated development of society, economy and environment, China promulgated the Environmental Impact Assessment Law in 2002. According to the Environmental Impact Assessment Law (2002), the scope of environmental impact assessment is generally limited to various kinds of planning that have great influence on environmental quality, development program, and construction projects. Environmental impact assessment can stimulate the enthusiasm of all sectors of society to protect the environment, in order to realize a wider public participation in environmental protection. Environmental impact assessment is a significant change to traditional economic development, and implementation of the environmental impact assessment system can provide a good reference for scientific, economic and social development in current China, and also provide the basis for the formulation of countermeasures for environmental protection and implementation of scientific management. However, the role of information disclosure in China is limited. Taking the Songhua River pollution incident as an example, local governments and enterprises failed to effectively open the specific circumstances of the corresponding water pollution incidents, leading to local residents panic. In addition, there are some provisions in the new revised Environmental Protection Law to promote environmental information disclosure.

4. The Second Layer of Social Transformation and Challenges

4.1. The Second Layer of Social Transformation—The Risk Society

During more than 30 years since the reform and opening up, China’s development model, lifestyles, consumption patterns and cognitive mode have been undergoing profound changes along with the rapid modernization and marketization. Such changes include the relationship between man and man, man and nature, the relationship between citizen and society, between citizen and country and between country and society [14]. Today, in the context of Chinese society facing globalization, the risk society arises. On the one hand, the promotion of modernization may be accompanied by many traditional risks; on the other hand, the process of social transformation brings many new risks that the state and the public have never encountered before. The second layer of social transformation is the transition from industrialized societies to post-industrial society. According to the German sociologist Ulrich Beck, reflexive modernization is a consequence of the risk of social self-conflict; industrial society leads to social self-confrontation, it is not possible to be disposed and digested according to the social system of the industry standard; the more modern the society is, the deeper the basic industrial society will be digested, changed and threatened [15]. In this process, the most significant sign is the emergence and development of the risk society. According to Beck’s theory, “By risks I mean above all radioactivity,

which completely evades human perceptive abilities, but also toxins and pollutants in the air, the water and foodstuffs, together with the accompanying short- and long-term effects on plants, animals and people. They induce systematic and often irreversible harm, generally remain invisible, are based on causal interpretations, and thus initially only exist in terms of the (scientific or anti-scientific) knowledge about them” [16]. As humans develop into the stage of “ecological civilization” and “risk society”, long-latent environmental problems or environmental risks make the issue more complicated, increasing the difficulty for management and control. Irreversibility of pollution and harms, in turn, adds more complexity to environmental problems or risks. Risks of modern risk society have significantly different characteristics from the former social risks: First, it happens across time and space. Risks arising from modernization have no geographical limit; in general, it has become a worldwide issue. Second, it is non-perceptible. Now, with the development of technology, consequences and dangers closely related to modern technology could not be directly perceived by victims. Transfer and movement of risk are often underlying and inherent. Third, the risk is unpredictable and uncontrollable. The risks of modern society have become extremely complicated, uncontrollable and unpredictable. Perfect evolving technologies and systems provide the perfect solution for controlling risk, yet at the same time it may lead to new and greater risks. Fourth, it has faster and stronger diffusivity and greater vulnerability. With the rapid development of China’s economy and society, resource use intensity increased, but the use efficiency did not subsequently increase. In the continuous process of economic development, China’s environmental, social and other interests suffered serious damage, while the gap between rich and poor is widening, and social security measures lag behind social reality, which means our society has entered a risk society.

The main features demonstrating that China has entered the risk society at present include:

- The market economy is an important source of risk in modern society, the profit-driven nature of the market economy has greatly stimulated the “institutionalization” of social risks;
- Science and technology is aggressively changing the frequency, scope, ways and influence that humans contact with nature, it not only increases the occurrence and scope of natural risks, but also makes the risk pattern evolve from a natural hazards dominant structure to a manmade uncertainty dominant structure;
- When human exploitation activities exceed environmental capacity, the overflow of environmental pollution and ecological destruction, in the case of long-term accumulation, can form environmental risk which affects human society.

At present, environmental risks in our country present a complex development, mainly manifested in the following aspects:

- The structural risk situation is grim as , currently, it is still mainly heavy industry that promotes the rapid development of China’s economy and society, development of traditional industry is still beyond the capacity of the environment, while the ability to withstand environmental risk is more fragile;
- As to risk caused by irrational location, site selection and location of many industries are along rivers, in densely populated areas, once an environmental event occurs, it will cause very serious environmental risks;

- Cumulative environmental risks increase with increasing human intervention in nature, intensified natural disaster risks, the possibility of long-term cumulative environmental risk outbreaks is increasing;
- New kinds of environmental risks are gradually revealed, with the rapid development of China's economy, the demand for various commodities continue to increase, in the process of consumption, new technologies whose safety has not been fully verified are continuously applied, which poses a potential threat to human health and ecological environment;
- External environmental risk threat is more and more prominent, China's interactions with foreign countries become more frequent than ever, currently foreign industry starts to transfer to China, during this process, the high environmental risk industries are transferred to our country which has brought serious pressure on our environment;
- Global environmental issues also increase the environmental risk in China, such as global warming [17].

4.2. Challenges for the Sustainable Development Raised by Risk Society

Under the conditions of the risk society, sustainable development is faced with enormous pressures and challenges. While the first generation of environmental and resource problems have not been fundamentally solved, human beings have encountered the unprecedented second generation of environmental and resource issues, such as climate change, ozone depletion, degradation of ecosystem, the risk of genetically modified organisms' technology, nuclear proliferation, chemicals that are harmful to human health and environment, *etc.* Due to the expanding production scale, continuous updated science and technology, the intervention and damage to the ecological environment have been increased. In turn, the "revenge" of nature caused by the imbalanced relationship between man and nature becomes more and more serious. Ecological risks become a basic risk that is unavoidable to human being.

Under the condition of risk society, sustainable development is facing the following challenges:

4.2.1. Coordination of Development Needs to Be Improved

The idea of modern development based only on economic growth regards development as pure GDP growth, materializes and simplifies social development, blindly pursues the raising of economic indicators, while the comprehensive, coordinated and harmonious development of society is ignored, without considering the ecological cost, safety cost and social cost of development, only focusing on realizing short-term effect and benefit. All these become important reasons for the frequent occurrence of multiple risks. Yet the social transitional period exacerbates a variety of "development diseases" [18]. Due to a short-sighted development pattern, China has over-emphasized economic development and social construction, and ecological protection does not receive the attention it deserves.

4.2.2. Public Safety Factor Should Be Concerned

Under the circumstance of the risk society, environmental protection has encountered great challenges, and the deterioration of the ecological environment has placed tremendous pressure on

economic development and social progress. Most of the risks are caused by collective irrational behavior. Once a risk occurs, it may cause harm to everyone equally, and no one can have a narrow escape considering different specific circumstances and conditions. The occurrences of most environmental risks are based on long-term environmental pollution, which is latent and indirect. The mission of law in risk society is to reduce the possibilities of underlying adverse factors, and management shall be targeted at uncertain problems caused by those possibilities. An important context of social development is to ensure public safety through social construction. Under the conditions of risk society, the unknown occurrence of risk and its strong destructive power make public safety the main social development task. In the process of sustainable development, environmental protection is a crucial pillar. The features of environmental risk determine that in this process, on the one hand, we need to realize economic growth; and on the other hand, we shall pay attention to public safety and its development.

4.2.3. Environmental Risks Shall Receive Great Attention

In the process of industrialization, the rapid development of China's economy is built upon the mass exploitation and utilization of resources. In this process, the low level of technology and extensive management reduce the level of resource efficiency. Although the economy has achieved great development, it brought about environmental risks and other issues in China, making sustainable development lack the foundation of environmental resource security. The ecological environment in China has been seriously damaged, yet good ecological environment is an important prerequisite for achieving sustainable development. The occurrence of multiple environmental risks makes us pay particular attention to ecological protection issues in the implementation of sustainable development.

Currently, China has entered into the risk society, and actual changes in social development of our country have brought new challenges to sustainable development. In the context of social transformation, China needs to deal with these challenges from various angles. Environmental law has an important role in supporting sustainable development. Nowadays, sustainable development is facing such problems as shortsighted development patterns, distribution of risk, ecological security, *etc.* In order to solve these problems, environmental law needs self-perfection, and to make a good legal response based on its development.

4.3. New Requirements for Environmental Law Proposed by Sustainable Development

In the transition process, new progress has been made in various areas in China. People's living standards are constantly improved, income is growing, and the law has also made remarkable achievements. However, the ecological environment has suffered serious damage at this stage. In order to control environmental pollution and ecological damage which has occurred in the development process we developed the environmental legal system, with the core of 1989 "Environmental Protection Law". Environmental law has played a major role in controlling environmental pollution, and protecting the environment. The development of society is accompanied with the occurrence of serious environmental risks, which caused great damage to some extent. The existing environmental law in China cannot effectively solve these environmental risk issues, and those problems impede the realization of sustainable development.

Sustainable development has achieved great success in China and it has received widespread social recognition. It also provides power and security for China's rapid economic development. Limitations regarding environmental and resource capacity, over-exploitation and utilization of environmental resources, and several bottleneck problems are becoming increasingly severe, such as the conflict between economic development and environmental protection, the excessive executive measures, and utilitarian tendencies. To break the current bottlenecks and improve the theory and system of sustainable development, it requires attention and support from the law, in particular environmental law [19].

4.3.1. The Function of Environmental Law Faces Legal Challenge

The function and task of law is to "recognize, determine, implement and safeguard the interests, or to meet various conflicting interest at the expense of as less (few/little) obstacles and waste as possible" [20]. In the transformation from an agricultural society to an industrial society, in order to protect and promote the economic and social development, especially the development of industrialized society, the rule of law is embodied in a logical way of promoting and safeguarding the production, expansion and re-development of wealth. In this legal tradition, environmental law is in fact only at the fringe of the legal system that is oriented by property law. Under the guidance of this logic, people regard economic development and wealth increase as the core content of development. In this condition, the mission of traditional environmental law lies in coordinating disputes between various interests in the process of economic development; when it is hard to coordinate, ecological environment benefits would make concessions for the development of economic interests. In this context, the legal function of environmental law is to coordinate and allocate the distribution of wealth. In the risk society, risk happens across time and space, and it is difficult to prevent, resulting in the occurrence of risk and its damages showing a "boomerang" effect, and the probability and impact of environmental risk greatly increase. Once an environmental risk occurs, it will cause great damage; and the serious outcome of environmental risk and environmental capacity allows environmental law to play its role in protecting the environment and reducing environmental risk. Through the effective regulation of human behavior that may result in environmental risk, the reduction and reallocation of potential environmental risk becomes an important part of legal function transition for our current legal system, especially for environmental law. In addition, how to coordinate the relationship between environmental law and other laws, and how to play the legal function of risk allocation of environmental law is an important challenge of environmental law in the context of social transformation.

4.3.2. New Development of Environmental Law

4.3.2.1. Prevention Should Become an Important Idea for Environmental Law

Currently, natural resource and environmental capacity is actually in a state of high-intensity exploitation and utilization. Environmental pollution and ecological damage make us realize that rational protection and use of resources is essential to achieve sustainable development. China cannot take the path the old way of western developed countries of "treatment after pollution". In the case of repeating such development pattern, China will have to pay an even bigger cost than the western countries. Risk in modern society has become extremely complex, and uncontrollable, unpredictable,

faster, stronger and greater diffusion and vulnerability are important features of environmental risks. To reduce the potential effects of environmental risks, China need to establish the legislative idea in environmental law that prevention shall be prior to treatment, and prevention is better than recovery. Therefore, the realization of the precautionary principle shall be the primary way of implementing environmental law, and become the goal of development of environmental law. Currently China is in a deepening development stage of industrialization and the prevention principle is an important principle guiding environmental protection. How to achieve the prevention of environmental risk and reduce its environmental damage is one of the challenges for environmental law.

4.3.2.2. Diversification of the Instruments of Environmental Law

“To gain and keep a place in the scientific community, it is practically essential to concentrate one’s research on a very narrow range of problems in a very restricted field within a particular discipline” [21]. Contradictorily, there is a phenomenon that social issues of many technologies are complicated, comprehensive, and multidisciplinary, making experts expose their limitations on knowledge to a certain sense. Experts are familiar only with their own area of expertise, but to other relative areas they are still “outsiders”. There is no expert on risk [16]. Limitation of single legislation and legislation dominated by the elite is more evident. In the field of environmental risk regulation, the general negative externality of behavior that does harm to the environment and the positive externality of protecting the environment, make the recognition that environmental risk regulation needs to rely mainly on administrative measures almost becomes a consensus [22]. Only using administrative measures to control pollution and prevent environmental risks plays a very limited role. Through market-based mechanisms, such as emission trading, environmental taxes, environmental protection contracts, environmental insurance, and the green market economy, can encourage people who develop and utilize resources consciously to take certain means to protect the environment and reduce environmental risks. The market economy, especially economic incentives can play an important role in protecting the environment. However, the current development of China’s market economy is not good enough, together with the intervention of government on economic development, single market adjustment means, and low economic stimulus cannot provide market-based means to regulate activities including exploitation, utilization and conservation of resources, and it is difficult for the market economy to meet the needs of environmental protection. On the premise that administrative regulations and administrative guidance are the main means of environmental protection in China, combining these two measures with economic incentives, public participation and other ways to respond to environmental risk, is the challenge raised by risk society to China’s environment law.

4.3.2.3. Expansion of the Risk Prevention Function of the Legal System

Risks of modern society become extremely complicated, uncontrollable and unpredictable. While the development of technologies and regimes providing improved solutions for controlling risk, it may bring greater new risks. In the risk society, uncertainty of risks requires the environmental legal system to be more flexible so that it can be updated and revised in a timely manner. In the process of transition from an agricultural society to an industrial society, the focus is on promoting social progress and economic development; and the focus of social progress and economic development is on exploitation

and utilization of resources; Therefore, assessment of the adverse effects which may be caused by this behavior is an important tool for the prevention and control of environmental pollution. The main task of these assessments is to evaluate the environmental impact of relevant activities and to make pre-target measures of prevention. However, the actual effects of these predictive activities are extremely limited, because attentions are still focused on the treatment after pollution. After a time preventive measures gained legal recognition, creating a legal regime with preventive functions in environmental law. In the transition from industrial society to post-industrial society, an increasing number of environmental risks cause more serious adverse effects to the environment and people. In the actual operation process, these preventive legal regimes can hardly respond to environmental risks. Taking the characteristics of environmental risks into account, legal regimes that can predict and assess environmental risks and encourage China to take necessary preventive means are urgently needed. Therefore, expansion of the risk prevention function of environmental legal regimes is an important tool for environmental law in dealing with risk.

5. The Environmental Law's Response to the Sustainable Development in the New Era

Since the industrial revolution, human nature, alienation of science and technology and many other factors determine that the natural environment is increasingly being placed under the control of people. The overloading of the earth's capacity makes the relationship between man and nature; and man and man gradually fall into chaos, being in disorderly situation. The actual ecological crises that hamper people's living standards and development—ecological disorder—have become a lingering problem for people under the risk society. In the current particular period of development and transformation, conflict between economic growth and the ecological environment and shortage of resources in China impedes normal development and benign social operation, while the shadow of ecological disorder is becoming increasingly prominent. For this reason, it is necessary to create an environment where people can achieve common survival and development, which enables all people in the community to have the opportunity to be in harmony with each other, and to achieve harmonization between man and nature. After achieving harmonization between man and nature, we gradually reach interpersonal isomorphic ecological order. In essence, ecological order is a relatively stable, sustained and coordinated dynamic balance status within a certain period formed in the interaction between nature and man, nature and society and its reflection on relationship between man and man, in the process of environmental and social development. Therefore ecological order is the inherent concept in the post-industrial era, which pursues coordinated development between economy and environment and harmony between man and nature. In order to achieve the evolution of the complex human-self-sustained structure, regulatory methods shall become the major path to establish, expand and reshape ecological order [23]. In this process, China not only needs to fulfill the main goals of industrial society—to improve people's living standards, to meet people's social needs—but also to respond to requirements proposed by the risk society, to realize stable, harmonious and sustainable development of the human and ecological environment. As a concept, strategy, policy, principle, or as a method or mode, sustainable development has a profound impact on social change; and legal regime as a kind of social system, is not only the result of social change, but also in turn directly impacts social transformation. Therefore, under the condition of social transformation, from a legal perspective we should respond to

the current obstacles of sustainable development [24], in order to meet the requirements and challenges proposed by social transformation.

In the transition process from an agricultural society to an industrial society, the main task of laws related to sustainable development is, on the one hand is dealing with environmental pollution, and protecting the environment and, on the other hand, to improve resource utilization efficiency, to improve innovations of science and technology, and to achieve coordination between environmental protection and economic and social development. In the social transformation from an industrial society to a risk society, continuous occurrence and expansion of risk factors bring attention to the concept of the risk society. Environmental risk is an extremely important risk factor. Characteristics of environmental risk such as anthropogenic source, diffusion of influence, difficulty of perception and mitigation, complexity of risk mental calculation, and seriousness of damage, propose new requirements to law in China. The missions of law on one hand is to control the risk and on the other hand to promote comprehensive, coordinated and sustainable development of human and society, these factors together determine that our country must adhere to the development and construction of a sustainable society. In addition, according to experiences from foreign practice, there is continuity in these two types of social transformation; it means that laws related to sustainable development not only need to adapt to the current status of industrialization and social development, but also need to respond to social challenges raised by sustainable development to a certain extent. When looking at the challenges faced by sustainable development from a legal perspective, people can find that these challenges put forward totally new demands on sustainable development. In order to promote sustainable development, the following aspects should be noted. At first, in terms of environmental and natural resources law, China shall pay attention to the function of rules in the process of legal remodeling, and use environmental regulations such as administrative regulation and economic incentives to reconstruct ecological order. Secondly, China needs to place emphasis on the procedural legal norms and use public participation to promote the generation and construction of public dialogue under China's complex social context, thereby expanding the expression mechanism of private and public environmental benefits; Thirdly, China must strengthen preventive measures as the primary tools during the implementation of environmental law, which means improving the content of the precautionary principle, the environmental impact assessment system, that risk assessment system and so on [23]. To be specific, environmental law should respond to the requirements of sustainable development in the following aspects.

5.1. Adjust Function of Environmental Law

The law is the tool to regulate interests. In the context of a risk society, relationships of various interests are becoming more diverse and complex. Social transformation inevitably leads to the update of legal function. Only through the establishment of legal ideas that fit modern society, can China gain a deeper insight into the nature of law and its laws of development, improve legal value at a higher level, build the spirit of a law of social transformation, and thus meet the needs of social transformation. Certainty is the basic feature of law. Legal certainty can be divided into extrinsic and intrinsic legal certainty. Extrinsic certainty depends on the needs order of in human life; law as a kind of social norm, its attributes such as clarity, universality and coerciveness constitute the certainty of

law itself, and that is intrinsic certainty; intrinsic certainty of law is also reflected in the fact that the formation of legal rights and obligations is according to and only according to human behavior, *i.e.*, the law determines allocation of resources which are insufficient according to human behaviors. Taking behavior as a regulated object not only shows the certainty of law, but also guarantees institutional balance of interest relationships [25]. Development of laws related to sustainable development is also an important reflection of legal certainty. The legalization process of sustainable development reflects the significant changes in current law; the law is no longer just a norm system of the existing social order, it is also the active constructor of the future social order. This shift of legal ideology provides the theoretical foundation and basic condition for the legislation of social risk [26].

In the current situation, multiple risk factors continuously emerge and become intensified in the process of social development, resulting in an unstable state social development process in China. Sustainable development and social construction, are directly related to China's economic and social development and the quality of people's lives. In current social conditions, in the process of sustainable development, China puts emphasis on coordination among economic construction, social development and ecological protection, but we also have to note that sustainable development has gradually become an important point of consensus on the development pattern of China's economy. Traditional sustainable development mainly emphasizes the sustainable use of natural resources from the point of view of maintaining friendly relationship between man and nature [27], but this concept of sustainable development of natural resources limits the further understanding on the concept of sustainable economic development, and consideration of social factors. Considering the actual situation of current social transition and specific requirements of sustainable development in China, the adjustments of functions of environmental law are mainly manifested as the following aspects.

5.1.1. Introduction to Public Safety

Law functions as an important guarantee of development, most of which, was established in the 1990s, as represented by the Environmental Protection Law (1989) [13]. In addition, after years of rapid development, China's economic development has made great achievements; people's living standards have been improved to higher levels, while the natural and social environment in which we live has always been in a worsening state. At that time, China was in the early stage of reform and opening-up, environmental pollution was the most significant phenomenon of environmental and ecological problem. Therefore, the primary goal for society then was to control environmental pollution and protect the environment. Accordingly, the objective of the Environmental Protection Law (1989) [13] is to protect and improve the living environment and the ecological environment, prevent pollution and other public hazards, safeguard human health and promote the development of socialist modernization". At that time, this provision set targets of environmental pollution management, human health protection and socialist modernization promotion, as legal objectives. Indeed, it has had significant impacts on the promotion of economic and social development and environmental pollution treatment. Yet with the country becoming a risk society, continuous occurrence and intensification of a variety of risks, especially environmental risks, raise new requirements for legal objectives of sustainable development, putting governance of environment pollution and protection of ecological environment to a more important position. After a long period of

social development, people's living standards have been improved; people's requirements regarding health are getting higher and higher, and along with the emergence of a risk society, legal definition of health needs to be broadened with the development of society. In a risk society, there is a high frequency of occurrence of environmental risks, causing serious adverse impact on local the environment and at the same time, bringing serious threats or even damages to local people's lives, property, health and safety. In this condition, the focus of legal objectives should be changed from the previous one of protecting humans from harm to that one requiring development should be more conducive to health. In a risk society, we should pay more attention to protection and application of the right to health. Currently, the definition of health in our country mainly refers to health of human body, with no consideration of health issues caused by ecological security. The scope of the definition of health is relatively narrow, and cannot meet the needs of social development in a risk society. Therefore, China should expand and improve the content of the term "health", thus ensuring the coordination among economic development, social development and ecological protection, and making people the focus of sustainable development. On 24 April 2014, the Standing Committee of the National People's Congress deliberated and approved the new Environmental Protection Law of the People's Republic of China (2014). Article 1 of this law stipulates that its legislative purpose is "to protect and improve the environment, prevent pollution and other public hazards, safeguard public health, promote the construction of ecological civilization, and to promote sustainable economic and social development". This shows that concern for public health is increasingly evident.

5.1.2. Priority of Ecological Safety

In the development process, China has reflected the idea that the objective of social development is to promote better economic development. In this process people can freely make use of any natural factor in the surrounding environment, without bearing any responsibility. In the process of China's economic development, this guiding principle is conducive to initiating people's activeness involvement in development, and to promote the development of China's economy and society. From the perspective of social development, this guiding ideology no longer meets the requirements of China's social reality, because natural resources and environmental capacity can hardly support the rapid economic and social development in China. Therefore, China should adjust legal ideas, setting sustainable development as the guiding philosophy of law. The sustainable development concept can help to play its role of coordination and balance between the environmental protection and economic and social development. Sustainable development is the best choice for coordinating a variety of issues that arise in the process of social transition, and it can help avoid or reduce various social problems in social transformation. It also helps to promote the modernization of various social elements. In addition, currently China already experiences some features of a risk society, thus the sustainable development requires sufficient for such social change considerations. So social risk prevention, and ecological security maintenance shall together with the development of social productive forces be the aims and objectives of Chinese legal operation [28]. Therefore, ecological security should be emphasized in the process of sustainable development. China is gradually trying to internalize the concern for ecological security into relevant laws, such as the revised "Environmental Protection Law (2014)", Article 29 of which provides that "the state defines an ecological protection red line in key

ecological function areas, environmentally sensitive areas, vulnerable ecological areas and *etc.* and carry on strict protection”.

5.1.3. Coordination of Multiple Interests

Sustainable development is a process of continuous coordination and balance of economic interest, social interest and environmental interest. In this process, coordination and development of multiple interests will help to achieve coordinated development and healthy development of society. In a risk society, the uncertainty of risk and the severity of damage requires careful attention to ecological security and risk control which, when reflected in the social development process, is to focus on coordinating the development of various interests. Therefore, in a risk society, for sustainable development, China should attach more emphasis on multi-stakeholder coordination and development. Add the element of “ecological interest” into the economic growth and social development framework; incorporate into the legal system timely security demands raised by the constantly changing and updating risks; expand the regulatory scope of law, showing a positive response to the uncertainty of risk [29].

5.2. Improvement of Some Legal Principles

5.2.1. Adjustment and Expansion of the Prevention Principle

5.2.1.1. Expansion of the Damage Prevention Principle

On the issue of pollution, western countries had taken the road of “treatment after pollution”. In the mid-20th century, western developed countries experienced serious environmental pollution. Currently, in the process of China’s rapid economic development, resources are constantly being exploited and utilized, and the continuous production, consumption and creation of waste, cause severe environmental pollution and ecological damage in China. For a long time, economic progress was at the center of development, and environmental protection law mainly relied on “end control”. Relevant provisions of the Environmental Protection Law (1989) [13] (e.g., Articles 25, 28, 29) still put emphasis on ways to deal with or treat pollutions, rather than effective prevention of potential pollutions. Two typical preventive legal regimes, environmental standards system and environmental impact assessment system, cannot fully play their preventive functions. The increasing severe environmental pollution and ecological damage requires the transition from prevention principle to precautionary principle [30]. The prevention principle shall be adjusted and expanded so that the center of the principle of prevention will be changed from the traditional damage prevention to risk prevention.

5.2.1.2. The Introduction of the Precautionary Principle

In the context of a risk society, facing more and more uncertainties, there should be some changes to the ideology of environmental law. In addition, apart from responding to certain damages, the content of the precautionary principle shall also deal with scientific uncertainty. The content of risk precaution should be added to the precautionary principle. Just as Principle 15 of the Rio Declaration states: “Where there are threats of serious or irreversible damage, lacking of scientific certainty shall

not be used as a reason for postponing cost-effective measures to prevent environmental degradation” [31]. Against the background of a risk society, a risk precaution principle should be confirmed under the precautionary principle [30], in order to play the guiding role as to the basic content of law applying to the risk era, and lead the direction of development for the legal regime, emphasize the role of “prevention” in the practical implementation of the precautionary principle, and prevent future environmental risks. Therefore, China should replace the prevention principle by the precautionary principle, improve and update its contents in accordance with the requirements of sustainable development, and include a risk precaution principle into the content of the precautionary principle.

5.2.2. Development of the Polluter Pays Principle

5.2.2.1. Replace the Polluter Pays Principle by the Causer Responsibility Principle

The polluter pays principle is the basic legal principle of existing laws on sustainable development in China, especially in environmental law. This principle provides that the polluter shall pay for the damage caused by environmental pollution and the cost to treat the pollution, people who utilize resources shall make economic compensation, the exploiter of environmental resources shall have the obligation to provide protection to natural resources, and organizations and individuals who damage environmental resources shall bear the responsibility to recover and treat the damages. This legal principle has guided our environmental protection activities for a long time, and it has played a positive role in promoting the prevention of environmental pollution. Along with the development of society, more and more resources are exploited for our consumer goods, some components of which are not originally in the natural environment, a lot of them are artificially synthesized products created by scientific technologies, such as: the existence and widespread use of plastic products, which bring convenience, but, at the meanwhile, they also lead to environmental pollution and ecological damage. Many consumer goods could be used repeatedly, but affected by social consumption patterns many products are abandoned after one-time use. According to the polluter pays principle, environmental pollution caused by production shall be treated by and be the responsibility of the producer of the product. However, according to the definition of ownership and right to use traditional civil law, when a customer purchases a product, the ownership of the goods has been transferred from producer to the consumer; the consumer then enjoys the full right contents of his (her) ownership on the product, and he (she) can decide how to use or consume all by himself (herself). The current consumption view of “throw once used” leads to the abandon of an increasing number of products after one-time use, which becomes a new source of waste and environmental pollution. With the rapid development of China’s economy and society, market economy growth and diversification of market subjects lead to the unbalanced information accessed by different subjects, producers cannot gain timely, full and effective information on consumers and users of their products, nor on the influence the product may have on the environment after use. Thus, simply making polluters carry the responsibility to protect the environment and treat pollution, may bring stricter social responsibility to producers, and increase the difficulty of producers’ fulfilling responsibility to protect the environment. Pollution is not only the result of the production process, but also the result of product and service consumption, coupled with the presence of diffuse non-point source pollution, and features of pollutants such as accumulation,

retention, mobility and complexity, so that determination of “polluter” is often very difficult. Especially in the context of the contemporary risk society, the emergence of new-type environmental risks such as global climate change or genetically modified organisms, make the “polluter” become a very vague concept, and in many cases it is impossible for us to accurately identify the “polluter”. The increasing difficulty of determining the “polluter” leads to complexity in understanding the polluter pays principle [32]. In addition, the expansion of consumer groups and the increase in the types and quantity of goods intensify environmental pollution through irrational use and disposal of products. Therefore, China should pay attention to consumers’ legal liability to protect the environment. “Polluter pays principle” cannot effectively cover this important concept. If replaced by “Causer Responsibility Principle”, it can cover consumers’ responsibility on the basis of the original producers’ environmental responsibility. Expansion of subjects who bear environmental protection responsibility from the original polluter to multiple subjects including producers and consumers is more conducive to pollution prevention and environmental protection. The Environmental Protection Law (2014) did not adopt “causer responsibility principle”, rather it used the phrase of “burden of responsibility”, but it also expands the scope of relevant subjects.

5.2.2.2. Diversification of Implementation of the Principle

An important factor in the transition from the polluter pays principle to the causer responsibility principle is the diversification of subjects who bear responsibility, including not only the traditional producers, but also sellers and consumers. In addition, because the main activities of these three actors are different, ways to implement the causer responsibility principle are there for diverse. First of all, as for producers, the realization of this principle includes the following aspects: select raw material for products that are favorable to the environment, apply environmentally friendly processing technologies to reduce environmental risks, strive to repeatedly use, and make full use of raw materials, and improve utilization rate of raw materials. Secondly, in terms of sellers, they should properly pay attention to the demands of environmental protection and risk control, and sell products that fit these criteria. Finally, when it comes to consumers, in the consumption process they should consciously select those products that meet environmental protection requirements, and can help reduce the risk, to achieve green and ecological consumption. In particular, the government should give priority to environmentally friendly products through administrative procurement.

5.3. Enrich and Expand Legal Enforcement Mechanisms for Sustainable Development

5.3.1. Improve Government Administrative Measures

In the “New Trends of Administrative Law Development in 21st Century”, Prof. Cheng Chung-mo points out that: “Today, there is no difference between people who rule and people who are ruled, and administrative and social responsibility distribution of one unilateral administrative power has long been replaced by the concept of administrative partner and responsibility partner” [33]. This manifests the changes of administrative functions brought by social transition, and those changes become more obvious under the characteristics of law on sustainable development. China should fully play the role of government in the environmental protection process, especially in the establishment, enforcement

and implementation of environmental standards, environmental monitoring, information disclosure and legal responsibilities.

Considering the severe environmental pollution and ecological damage, and the fact that China is the pressure caused by both industrialization and the risk society, China shall continue to recognize the government as the main executive body, and adhere to the legal implementation mechanism centered on administrative measures, to properly deal with relevant issues. In addition, due to the development of a market economy and diversification of market subjects, actual information that government is also able to gain is relatively limited. In order to better attain information on market subjects' exploitation and utilization of resources and discharge of pollutants, government should take measures, such as administrative contracts, administrative supervision and administrative guidance, to fulfill its role. At the same time, the government's environmental responsibility should be strengthened, governmental behavior shall be regulated and constrained, and legal regimes that can effectively restrain government and prompt government and its staff at all levels to fulfill their environmental protection duties according to law shall be established [34]. In the development of a market economy, the government should also develop industrial policies that are conducive to development, utilization and protection of environmental resources; establish and improve the integrated decision-making system and mechanism for the environment and development; and enhance the government's ability for integrated decision-making and coordination in the aspects of industrial restructuring, resource utilization and environmental protection. Article 21 and 22 of the Environmental Protection Law (2014) provide that the government shall adopt ways such as financial support, taxation, pricing, and government procurement, to promote development of environmentally-friendly industry and reduction of pollutant emissions.

Article 10 of the Environmental Protection Law (2014) provides that, "The competent department of environmental protection administration under the State Council shall conduct unified supervision and management of the environmental protection work throughout the country. The competent departments of environmental protection administration of the local people's governments at or above the county level in charge of environmental protection, environmental protection works. People's governments above the county level environmental protection departments and the armed forces, in accordance with the provisions of relevant laws on resource conservation and pollution prevention and other environmental supervision and management work". Accordingly, at present, activities such as environmental protection, pollution prevention and control are mainly conducted by environmental protection departments of people's government at all levels; that is to say environmental protection activities are carried out according to its administrative area, rather than environmental units. Such arrangement of environmental protection can fit the specific characteristics of local economic progress, social development and environmental protection, and achieve good results. However we should note that in practice this arrangement may lead to the disharmony and imbalance of economic and social development and environmental protection of one region with that of other regions, making it impossible to take coordinated treatment for a specific environmental factor in a larger ecological area, which result in the low effectiveness of sustainable development in the whole region, despite huge efforts made by one administrative area, because of the imbalance with other areas. From this point of view, we should strengthen the role of regional ecological protection department, including regional governance and river basin management in the process of ecological protection; and coordinate economic progress, social development and environmental protection in a larger ecological area, in

order to achieve sustainable development and better respond to the new challenges and demands for sustainable development proposed by social transformation. Article 20 of the Environmental Protection Law (2014) provides that, “the state sets up a joint prevention and control coordination mechanism, which deals with environmental pollution and ecological damage in key areas and watershed crossing administrative regions, and carry out overall planning, unified standards, comprehensive monitoring, and integrated prevention measures”.

5.3.2. Make Full Use of Market-Based Instruments

In reality, certain targets of environmental protection failed because the government pursues its own interests. To reduce the adverse effects on the environment caused by government failure, China should emphasize the active role of the market economy, in order to promote the realization of sustainable development goals. The environmental supervision and management system should also draw on the advantages of the market economy and the introduction of market economic factors in the appropriate management activities, and solve some environmental problems relying on market economy means. China also needs to focus on economic incentives, such as: effluent charge, environmental taxes, emissions trading and bans. Compared with the direct regulation mode of command and control, economic incentives introduce economic factors into environmental laws and policies. Through the introduction and operation of market mechanisms, “commercialization” of environmental protection work itself has become part of economic development, in the long run, which will be able to reconcile the conflict between environmental protection and economic growth [35]. Economic incentives can have both flexibility and efficiency in achieving environmental policy goals, and it can produce sustained guidance and stimulation to further reducing emissions and applying clean technologies [36]. Combining administrative regulation and economic instruments can help to play their corresponding roles, in order to eliminate the negative factors hindering sustainable development arising from government failure and market failure. The market can push the market players to pursue more economic benefit, while the government supervision and enforcement are needed to reduce market failures. In this process, China should gradually establish a paid use system of resources and a pricing formation mechanism; explore and establish economic compensation system of environmental protection and ecological restoration, in particular strengthening the application and improvement of scientific and economic instruments [37], and various approaches such as polluter pays, emission trading, green taxes, environmental contracts, environmental insurance and green market, to better take advantage of market forces in order to provide more powerful means for sustainable development. At the same time, establishing strict environmental standard and encouraging companies to establish their own environmental standards by the economic stimulus are both needed to fully enforce the environmental standards. In addition, the energy efficiency labeling of appliances can also be a useful means.

5.3.3. Improve Mechanisms for Effective Public Participation

Baker believes that to solve problems in risk society, there is a need for ecological democracy. To deal with risk by “rebuild of politics”, “get rid of the monopoly of expertise”, “achieve open jurisdiction”, “all participants must be aware that a good decision is not developed, nor made from the

outside. China needs to achieve an open decision-making structure". The closed-door negotiations between experts and policy-makers must be communicated to or converted into an open dialogue between the various agents [38]. Risk management requires more active participation of all parties, and a platform of resource and information interaction and exchange shall be built among government, enterprises, community and non-profit organizations, to establish a network of trust relationships, and to share risk responsibilities; for the individual, they should take a more conscious attitude and more active measures of self-protection. In addition, this provides a more viable solution to multiple social risks, which is a risk-sharing mechanism formed by way of deliberative democracy [39].

Public participation mechanisms can protect people's right to know basic information of their surrounding environment, their environmental rights and obligations, and to participate in decision-making and implementation processes. In a risk society, the application of a public participation principle can help protect the public's right to know, help the decision makers gain information on certain issues, and allow the majority people to take function in the decision-making. Facing the challenges of risk society, China should expand and strengthen our own democracy along the direction of deliberative democracy, only in that way can we properly deal with ecological disaster and achieve sustainable development goals under the risk society [40]. In order to play the role of the public participation principle to the greatest extent, China should stick to and improve contents related to the principle. The Environmental Protection Law (2014) contains a special chapter on "information disclosure and public participation", providing provisions on citizens', legal persons' and other organizations' access to information and participation in environmental protection, which reflects the growing recognition of the importance of public participation.

5.3.3.1. Diversification of Public Participation Actors

"Who belongs to the public" and "Who represents the public" are representative questions proposed by environmental public participation actors. Actors with high representativeness participating in environmental decision-making can contribute to the acceptance and implementation of final environmental decisions, which reduce the cost of environmental policy implementation and raise the effectiveness of environmental regulation [41]. Therefore, public participation subjects selected in scientific way can promote the smooth operation of environmental protection activities. Public participation shall include expertise from the scientific community and academic fields related to environmental protection. When the implementation of environmental policies affects the interests of people in a particular region, in decision making process, the affected stakeholders should be regarded as public representatives in the decision making process China should listen carefully and rationally weigh their objections, and make reasonable decisions.

5.3.3.2. Guarantee the Effective Realization of Public Participation

First, it should be stipulated in procedural law that the public has the right to participate in practical environmental protection activities, in order to ensure effective implementation of public participation, and substantive law shall provide corresponding provisions on methods for public participation. Secondly, procedural law shall contain provisions on the information disclosure system, an important prerequisite for public participation principle, including its detailed contents, procedures and measures,

in coordination with other legal requirements. Of course, adequate attention should also be paid to the experts' role in identifying and dealing with environmental risks. For public participation, comprehensive and effective regulations shall be established. More importantly, practical implementation of public participation shall be attained. That is to say, we must not only let the public know about exploitation and utilization activities, but also, which is more crucial, we must create opportunities and channels for them to participate in environmental protection, China should protect their right to comprehensively and effectively express their opinions on the relevant activities, and guarantee that their viewpoints can be reflected and applied in the subsequent environmental protection work. This is necessary in order to promote the development of substantive regulations on public participation [42], and achieve a deeper level of public participation. Finally, as to legal liability, China should give negative evaluation to behaviors impeding the implementation of public participation in environmental protection, and provide penalties to regulate those behaviors.

5.4. Improvement of Basic Legal Regimes of Environmental Law

Sustainable development requires support and promotion from a variety of elements, such as law and technology. The risk society is a society full of uncertainties. The process of China's industrialization is overlapping with the risk society. Transition from industrial society to risk society means the whole society has undergone a structural change, and such change will inevitably lead to the practical transformation of legal regimes [43].

5.4.1. Improvement of Environmental Impact Assessment System

5.4.1.1. Expand the Content of Environmental Impact Assessment

According to the 2002 “*Environmental Impact Assessment Law*”, regulations on EIA of construction projects are mainly divided by the degree of potential impact they may exert on the environment, and into different categories of projects. Different regulatory measures apply to different categories. Currently, the environmental impact assessment system includes environmental impact assessment on planning and construction projects. With the development of society, environment risk occurs constantly. To further reduce the damage that may be caused by environmental risks, the public needs to conduct scientific environmental impact assessment on all sorts of resources development and utilization activities. Therefore, the content of the existing EIA system shall also include exploitation and utilization activities, and new kinds of pollution companies with agricultural development. In addition, the focus of the current EIA system is still on the adverse effect that construction projects may have on the environment, which does not take environmental risk into account. The frequent occurrence of environmental risk and the severe damages that it may cause, determine that China shall also pay attention to environmental risk prevention. Therefore, EIA of environmental risk shall be included into the content of environmental impact assessment system.

5.4.1.2. Establish Planning Environmental Impact Assessment

To improve the EIA system in China, the national economic and social development plans, local regulation, and policies should also be included in the scope of strategic environmental impact

assessment, and the scope should gradually be extended to national laws and administrative regulations, and even legislative activities for environmental protection and natural resources protection. The law shall specify the subject and object of assessment, evaluation methods, evaluation data collection and organization, role of assessment conclusions and related work, in order to achieve standardized operation. China should establish and improve the strategic environmental assessment system for environmental and resources legislation, provide scientific and objective criteria and standards for the assessment of environmental and resources legislations, including the various elements and links that reflect the feasibility and effectiveness of the implementation of environmental resources regulation, in order to gradually expand and improve our strategic environmental impact assessment system and build up a comprehensive EIA system. Thus, China can gradually expand and improve its strategic EIA system [38].

5.4.2. Establishment and Operation of the Information Disclosure System

As to information disclosure, Madison said that: “To become masters of their own public, they must use the knowledge learned in the implied powers to arm themselves; If the Government does not provide sufficient information for the public, or the lack of a public information flow channel, then the so-called public-facing government, is reduced to a farce or a tragedy or a tragicomedy prologue” [44]. In the risk society, risk is constructed in a certain extent. The media takes the initiative in the process of propagandizing the various environmental risks. In this process, for its own benefit, the media may have exaggeratedly propagandized the risks. In order to better cope with this problem, we need to build and strengthen the operation of an information disclosure system to allow the public easy access to comprehensive timely and understandable the relevant environmental information, so as to be able to make the right judgments.

5.4.2.1. Diversification of the Subject of Information Disclosure

In the current context of the risk society, the frequent occurrence of environmental risk and environmental crises raise new demands and challenges for environmental management. How to better gain more comprehensive information is the key element to solve the problem. Determination of the subjects of environmental information disclosure is a prerequisite for the operation of this system. Currently, it is the government who has the most abundant and comprehensive information. According to Article 3 of Measures for Disclosure of Environmental Information (for Trial Implementation), State Environmental Protection Administration of China (SEPA) is responsible for promoting, guiding, coordinating and supervising the work of national environmental information disclosure. Local people's governments at or above the county level environmental protection department are responsible for organizing, coordinating and supervising the work of environmental information disclosure in its administrative areas. Government naturally becomes the subject of environmental information disclosure.

Besides government, enterprise is an important source of environmental risks. Environmental information disclosure by enterprise is the premise for law enforcement agencies of environmental risk regulation. Article 20 of the Measures for Disclosure of Environmental Information (for Trial Implementation), provides that companies shall not use the excuse of business secrecy to refuse to

disclose information such as their name, address, and legal representative of the company; names of major pollutants, means of discharge, and the total emission concentration, whether or not the discharge fits within environmental standards or exceeds the stated quantity; the construction and operation situation of environmental protection facilities; the emergency plan for environmental pollution, *etc.* These kinds of information are crucial for the public to gain awareness of uncertainties in the environment in which they live. Taking into account the need for dealing with environmental accidents, companies shall also be the subject of information disclosure. The Environmental Protection Law (2014) also stipulates that government departments, sewage units, and construction units have the obligation of information disclosure.

5.4.2.2. The Statutory Scope of Information Disclosure

Currently, in China, the Measures for Disclosure of Environmental Information (for Trial Implementation) stipulates scope of government environmental information disclosure and corporate environmental information disclosure. However, it is noted that the body which formulated the Measures for Disclosure of Environmental Information (for Trial Implementation) is the former State Environmental Protection Administration. There are a lot of departments responsible for environmental protection task in China, and based on the current division of tasks and authorities, conflicts often occur. These departments do not have clear guidance on division of responsibilities, cooperation and information sharing mechanisms [22]. As to enterprises' environment information disclosure, Article 11 and Article 13 of the Measures for Disclosure of Environmental Information (for Trial Implementation) provide that, the enterprise who bears the duty of information disclosure only includes "the list of companies whose pollutant emissions exceed the national or local discharge standards, or heavily polluting enterprises determined by local government whose total discharge of pollutants exceeded the total emissions control". The scope is very narrow, and needs to be expanded. Article 55 of the Environmental Protection Law (2014) stipulates that a key pollutant-discharging entity shall make public the names of its major pollutants, the ways of emission, the emission concentration and total volume, whether the emission exceeds relevant limits, as well as the construction and operation of pollution prevention and control facilities and accept social supervision.

5.4.2.3. Standardization of Information Disclosure

Both the Regulation on Government Information Disclosure (2007) and the Measures for Disclosure of Environmental Information (for Trial Implementation) contain the requirements of timeliness and accuracy for environmental information disclosure. However, for environmental information disclosure, the following aspects shall be paid attention. Firstly, disclosed environmental information shall be easy to understand and access. Currently, the inherent scientific and technical features of environmental problems determine that environmental information may contain a large amount of professional and technical terminology, for which the general public are not equipped with the relevant professional knowledge and skills to be able to understand its true meaning, which is not conducive to public participation in environmental protection. Therefore, in the process of environmental information disclosure, enterprises should adopt language and practices that the general public can understand. Secondly, bi-directional environmental information disclosure shall be

established, that is to say that the disclosure of environmental information should be bi-directional, including both government information disclosure to the public and the public's feedback and exchange of information to the government. By communication and information exchange, we can achieve more comprehensive information. Thirdly, China shall pay attention to the diversity of environmental information disclosure approaches. With the development of society and technological progress, the development of a variety of media provides various options for information disclosure. Therefore, approaches of environmental information disclosure can be diversified, which include: announcements, to use media such as newspapers, television, radio, the Internet to release brief or special news, to distribute information pamphlets and other written materials in news conference *etc.* [45].

5.4.3. Establishment of a Risk Assessment System

Achieving socially sustainable development needs coordination and balance among environmental protection, economic progress, and social development. Environmental protection and economic and social development should be in a balanced relationship. If one of these factors is being overly emphasized or promoted, it is likely to undermine proper coordination and balance and affect the achievement of sustainable development. Governance of the risk society needs the guarantee of legal regimes, and should be conducted within the range of established rules. To this end, it is necessary to create a particular legal regime, to regulate risk behavior in the long-term, and to achieve stability and predictability in the risk management process. Therefore, China should engage in systematic research that is in line with the whole process of sustainable development, and establish an effective legal mechanism on early warning. Generally speaking, risk early warning refers to systems based on development laws applying to different matters, through detailed data collection and research, using advanced technologies and means to make accurate judgments for facing reality, and accordingly to evaluate, forecast and warn on the quality and effects of a certain part or overall social operation [46]. An early warning mechanism is the legal mechanism that collects, analyzes, and evaluates corresponding information in the process of environmental protection, economic development and social operation. This mechanism analyzes and evaluates potential factors which affect sustainable development, finds out the main adverse factor, and presets targeted remedial measures, in order to reduce the adverse environmental impacts to the minimum level. It is a supplement to and further improvement upon environmental impact assessment and it includes all the elements of sustainable development incorporated in EIA; it takes effective preventive measures to prevent regional and systemic factors from impeding sustainable development. At the same time, we need to set sustainable development as an important basis for social management, and take different measures on different subjects, in order to reduce the barriers in the process of sustainable development [47]. Article 18 of Environmental Protection Law (2014) provides that, "People's government at or above provincial level should organize relevant departments or authorize professional agencies to investigate and evaluate environmental situation, and establish environmental resources capacity monitoring and early warning mechanisms".

Development and implementation of a risk assessment legal regime can enhance risk prediction and take early targeted measures to reduce the adverse environmental risks that may arise. In this context, the subject and object of scientific risk assessment and evaluation procedures may influence the actual effect of this legal regime in practice.

5.4.3.1. The Subject of Risk Assessment

In China, governments have a large amount of environmental information, and thus they have a more profound understanding of the corresponding environmental problems and also bear the obligation to protect the environment. Therefore, the government should be established as the subject of risk assessment and early warning, and can fully exploit its advantage in terms of information and human resources, in order to achieve the objectives of the system. We suggest that evaluation of planning and construction projects shall be made by professional technical agencies authorized by competent environmental protection departments.

5.4.3.2. Object of Risk Assessment

Under the risk society, uncertainty and other factors of risk determine that the occurrence of risk is a potentiality; *i.e.*, the probability and extent of potential damages of risk are still unknown. Environmental risks may in fact cause significant adverse impact on our lives. So the public need to pay special attention to those risks that are likely to result in great adverse environmental effects, and engage accordingly in risk prediction and evaluation. Environmental risks can be divided into two categories. First, there are sudden environmental risks of environmental pollution accidents. Secondly, there are non-sudden environmental risks, including health risk and ecological risk. The scope of risk assessment should include not only construction projects, but also strategic planning, because compared with construction projects, planning often hides even greater environmental risks and social risks. Besides major construction projects, general construction projects shall also be included within the scope of risk assessment, in order to take every potential risk factors into account. The Environmental Protection Law (2014) stipulates that people's governments at or above the county level shall establish public environmental pollution monitoring and early warning mechanisms.

5.4.3.3. Procedures of Risk Assessment

The procedure of a risk assessment operation mainly includes the following aspects: First, determining the panel members for risk assessment. The scientific selection of professional scientists has important implication on risk assessment. The panel members shall include experts of the particular project, legal experts, environmental science experts, and social science experts. As to the determination and selection of experts, a certain administrative department can build up an expert database on the basis of current information. When making those risk assessments, the experts can be randomly selected from the expert database. Second, setting specific procedures for risk assessment. The assessment shall be chaired by administrative organs, which have no direct interest relationship with the project, and shall be made in accordance with the scientific and technological standards and the actual situation. During the demonstration process, we should pay attention to public participation, and the environmental information disclosure. Listening to public opinion about the adverse environmental effects through seminars, and explaining whether the relevant advice was adopted. Risk communication mechanism should be gradually incorporated into the public participation. China needs to convey the possible risk and suggested prevention methods of the project to stakeholders. Encouraging the construction units to use questionnaires, seminars and other forms, to make face-to-face

communication on environmental risk issues and enhance public understanding on the project [48]. Third, approval of the risk assessment result, China shall organize the relevant personnel and institutions to make a decision, requiring the panel members to explain the relevant content, and at last make a rational decision based on a full understanding of the content. On this basis, corresponding legal liabilities shall also be stipulated to ensure the appropriate operation of risk assessment.

5.4.4. Improvement of Environmental Tax System

Implementation of environmental taxes may contribute to the enforcement of the precautionary principle in environmental law. In order to eliminate the difference between marginal private costs and marginal social costs caused by “negative externalities”, government should carry out intervention measures, thus internalizing the externality costs, forcing polluters to bear real costs and benefits, to control the amount of pollution and achieve optimal allocation of resources [49]. Environmental tax is an important way to achieve the internalization of external costs for the polluters. Currently, China’s revenue model is based on fees, and supplemented by taxation. In practice, although it plays an important role in environmental protection, regulation is not enough. Learning from the setting and implementation of environmental tax in foreign countries, China can gradually carry out “tax reform”. The first step can be targeted at large-scale emitters of pollutants, which at the same time are relatively stable and easy to levy taxes against, such as sulfur dioxide, water pollutants and so on. As regards other pollutants, the authorities can still levy discharge fees according to the original regulations [50]. The Environmental Protection Law (2014) stipulates that for pollutants upon which taxes have been imposed in accordance with the law, there is no need to pay effluent fees. The scope of environmental taxes shall include pollutant discharges, such as wastewater, waste gas, and solid waste, and carbon dioxide emissions. The tax rate should be set according to the actual situation in our country, and the different pollution situation and degree of each pollutant in different areas, and the tax department shall be in charge of tax levy. All the taxes levied shall be used in environmental protection [51], in order to promote the development of environmental protection.

6. Conclusions

China has not yet completed the transformation from an agricultural society to an industrial society, and has not yet finished the process of industrialization. However, China is already confronted with issues related to the risk society and post-industrial society. Compared with western countries, China’s social transformation is more complicated. Challenges for economic progress, social development and environmental protection are more severe, and the task of promoting sustainable development is more difficult. Social transition and law interact with each other, thus the law is required to be adjusted and improved to follow the development of society. As to environmental law, in order to solve questions such as how to respond to the particular stage of social transformation and development, and how to achieve sustainable development, coordinated consideration is urgently needed. Needless to say, environmental law shall be adjusted in aspects of ideology, principle, legal regime, mechanism and so on, on the basis of the particular requirements of social transition and actual challenges for sustainable development, in order to better respond to these demands and challenges. In fact, China’s environmental problems include both environmental pollution and ecological destruction, and

environmental protection work needs to start from multiple levels in a variety of ways. Taking the revision of the Environmental Protection Law as an example, on the one hand, China needs to add provisions on the environmental protection responsibility of enterprises, the daily metering penalty, detention and other means to strengthen pollution control. On the other hand, we also need to protect the ecological environment through ecological red lines, ecological compensation, *etc.* In this “best and worst” era, the questions remain and require further research, how to realize sustainable development in the context of industrialization and the risk society, and how to respond to the demands and challenges for environmental law.

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Conflicts of Interest

The author declares no conflict of interest.

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