

## THE CONNOTATION AND MECHANISM OF REGIONAL GREEN DEVELOPMENT

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### Abstract

The definition and connotation of green development are developed based on the concepts related to green development in the existing literatures. And a regional green development promotion mechanism is formulated, in which the control subsystem including national and regional policy exerts influences on the management subsystem including economic, energy, environmental, demographic and social systems through seven successive steps.

**Keywords:** regional green development, concept evolution, promotion mechanism, policy implementation, interaction among indicators.

## КОННОТАЦИЯ И МЕХАНИЗМ РЕГИОНАЛЬНОГО ЗЕЛЕННОГО РАЗВИТИЯ

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### Реферат

Определение и коннотация зеленого развития разработаны на основе концепций, связанных с зеленым развитием в существующей литературе. Сформулирован механизм стимулирования регионального зеленого развития, в котором управляющая подсистема, включающая национальную и региональную политику, оказывает влияние на управляющую подсистему, включающую экономическую, энергетическую, экологическую, демографическую и социальную системы, посредством семи последовательных шагов.

**Ключевые слова:** региональное зеленое развитие, эволюция концепции, механизм продвижения, реализация политики, взаимодействие показателей.

### Introduction

Regional green development determines the sustainability of regional economies and the people's welfare in the region, and is the current dominant trend of economic and social development worldwide. In recent years, China attaches importance to resolving the contradiction between the ecological environment and economic development. The enhancement of ecological civilization and the promotion of regional green development become the priorities in national and regional policies.

### The connotation of green development

The concept related to green development has a long history in the academic world. The oldest relevant concept was sustainable development, which was introduced in 1980. The International Union for Conservation of Natural Resources, in its world conservation strategy, stated that the fundamental relationships among nature, society, ecology, economy in the use of natural resources should be examined in order to ensure sustainable development worldwide [1]. In 1987, the World Commission on Environment and Development defined sustainable development as development that satisfies the needs of the present without jeopardising the ability for future generations to satisfy their needs [2]. Subsequently, green economy was introduced by Pearce in 1989 in response to the undervaluation of environmental and social cost in the current price system [3; 4]. And green economy has been defined by UNEP in 2011 as one that results in improved welfare and social equity, while significantly reducing environmental risks and ecological scarcities [5]. In addition to green economy, the term green growth is often used. According to OECD, green growth is about fostering economic growth and development while ensuring that the natural assets continue to provide the resources and the environmental services on which our welfare relies [6]. In 1995, the Chinese scholar Dai Xingyi first used the term "green development" in "Development Towards Green" to elaborate on a series of theoretical and practical issues of sustainable development. He pointed out that the fundamental path to green development is to increase the sustainability of development [7]. In 2002, the Stockholm Environment Institute and the United Nations Development Programme jointly published the China Human Development Report 2002: Making Green Development a Choice, which described the state of ecological and environmental development in China and the opportunities and challenges it faced, and clearly indicated that China should adopt the path of green development [8].

Scholars in China have conducted numerous studies on green development, but they have various understandings on green development. Wang Jinnan, Cao Dong and Chen Xiaojun believe that green develop-

ment is a development pattern that is sustainable for environment and resources, and harmonious between human beings and nature, and in this development pattern the environment is regard as an intrinsic productivity [9]. Wang Lingling and Zhang Yanguo believe that green development is a new development pattern that achieves sustainable development through strengthening ecological and environmental protection despite the constraints of natural resources and the carrying capacity of the ecological environment [10]. Jiang Nanping and Xiang Renkang believe that the essence of green development should be defined on the basis of the ideas that resources and energy should be reasonably and sparingly used, the economy and society should develop moderately and healthily, damages and compensation should be balanced and human beings should live in harmony with nature [11]. However, the understanding on green development by Chinese scholars has not been separated from the idea of ecological and environmental protection and sustainable development of environmental and resources. However, both for the conceptual definition of green development and of the closely analogous green economy, Belarusian scholars emphasize and pay more attention to the significance of green development for people's welfare. K. M. Mukina defines a green economy as one that improves people's health and social justice, as well as significantly reduces harmful environmental impacts and ecological deficits [12]. With full consideration of the differences in the meaning of green economy in economics, ethics, ecology and philosophy, V. A. Rybak argued that green development should be associated with the implementation of such a life activity, which will increase people's satisfaction with their present and future lives [13].

Considering the main focuses, advantages and disadvantages of existing definitions of green development, the connotation of green development could be redefined as a development and lifestyle based on the harmony between human being and nature for the purpose of economic growth, resource conservation, environmental friendliness, ecological protection, and people's welfare.

### The mechanism of regional green development

According to the new definition of green development, green development is related closely to economic, energy, environmental, demographic and social systems. To promote regional green development, is to exert influences on the management subsystem including economic, energy, environmental, demographic and social systems through the control subsystem including national policy and regional policy with successive steps [14]. A regional green development mechanism could be formulated as shown in Figure 1.

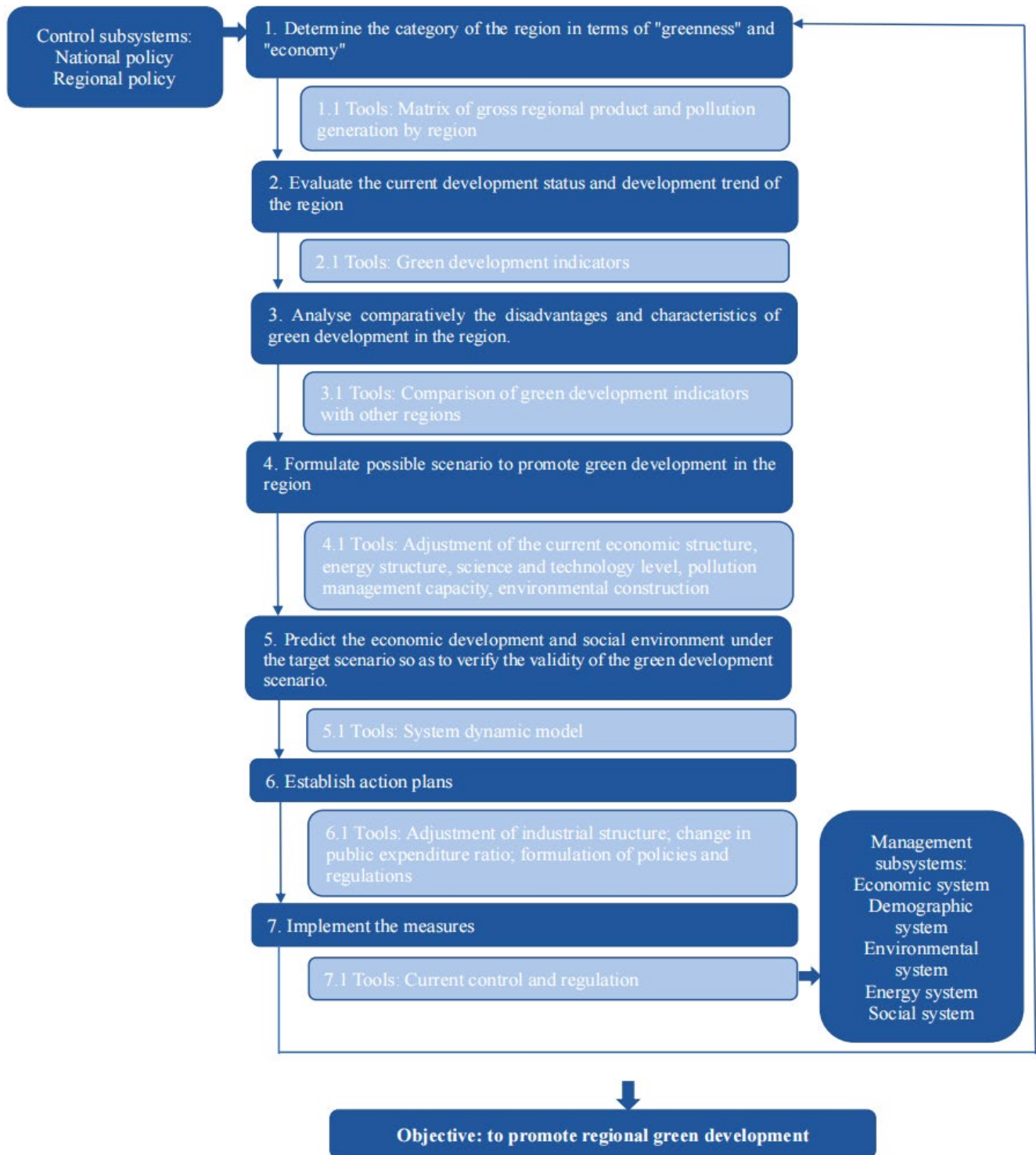


Figure 1 – Regional green development promotion mechanism

1. Determine the category of the region in terms of “greenness” and “economy”

To determine the category of the region in terms of “greenness” and “economy”, the change in gross regional product and change in pollution generation should be analysed. By assigning weights to different pollutants, a composite indicator that can quantitatively measure pollution generation is calculated. And the economic development of the region can usually be reflected by the gross regional product. By recording and calculating the gross regional product and comprehensive pollution indicator for different years, the change in “economy” and “greenness” of the region is learnt. In terms of “economy” and “greenness”, possible situations include economic growth with pollution increase, economic growth

with pollution decrease, economic decline with pollution increase, and economic decline with pollution decrease. These four situations can be defined as four categories of regional development. These categories are fundamentally different in terms of “economic” and “green” development. Regions belonging to different categories can be considered to confront different situations and should adopt different strategies for promoting green development [15]. In the pursuit of green development, regions belonging to different categories have different choices about the priority of “economy” before “greenness” or “greenness” before “economy”. Therefore, when promoting the green development of regions, the first thing that should be learnt is the categories to which regions belong in terms of “greenness” and “economy”.

To determine the category of the region in terms of "greenness" and "economy" requires various actors to fulfil the relevant functions. Firstly, the regional statistical office needs to provide specific data on the relevant indicators. Secondly, the national or regional departments should be responsible for the calculation of the indicators and the statistics on the changes of the indicators from year to year. Thirdly, the national or regional government should be in charge of coordinating the work and ratifying the results in this stage. Moreover, the frequency of this stage must be annual, as some regions could have data fluctuations in the indicators of gross regional product and pollution generation. To determine the category of the region is to determine the priority in the regional green development, and it is the basis to formulate the green development scenario as well as reasonable green development strategy.

2. Evaluate the current development status and development trend of the region

To evaluate the current development status and development trend of the region, several green development indicators selected and the interrelationship among them are demonstrated in Figure 2 [16].

According to the interrelationships among the indicators, it can be seen that the indicators for evaluating the regional green development status can be divided into two types: endogenous variables and exogenous variables. The former is influenced by the operation of the whole system mechanism and is a result of changes in several variables, while the latter always changes with policies, laws, financial subsidies and other forms of government regulation. Green development is usually promoted through national or local authorities regulating exogenous variables to influence the green development mechanism and ultimately to optimise the trend of the core endogenous variables [17]. Therefore, when it comes to measures to promote green development, it is important to focus on the exogenous variables, while when it comes to evaluating the green development status, it is necessary to pay attention to the current trends of the endogenous variables. By calculating the endogenous variables related to regional green development, the current green development status of the region can be learnt in detail. And through reasonable predictions, the future trends of these green development indicators of the region under the current natural development scenario can be known.

To evaluate the current development status and development trend of the region, multiple actors are required to fulfil the relevant functions. Firstly, the regional statistical office needs to provide specific data on the relevant indicators. Secondly, the regional departments should be responsible for the calculation of the indicators and the statistics on the changes of the indicators from year to year. Thirdly, the regional government should be in charge of coordinating the work and ratifying the results in this stage. The frequency of this stage is once a year. The evaluation of the current development status and development trend of the region is necessary to the design of green development scenarios.

3. Analyse comparatively the disadvantages and characteristics of green development in the region

To analyse comparatively the disadvantages and characteristics of green development in regions, the key lies in comparing the differences between regions in various green development indicators, especially the differences between regions belonging to different categories in various endogenous variables of green development. Through the comparison between regions belonging to different categories, on the one hand, the differences and weaknesses of green development in the study regions could be known, and on the other hand, the differences between the categories could be grasped more concretely. In the previous step, by comparing and analysing the green development indicators vertically in different years, the development status and development trend of the region could be learned. In this step, by comparing and analysing the green development indicators horizontally among different regions, the disadvantages and characteristics of green development in the region would be learned.

To analyse comparatively the disadvantages and characteristics of green development in regions, multiple actors are required to fulfil the relevant functions. Firstly, the regional statistical office needs to provide specific data on the relevant indicators. Secondly, the national departments should be responsible for the calculation of the indicators and the statistics on the changes of the indicators from year to year. An analysis report should be issued by the relevant national department. Thirdly, the national government should be in charge of coordinating the work and ratifying the results in this stage. The frequency of this stage is once a year.

4. Formulate possible scenario to promote green development in the region

To formulate possible scenarios to promote green development in the region is to address the most critical problems in regional development based on the conclusions obtained in the previous steps. Regions belonging to different categories have completely different green development characteristics and face differentiated development problems. Therefore, differentiated green development scenarios are necessary for regions belonging to different categories.

To formulate possible development scenarios for green development in the region, multiple actors are required to fulfil the relevant functions. Firstly, the Institute of Economics Chinese Academy of Social Sciences, the China Magisterial Energy Navigator and the Chinese Research Academy of Environmental Sciences are required to study and collect information on factors affecting regional green development, which could be supplemented as possible exogenous variables. Secondly, the regional departments should determine the adjustment direction of green development in the region and design possible development scenarios. Thirdly, the regional government should be in charge of coordinating the work and ratifying the results in this stage. The frequency of this stage is every five years to determine the direction, and annually to check and adjust.

5. Predict the economic development and social environment under the target scenario so as to verify the validity of the green development scenario

To predict the economic development and social environment under the target scenario, the adjusted parameters of policy variables under each scenario are inputted into the designed model. When analysing the regional green development trend under different scenarios, the first thing that should be taken into account is the regional economic growth under different development scenarios. Moreover, as mentioned in the connotation of green development, the regional green development should be focused on the life quality of the residents, with the fundamental aim of enhancing social welfare. Social welfare consists of two aspects, one of which is socio-economic welfare, which is improved through the rise of local disposable income per capita driven by regional economic growth, and the other is socio-environmental welfare, which is also referred to as social livability, and which is improved through the optimisation of pollution control, pollution treatment, and environmental construction in the region. [18] Therefore, when analysing regional green development trends under different development scenarios, it is important to consider not only regional economic growth, but also social livability, which represents several aspects such as pollution control, pollution treatment and environmental construction. [19] Economic growth and social livability are crucial determinants for the life quality of local populations, and are the primary focus for monitoring green development trends under different development scenarios.

To predict the economic development and social environment under the target scenario, multiple actors are required to fulfil the relevant functions. Firstly, the regional departments should study and record the trends of economic growth and social welfare under the target scenario by adjusting the parameters and verify the validity of the target development scenario. Secondly, the regional finance department should verify the practical feasibility of the optimal scenario in terms of the proportion of fiscal expenditures or price subsidies. Thirdly, the regional government should be in charge of coordinating the work and ratifying the results in this stage. The frequency of this stage is every five years to determine the direction, and annually to check and adjust.

6. Establish action plans

To establish action plans, based on green development scenarios with proven effectiveness, the regulation and control over exogenous variables would be achieved through a variety of government interventions, such as regional policies and financial policies. Firstly, for each region, a regional development plan is necessary. The development plan should describe the current annual development goals in terms of economy, energy, environment and other indicators. Secondly, based on the optimal development scenario of each region verified in the previous steps, specific policies, regulations, and related systems should be developed to control the exogenous variables.

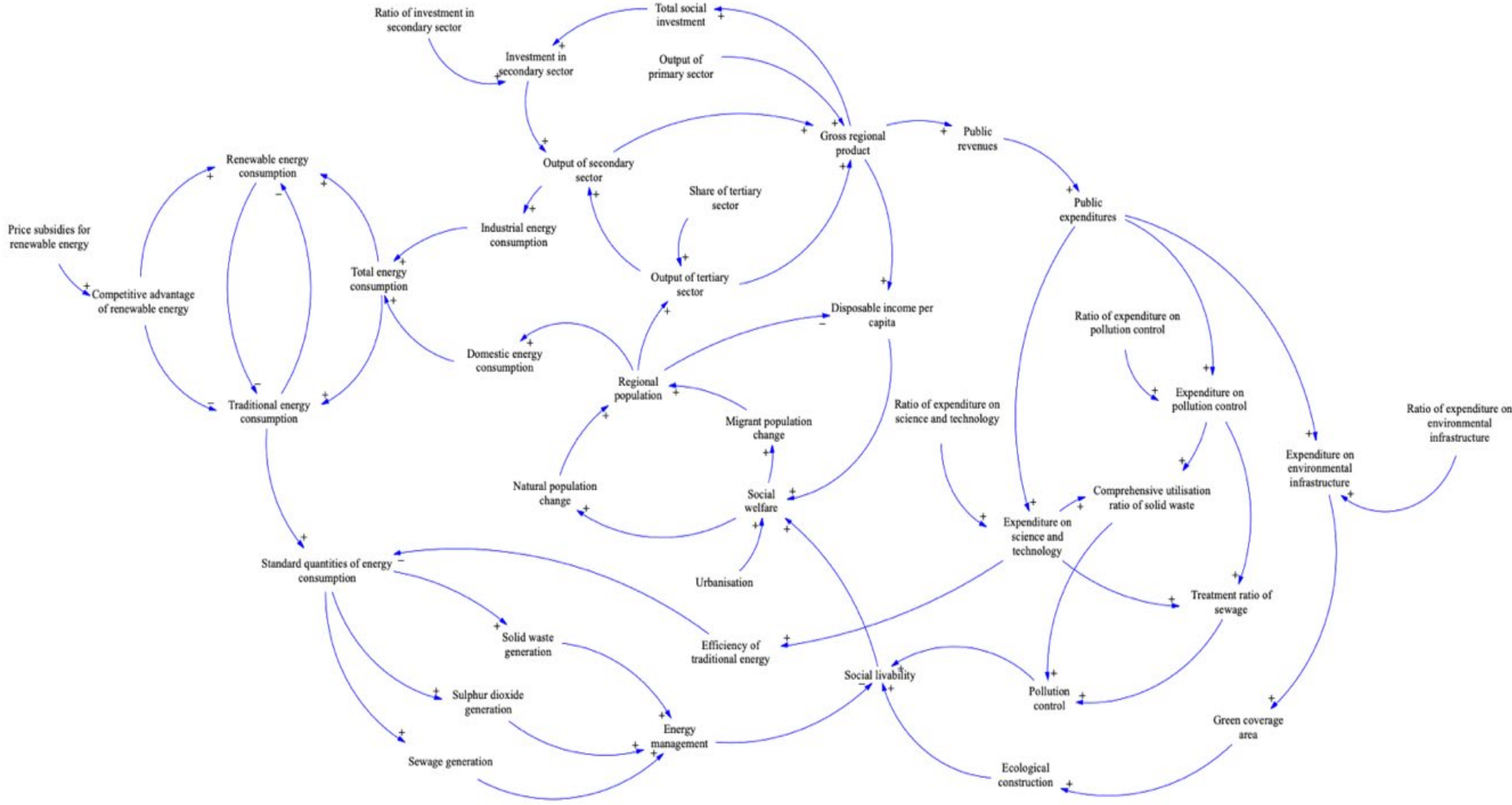


Figure 2 – Causal loop diagram of regional green development system dynamic model

To establish action plans, multiple actors are required to fulfil the relevant functions. Firstly, regional governments, regional economic departments, regional energy departments and regional environmental departments should be responsible for formulating regional or sectoral development plans. Secondly, the regional finance departments should study and formulate financial policies and programmes for adjusting fiscal expenditures. Thirdly, the regional environment department, the regional energy department, the regional justice department, and the regional government should formulate regulatory policies and relevant laws and regulations. Fourthly, the regional government is responsible for the co-ordination and approval of final results in this stage. The frequency of this stage is every five years to determine the direction, and annually to check and adjust.

#### 7. Implement the measures

In this step, factors affecting the implementation of measures include the economic development of the country and the region, changes in the domestic and foreign markets, and the compatibility of measures with the national economic conditions. And the controls and regulations can help to monitor and adjust the actions taken to promote regional green development in time.

To implement the measures, multiple actors are required to fulfil the relevant functions. Firstly, the regional authority should identify the actual takers of measures in the management subsystem or the providers of feedback. For example, enterprises in the energy system that may receive subsidies for renewable energy, or enterprises in the economic system that receive investment for fixed assets, or regional demographic departments in the demographic system, regional environmental departments in the environmental system, etc. Based on their information, the implementation of the measure is monitored and feedback is provided. Secondly, the regional authority should have general control over the implementation of the measures. Thirdly, the regional economic department, the regional energy department and the regional environmental department should collect and provide data that can reflect the implementation of measures and control the implementation of measures. Fourthly, the regional government is expected to summarise the results of implementing the regional green development mechanism. The frequency of this stage is once every six months for monitoring and feedback on the implementation of measures and once every year for final control.

The seven steps mentioned above constitute a complete mechanism for regional green development. Through this green development promotion mechanism, the green development of regions belonging to different categories can be promoted.

#### Conclusion

Based on the discussion on the definitions related to green development, the connotation of green development could be redefined as a development and lifestyle based on the harmony between human being and nature for the purpose of economic growth, resource conservation, environmental friendliness, ecological protection, and people's welfare. And in order to promote regional green development, a regional green development promotion mechanism is formulated, in which the control subsystem including national and regional policy exerts influences on the management subsystem including economic, energy, environmental, demographic and social systems through seven successive steps.

#### References

- World conservation strategy: living resource conservation for sustainable development – 1980 [Electronic resource] // The international union for conservation of nature and natural resources. – Mode of access: <https://portals.iucn.org/library/efiles/documents/wcs-004.pdf>. – Date of access: 13.10.2023.
- Our common future – 1987 [Electronic resource] // The world commission on environment and development. – Mode of access: <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>. – Date of access: 13.10.2023.
- Pearce, D. Blueprint for a green economy / D. Pearce, A. Markandya, E. Barbier. – London : Earthsan, 1989. – 208 p.
- Blanc, D. L. Special issue on green economy and sustainable development / D. L. Blanc // Natural resources. – 2011. – Vol. 35. – P. 151–154.
- Towards a green economy: pathways to sustainable development and poverty eradication – 2011 [Electronic resource] // UNEP. – Mode of access: <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=126&menu=35>. – Date of access: 13.10.2023.
- Towards green growth: monitoring progress – 2011 [Electronic resource] // The organization for economic cooperation and development. – Mode of access: <https://www.oecd.org/greengrowth/48224574.pdf>. – Date of access: 13.10.2023.
- Dai, X. Y. Towards a green development / X. Y. Dai. – Shanghai : Fudan university press, 1999. – 320 p.
- Human development report 2021-2022 – 2022 [Electronic resource] // The United Nations Development Programme. – Mode of access: [https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22pdf\\_1.pdf](https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22pdf_1.pdf). – Date of access: 13.10.2023.
- Wang, J. N. Conception of national green development strategic plan / J. N. Wang, D. Cao, X. J. Chen // Environmental protection. – 2006. – № 6. – P. 39-49.
- Wang, L. L. Exploring the connotation of green development / L. L. Wang, Y. G. Zhang // Socialism studies. – 2012. – № 5. – P. 143–146.
- Jiang, N. P. Some issues in the green development of China's economy / N. P. Jiang, Y. G. Zhang // Contemporary economic research. – 2013. – № 2. – P. 50–54.
- Mukina, K. M. Implementation of the principles and analysis of the main directions for the implementation of the green economy concept in Belarus / K. M. Mukina, N. S. Smashny // Sakharov readings 2022: environmental problems of the 21 century: collection of materials of scientific conference, Minsk, 19-20, May, 2022 / International state ecological institute named after A. D. Sakharov ; editor: A. N. Batyan [et al.]. – Minsk, 2022. – P. 295–298.
- Rybak, V. A. Analysis of green economy phenomenon and tools of environment quality management: a case study for the Republic Belarus / V. A. Rybak, A. Grib, A. Chokr // Interactive science. – 2016. – № 4. – P. 97–107.
- Zoryna, T. G. Formation of the economic mechanism of sustainable development of the electric power industry of the Republic of Belarus / T. G. Zoryna // Sustainable development of the economy of industrial enterprises: proceedings of the international scientific and practical conference, Nizhny Novgorod, 25 Nov. 2015. – N. Novgorod, 2015. – P. 53–58.
- Han, M. Y. Regional disparity and decoupling evolution of China's carbon emissions by province / M. Y. Han, W. D. Liu, Y. T. Xie // Resources science. – 2021. – Vol. 43, № 4. – P. 710–720.
- Liu, X. Y. A study on regional green development in China / X. Y. Liu // Minsk scientific readings 2023, Minsk, 6–8 Dec., 2023 / Belarusian State Technical University ; editor: I. V. Voytov [et al.]. – Minsk, 2023. – P. 179-183.
- Zhao, D. X. A study on the endogenous development of the urban economy and its dynamic mechanism / D. X. Zhao, L. Z. Li // Contemporary economic management. – 2016. – Vol. 38, № 4. – P. 68–73.
- Li, A. Spatial-temporal differentiation and coupling coordination between ecosystem services and human well-being in Beijing-Tianjin-Hebei region / A. Li, C. H. Mi, Y. Y. Yang // Ecological economy. – 2023. – Vol. 39, № 4. – P. 170–178.
- Yang, S. S. Research progress of application of system dynamics in regional green development policy simulation in China / S. S. Yang // Chinese journal of environmental management. – 2017. – № 6. – P. 41–47.

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