Appendix A1: Summary Report of the Pilot of NCAVES Project in Guangxi

Report of the NCAVES Project

United Nations

System of Environmental Economic Accounting

Summary Report of the Pilot of NCAVES Project

(Revised)

Guangxi Zhuang Autonomous Region Bureau of Statistics

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Executive summary

Nowadays, the world is shifting gear towards ecological civilization and a low-carbon economy. The significance of the ecosystem has gained a broader acceptance among all stakeholders in pace with the progress of ecology and improvement of ecosystem cognition, and the application prospects of the sustainable use of resources in ecological environment management abound with huge potentials. The United Nations (UN) et al. jointly published the *System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting* (SEEA EEA) in 2014, which elaborated on the principles of ecosystem accounting, physical flow accounting and valuation method of ecosystem services and assets, and monetary flow accounting of ecosystem, laying the initial groundwork for the ecosystem accounting theory. The UN drafted the *Technical Recommendations in Support of the System of Environmental-Economic Accounting 2012 Experimental Ecosystem Accounting* (white cover) at the end of 2017, which further clarified the main calculation objectives, core valuation concepts and calculation approaches of ecosystem accounting, envisioning clearer and more practical ecosystem accounting by confirming the concept development.

In 2017, the United Nations Statistics Division (UNSD), the United Nations Environment Programme (UNEP), the Secretariat of the Convention on Biological Diversity (SCBD) and the European Union (EU) jointly launched the Natural Capital Accounting and Valuation of

Ecosystem Services (NCAVES) project. In November 2017, Guangxi Zhuang Autonomous Region (Guangxi) was selected as one of the two pilot areas of the UN NCAVES project in China. Over two years of active exploration following commencement of the pilot project, Guangxi Zhuang Autonomous Region Bureau of Statistics (GBS) has taken the lead in organizing cross-department unity and collaboration in line with the work deployment of the Autonomous Region Party Committee and the Central Government, and remarkable progress has been attained.

First, the *Guidelines for the Pilot of Guangxi NCAVES Project* (hereinafter referred to as the Guidelines) has been thoroughly revised to standardize the pilot project from five aspects: (1) The accounting framework of the Guangxi pilot NCAVES project has been classified into three types of accounts: asset accounts for natural resources, asset accounts for ecosystems, and accounts for ecosystem services; (2) The concept, classification, and indicators of ecosystem services have been delimitated. Based on the features of land cover in Guangxi, the Guidelines divided the ecosystem into six subsystems - forest ecosystem, grassland ecosystem, farmland ecosystem, wetland ecosystem, urban ecosystem, and marine ecosystem. Three widely recognized ecosystem service categories consistent with the SEEA EEA - provisioning services, regulating services, and cultural services have been adopted for accounting (including a total of 25 ecosystem service indicators in three levels: 5 provisioning services, 15 regulating services and 5 cultural services); (3) The calculation of essential spatial data, related parameter sources, and biophysical models

for the value of different types of ecosystem services have been unified and standardized; (4) The physical flows corresponding to different types of ecosystem services have been determined, and the physical and monetary flows of ecosystem services have been calculated; (5) The valuation methods of different types of ecosystem services have been unified and standardized.

Second, the annual physical flow and monetary flow accounts of the ecosystem services in 2016-2017 have been compiled. In this report, compilation results of the asset accounts for natural resources, ecosystem accounts, and accounts for ecosystem services of Guangxi in 2016-2017 are listed. (1) The accounts for natural resources comprise asset accounts for land resources, forestland resources, timber resources, and aquatic resources. The asset accounts for land resources consist of land use accounts and land cover accounts. The compilation of Guangxi land use accounts in 2016-2017 was based on the classified data of annual land use condition issued by the natural resources authorities. Based on the land use condition data, through changes of forestland and forest resources data issued by the forestry authorities, the land cover accounts were obtained after de-fragmentation and spatial data fusion, with a resolution of 0.25hm^2. The land cover in the pilot project comprises 20 categories. The asset accounts for forestland resources were classified according to the *Technical Regulations for Continuous Forest Inventory*. The asset accounts for timber resources include physical flow accounts for timber and carbon accounts, which were obtained from the ninth review of the

national continuous forest inventory of Guangxi. The asset accounts for aquatic resources were established with reference to the compilation mechanism of natural resource balance sheets. (2) The ecosystem accounts comprise ecosystem extent accounts and ecosystem condition accounts. The compilation of ecosystem extent accounts was based on the spatial distribution map of ecosystem, which was a major improvement compared with the previous assessment approach of Guangxi. According to the natural conditions, Guangxi ecosystem is classified into forest ecosystem, farmland ecosystem, grassland ecosystem, freshwater ecosystem, marine ecosystem and urban ecosystem. The annual ecosystem condition accounts of Guangxi in 2016-2017 were obtained through comprehensive assessment of remote sensing data and field survey data of related authorities. The indicators of physical condition, environmental condition, and ecosystem condition consistent with the technical recommendations for the SEEA EEA issued by the UNSD et al. were mainly considered. (3) In terms of accounts for ecosystem services, the annual ecosystem services of Guangxi in 2016-2017 were calculated from physical and monetary flow aspects. In consideration of a wide range of ecosystem services across the entire ecosystem domain, a spatial model was applied, and two basic methods were adopted for compiling physical flow accounts in the pilot project. First, a “top-down” approach was applied to provisioning services (e.g. supply of agricultural products), which involved the spatial decomposition of information that already exists in the system of national accounts. Second, a “bottom-up” approach was adopted for regulating

services and cultural services, e.g. carbon sequestration and soil conservation, and the provincial summary was achieved by summarizing municipal and county level information based on various models.

Third, the research and exploration on the ecosystem service value accounting of the Xijiang River basin based on scenario analysis has been carried out, and exploration was made to incorporate the research results of pilot ecosystem service value accounting in compiling the horizontal ecological compensation policy of the Xijiang River basin in Guangxi. By taking the basin as an example, the project conducted an initial study of the accounting for ecological compensation standards based on scenario simulation. On the basis of accounting ecological protection costs and benefits, according to the amount of ecosystem services benefited from upstream regions, combined with the socioeconomic features of each region, the accounting for ecological compensation standards based on ecosystem services takes different regions in the upper and lower reaches of the basin as the main bodies partaking in ecological compensation, and estimates the changes of ecological compensation threshold value under different scenarios. Accordingly, the priority of ecological compensation in county-level regions in the Xijiang River basin was obtained.

Compiled by the GBS, this report is a summary of the pilot work of Guangxi NCAVES project. It is expected the project shall bring forth the latest information on the Guangxi pilot biophysical ecosystem modeling and monetary flow accounting work, powerfully support and contribute to

the development and application of the ecosystem accounting across the globe.

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1. Introduction

Situated along the coast, rivers and national border, Guangxi composes vital ecological barriers for the southern borders and the upper reaches of the Pearl River. Ever since the 16th National Congress of the Communist Party of China, Guangxi has made unremitting efforts in the construction of ecological civilization. It has successively launched major strategies of building an ecological Guangxi and ecological civilization demonstration zone, and implemented a set of policies and measures to promote green, circular and low-carbon development. Under the banner of ecological economy, Guangxi strived to transform ecological advantages into development advantages, and has embarked on a path of green transformation and green rise with Guangxi characteristics, where the industry is strong, the people are rich, and the ecology is beautiful. In turn, the regional eco-environment and sustainable socio-economic development capacity has been significantly improved.

Guangxi was selected as one of the two pilot areas of the UN NCAVES project in China. The main objectives of the Guangxi pilot project are set to offer practices and experience of Chinese value assessment of eco-services, and to contribute Chinese wisdom to the global resource and environmental accounting through exploration in theory and practice.

1.1 Introduction to the UN NCAVES project

Jointly launched in 2017, the EU funded NCAVES project is supported by the UNSD, the UNEP, the SCBD and the EU. It is a highly challenging frontier work that aims to conduct experimental ecosystem accounting, ecosystem valuation, analysis of economic environment, and assessment of key areas and data availability of relevant policies in pilot areas. By

formulating national plans for the establishment of an information system that supports sustainable development, NCAVES project builds up replicable and extendable experience that improves the global resource and environmental accounting methods, and promotes the inclusion of biodiversity and ecosystems into policy planning and implementation at the national or provincial level. China, along with Brazil, South Africa, India and Mexico have been selected as pilot countries by the UNSD to proceed a three-year NCAVES project scheduled to be completed by the end of 2020.

It is of great significance and high time that China launched the NCAVES project, which is conducive to the implementation of major national-level decisions and deployments (e.g. the construction of ecological civilization and green development), the compilation of natural resource balance sheets, and the demonstration of resource and environmental accounting across China. In November 2017, the Inception Meeting on Natural Capital Accounting and Valuation of Ecosystem Services Project in China was jointly hosted by the National Bureau of Statistics (NBS) of PRC, the UN and EU in Beijing. The value assessment of ecosystem services in Guangxi won recognition and acclaim from domestic and overseas experts, and Guangxi was confirmed as one of the two pilot areas of the UN NCAVES project in China. The main objectives and tasks of the Guangxi pilot project are set to offer practices and experience of Chinese value assessment of eco-services, and to contribute Chinese wisdom to the global resource and environmental accounting through exploration in theory and practice.

1.2 Overview of the current Guangxi natural capital accounting

At present, the natural capital accounting work of Guangxi mainly comprises the compilation of natural resource balance sheets, value assessment of eco-services, and the Guangxi pilot NCAVES project. Outlined below is the brief introduction.

1.2.1 Compilation of Guangxi natural resource balance sheets

Guangxi convened relevant departments of land, environmental protection, agriculture, forestry, and water conservancy in May and November 2018, for the study of trial compilation of natural resource balance sheets. Upon consultation with relevant departments, in line with the requirements of the national compilation system in the context of Guangxi, the Work Plan for the Compilation of Guangxi Natural Resource Balance Sheets was drafted and consultation were solicited from relevant departments in July 2018 and January 2019, respectively. At present, the compilation fof Guangxi asset accounts for land resources, timber resources, aquatic resources, and mineral resources in 2016, 2017 and 2018 has been completed and submitted to NBS.

1.2.2 Valuation assessment of Guangxi ecosystem services

In the spirit of "lucid waters and lush mountains are invaluable assets" proposed by the General Secretary Xi, which aims to 1) establish the valuation assessment of ecosystem services; 2) promote the construction of ecological civilization in Guangxi; 3) e Establish ecological administrative regions, and 4) promote green transformation and sustainable development, the General Office of People's Government of Guangxi Zhuang Autonomous Region issued the Assessment Plan of

Guangxi Ecological Service Values (G. Z. B. F. [2016] No. 69) on June 15, 2016, which requests the Guangxi Bureau of Statistics (GBS) to take the lead in organizing the valuation assessment of Guangxi ecosystem services. The valuation assessment of Guangxi eco-services in 2016 shall be completed by 2017 with issuance of assessment reports, followed by the practice of annual assessments and gradual implementation in all cities from 2020. For this purpose, the GBS took the lead in organizing, researching, formulating and improving the plan and guidelines of valuation assessment of ecosystem services, and coordinated among departments to steadily advance the valuation assessment of ecosystem ervices across Guangxi. So far, the assessment spanning 2015-2019 has been completed, and phase achievements have been attained.

1.2.3 Pilot work of Guangxi NCAVES project

In November 2017, Guangxi was selected as one of the two pilot areas of the UN NCAVES project in China. Over two years of exploration following commencement of the pilot project, based on the valuation of ecological services in Guangxi, the GBS has taken the lead in organizing cross-department unity and collaboration in line with the work deployment of the Autonomous Region Party Committee and the Government, and remarkable progress has been attained. First, the Guidelines for the Pilot of Guangxi NCAVES Project has been thoroughly revised. Second, the annual physical flow and monetary flow accounts of the ecosystem services in 2016-2017 have been compiled. Third, the research and exploration on the ecosystem service value accounting of the Xijiang River basin based on scenario analysis has been carried out in cooperation with the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, and exploration was made to incorporate the research results

of pilot ecosystem service value accounting in compiling the horizontal ecological compensation policy of the Xijiang River basin in Guangxi.

1.3 Introduction to pilot work of Guangxi

1.3.1 Main objectives of pilot work

In accordance with the requirements of the Accounting Department of NBS, the objectives of Guangxi pilot work were formulated to facilitate smooth practice of the Guangxi pilot NCAVES project. Through participating in the pilot work of UN NCAVES project, it is expected to address the value assessment of Guangxi eco-services, tackle the technical difficulties encountered in compiling natural resource balance sheets, and work out a value assessment method of eco-services that not only follows the international standards but also embodies the characteristics of Guangxi. It is also prospected to promote the green valuation and green development of Guangxi, provide reproducible, replicable and extendable experience that improves the compilation system of Chinese natural resource balance sheets, and contribute Guangxi's practice and experience to the follow-up revision of the SEEA EEA framework.

(1) To develop and compile land use accounts and land cover accounts for Guangxi. The spatial classification of ecosystem types is the basis for all subsequent ecosystem accounts. From the perspective of national accounting, ecosystem units are equivalent to economic sectors. Each sector (ecosystem unit) produces a specific set of (ecosystem) services and products, the number of which depends on the extent (scope) of the unit and its condition. Therefore, a highly detailed map (showing the ecosystem units in Guangxi) is essential for advancing the pilot project.

(2) To conduct inventory of the available data on Guangxi ecosystem services, assets, and conditions. There are already many data and maps containing relevant information, hence an inventory is needed to find out all the appropriate data and determine the possibility of comparing ecosystem scope and service supply over time.

(3) To compile the accounts for ecosystem services of Guangxi in 2016-2017. The accounting tables for all design and development accounts are not clarified in the current guidelines and technical recommendations for the SEEA EEA, and the potential content of the account tables depends on the availability and quality of data.

1.3.2 Expected outcomes

(1)Amend the Guidelines for Ecosystem Accounting and Valuation of Ecosystem Services of Guangxi (Revised) comprehensively and systematically.

(2)Compile the ecosystem accounts for 2016 to 2017 based on guidelines for ecosystem accounting and valuation of ecosystem services.

(3)Conduct the study of ecosystem compensation standards in Xijiang basin based on scenario analysis.

(4)Finish the pilot report and present to the NBS and UN project team.

1.4 Organizational structure/mode of Guangxi pilot practice

In line with the pilot work mode of “government leadership, statistics guidance, cross-department cooperation, coordination and linkage, and joint completion”, the pilot work is organized and implemented by 10

departments. The GBS is responsible for taking the lead and coordinating various departments to carry out subsystem valuation work; Water Resources Department, Department of Agriculture and Rural Affairs, Department of Forestry, Department of Oceanography, and Department of Housing and Urban-Rural Development of Guangxi are responsible for the survey, monitoring and valuation of the freshwater, farmland, grassland, forest, marine, and urban ecosystem services; Department of Natural Resources, Department of Ecology and Environment, Department of Culture and Tourism, and Department of Meteorology are responsible for providing essential data required for assessment.

2. Ecosystem accounts

2.1 Overview of the Guidelines for the Pilot

In order to scientifically guide the valuation of ecosystem services in Guangxi, since August 2016, the Statistical Bureau of Guangxi Zhuang Autonomous Region has widely referred to domestic and foreign literature, and taken the lead in formulating the Guidelines for the Valuation of Ecological Services in Guangxi, which was used to guide the valuation of ecological services in Guangxi. It completed the valuation of ecosystem services in the whole region in 2015, 2016 and 2017, and achieved phased results. In November 2017, Guangxi was designated as one of the pilot areas in China for the Natural Capital Accounting and Valuation of Ecosystem Services Project (NCA&VES) at the Start-up and Consultation Meeting of China Natural Capital Accounting and Valuation of Ecosystem Services Project, which was jointly organized by the National Bureau of Statistics, the United Nations and the European Union in Beijing. The NCA&VES project is funded by the European Union and jointly implemented by the United Nation Statistics Division (UNSD), United Nations Environment Program (UNEP), in close collaboration with the Secretariat of the Convention of Biodiversity and national stakeholders such as the NBS in China.

From May 21 to 23, 2018, a project assessment mission from the United Nations Statistics Division visited Guangxi and gave some instructions on the technical problems encountered in the pilot work in Guangxi. From March 24 to 27, 2019, the second project assessment mission from the United Nations Statistics Division led by Mr. Bram Edens visited Guilin city and and gave some further suggestions on the Guangxi pilot work. In

order to provide scientific guidance on the pilot work of the NCA&VES Project in Guangxi, based on the consensus reached at the start-up meeting of the NCA&VES Project, and combining with specific requirements of expert team set up by the National Bureau of Statistics and the United Nations for the Natural Capital Accounting and Valuation of Ecosystem Services Pilot Project, the Statistical Bureau of Guangxi Zhuang Autonomous Region organized relevant professionals to revise the original Guidelines for the Valuation of Ecological Services in Guangxi from four aspects: clarifying relevant concepts and classifications, determining the physical quantity of different types of ecosystem services, unifying and standardizing the Monetary methods for different types of ecosystem services (including selecting the values of relevant coefficients, etc.), and standardizing the basic area data to calculate the value of different types of ecosystem services, thereby forming the Guidelines for the Pilot of Natural Capital Accounting and Valuation of Ecosystem Services Project.

2.1.1 Normative References

The references of this Guidelines include:

(1) System of Environmental-Economic Accounting 2012: Central Framework

(2) System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting

(3) Technical Recommendations in Support of the System of Environmental-Economic Accounting 2012–Experimental Ecosystem Accounting (White Paper)

(4) Technical Rules for Monitoring of Environmental Quality of Farmland Soil (NY/T 395-2012)

(5) Specifications for Valuation of Forest Ecosystem Services in China (LY/T 1721-2008)

(6) Specification of Biodiversity Monitoring and Evaluation for Forest Ecosystem (LY/T 2241-2014)

(7) Technical Specification for Forest Vegetation Monitoring (GB/T 30363-2013)

(8) Observation Methodology for Long-term Forest Ecosystem Research (LY/T 1952-2011)

(9) Standards for Ambient Air Quality Monitoring (Trial) (National Environmental Protection Bureau Announcement [2007] No. 4)

(10) Technical Specification for Soil Environmental Monitoring (HJ/T166-2004)

(11) Water Quality - Determination of Total Nitrogen - Alkaline Potassium Persulfate Digestion - UV Spectrophotometric Method (HJ636-2012)

(12) Water Quality - Determination of Phosphorus - Phosphomolybdenum Blue Spectrophotometric Method (temporary) (HJ593-2010)

(13) Water Quality— Determination of Potassium and Sodium - Flame Atomic Absorption Spectrophotometry(GB11904-89)

(14) The Specification for Marine Monitoring (GB 17378-2007)

(15) The Specification for Oceanographic Survey (GBT 12763.4-2007)

(16) Technical Directives for Valuation of Marine Ecological Capital (GB/T 28058-2011)

(17) Assessment on the Carbon Sequestration Capability of Mangroves Wetland Ecosystem and Technical Regulations (DB45/T 1230-2015)

(18) Current Land Use Classification (GB/T 21010-2017)

(19) Notice on the Adjustment of Levy Standards for Pollutant Discharge Fees and Other Related Issues (GJF [2015] No.67)

Note: For the references with a date, only the version with the date is applicable to this document. For the undated references, their latest version (including all revisions) is applicable to this document.

2.1.2 Improvements compared to the previous guidelines

First, the concepts and classifications have been further clarified. The concepts of natural resources, environmental assets, natural capital, and ecosystem assets have been systematically sorted out; the concept, classification, and indicators of ecosystem services have been delimitated, and three widely recognized ecosystem service categories consistent with the SEEA EEA - provisioning services, regulating services, and cultural services have been adopted. Meanwhile, with reference to the *Common International Classification of Ecosystem Services* (CICES), combined with the feedback of experts from the UN project delegation, the valuation indicator system of Guangxi ecosystem services in Guangxi has been revised. The revision eliminated the accumulation of nutrients, oxygen release, and maintained services such as nitrogen/phosphorus/potassium/organic content in the soil to avoid repetitive calculation. Second, the accounting framework of the pilot NCAVES project has been perfected and classified into three types of accounts: asset accounts for natural resources, asset accounts for ecosystems, and accounts for ecosystem services. Third, the calculation of essential spatial data, related parameter sources, and biophysical models for the value of different types of ecosystem services have been unified and standardized. Fourth, the physical flows corresponding to different types

of ecosystem services have been determined, and the physical and monetary flows of ecosystem services have been calculated simultaneously. Fifth, the valuation methods of different types of ecosystem services have been unified and standardized.

2.1.3 Scope of Application

According to the land cover characteristics of Guangxi, in this Guideline ecosystems are divided into six categories: forest ecosystem, grassland ecosystem, farmland ecosystem, wetland ecosystem, urban ecosystem and, marine ecosystem. The valuation contents cover the physical and monetary of ecosystems' provisioning services, regulating services and cultural services. The specified indicators system, indicator calculating methods and evaluation result account table for natural capital accounting and valuation of ecosystem services can be used to evaluate the development status and trend of natural capital and ecosystem services in the administrative regions of Guangxi at all levels. They can also be used separately to account for forest ecosystem, grassland ecosystem, farmland ecosystem, wetland ecosystem, urban ecosystem or marine ecosystem in Guangxi.

2.1.4 Accounting Framework

In this Guidelines, the idea of natural capital accounting originates from the accounting of stocks and flows in economic assets; the idea of ecosystem accounting originates from the Valuation of ecosystem services' functions and their ecological-economic value and the SNA. The accounting of natural capital and ecosystem services is divided into accounting for stocks and accounting for flows. Stocks and flows are both physical quantities (or physical amount) and can be measured in monetary

terms. The stocks of natural capital and ecosystems are mainly measured in terms of area, distribution, quality grade and so on. The flows of natural capital and ecosystems, i.e. asset flows, refer to the abiotic and biotic services arising from stocks, including material circulation, energy flow, ecosystem services etc.

Table 2-1 Indicators System for the Valuation of Ecosystem Services in Guangxi

First-level indicators	Second-level indicators	Third-level indicators	Ecosystems involved					
			Farmland	Forest,	Grassland	Wetland	Marine	Urban*
Provisioning services	Provisioning food and raw materials	Agricultural products	√					
		Forest products		√				
		Livestock products			√			
		Wetland products				√		
		Marine products					√	
Regulating services	Carbon sequestration	Carbon sequestration	√	√	√	√	√	√
	Regulating climate	Regulating temperature*						√
	Purifying atmosphere	Absorbing sulfur dioxide	√	√	√			√
		Absorbing fluoride	√	√	√			√
		Absorbing nitrogen oxides	√	√	√			√
		Dust retention	√	√	√			√
	Pollution degradation treatment	Inorganic nitrogen purification					√	
		Active phosphate purification					√	
		Chemical oxygen demand (COD) treatment					√	

		Petroleum disposal					√	
	Water conservation	Conserving water resources		√	√	√		√
	Protection and disaster reduction	Farmland protection		√				
		flood mitigation				√		
	Soil conservation	Soil retention	√	√	√			√
	Protection of biodiversity	Biological conservation*		√				
Cultural services	Recreational services	Forest tourism	√					
		Water conservancy tourism		√				
		Agricultural tourism				√		
		Urban tourism					√	
		Marine tourism						√

Note: For the urban ecosystem, we only accounting the urban green spaces. For indicators, we only calculate the monetary of regulating temperature and biodiversity conservation.

In terms of accounting for ecosystem services, with reference to the basic valuation theory of integrated ecosystem services, domestic and international researches, relevant policies, programs and industry standards, and the CICES, combined with the feedback of experts from the UN project delegation, the valuation system of ecosystem services pertain to the research area has been built. The indicator system is divided into three levels, of which the first level includes provisioning, regulating and cultural services; the second level includes food and raw material supply, tourism services, carbon sequestration, water conservation, soil

conservation, maintenance of biodiversity, etc.; and the third level includes specific indicators of ecosystem services such as agricultural and forest products (Table 2-1). The selection of indicators was guided by the principle of "producing services for humans", and the potential or actual services that the ecosystem produces for humans in one year was calculated on the time scale of "years". Among them, provisioning services and cultural services were calculated by actual services, and regulating services by potential services. The pilot accounting for ecosystem services was based on the scope and condition of the ecosystem, which provide the necessary parameters for the quantitative calculation of ecosystem services. The ecosystem types in the research area were divided into farmland, forest, grassland, freshwater, marine, and urban subsystems. For the detailed inclusion of indicators, selection of parameters and technical plan for calculation, refer to Annex 1 *Guidelines for the Pilot of NCAVES Project*.

2.2 Results of accounts compilation

The account forms are designed referring to SEEA EEA, refer to the Guidelines of NCAVES Pilot Practice for details. The asset accounts for natural resources of Guangxi in 2016-2017 were aggregated based on the statistics of various departments. The compilation of ecosystem extent accounts was based on the ecosystem distribution map, which was a major improvement compared with the previous assessment approach of Guangxi because ecosystem services could be linked to more detailed and accurate maps. The accounts analyzed the ecosystem supply of each ecosystem unit and all ecosystem services, most of which can directly determine the physical flow of the actual supply of ecosystem services for each ecosystem unit based on the modeling of the ecosystem distribution map. Take the actual supply of food production as an example, the actual supply

of food could be modeled based on the available information on the types of farmland in the ecosystem distribution map.

2.2.1 Asset accounts for natural resources

The data source for the compilation of asset accounts for natural resources of Guangxi in 2016-2017 was coherent with the requirements of the national compilation of natural resource balance sheets. The data was aggregated based on the statistics of various departments.

(1) Asset accounts for land resources

①Land use accounts

The data on physical flow accounts of land use in Guangxi during 2016-2017 shown in Table 2-3 was based on the classified data of annual land use condition issued by the natural resources authorities. The opening stocks of land use physical flow are subject to the statistics at the end of 2016, and the closing stocks are subject to the statistics at the end of 2017. The compilation results are basically aligned with the current compilation results of natural resource balance sheets.

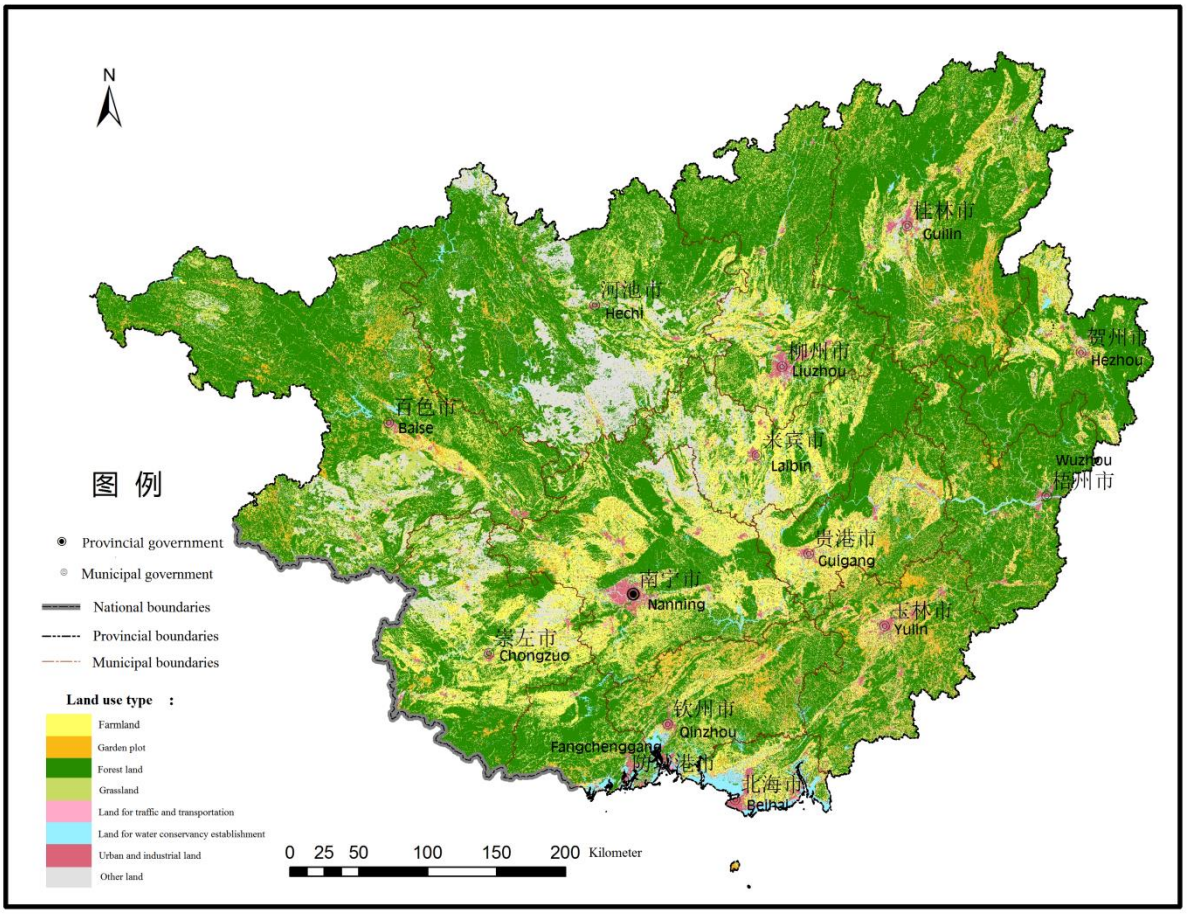


Figure 2-1 The current state of land use in 2017

Table 2-2 Comparison of the Land Use Classification of SEEA CF and Current Land Use Classification in China

Serial No.	Category	Corresponding land use classification by SEEA CF
1	**Land**	**Land**
1.1	Farmland	Agriculture
1.2	Garden plot	Agriculture, forestry
1.3	Forest land	Forestry
1.4	Grassland	Agriculture
1.5	Urban and industrial land	Construction land and related areas
1.6	Land for traffic and transportation	Construction land and related areas

Serial No.	Category	Corresponding land use classification by SEEA CF
1.7	Other land	Other lands that are not classified for other purposes, unused land
1.8	Land for water conservancy establishment	Construction land and related areas
2	**Water areas**	**Inland waters**
2.1	River water surface	Inland waters used for aquaculture or holding facilities, inland waters used for the maintenance and restoration of environmental functions
2.2	Lake water surface	
2.3	Reservoir water surface	
2.4	Pond water surface	
2.5	Coastal beaches	
2.6	Inland beaches	Inland waters used for the maintenance and restoration of environmental functions
2.7	Ditches	Inland waters used for the maintenance and restoration of environmental functions
2.8	Glaciers and permanent snow	Unused inland waters

Table 2-3 **Physical Account for Land Use of Guangxi (Unit: Hectare)**

Land Use Classification		Opening stock	Additions to stock	Reductions in stock	Net change	Ratio of change to total area（%）	Closing stock
Land	Farmland	4397412	3541	13497	-9956	-0.04	4387456
	Garden plot	1083488	4355	7318	-2963	-0.01	1080525
	Forest land	13306336	9120	16054	-6934	-0.03	13299402
	Grassland	1110605	100	2177	-2077	-0.01	1108528

	Urban and industrial land	293042	7931	3318	4613	0.02	297655
	Land for traffic and transportation	910025	19998	879	19119	0.08	929144
	Other land	10650	68	292	-224	0.00	10426
	Land for water conservancy establishment	1801883	1884	2082	-198	0.00	1801685
Water areas	River water surface	288667	900	1114	-214	0.00	288453
	Lake water surface	462	0	0	0	0.00	462
	Reservoir water surface	170320	489	73	416	0.00	170736
	Pond water surface	176093	525	1625	-1100	0.00	174993
	Coastal beaches	84606	8	255	-247	0.00	84359
	Inland beaches	36315	74	129	-55	0.00	36260
	Ditches	92956	82	262	-180	0.00	92776
Total		23762860					23762860

The largest increases of in stock occurred in land used for transportation and urban land, respectively of 0.08% and 0.02 % （Compared with total

land area）. The largest decreases occurred in farmland and forests (-0.04% and -0.03%). This is testimony to the rapid urbanisation that Guanxi is experiencing. The changes in water extent are fairly small and to a large extent reflect seasonal differences in precipitation.

②Land cover accounts

The land cover classification used comprises 20 categories.The data on land cover accounts shown in Table 2-5 was based on the land use condition data issued by the natural resources authorities, through changes of forestland and forest resources data issued by the forestry authorities, and obtained after de-fragmentation and spatial data fusion, with a resolution of 0.25hm^2. The opening and closing stocks are subject to the statistics of the land use condition database at the end of 2016 and 2017 respectively, and the time scale is aligned with the statistics of the land use account.

Table 2-4 Comparisons of the Land Cover Classification of This Guidelines and the Land Cover Classification of SEEA CF

Serial No.	Land cover	Corresponding cover classification of SEEA CF	Ecosystem type
1	Wet crops	Herbaceous crops	Farmland ecosystem
2	Dryland crops	Herbaceous crops, woody crops	
3	Chinese fir	Tree covered area	Forest ecosystem
4	Pines	Tree covered area	
5	Broad-leaved trees	Tree covered area	
6	Eucalyptus species	Tree covered area	
7	Arbor economic forest	Tree covered area	
8	Bamboo forest	Tree covered area	

Serial No.	Land cover	Corresponding cover classification of SEEA CF	Ecosystem type
9	Shrub forest in artificial mounds	Shrub covered area	
10	Shrub forest in stone hills	Shrub covered area	
11	Shrub economic forest	Woody crops, shrub covered area	
12	Grassland	Grassland	Grassland ecosystem
13	Marsh	Aquatic or periodically submerged shrubs or herbaceous vegetation	Wetland ecosystem
14	Inland beaches	Aquatic or periodically submerged shrubs or herbaceous vegetation	
15	Land surface water	Inland waters	
16	Mangroves	Mangroves	Marine ecosystem
17	Coastal beaches	Nearshore waters and intertidal zones	
18	Parks and green land	Tree covered area, shrub covered area, grassland	Urban ecosystem

The structure of land cover account is similar to that of the land use account.

The physical account for land cover is as follows (Table 2-5):

Table 2-5 Land Cover Account of Guangxi (Unit: Hectare)

Land cover	Opening stock	Additions to stock	Reduction in stock	Net change	Ratio of change to total area（%）	Closing stock
Wet crop	2178845	8452	7603	849	0.00	2179694
Dryland crops	2689121	5089	11628	-6539	-0.03	2682582
Chinese fir	1856480	64279	51651	12628	0.05	1869108

Pines	2141764	101261	147063	-45802	-0.19	2095962
Hard broadleves	1967204	76095	196301	-120206	-0.51	1846998
Soft broadleves	1289836	221385	122473	98912	0.42	1388748
Eucalyptus species	2118773	206935	137112	69823	0.29	2188596
Arbor economic forest	734775	23732	34368	-10636	-0.04	724139
Bamboo forest	318545	22446	15055	7391	0.03	325936
Shrub forest in artificial mounds	90274	11914	13581	-1667	-0.01	88607
Shrub forest in stone hills	1557924	63482	89813	-26331	-0.11	1531593
Shrub economic forest	646523	80233	33423	46810	0.20	693333
other forest communities	1722989	0	2748	-2748	-0.01	1720241
Grassland	1115449	1033	9443	-8410	-0.04	1107039
Land surface water	633416	1616	2713	-1097	0.00	632319
Ditches	91886	82	385	-303	0.00	91583
Inland beaches	36536	74	511	-437	0.00	36099

Coastal beaches	84643	7	224	-217	0.00	84426
Mangroves	9431	69	391	-322	0.00	9109
Parks and green land	24733	314	681	-367	0.00	24366
Other types	2453713	0	11331	-11331	-0.05	2442382
Total	23762860					23762860

(2) Asset accounts for forestland resources

According to the *Technical Regulations for Continuous Forest Inventory*, China's forestland consists of forest land, sparse land, shrubbery land, unformed land, nursery land, non-standing land, suitable land and forestry auxiliary land. In view of the inconsistency between the current forestry and the original land use classification standards of the land use authorities, a separate forest land asset account was set up.

①Forest land use account

The data in the table was obtained from the ninth review of the national continuous forest inventory of Guangxi. Based on the availability of data, the opening and closing of the period is 2010 and 2015, respectively (Table 2-6).

Table 2-6 Forest Land Use Account (Unit: Hectare)

	Wooded land	Sparse	Shrub land	Other	Total

	Arbor forest	Mangroves	Bamboo forest		National special shrub land	General shrub land		
Opening stock	9900700		340900	28800	3185400	168000	1647900	15271700
Net change	600300		19300	-19200	249900	-76800	249800	1023300
Closing stock	10501000		360200	9600	3435300	91200	1897700	16295000

Note: The data in the table are mainly derived from forestry departments' continuous inventory data of forest resources.

②Forest land cover account

Aligned with the structure of the land use account, the accounts were compiled according to the area of different tree species (Table 2-7).

Table2-7 Forest Land Cover Account (Unit:Hectare)

	Opening stock	Additions to stock	Reduction in stock	Closing stock
Chinese fir	1856480	64279	51651	1869108
Pines	2141764	101261	147063	2095962
Hard broadleves	1967204	76095	196301	1846998
Soft broadleves	1289836	221385	122473	1388748
Eucalyptus species	2118773	206935	137112	2188596
Arbor economic forest	734775	23732	34368	724139
Bamboo forest	318545	22446	15055	325936
Shrub forest in artificial mounds	90274	11914	13581	88607
Shrub forest in stone hills	1557924	63482	89813	1531593
Shrub economic forest	646523	80233	33423	693333
other forest communities	1722989	82818	85566	1720241

Total	14445087	1054580	1026406	14473261

Note: The data are collected from the forest land change survey of forestry departments.

(3) Asset accounts for timber resources

①Physical flow accounts for timber

The physical flow of timber resources often refers to the standing stocks. Based on the availability of data, the physical flow asset accounts for timber resources recorded the total amount of timber resources at the opening and closing of the accounting period, and the inventory changes during the accounting period. The basic structure is shown in the following table, in which the data was obtained from the ninth review of the national continuous forest inventory of Guangxi. The opening and closing of the period is 2010 and 2015, respectively (Table 2-8).

Table 2-8 Physical Asset Account for Timber Resources (Unit: 10,000 Hectare, 10,000 Cubic Metre)

	Forests											Other timber
	Total	Arbor forest						Bamboo forest		National Special shrub forest		
		Total		Natural		Artificial		Natural	Artificial	Natural	Artificial	
	Area	Area	Stock	Area	Stock	Area	Stock	Area		Area		Stock
Opening stock	1342.7	990.1	50936.8	475.1	28664.6	514.9	22272.2	6.7	27.4	225.8	92.7	4879.8
Additions to stock	247.9	184.0	41932.0	65.3	13381.3	118.7	28550.8	1.0	3.9	17.8	41.3	2830.5
Reductions in stock	161.0	124.0	25116.4	82.7	8809.6	41.3	16306.8	0.5	2.4	12.5	21.6	1029.5
Closing stock	1429.7	1050.1	67752.5	457.8	33236.3	592.3	34516.1	7.2	28.8	231.1	112.4	6680.8

Note: The data are collected from forestry departments' continuous inventory data of forest resources, or the forest land change survey of forestry departments.

The reason for the larger increase in forest area and stock volume in 2015 compared with 2010 was mainly due to the contribution of arbor forests. Among them, eucalyptus, fir and other hard broad species contributed the most to the area growth, and the increase in stock volume was mainly due to the stock volume of eucalyptus, fir, masson pine and broad-leaved mixed forest increased rapidly.

② Carbon Asset Account for Timber Resources

According to the structure of the physical asset accounts for timber resources, combined with the compilation method of IPCC (Intergovernmental Panel on Climate Change) land use change and forestry greenhouse gas inventory, the carbon accounts for timber resources were established. The carbon increase during the period was largely derived from the increase in timber carbon resulting from the natural timber growth and planting structure adjustments; the carbon decrease during the period was largely derived from the release of timber carbon caused by timber logging, planting structure adjustments and changes in land use mode. The data in the table was obtained from the ninth review of the national continuous forest inventory of Guangxi, the opening and closing of the period is 2010 and 2015, respectively (Table 2-9).

Table 2-9 Carbon Asset Account for Timber Resources (Unit: tC)

	Arbor forest	Bamboo forest	National special shrub forest	Other trees	Total
Opening stock	31075.2	640.9	3115.1	3076.7	37908.0
Additions to stock	3306.4	6.8	25.1	327.4	3665.6
Reduction in stock	0.0	0.0	0.0	0.0	0.0
Closing stock	34381.6	647.7	3140.2	3404.0	41573.6

Note: The basic data are collected from forestry departments' inventory data of forest resources.

The largest increase in the stock is arbor forests, which accounted for 90.2% of the increase in forest carbon assets, which is consistent with the rapid increase in the accumulation of arbor species in Guangxi in recent years.

(4) Asset accounts for aquatic resources

The natural water cycle, i.e. hydrologic cycle, involves the connections among the atmosphere, ocean, ground surface and the underground. The physical asset accounts for aquatic resources were compiled according to the type of water resources. The water stocks at the opening and closing of the accounting period, and water stock changes during the accounting period were counted. The unit of measurement for water adopted 'million m^3' when compiling accounts. When accounting for changes in water stocks, consideration should be given to increases, decreases and other changes in stocks. With reference to the national compilation system of natural resource balance sheets, the structure of physical asset accounts for aquatic resources is shown in the following table, in which the data is derived from the 2017 annual accounting data (Table 2-10).

Table 2-10 Physical Account for Water Resources (Unit: 10,000 Cubic Meters)

	Total	Surface water	Underground water
Opening stock	2474534	2446155	28380
Additions to stock	36829099	32362614	4466485
Water resources formed by precipitation	23880397	19413912	4466485
Inflows and inputs	11403785	11403785	0
Inflows from outside the region	6957200	6957200	
Inputs from outside the region	0	0	—
Inflows from other water bodies in the region	4446585	4446585	0
Other water sources	13683	13683	0

	Total	Surface water	Underground water
Return from economic and social water consumption	1531234	1531234	0
Reduction in stock	36614876	32166686	4448190
Water abstraction	2849391	2847786	1605
Residents' domestic	402382	401528	855
Industry	459641	459111	529
Agriculture	1957614	1957437	177
Water supplementation in artificial ecological environment	29754	29710	45
Outflows and outputs	33765485	29318900	4446585
Outflows to external regions	29318900	29318900	0
Outputs to external regions	0	0	0
Water flow to other water bodies in the region	4446585	0	4446585
Closing stock	0	0	0
Opening stock	2688757	2642082	46675

Note: This table is quoted from *the compilation system of national natural resource asset balance sheet.*

2.2.2 Ecosystem asset accounts

According to the current natural conditions, Guangxi ecosystem is classified into forest ecosystem, farmland ecosystem, grassland ecosystem, freshwater ecosystem, marine ecosystem and urban ecosystem. The ecosystem accounts comprise ecosystem extent accounts and ecosystem condition accounts.

(1) Ecosystem extent accounts

①Compilation results

Table 2-11 shows the statistics of ecosystem extent accounts of Guangxi. In comparison to the land cover accounts, Table 2-11 classifies the land cover types of the 6 major ecosystems in more detail. It should be noted that, the assessment of the urban ecosystem only considered urban green spaces, urban waters were calculated in the freshwater ecosystem without separation, the impervious surface and other cover types of the urban ecosystem were not proposed as they were not included in the assessment. Therefore, Table 2-11 only shows the statistics of urban green spaces, and all sub-ecosystem extent accounts were aligned with the ecosystem extent accounts.

Table2-11 Ecosystem Extent Account(Unit: Hectare)

Ecosystem types			**Opening extent**	**Additions to extent**	**Reductions in extent**	**Closing extent**	**Ecosystem area**	**Net change**	**Ratio of change to total area（%）**
Farmland ecosystem	Wet crops		2178845	8452	7603	2179694	4862276	-5690	-0.02
	Dryland crops		2689121	5089	11628	2682582			
Forest ecosystem	Chinese fir		1856480	64279	51651	1869108	14473261	28174	0.12
	Pines		2141764	101261	147063	2095962			
	Hard broadleves		1967204	76095	196301	1846998			

	Soft broadleaves		1289836	221385	122473	1388748			
	Eucalyptus species		2118773	206935	137112	2188596			
	Arbor economic forest		734775	23732	34368	724139			
	Bamboo forest		318545	22446	15055	325936			
	Shrub forest in artificial mounds		90274	11914	13581	88607			
	Shrub forest in stone hills		1557924	63482	89813	1531593			
	Shrub economic forest		646523	80233	33423	693333			
	other forest communities		1722989	82818	85566	1720241			
Grassland ecosystem	Natural grassland		5012	33	10	4936	1107039	-8410	-0.04
	Artificial grassland		214	0	2	212			

	other Grassland		1110223	1000	9431	1101891			
Freshwater ecosystem	Rivers		285548	900	368	290080	611352	-1837	-0.01
	Lakes,		462	3	0	465			
	Reservoirs		170467	189	114	171542			
	Ponds		176939	525	2232	170232			
	Ditches		91886	82	385	91583			
	Inland beaches		36536	74	511	36099			
Marine ecosystem	Mangroves		9431	69	391	9109	93535	-539	0.00
	Coastal beaches		84643	7	224	84426			
Urban ecosystem	Parks and green land		24733	314	681	24366	24366	-367	0.00
Other land			2453713			2442382	2442382	-11331	-0.05
Total			23762860			23762860			

From the ecosystem scope account, it can be seen that the dominant ecosystem type in Guangxi is the forest ecosystem. The ending stock of 14,473261 hectares, accounting for 60.9% of the total area in Guangxi; followed by the farmland ecosystem, the ending stock of 4862276 hectares, accounting for 20.5 %of the total land area in Guangxi . Followed by

grassland, wetland, marine and urban ecosystems, accounting for 4.6%, 2.7%, 0.4% and 0.1% respectively. The six ecosystems included in the assessment scope accounted for 89.2% of the total area. The largest increase in the stock is Forest ecosystem, The percentage of its change in the total area is 0.12%. The largest decreases occurred in Other land and Grassland ecosystem (-0.05% and -0.04%), The main reason is that some other grasslands have been developed and utilized, such as being converted into forest land.

Refer to farmland ecosystem extent accounts in Table 2-12, which further subdivided on the basis of ecosystem extent accounts. The paddy field crops in Guangxi are mainly rice, and dryland crops are mainly sugarcane, corn, soybeans and potatoes.

Table 2-12 Farmland Ecosystem Extent Account(Unit: 10^4 Hectare)

	Wet crops		Dryland crops					Total
	Rice	Others	Sugarcane	Corn	Soybean	Potatoes	Others	
Opening stock	195.98	21.90	95.1	60.93	9.73	27.46	75.69	486.80
Variation	-3.73	3.81	-1.6	-1.21	0.31	-0.26	2.11	-0.57
Closing stock	192.25	25.72	93.5	59.72	10.04	27.2	77.80	486.23

Refer to forest ecosystem extent accounts in Table 2-13, and spatial distribution of forest ecosystem types in Figure 5-8. The forest ecosystem extent accounts are classified into 10 types according to the dominant species in compartments, specifically, fir forest, pine forest, hard broad-leaved forest, soft broad-leaved forest, eucalyptus forest, arbor economic forest, bamboo forest, earth mountain shrubs, stone mountain shrubs, and economic shrubs. The tree species distribution data is supplemented

by the forest resources survey and change database provided by the forestry authorities (resolution of 0.0667hm^2, 1 mu), and the total scope is subject to the current land use database.

Table 2-13 Forest Ecosystem Extent Account (Unit: 10^4 Hectare)

	Chinese fir	Pines	Hard broadleves	Soft broadleves	Eucalyptus species	Arbor economic forest	Bamboo forest	Shrub forest in artificial mounds	Shrub forest in stone hills	Shrub economic forest	other forest communities	Total
Opening stock	185.65	214.18	196.72	128.98	211.88	73.48	31.8545	9.03	155.79	64.65	172.30	1444.51
Additions to stock	6.43	10.13	7.61	22.14	20.69	2.37	2.2446	1.19	6.35	8.02	8.28	105.46
Reduction in stock	5.17	14.71	19.63	12.25	13.71	3.44	1.5055	1.36	8.98	3.34	8.56	102.64
Closing stock	186.91	209.60	184.70	138.87	218.86	72.41	32.5936	8.86	153.16	69.33	17.20	1447.33

Refer to grassland ecosystem extent accounts in Table 2-14. The statistics are basically aligned with the scope provided by Guangxi Grassland Supervision Center.

Table 2-14 Grassland Ecosystem Extent Account (Unit: Hectare)

	Natural pasture	Artificial pasture	Other grassland	Total
Opening stock	5012	214	1110223	1115449
Additions to stock	33	0	1000	1033
Reduction in stock	10	2	9431	9443
Closing stock	4936	212	1101891	1107039

Refer to freshwater (wetland) ecosystem extent accounts in Table 2-15, which includes six subtypes outside and within the urban built-up area, specifically, rivers, lakes, reservoirs, ponds, and inland beaches. The statistics are basically aligned with the scope provided by the Water Resources Department of Guangxi.

Table 2-15 Wetland Ecosystem Extent Account (Unit: Hectare)

	River Water surface	Lake water surface	Reservoir Water surface	Pond water surface	Ditchs	Inland beaches	Total
Opening stock	285548	462	170467	176939	91886	36536	761838
Additions to stock	900	3	189	525	82	74	-
Reduction in stock	368	0	114	7232	385	511	-

Closing stock	290080	465	171542	170232	91583	36099	760001

Refer to marine ecosystem extent accounts in Table 2-16. Owing to the absence of marine spatial data, marine ecosystem extent accounts only include two subtypes: mangroves and coastal shoals, without inclusion of offshore areas, which is significantly different from the scope provided by the oceanography authorities.

Table2-16 Marine Ecosystem Extent Account (Unit: Hectare)

	Mangroves	**Coastal beaches**	**Total**
Opening Stock	9431	84643	94074
Additions to stock	69	7	-
Reduction in stock	391	224	-
Closing stock	9109	84426	93535

Refer to urban ecosystem extent accounts in Table 2-17. Similarly, owing to the absence of spatial data, urban ecosystem extent accounts only include urban green spaces, without inclusion of green cover and garden greens in built-up area, which is partially different from the total scope provided by the housing and urban-rural development authorities.

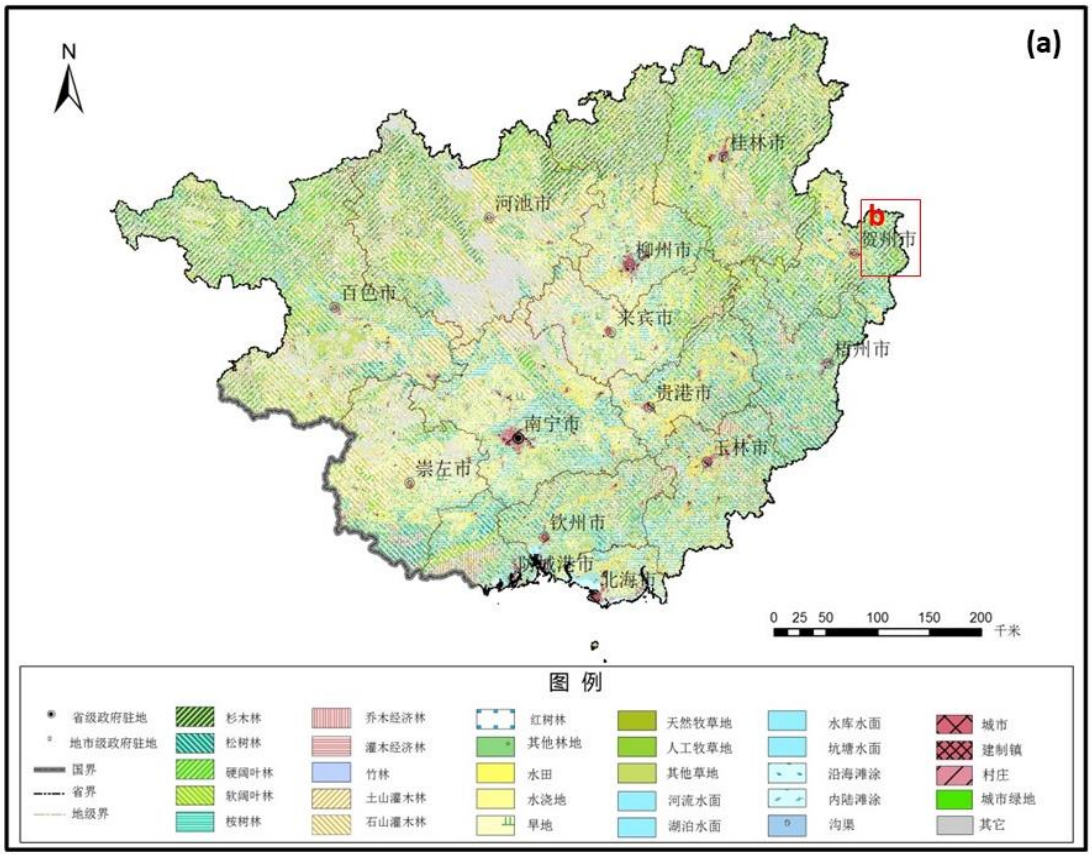
表 2-17 Urban Ecosystem Extent Account (Unit: Hectare)

	Urban green space（park green space）	**合计**
Opening stock	24733	24733
Additions to stock	314	314

Reduction in stock	681	681
Closing stock	24366	24366

③Mapping of Ecosystem extent

The ecosystem extent space mapping data is derived from the current land use condition database provided by the natural resources authorities. Through de-fragmentation and data fusion, the mapping space obtained a resolution of 0.25hm^2.Refer to ecosystem extent space mapping of the six major subsystems in Figure 2-2.



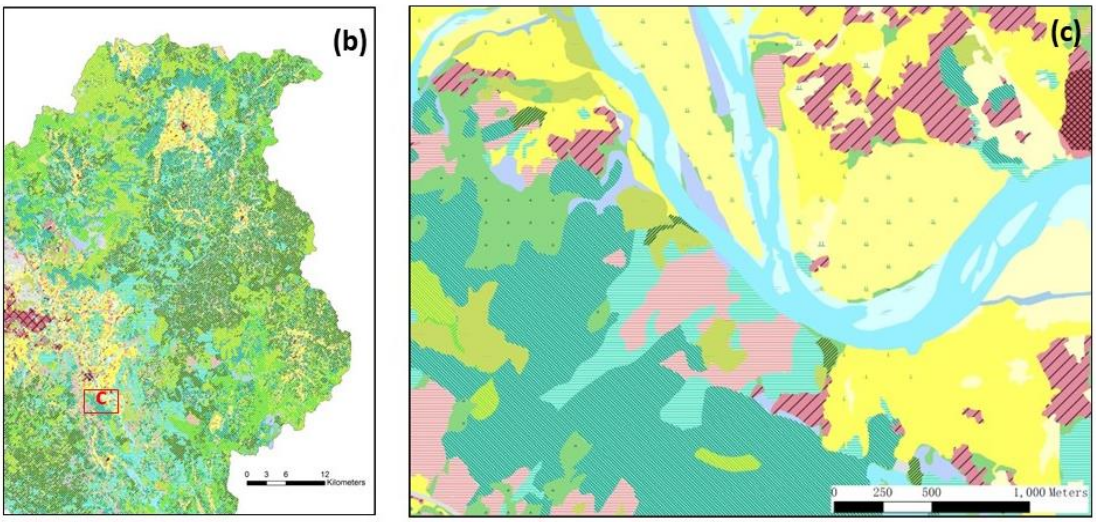


Figure 2-2 Detailed land cover of Guangxi（2017）

(2) Ecosystem condition accounts

The ecosystem condition accounts record information on various characteristics that reflect the condition or quality of the ecosystems. The annual ecosystem condition accounts of Guangxi in 2016-2017 were obtained through comprehensive assessment of remote sensing data and field survey data of related authorities. The Guangxi pilot compiled indicators of geographic and rainfall condition, pressure indicators based on air emission, and ecosystem condition.

The section presents results of ecosystem condition accounts for four ecosystem types, namely farmland ecosystem, forest ecosystem, marine ecosystem and urban ecosystem. The reference year was set at 2016 and the closing period was 2017 based on data availability.

Table 2-18 Farmland ecosystem condition accounts

		Sugarcane	Rice	Corn	Soybean	Potato	Others
Soil bulk density	2016	1.33	1.33	1.33	1.33	1.33	1.33
$(t \cdot m^{-3})$	2017	1.47	1.22	1.29	1.29	1.41	1.27

		Sugarcane	Rice	Corn	Soybean	Potato	Others
Soil Nitrogen content	2016	0.09	0.11	0.09	0.09	0.09	0.09
(%)	2017	0.13	0.26	0.2	0.2	0.21	0.16
Soil phosphorus content	2016	0.05	0.05	0.05	0.05	0.05	0.05
（%）	2017	0.07	0.08	0.1	0.1	0.1	0.08
Soil potassium content	2016	0.25	1.66				0.25
（%）	2017	0.26	1.19	1.65	1.65	1.65	1.91
Soil organic matter content（%）	2016	1.86	3.91				1.86
	2017	1.48	3.87	2.67	2.67	3.36	2.78

Table 2-19 Forest ecosystem condition accounts

		Chinese fir	Pines	Hard broadleves	Soft broadleves	Eucalyptus species	Arbor economic	Bamboo	Shrub forest in artificial mounds	Shrub forest in stone hills	Shrub economic forest	others
Mean tree high (m)	2016	12.80	14.20	13.40	13.40	11.60	7.10	8.60	1.50	0.50	2.50	1.75
	2017	13.70	14.30	13.80	13.80	12.90	7.50	8.50	1.75	1.75	1.75	1.75
Soil bulk density （$t \cdot m^{-3}$）	2016	1.09	1.35	1.06	1.06	1.27	1.15	1.12	1.30	1.20	1.23	
	2017	1.14	1.25	1.12	1.12	1.59	1.15	1.12	1.30	1.20	1.23	
Soil Nitrogen content (%)	2016	0.25	0.14	0.24	0.24	0.18	0.17	0.23	0.23	0.22	0.15	
	2017	0.19	0.18	0.19	0.19	0.12	0.17	0.23	0.23	0.22	0.15	
Soil phosphorus content（%）	2016	0.09	0.07	0.08	0.08	0.04	0.05	0.08	0.06	0.06	0.05	
	2017	0.02	0.02	0.03	0.03	0.01	0.05	0.08	0.06	0.06	0.05	
	2016	3.50	2.27	1.34	1.34	1.53	1.62	1.36	2.09	1.86	1.45	

		Chinese fir	Pines	Hard broadleves	Soft broadleves	Eucalyptus species	Arbor economic	Bamboo	Shrub forest in artificial mounds	Shrub forest in stone hills	Shrub economic forest	others
Soil potassium content（%）	2017	1.90	1.59	1.61	1.61	0.95	1.62	1.36	2.09	1.86	1.45	
Soil organic matter content（%）	2016	5.07	3.13	4.72	4.72	3.63	3.05	4.49	3.66	6.38	2.97	
	2017	3.78	2.54	5.26	5.26	1.70	3.05	4.49	6.66	6.38	2.97	
Shannon-Wiener Index	2016	2.38	2.33	4.09	4.09	1.57	0.69	2.17	2.91	3.29	0.73	0.69
	2017	2.38	2.68	4.09	4.09	2.16	0.69	2.17	2.91	3.29	0.73	0.69

Table 2-20 Marine ecosystem condition accounts

		Mean
Nitrogen content (g/m3)	2016	0.298
	2017	0.332
Phosphorus content (g/m3)	2016	0.021
	2017	0.042
Silicon content (g/m^3)	2016	0.284
	2017	0.382
Mass uptake of inorganic nitrogen (t/a)	2016	18464
	2017	35782
Mass intake of reactive phosphoric acid（t/a）	2016	4001
	2017	3765
Ocean chemical oxygen Demand（t/a）	2016	337593
	2017	521915
Massive inflow of petroleum pollutants （t/a）	2016	955.9
	2017	1145.9

Table 2-21 Urban ecosystem condition accounts

		Green lands of parks	Attached green land	protection green land	Green lands of scenic area	mean
NPP	2016					11.68
$(t \cdot hm^{-2} \cdot a^{-1})$	2017	13.89	8.31	8.61	13.96	11.19
Mean tree high	2016					9
(m)	2017	12.03	7.08	7.42	12.95	9.87
Shannon-Wiener Index	2016					
	2017	3.09	1.54	1.80	3.31	2.44

Note: The Opening condition (2016) is the literature data, and the mean value is used for each type, while the Closing condition (2017) is the measured data.

Due to the short interval between the opening and closing year, the changes of the condition indicators are more likely to reflect the dynamic fluctuations of the ecosystem. If it is necessary to reflect the long-term change trend of the ecosystem, longer and more periods of observation are needed to draw the trend conclusion consistent with the statistical significance.

2.2.3 Physical flow accounts for ecosystem services

The purpose of compiling accounts for ecosystem services is to simulate a series of ecosystem services, with the focus laying on the final ecosystem services. The definition of ecosystem services excludes a set of flows commonly referred to as support or intermediate services. However, in order to gain an understanding of how the ecosystem typically promotes economic activities, some intermediate services that contribute to the production of final services must also be included. In the early stages of Guangxi's previous research and project piloting, a series of other ecosystem services were considered. However, combined with the current data availability, experience from previous studies in Guangxi, feedback report of expert delegation from the UN project pilot and discussions of other stakeholders, the previous valuation indicator system of Guangxi ecosystem services has been revised. The revision eliminated the accumulation of nutrients, oxygen release, and maintenance services such as nitrogen/phosphorus/potassium/organic content in the soil to avoid repetitive calculation. Three widely recognized ecosystem service categories - provisioning services, regulating services, and cultural services were adopted (including a total of 25 ecosystem service indicators: 5 provisioning services, 15 regulating services and 5 cultural services). In terms of accounts for ecosystem services, the annual ecosystem services of Guangxi in 2016-2017 were calculated from physical and monetary flow aspects in this report (Table 2-1).

In consideration of a wide range of ecosystem services across the entire ecosystem domain, a space-based biophysical model was applied, and two basic methods were adopted for compiling physical flow accounts. First, a "top-down" approach was applied to provisioning services (e.g. supply of

agricultural products), which involved the spatial decomposition of information that already exists in the system of national accounts. Second, a "bottom-up" approach was adopted for regulating services and cultural services, e.g. carbon sequestration and soil conservation, and the provincial summary was achieved by summarizing municipal and county level information based on various models.

(1) Provisioning services

Table 2-22 present the results of the physical flow accounts of provisioning services in Guangxi. The provisioning services include provision of agricultural products, forest products and raw materials, freshwater products, including the provisioning services of farmland, forest, grassland, freshwater, and marine ecosystems. Note that the provisioning services of urban ecosystem were not considered in this report. Owing to the lack of data, the physical flow accounts for marine products were not proposed.

Table 2-22 Physical flow accounts of provisioning services

Second-level indicators	Third-level indicators	Provisioning type	Provisioning services		
			Opening stock	NET change	Closing stock
Provisioning food and raw materials	Agricultural products	Sugarcane (10^4 t)	7461.32	150.37	7611.69
		Rice (10^4 t)	1137.25	-49.35	1087.9
		Corn (10^4 t)	278.6	-4.2	274.4
		Soybeans (10^4 t)）	14.94	1.36	16.3
		Potato (10^4 t)	76.05	-0.85	75.2
		Others (10^4 t)	4811.31	342.51	5153.82

	Summation of agricultural products (10^4 t)		13772.37	446.94	14219.31
	Forest products	Wood（10^4 m^3 ）	2954.80	104.41	3059.21
		Bamboo（10^4 stick）	50669.10	1770.92	52440.02
		Fruit (10^4 t)	1189.02	133.72	1322.74
		Drive fruit (10^4 t)	25.24	-0.94	24.3
		Beverage products of forest products (10^4 t)	6.26	0.87	7.13
		Forest seasoning products (10^4 t)	19.43	-0.67	18.76
		Forest food (10^4 t)	7.18	6.21	13.39
		Forest herbs (10^4 t)	18.84	4.01	22.85
		Woody oil (10^4 t)	22.31	0.77	23.08
		Industrial raw Materials of Forest Products (10^4 t)	71.55	1.07	72.62
	Hay products	Natural grass (t)	11442.40	552.08	11994.48
		Artificial grass (t)	2897.56	365.12	3262.68
		Other grass (t)	2534639.00	142956.00	2677595.00
	Summation of hay products (t)		2548978.96	143873.20	2692852.16
	Wetland products	Fish (t)	1597527	82373	1679900
		Shrimp (t)	13280	-2199	11081
		Crab (t)	2291	-139	2152
		Bei (t)	16939	22	16961
		Algae (t)	81	6	87
	Summation of wetland products （t）		1630118	80063	1710181

(2) Regulating services

Table 2-23 presents the summary result of the physical flow accounts for regulating services in Guangxi.The types of regulating services provided

by the six ecosystems vary according to their different structures and functions. Refer to the specific types of provision in the valuation indicator system in Table 2-1;Among them, biodiversity indicators were not included as it only calculated the monetary flow accounts.

Table 2-23 Physical flow accounts of regulating services (Unit: t)

Service types			Ecosystem types						
			Farmland	Forest	Grassland	Wetland	Marine	Urban	Summation
Carbon sequestration	Carbon sequestration	2016	5247125	15956884	103148	107100	1951	51197	21467405
		2017	5241195	16042383	102371	106269	1884	50438	21544540
Purifying atmosphere	Absorbing sulfur dioxide	2016	219059	139036	55772			1862	415729
		2017	218802	139171	55352			1834	415159
	Absorbing fluoride	2016	2264	3259	13340			124	18987
		2017	2262	3250	1330			122	6964
	Absorbing nitrogen oxides	2016	161987	8243	41309			121	211660
		2017	161796	8256	40997			119	211168
	Dust retention	2016	403652	24.96×10^6	132181			237443	773276
		2017	403180	24.93×10^6	131303			233920	768403
	Inorganic nitrogen purification	2016					8220		8220

Pollution degradation treatment		2017					7084		7084
	Active phosphate purification	2016					514		514
		2017					443		443
	Chemical oxygen demand (COD) treatment	2016					337593		337593
		2017					521915		521915
	Petroleum disposal	2016					956		956
		2017					1146		1146
Water conservation	Conserving water resources	2016		368.65×10^8	27.53×10^8			0.99×10^8	397.17×10^8
		2017		404.79×10^8	29.84×10^8			1.17×10^8	435.80×10^8
Protection and disaster reduction	Farmland protection	2016		1521.3×10^4					1521.3×10^4
		2017		1453.8×10^4					1453.8×10^4
	Flood mitigation	2016				124.78×10^8			124.78×10^8
		2017				125.21×10^8			125.21×10^8
Soil conservation	Soil retention	2016	1.44×10^8	4.09×10^8	0.37×10^8			0.01×10^8	5.91×10^8
		2017	1.44×10^8	4.14×10^8	0.37×10^8			0.01×10^8	5.96×10^8

(3) Cultural services

Cultural services are mainly tourism services. The physical flow accounts for tourism services mainly count the number of scenic spots and tourists. As the grassland ecosystem dominated by natural grassland is relatively small in Guangxi and owing to the lack of data, the cultural services were not measured. Table 2-24 presents the results of physical flow accounts for cultural services in Guangxi providing by the five ecosystems.

Table 2-24 Physical flow accounts of cultural services

Service types			Ecosystem types					Total
			Farmland	Forest	Wetland	Marine	Urban	
cultural services	Number of A-level scenic spots	Opening stock	118	69	28	11	124	350
		Closing stock	127	65	32	13	143	380
	Total number of visitors in the scenic area (10,000 person-times)	Opening stock	4043.63	2817.12	837.88	1679.72	9364.69	18743.06
		Closing stock	4741.82	2401.66	1208.91	1863.96	10710.65	20927.00

2.2.4 Monetary flow accounts for ecosystem services

(1) Valuation method

In accounting for natural resources and ecosystems, the main purpose of valuation is to integrate information on natural resources, ecosystem conditions and ecosystem services with the information in standard

national accounts. To this end, the valuation concepts of accounting for natural resources and ecosystems have been aligned with that of national accounts, i.e. exchange value which is exchange value. In line with the concept of exchange value, the value assessment methods commonly used in existing accounting for natural resources and ecosystems are summarized and assessed in the Technical Recommendations in Support of the System of Environmental-Economic Accounting 2012 Experimental Ecosystem Accounting(white cover) . Refer to Table 2-25. Regarding the travel cost method, the time cost remains the most controversial issue.

Table 2-25 Characteristics of Commonly Used Monetary methods for Natural Resources and Ecosystem Accounting and Their Scope of Application

Methods	Adopting exchange value	Applicable for the following ecosystem services
Resource rent	Yes (it has been applied in SNA)	Provisioning services (and cultural services)
Production function method	Yes	Provisioning services (and regulating services)
Payment for Ecosystem Services (PES) schemes	Yes	Regulating services, such as carbon sequestration
Hedonic pricing method	Yes (it has been applied in SNA)	Cultural services, such as aesthetic pleasure
Replacement cost method	If the actual conditions are suitable	Regulating services
Damage costs avoided method	If the actual conditions are suitable	Regulating services
Averting behavior method	Likely inappropriate	
Restoration cost method	No (it may be used to estimate degradation)	

Methods	Adopting exchange value	Applicable for the following ecosystem services
Travel cost method	Possibly appropriate	Leisure and recreation
Statement preference method	Not direct value, but available demand curve	Cultural services
Marginal values method from demand functions	Yes	Regulating services (and cultural services)

Resource rent method encompasses three methods: residual value method, appropriation method and access price method. The residual value method is the most commonly used. The difference between the unit labor, production asset cost and benefit price is the unit resource rent. To quote an expert feedback from the UN project delegation: take the supply of agricultural products as an example, suppose that the value of crops is 100, the cost of seeds and fuel is 20, labor cost is 10, capital cost (depreciation and opportunity cost is 15), and resource rent is 100-20-10-15=55. In this case, the ecosystem service value is only 55 instead of 100. The valuation of this ecosystem service requires information on the average agricultural cost (perhaps classified by crop types), capital cost (depreciation) and wages.

Production function method measures the quantitative relationship of technical factors between the input and output quantity of production factors, and is applicable to the valuation of provisioning services.

Replacement cost method estimates the value of ecosystem services based on the cost involved in mitigation actions after the loss of ecosystem services. For example, to build a water purification plant as a consequence of damage to the water filtration service of the ecosystem that supplies

groundwater to aquifers for drinking water. Indicators such as climate regulation value, water conservation value, and flood regulation and storage value are measured by this method.

Opportunity cost method: Under the condition of scarce resources, the use of one method means that other methods must be abandoned, and the maximum benefit that may be obtained from the abandoned methods constitutes the opportunity cost. The assessment of biodiversity indicators applies this method.

Cost analysis method assesses the value of ecosystem services from the perspective of consumers. It takes the cost that people spend to enjoy a certain ecosystem service function as the economic value of the service. Indicators such as tourism value are measured by this method.

Payment for ecosystem services is a voluntary transaction between producers who can guarantee the continuous supply of certain ecosystem services and consumers who are willing to pay for such services. The purpose is to address insufficient supply of ecosystem services by regulating market behavior, encourage environmental protection behavior, and promote the internalization of environmental externalities. The concept includes three dimensions: the definition of ecosystem services, accounting for exchange value, and transaction of ecosystem services. Payment for ecosystem services is applicable to the valuation of regulating services such as carbon sequestration.

(2) Results of accounts compilation

In terms of compilation of ecosystem service accounts of Guangxi in 2016-2017, the physical flows of indicators were first measured, then a variety of economic value transfer methods were applied to calculate the monetary

flow of the first, second, and third-level ecosystem service indicators corresponding to the six ecosystems in Guangxi. After summary, the total monetary flow of Guangxi ecosystem services was obtained (refer to Annex 1 for the specific measurement method).

Refer to the summary of monetary flow accounts for ecosystem services in Table 2-35. According to the valuation indicator system in the Guidelines, the indicators of Guangxi ecosystem services in 2016-2017 were calculated. The assessment results of first-level indicator values are ranked as: regulating services>provisioning services>cultural services. Among them, the value of regulating services accounts for more than 60%, highlighting its proportion in the service value of Guangxi ecosystem. The total value of services provided by Guangxi ecosystem in 2016 and 2017 was RMB 914.1 billion and RMB 879.45 billion, respectively.

Refer to the detailed monetary flow accounts classified by the three-level indicators of ecosystem services and types in Table 2-26, 2-27. According to the summary of the valuation results of the six sub-indicator systems provided by the valuation indicator system, the value of the services provided by the ecosystems is ranked as forest>farmland>urban>marine>freshwater>grassland.

Table 2-26 Monetary flow accounts for ecosystem services

Unit: 100 million YUAN

		Farmland	Forest	Grassland	Wetland	Marine	Urban	Subtotal
Provisioning services	Opening stock	100.2	987.4	14.2	97.8	206.0		1405.6
	Closing stock	100.5	954.7	15.5	102.7	216.0		1389.4
Regulating services	Opening stock	284.3	6758.6	115.7	60.0	19.1	141.9	7379.6
	Closing stock	288.6	6337.4	130.8	50.8	21.9	163.6	6993.1
Cultural services	Opening stock	74.2	54.9	0.0	14.6	59.9	152.3	355.8
	Closing stock	94.4	50.4	0.0	21.7	61.2	184.3	412.0
Total	Opening stock	458.7	7800.9	129.9	172.4	285.0	294.2	9141.0

	Closing stock	483.5	7342.5	146.3	175.2	299.1	347.9	8794.5

Table 2-27 Details of monetary flow accounts for ecosystem services (divided by the three level indicators)

Unit: 100 million YUAN

First-level indicators	Second-level indicators	Third-level indicators	Opening stock	Closing stock	(+/-)
Provisioning services	Food/material provisioning	Agricultural /forestry/hay/ aquatic /seafood products	1405.6	1389.4	-16.2
Summation of provisioning services			1405.6	1389.4	-16.2
Regulating services	Carbon sequestration	Carbon sequestration	20.3	20.4	0.1
	Regulating climate	Regulating temperature	117.7	126.1	8.4
	Purifying atmosphere	Absorbing sulfur dioxide	20.9	19.4	-1.5
		Absorbing fluoride	0.3	0.2	-0.1
		Absorbing nitrogen oxides	3.9	3.4	-0.5
		Dust retention	380.4	347.0	-33.4

	Pollution degradation treatment	Inorganic nitrogen purification	0.2	0.4	0.2
		Active phosphate purification	0.0	0.0	-
		Chemical oxygen demand (COD) treatment	4.7	7.3	2.6
		Petroleum disposal	0.0	0.0	-
	Water conservation	Conserving water resources	3688.4	3374.5	-313.9
	Protection and disaster reduction	Farmland protection	42.1	38.5	-3.6
		Flood mitigation	31.3	26.8	-4.5
	Soil conservation	Soil retention	18.5	17.2	-1.3
	Protection of biodiversity	Biological conservation	3050.9	3011.9	-39.0
Summation of regulating services			7379.6	6993.1	-386.5
Cultural services	Recreational services	Agricultural tourism	74.3	94.4	20.1
		c tourism	54.9	50.5	-4.4
		Water conservancy tourism	14.6	21.7	7.1
		Marine tourism	59.9	61.1	1.2
		Urban tourism	152.2	184.3	32.1

Summation of cultural services	355.8	412.0	56.2
Total	9141.0	8794.5	-346.5

Table 2-28 Details of monetary flow accounts for ecosystem services (divided by ecosystem types)

Unit: 100 million YUAN

First-level indicators	Second-level indicators	Third-level indicators		Ecosystem types					
				Farmland	Forest	Grassland	Wetland	Marine	Urban
Provisioning services	Food/material provisioning	Agricultural /forestry/hay/ aquatic /seafood products	Opening stock	100.2	987.4	14.2	97.8	206.0	-
			Closing stock	100.5	954.7	15.5	102.7	216.0	-

First-level indicators	Second-level indicators	Third-level indicators		Ecosystem types					
				Farmland	Forest	Grassland	Wetland	Marine	Urban
Regulating services	Carbon sequestration	Carbon sequestration	Opening stock	2.6	17.5	0.1	0.1	0.0	0.0
			Closing stock	2.6	17.6	0.1	0.1	0.0	0.0
	Regulating climate	Regulating temperature	Opening stock						117.7
			Closing stock						126.1
	Purifying atmosphere	Absorbing sulfur dioxide	Opening stock	2.5	17.6	0.7	-	-	0.1
			Closing stock	2.5	16.1	0.7	-	-	0.1
		Absorbing fluoride	Opening stock	0.0	0.3	0.0	-	-	0.0
			Closing stock	0.0	0.2	0.0	-	-	0.0
		Absorbing nitrogen oxides	Opening stock	2.3	1.1	0.5	-	-	0.0
			Closing stock	1.9	1.0	0.5	-	-	0.0
		Dust retention	Opening stock	0.5	378.8	0.2	-	-	0.9
			Closing stock	0.6	345.2	0.2	-	-	1.0
		Inorganic nitrogen purification	Opening stock	-	-	-	-	0.2	-

First-level indicators	Second-level indicators	Third-level indicators		Ecosystem types					
				Farmland	Forest	Grassland	Wetland	Marine	Urban
	Pollution degradation treatment		Closing stock	-	-	-	-	0.4	-
		Active phosphate purification	Opening stock	-	-	-	-	0.0	-
			Closing stock	-	-	-	-	0.0	-
		Chemical oxygen demand (COD) treatment	Opening stock	-	-	-	-	4.7	-
			Closing stock	-	-	-	-	7.3	-
		Petroleum disposal	Opening stock	-	-	-	-	0.0	-
			Closing stock	-	-	-	-	0.0	-
	Water conservation	Conserving water resources	Opening stock	272.7	3282.1	113.0		-	20.6
			Closing stock	277.2	2945.9	128.1		-	23.3
	Protection and disaster reduction	Farmland protection	Opening stock		42.1				
			Closing stock		38.5				
		Flood mitigation	Opening stock				31.3		
			Closing stock				26.8		

First-level indicators	Second-level indicators	Third-level indicators		Ecosystem types					
				Farmland	Forest	Grassland	Wetland	Marine	Urban
	Soil conservation	Soil retention	Opening stock	3.7	13.5	1.2	-	-	0.1
			Closing stock	3.8	12.1	1.2	-	-	0.1
	Protection of biodiversity	Biological conservation	Opening stock		3005.6		28.6	14.2	2.5
			Closing stock		2960.8		23.9	14.2	13.0
Cultural services	Recreational services	Agricultural / Forestry / Water conservancy / Marine / Urban tourism	Opening stock	74.2	54.9		14.6	59.9	152.2
			Closing stock	94.4	50.4		21.7	61.1	184.3

3. SEEA-linked Indicator Test

See Annex 2 “SEEA-linked Indicator Test Report” for details

4. Scenario analysis

See Annex 3 “Brief Description of Scenario analysis” for details

5. Main conclusion

The pilot tapped into the possibility of ecosystem accounting for a group of selected natural resources and ecosystem services in Guangxi. The research shows that a considerable amount of potential data can be obtained by adopting the ecosystem accounting method under the SEEA EEA guidelines. However, there is still a lot of work that needs further improvement. In regard of the accounting for Guangxi ecosystem services, the current pilot project has not yet included ecosystem services of socio-economic significance. Biophysical models are widely used in accounting for many ecosystem services, which meet the needs of provincial-level accounting and smaller-scale (municipal/county-level) comparisons. In the future, the quality and simulation precision of existing biophysical models shall be further improved. The use of spatial information is expected to show the detailed supply locations of ecosystem services, determine the places most in need of change or protection, and optimize the supply of ecosystem services. In the meantime, the approaches of collecting ecosystem condition indicators should be consistent, as the information is essential for monitoring the progress of the objectives set by the government.

5.1 Main challenges

With regard to the Guangxi pilot, it is particularly important to implement accounting step by step in a flexible manner, as there is still a tremendous gap in the basic information related to the environment, and the matching with economic accounting is unsatisfactory. The factors of resources and environment are subject to the management of Department of Natural Resources, Department of Ecology and Environment, Water Resources

Department, Department of Agriculture and Rural Affairs, Department of Forestry, and Department of Oceanography. In this connection, the content covered by environmental economic accounting has in fact been divided into different components, presenting difficulties to the implementation of comprehensive accounting.

5.2 Next steps in guangxi

（1）Strengthen data collection capabilities. Basic data directly affects the accuracy and reliability of the value evaluation results. At present, when carrying out the evaluation of ecosystem services in Guangxi , some basic data have lags and quality problems. In addition, due to the problem of data update, the basic data of some departments and the land use data provided by the natural resources department are inconsistent, which will affect the determination of the valuation scope, the spatialization of the valuation results, and the further extension of the evaluation work to the city and county in the future. In the next step, we need to establish quality standards and norms for ecosystem accounting data to improve the consistency and quality of basic data.

(2) Continue to compile the Guangxi Natural Capital and Ecosystem Service Account on an annual basis.Compared with mature socio-economic accounting, ecosystem accounting is still in its infancy, thus restricting the initiative and enthusiasm of local governments in ecosystem management. In the future, within the remit of the SEEA EEA framework, we shall Continue to explore the compilation of provincial accounts to further improve the accounting indicator system, innovate accounting methods, strengthen cross-department and professional collaboration, and carry out comprehensive accounting actively and steadily.

(3) Carry out city-level pilot in Guilin.This work has been included in the key work content of Guangxi Zhuang Autonomous Region in 2021, which has important practical significance for exploring the mechanism for realizing the value of ecological products.

(4) Exploring the standardization of accounting methods.At present, the accounting for most of the ecosystem service indicators resort to biophysical models. Although the accounting results are highly accurate, the complex model structure, large data demand and difficult repetition of accounting results make it difficult to adapt to the business accounting needs of administrative departments. Therefore, exploring and innovating universal accounting methods based on the SEEA EEA framework is of great significance to further advance the development of ecosystem accounting.

5.3 Main application

The pilot work experience is expected to be applied in three areas in Guangxi. The first is to improve the annual work of Guangxi's ecological service value evaluation, to provide scientific reference for the government's ecosystem management and decision-making, the second is to help the establishment of Guangxi's ecological product realization mechanism, and the third is to promote the development of ecological compensation standards applied to the river basin.

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Annex

1. Guidelines for the Pilot of Guangxi NCAVES Project (EN)
2. SEEA-linked Indicator Test Report
3. Brief Description of Scenario Analysis