

Population, Resources, the Environment and Sustainable Development

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Abstract The formation of population, resources and environmental issues is directly related to the excessive growth of population, the excessive use and consumption of resources, and environmental pollution. Therefore, it is necessary to curb the excessive growth of population, rationally utilize natural resources, enhance the purification capacity of the environment, and promote the coordinated development of population, resources and the environment to make the economic development process sustainable.

Key words Population; Resources; Environment; Sustainable development

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Sustainable development is the product of people's deepening understanding of the relationship between population, resources and the environment. People raise the issue of sustainable development in the process of deepening the understanding of population, resources and the environment. The formation of population, resources and environmental issues is directly linked to the rapid growth of population, excessive utilization and consumption of resources, and environmental pollution. Therefore, to achieve the goal of sustainable development, on the one hand, it is necessary to eliminate population, resources and environmental issues in the process of economic development to coordinate their relationship; on the other hand, it is necessary to transform economic development mode and incorporate environmental protection into economic development plans to make economic development process sustainable.

1 Populations and economic development

1.1 Population and economic development

1.1.1 Relationship between population and industrial structure. Marx pointed out that population and population density are the material prerequisites for the internal division of labor in society^[1]. Industrial structure is carried out based on social division of labor. Due to the different conditions of the population, the requirements for social division of labor are different, and the requirements for industrial structure are also different. In the development process of human society, agriculture is generally developed first, then light industry can be developed, and finally heavy industry is developed to provide advanced production means for agriculture and light industry, thus forming an industrial structure with large industries as the main sectors. On the basis of high development of material production departments, the tertiary industry, which is mainly based on service industry, can develop rapidly. Obviously, without a certain

number of people, it is difficult to establish a complete industrial system.

1.1.2 Relationship between population and national income.

Firstly, national income per capita and its growth rate are indicators that directly reflect the relationship between population and national income. Under the condition that the total national income is the same, the larger the population is, the lower the national income per capita is; on the contrary, the smaller the population is, the higher the national income per capita is. Under the condition that the growth rate of population remains unchanged, the faster the national income grows, the higher the growth rate of national income per capita is; on the contrary, the slower the national income grows, the lower the growth rate of national income per capita is. Secondly, after the initial distribution and redistribution of national income, it eventually forms accumulation fund and consumption fund, and there is a trade-off between the two. The lowest limit of the accumulation fund is the highest limit of the consumption fund, and the lowest limit of the consumption fund is the highest limit of the accumulation fund. Under the condition that the total national income is established, the quantity depends mainly on the growth speed of population and the speed of improvement in people's life. If national income per capita grows fast, more national income is available; on the contrary, less national income is available.

1.1.3 Relationship between population and consumption. The first is consumption level. Consumption level refers to the satisfaction of people to the material and cultural needs in the consumption process. An important indicator for measuring consumption level is the average consumption level of society, which is calculated on the basis of per capita physical and labor consumer goods. Under the condition that total population is established, consumption level depends on the quantity of consumer goods, and the two are directly proportional. The second is the composition of consumption. The composition of consumption refers to the proportion of various consumer goods and labour services in consumer spending. The composition of consumption is affected by many factors such as the composi-

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tion, quantity and quality of the population and social consumption level. Among them, population has a major constraint on the composition of consumption by affecting per capita consumption fund. The third is the impact of economic development on population. Traditional economics believes that economic development is conducive to population growth, and the growth rate of population increases if per capita income rises. However, the experience of developed countries shows that when the economy develops to a certain extent, the birth rate will decline, which will help slow down population growth.

1.2 Population quality and economic development

1.2.1 Regulations on population quality. Population quality is a comprehensive manifestation of overall physical, cultural and ideological qualities of the population. It reflects the conditions and capabilities of the population as a whole to understand and transform the world. Population quality is ultimately determined by economic development, but it in turn strongly influences and constrains the economic process.

1.2.2 Population quality restricts the quality of labor force. Labor force is part of the total population, and its quality is determined by the quality of the total population. Any countermeasure that can improve population quality can improve the quality of labor force. By improving the quality of labor force, three kinds of talents can be created for the development of social economy: one is the talents who have scientific discovery, invention and innovation; the other is the talents who are proficient in advanced production methods; the third is the management talents who are good at organization, control and coordination. At the same time, knowledge-intensive products can be increased.

1.2.3 Population quality and scientific and technological progress. The greater the contribution of science and technology to economic development is, the higher the requirements of economic development for population quality and the quality of labor force (especially the cultural quality of workers) are. The advancement of science and technology will inevitably require a corresponding increase in population quality. First, the development of science and technology requires a large number of high-quality talents engaged in scientific research and technology promotion; second, the transformation of scientific and technological achievements into real productivity requires a large number of workers with operational skills.

2 Population and resources

2.1 Resource-related population signs

2.1.1 Optimum population. Optimum population means that when a country's labor force is able to make full use of its available resources, or as a country reaches its highest standard of living under certain conditions, the population is the country's optimum population. However, this balance is not static. As resources increase, the level of optimum population also increases. In fact, the level of optimum population will vary with time and space depending on various factors such as the size of a country, actual or potential resources, the quality of technology and transportation and social structure.

2.1.2 Overpopulation. Overpopulation means that when the population exceeds the resources available in a country, the country is overpopulated. The reasons are population growth, resource depletion and natural disasters. In other words, when resource growth cannot keep up with population growth and the growth of the tertiary industry lags behind the development of science and technology, overpopulation may appear. Overpopulation includes absolute overpopulation and relative overpopulation. The former means that production has reached its maximum and life continues to be at a very low level. The latter refers to the fact that although there is potential to greatly increase productivity, current productivity is not sufficient to fully support the current population.

2.1.3 Underpopulation. Underpopulation means that the population of a country or region is too small to adequately or effectively utilize the resources of the country and the region. In other words, underpopulation means that the resources of a country or region can support more people but not lower their standard of living. Underpopulation mainly refers to the shortage of relative population.

2.2 Population and non-renewable resources On the one hand, the relationship between population and non-renewable resources is reflected in the impact of population growth on non-renewable resources. There is no inevitable connection between the growth rate of population and the consumption rate of resources, and a country's income level has an important impact on the speed of resource storage and consumption. A country with rapid population growth and slow income growth will consume less resources than a country with stable population and rapid income growth because the market demand of income level for resources is large. On the other hand, changes in quantity of resources used in any country are closely related to their market size and population size. As long as a certain resource becomes scarce, its price will increase, which will stimulate people to implement resource protection, improve mining technology, and seek cheaper alternatives.

2.3 Population and renewable resources

2.3.1 Impact of population on agriculture. If other conditions remain unchanged, the expansion of agricultural labor force will reduce labor productivity and correspondingly reduce farmers' income.

2.3.2 Impact of population on land. Because of population growth, expanding cultivated land and strengthening land use will also lead to further erosion of land, and this problem is particularly serious especially in places where property rights are unclear and agricultural practices are not appropriate.

2.3.3 Impact of population on forests and fishery. Since the demand for wood, woodland, and fish is closely related to population, sustained and rapid population growth poses a threat to these resources.

3 Population and the natural ecological environment

3.1 Population should maintain a harmonious relationship with the natural ecological environment The natural

ecological environment includes atmospheric environment, water environment, soil environment, biological environment, etc. Population is one of advanced and active factors in the natural ecological environment, so the relationship between population and the ecological environment is very important. Only when population maintains a mutually reinforcing relationship with the natural ecological environment can human beings be in a state of sustainable development. Otherwise, while destroying the natural ecological environment, human beings also pollute the atmosphere, water bodies and cultivated land, thereby leading to the reduction and extinction of other biological species.

3.2 Causes of population ecological problems Since the entry of human society into the 18th century, the population has increased dramatically, and people's ability to conquer nature has greatly increased. Due to unscientific and unreasonable economic activities, the use, destruction and discharge of natural materials have exceeded their ability to regenerate and self-purify, resulting in air pollution, water pollution, soil pollution, biological pollution and shortage of various natural resources and creating population ecological problems. The reasons are as follows: firstly, when other conditions are unchanged, the more population growth is, the greater the pressure on the ecological environment is; the second is the unscientific and unreasonable production and economic activities; thirdly, human use of various physical energy sources, absorption of nutrient sources, waste discharge and lifestyle choices have a great impact on the ecological environment.

3.3 The contradiction between population and the ecological environment will be further sharpened Under certain conditions of living standard, when population develops to the critical point of self-purification capacity of the ecological environment, population increase will cause the deterioration of the ecological environment. The greater the population is, the more serious the damage and pollution of the ecological environment is. Because population increase puts tremendous pressure on cultivated land, forests, grasslands, fresh water and various energy sources. In addition, population increase has forced the unscientific and irrational increase of economic activities, bringing the carrying capacity of the ecological environment to the limit, and even overloading in some places. In China alone, due to the inertia of population movement and the law of population reproduction, even if the fertility rate is below the replacement level, total population will continue to grow for a period of time, so the contradiction between population and the ecological environment will be further sharpened.

4 Sustainable development of population, resources and the environment

4.1 Reviewing past development models The formation of population, resources and environmental issues is related to the uncoordinated relationship between population, resources and the environment, and is closely related to the economic and social development model. First, the global environmental pollution problem has become increasingly serious largely because of the "high consumption, high investment and high pol-

lution" production mode since the industrial revolution. Although this mode of production has greatly improved the productivity of some countries, it has also caused serious pollution to the environment. Second, the consumption pattern of unsustainable resource utilization enables some people to enjoy a high level of enjoyment, causes excessive consumption of natural resources and undermines the ecological balance. Third, the uncontrolled population growth pattern has led to a dramatic expansion of population, which not only exacerbates resource and environmental problems, but also exacerbates the unsustainability of development.

4.2 Unsustainability of economic development The first is the unsustainability of production model that does not consider environmental consequences. The second is the unsustainability of consumption pattern that does not consider environmental consequences. That is to say, unsustainable economic development is the most basic reason for the formation of population, resources and environmental problems, and the formation and severity of these problems in turn jeopardize the sustainability of economic development. Therefore, to achieve the goal of sustainable development, on the one hand, it is necessary to achieve coordinated development between population, resources and the environment; on the other hand, it is necessary to completely transform the way of economic development.

4.3 Regulations on the inclusion of sustainable development First of all, the premise of sustainable development is development. Without development, there is no sustainability. If poverty is not eliminated, it is impossible to achieve the goal of sustainable development. Secondly, sustainable development includes both economic development and social progress, as well as the sustainable ability of the ecological environment. It is the unification of economic, social and ecological benefits, and is the coordinated development of economy, society, the environment and population. Thirdly, sustainable development can meet the needs of contemporary people without jeopardizing the ability of future generations to meet their needs. Finally, sustainable development is not a problem of a certain country or region, but a problem faced by all mankind, and it can be realized by global cooperation and joint action.

5 Basic countermeasures for sustainable development in China

5.1 Controlling population growth and improving population quality First, population should be controlled. In view of the rapid population growth in China, it is necessary to continue to implement family planning and control population growth. At the same time, in order to better carry out family planning work and control population growth more effectively, a comprehensive population growth plan should be adopted to organically combine population control and social and economic development. Second, the quality of the population should be improved. It is necessary to vigorously improve the quality of the population, especially the quality of the talents and rural labor

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pean Union has a successful example of this. Considering the importance of agricultural environment, the European Union has formulated a voluntary agreement on agricultural environment (PPP) highly recognized by WTO. Main contents are as below: additional remuneration is given to farmers who voluntarily sign agreements to protect the environment and provide environmental services, thereby encouraging agricultural producers to protect agricultural environment and maintain sustainable development of agricultural system^[8-12,14]. In Xinjiang with so fragile eco-environment, the implementation of green development technology of Xinjiang cotton is the reference and expansion of PPP's successful experience and practice.

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force. Therefore, it is necessary continually optimize educational structure, establish a team of scientific and technological talents with complete categories and good overall quality and a team of laborers with high skills and cultural quality. Finally, demographic structure should be improved. The population structure of China is not reasonable, which is mainly reflected in the imbalance of the proportion of population in all age groups. Due to the challenges of employment pressure, on the one hand, it is necessary to maintain rapid economic growth and create more employment space. On the other hand, it is necessary to strengthen the social security of unemployed population and maintain social stability.

5.2 Sustainable use and protection of resources On the one hand, resources should be cherished and protected. Seen from the per capita possession of resources and economic development needs, the scarcity of resources is still very prominent. Therefore, in order to make resources sustainable, on the one hand, it is necessary cherish and protect resources and use resources scientifically and rationally. On the other hand, the utilization efficiency of resources should be improved. In China, the main problems in current resources are overuse, severe waste and inefficiency. Therefore, in resource development, it is needed to strengthen management, establish comprehensive utilization mechanisms, and improve the utilization efficiency of resources. Through scientific advancement, the comprehensive utilization, reuse and recycling of resources are strengthened, and waste recycling is promoted. At the same time, it is necessary

to pay attention to the development of the tertiary industry and high-tech industries and establish a resource-saving social and economic system.

5.3 Containing ecological degradation and controlling environmental pollution On the one hand, ecological degradation should be contained. First, it is necessary to strengthen the protection of forests, grasslands, living things, land and other resources. Second, in the process of resource utilization, management, monitoring and supervision should be strengthened to reduce damage to natural resources and the ecological environment. Third, it is necessary to increase investment in ecological construction and strengthen false construction of ecological engineering. On the other hand, environmental pollution should be controlled. The first is to change the mode of development and implement sustainable economic development and social development. Second, it is necessary to adhere to the simultaneous planning, simultaneous implementation and simultaneous development of economic construction, urban and rural construction, and environmental construction. All projects must have environmental protection planning requirements. The third is to control the total quantity of pollution discharge, increase law enforcement of environmental protection, improve policies and systems of environmental protection, and improve the system and price system for the compensated use of natural resources.

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