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Analysis of the Ecology-Economy Coordination Degree in Yanqi Basin, Xinjiang, China

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In this study, we analyzed the change of the ecosystem services value by the land use/cover change in Yanqi basin in 1985, 1990, 1996, 2000, 2005 and 2011 by evaluation model of the ecosystem services value and the ecology-economy coordination degree. The results showed: (1) the total ecosystem services value is increasing gradually during the research period. The contribution rate of the water body and farmland to the ecosystem services value is large; the decreasing of the ecosystem service functions of grassland and forestland has negative contribution to the total ecosystem services value. (2) The ecology-economy coordination degree stands are at the low level conflict and low level coordination stage. Therefore, reasonable use and effective management of water and soil resource is the key to coordinated development of maintain the ecosystem service function and the economic sustainable development.

Key Words: Ecosystem services value, Ecology-economy coordination degree, Yanqi Basin.

INTRODUCTION

China's rapid industrialization, urbanization and continuous exploitation of natural resources since the late 1970s have caused land-use/cover change (LUCC). The rate of urbanization is remarkable over recent decades because of fast economic development. The process of urbanization often leads to replacement of vegetations, water area and agricultural land with impervious concrete surfaces, such as buildings and roads. This trend has produced a series of environmental problems that affect biodiversity, local climate, hydrologic processes and so forth[1]. As a result, ecosystem service function will be damaged by overloaded excavation and overuse of ecosystem. Therefore, seeking for economic development and ensuring eco-security have become contradictive and coordination degree between such a GDP growth and ecological protection determines the sustainability state of regional development. Under the background of global low-carbon tendency, coordination degree of ecology-economic system is important for judging whether researched regional development is healthy or not. To measure coordination degree of eco-economic system is now one of the hottest research topics in sustainable development. Related researches in this domain have periodical features; in the beginning, the coordinative relations between rapid economic development and environment[2-6], which are regarded as a necessary way to realize the sustainable development of human society, are the focus of most of the research works. Subsequently, the relations between the rapid agglomeration of population, economy and environment[7-9] receive increasing attentions; scholars recognize that there are tight relations between population urbanization and environmental protection; later, it is widely acknowledged that the complicated coupled relations between human factors and ecological environment should be analyzed comprehensively, so the relations among economy, rapid expansion of urban area and environment become an issue that received great concerns[10,11]. However, most of the above researches have been carried out at provincial level. Few works have been carried out at a small region scale. How to coordinate the rapid economic growth and environmental degradation and resource consumption is an important way to achieve sustainable development.

Ecosystem service value (ESV) is closely related to regional socio-economic development levels. Researchers have investigated the relationship between regional ecosystem and economic system primarily based on three focal points, the first focus has been on the internal feedback mechanism of ecology-economic system. Researchers think that economic system is part of an ecosystem and the interaction and mutual feedback mechanism between economic subsystem and ecosystem is very important[12]. Topics on the relationship and feedback between ecology-economic system include the feedback mechanism between economic growth and resources loss[13,14], natural capital and basic living conditions[15], economy, energy and climate[16], *etc*.

Compared with numerous literatures on internal and mutual feedback, there are fewer studies on evaluating coordination degree of ecology-economic system in rapid urbanization regions. The goal of this study was to promote a healthy natural environment in which agro-ecological economic development. The evaluation of coordinative degree between population, economy and environment can reflect the sustainability of Yanqi Basin and provide useful information for sustainable development decision-making of Yanqi Basin.

Yanqi Basin is one of the oases agricultural demonstration areas on the southern slope of Tianshan Mountain, national policy adjustment, human activities, climate change and other factors caused the land use/cover change of Yanqi Basin, which seriously affect the regional ecological security and sustainable development[17,18]. In this context, in order to better understand the oasis basin land use structure and the change rules of ecological environment, we studied dynamic change of ecosystem service value in Yanqi Basin and the empirical study focusing on Land use changes and their ecological effects, based on six LUCC data by using the ecological economic coordination degree (CDES).

EXPERIMENTAL

Study area: Yanqi Basin, the study area, is located on the southern part of Tianshan Mountains, northwest China (86º39′-88º20′ E, 41º23′-43º31′ N). The administrative divisions include Hoxut, Hejing, Yanqi and Bohu four counties parts, It has a total area of 723766.86 ha (Fig. 1). The Yanqi Basin borders the Tianshan Mountains in the north and west and the Kuruktag Mountains in the south. Due to its long distance from the oceans and being surrounded by high mountains, Yanqi Basin is characterized by a typical mid-temperate continental arid climate, with average annual rainfall 50.7-79.9 mm and an average annual evaporation capacity of 2000.5-2449.7 mm. The annual accumulative active temperature e ≥ 10 °C is 3414.4-3694.1 °C and annual daily sun duration is 3074.3-3163.4 h.

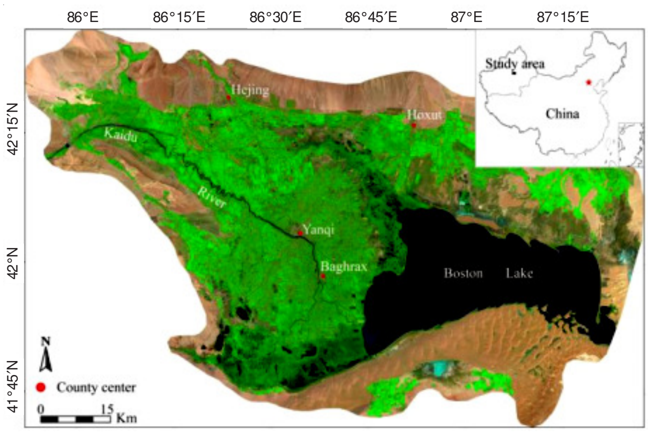


Fig. 1. Location map of Yanqi basin

Ground elevation of the Yanqi Basin is generally from 1050 to 1200 m. The topographic feature is high in the west and low in the east, while high in the north and low in the south. Overall it displays sloping landform features from periphery to the basin. Soil types are mostly brown desert soil, meadow soil and swamp soil, irrigation farming soil, soil, saline soil, weathered soil and other basins major soil types. Natural vegetation is tamarisk (*Tamarix ramosissima*), camel thorn (*Alhagi sparsifolia*), apocynum (*Apocynumvenetum*), licorice (*Glycyrrhiza uralensis*) and ephedra (*Ephedrap rzewalskii Stapf*) dominated desert vegetation and reed (*Phragmites communis*)-based aquatic vegetation.

Data sources and methodology

Data sources and processing: Land-use data used in this study was acquired from Landsat images of October 1985, October 1990, September 1996, September 2000, August 2005 and August 2011. Geometric correction and the mosaic of the images were collected using ENVI 4.5 image-processing software based on 1:100,000 topographic maps. According to the research purpose and status of the study area, images were classified by using visual interpretation and Supervised Classification methods. Field observations clarified the presence of mainly nine land use and land cover categories in the study area. The minimum level of interpretation accuracy in the identification of land use and land cover categories from remote sensor data was at least 87 % (Fig. 2). The sources of Socio-economic data in this paper are procured from the annual statistic books of Hejing, Heshuo, Yanqi and Bohu County.

Calculation of ecosystem service values

(1) In order to evaluate ecosystem service values for each of the nine land-use categories in the study area, each land-use category was compared with different biomes identified in both the world's[19] and China's[20,21] ecosystem. Ecosystem service values per unit area for each land-use category was assigned based on the nearest equivalent ecosystems suggested by Xie *et al.*[19] and Costanza *et al.*[21]. The ecosystem service values and ecosystem service functions represented by each land-use category in the study area were obtained as follows:

$$ESV_k = \sum_f A_k \times VC_{kf} \quad (1)$$

$$ESV_f = \sum_k A_k \times VC_{kf} \quad (2)$$

$$ESV = \sum_k \sum_f A_k \times VC_{kf} \quad (3)$$

where: ESV_k, ESV_f and ESV_k refer to the ecosystem service values of land-use category 'k', value of ecosystem service function type 'f' and the total ecosystem service values respectively. A_k is the area (ha) for land-use category 'k' and VC_{kf} the value coefficient (Yuan ha^{-1} a^{-1}) for land-use category 'k', ecosystem service function type 'f'[22].

(2) Since the biomes used as proxies for the land-use categories are clearly not perfect matches as mentioned above and there are uncertainties of the value coefficients, additional sensitivity analysis was needed in order to test the percentage change in the ecosystem service values for a given percentage change in value coefficients. In each analysis, the coefficient of sensitivity (CS) was calculated using the standard economic concept of elasticity as follows[22,23]:

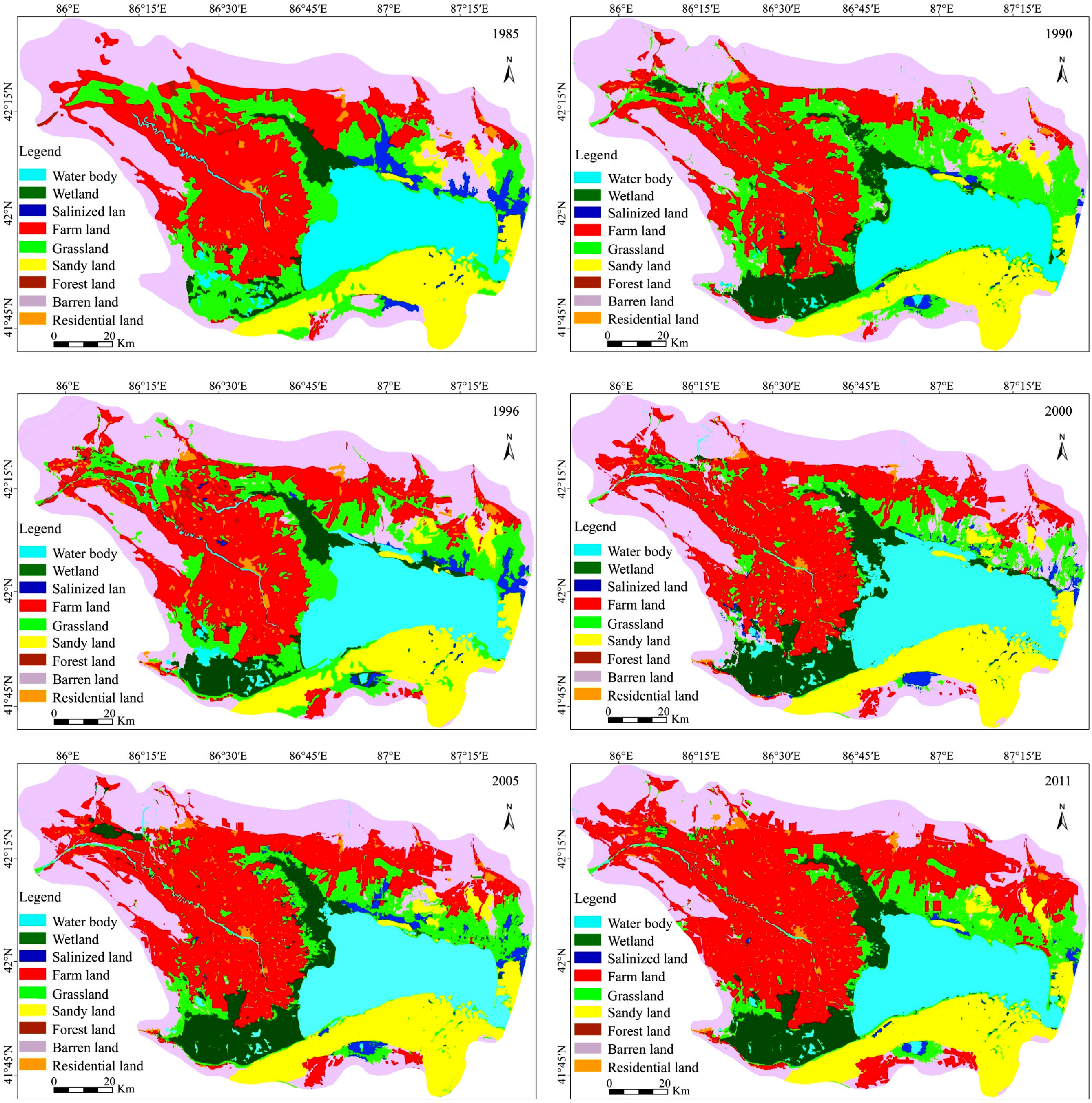


Fig. 2. Land use-cover map of Yanqi basin Oasis in 1985, 1990, 1996, 2000, 2005 and 2011

$$CS = \frac{\left(ESV_j - ESV_i\right)/ESV_i}{\left(VC_{jk} - VC_{ik}\right)/VC_{ik}} \quad (4)$$

where: ESV is the estimated ecosystem service value, VC is the value coefficient, 'i' and 'j' represent the initial and adjusted values, respectively and 'k' represents the land-use category.

If CS is greater than unity, then the estimated ecosystem value is elastic with respect to that coefficient, but if CS is less than one, then the estimated ecosystem value is considered to be inelastic. The greater the proportional change in the ecosystem service value relative to the proportional change in the valuation coefficient, the more critical is the use of an accurate ecosystem value coefficient[23,24].

Calculation of CDES: CDES means the ratio between the changing rate of ESV per unit area (ESpr) and that of GDP per unit area (GDPpr) during research periods[25,26]. And its formula is shown below:

$$CDES = \frac{ES_{pr}}{GDP_{pr}} \quad (5)$$

$$ES_{pr} = \frac{ES_{pj} - ES_{pi}}{ES_{pi}} \quad (6)$$

$$GDP_{pr} = \frac{GDP_{pj} - GDP_{pi}}{GDP_{pi}} \quad (7)$$

where, ES_{pj} and ES_{pi} are the ESVs per unit area (yuan h m^{-2}) respectively at the beginning and the end time points of research periods in a certain part of the study area. And GDP_{pi}, GDP_{pj} and ES_{pj} are the GDPs per unit area (yuan h m^{-2}) respectively at the beginning and the end time points of research periods in the same study area. The value estimation of GDP and ESV was based on the constant price level in 1985.

Then we can find four possible circumstances: (i) if eqns. (6) > 0 and (7) > 0, then (5) > 0, meaning the researched eco-economic system in a coordination state; (ii) if eqns. (6) > 0 and (7) < 0, then (5) < 0, meaning the researched eco-economic system in a poor coordination state; (iii) if eqns. (6) < 0 and (7) > 0, then (5) < 0, meaning the researched eco-economic system in a poor coordination state too; (iv) if eqns. (6) < 0 and (7) < 0, then (5) > 0, meaning the researched eco-economic system in the worst coordination state. So we should differentiate (i) from (iv).

Classification of the CDES: Therefore, CDES can be judged by the following criterion:

With statistics of ESVs and GDPs in each county unit, we can find the changes and features of CDES in the Yanqi Basin *via* eqn. 5.

(1) CDES ≥ 1, represents the growth rate of ecosystem services value is not less than the rate of economic growth during the study period and the ecology-economic system is in the state of coordination.

(2) 0 < CDES < 1, means that the growth rate of ecosystem services value lower than the economic growth rate during the study period, but the ecosystem services value will increase; economic development although not cause deterioration of ecological environment, but there is a potential crisis. The larger the CDES is, the more coordinative the researched eco-economic system is; In order to better represent regional differences in economic and environment development, the GDEE is subdivided into two classes: 0 < CDES ≤ 0.5, the low degree of coordination; 0.5 ≤ CDES < 1, the moderate coordination.

(3) -1 ≤ CDES < 0, means that the increasing of ecosystem services value is negative, the social and economic development has a negative impact on the ecological environment, regional economic development is uncoordinated with environment, economic development and ecological protection in conflict during the study period. In this case, it also be divided into two categories: -1 < CDES ≤ -0.5, the low degree of conflict; -0.5 ≤ CDES < 0 when the conflict moderate.

(4) CDES < -1, means that the value of ecosystem services decreased significantly and ecological environment is deteriorating during the study period, economic development and ecological environment protection serious conflicts, environmental uncoordinated with economic development, regional economic development is unsustainable.

RESULTS AND DISCUSSION

Changes of ecosystem services value: By utilizing the value coefficients[19,21] and land-use data, the total ecosystem services values of Yanqi Basin in 1985, 1990, 1996, 2000, 2005 and 2011 were obtained through programming in ARCVIEW GIS software following the eqns. 1 to 3, these results is shown in Table-1.

According to Table-1, the total ecosystem services values of Yanqi Basin increased from about 7,680,842,900 Yuan in 1985, to about 9,358,589,400 Yuan in 1990, declined from about 9,358,589,400 Yuan in 1990, to 8,502,463,100 Yuan in 1996 and increased from about 8,502,463,100 Yuan in 1996, to about 10,451,831,300 Yuan in 2000 and declined from about 10,451,831,300 Yuan in 2000, to 9,993,290,900 Yuan in 2005 and to about 9,829,326,000 Yuan in 2011. From the proportion of ecosystem services value in study area, in 1985-2011 years, the ecosystem service values produced by water body was the highest among the nine land-use categories (in 44.67 % above), followed by the wetland area (at 16.14 % or more), The aggregated ecosystem service values of water body and wetland were more than 60.81 % of the total value. Research shows that in the 1985-2011 years, water body, wetlands, sandy

TABLE-1
ECOSYSTEM SERVICES VALUE OF YANQI BASIN OASIS IN 1985, 1990,1996,2000,2005 AND 2011

		Water body	Wet land	Sandy land	Salinized land	Grass land	Residential land	Farm land	Forest land	Barren land
ESV_f 10^4 (Yuan/ year)	1985	443990.2	123894.1	2833.5	1514.7	67083.1	59.7	112570.7	3460.1	12678.3
	1990	431757.8	124681.3	2903.3	452.5	64632.2	77. 1	104103.9	3762.4	12488.7
	1996	490637.4	189543.7	2711.4	770.9	63348.1	87.4	121853.3	1713.7	11580.4
	2000	525191.2	348369.8	2776.8	808.6	30583.2	123.6	124103.1	435.1	12791.8
	2005	462540.9	346120.8	2905.9	1139.4	38402.3	130.5	136485.9	517.7	11085.8
	2011	439092.5	325205.7	2939.4	487.9	37568.7	155.8	167907.6	542	9033.1
1985-1990	10^4Yuan	-12232.4	787.2	69.8	-1062.2	-2450.9	17.4	-8466.8	302.3	-189.6
	%	-2.8	0.6	2.5	-70.1	-3.7	29.2	-7.5	8.7	-1.5
1990-1996	10^4Yuan	58879.6	64862.4	-191.9	318.4	-1284.1	10.3	17749.4	-2048.7	-908.3
	%	13.7	52	-6.6	70.4	-2	13.4	17.1	-54.5	-7.3
1996-2000	10^4Yuan	34553.8	158826.1	65.4	37.7	-32764.9	36.2	2249.8	-1278.6	1211.4
	%	7.1	83.8	2.4	4.9	-51.7	41.4	1.9	-74.6	10.5
2000-2005	10^4Yuan	-62650.3	-2249	129.1	330.8	7819.1	6.9	12382.8	82.6	-1706
	%	-11.9	-0.7	4.7	40.9	25.6	5.6	10	19	-13.3
2005-2011	10^4Yuan	-23448.4	-20915.1	33.5	-651.5	-833.6	25.3	31421.7	24.3	-2052.7
	%	-5.1	-6.1	1.2	-57.2	-2.2	19.4	23	4.7	-18.5
1985-2011	10^4Yuan	-4897.7	201311.6	105.9	-1026.8	-29514.4	96.8	55336.9	-2918.1	-3645.2
	%	-1.1	162.5	3.7	-67.8	-44	162.2	49.2	-84.4	-28.8

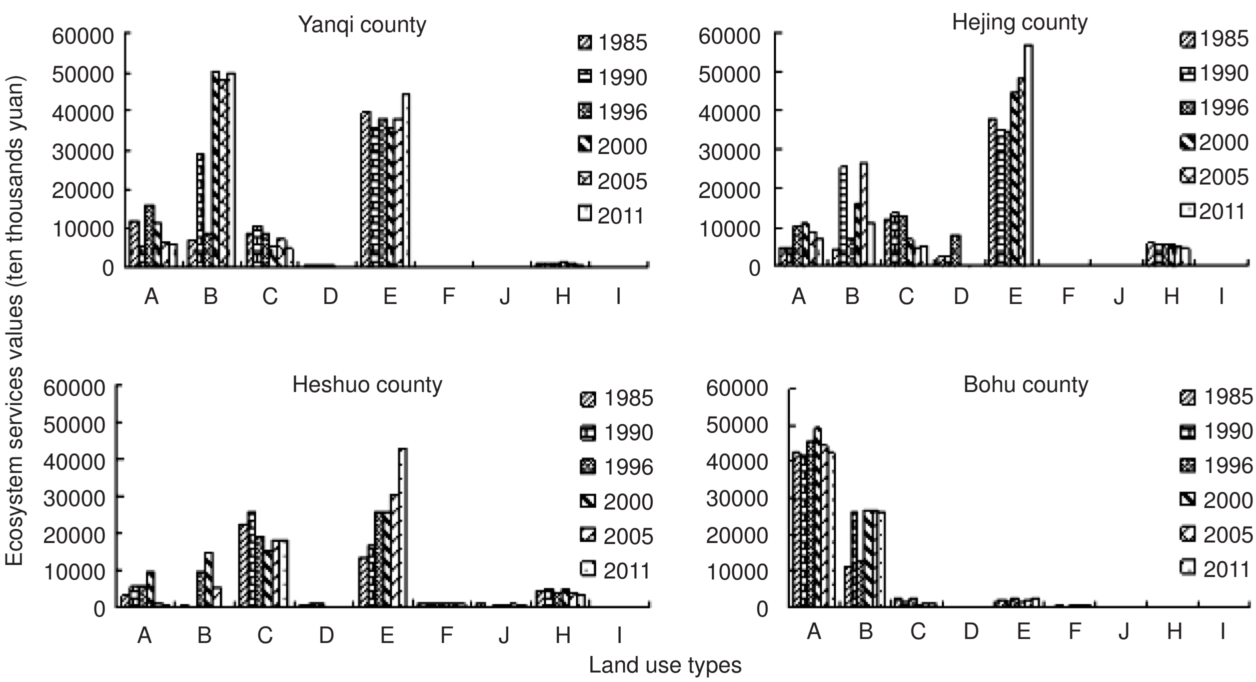
land, farmland and residential land ecosystem service value showed an increasing trend, while the salinized land, grassland, forest land and barren land ecosystem service value decline. Among them, the wetland ecosystem services value increased by 2,013,116,000 Yuan; sandy ecosystem services value increased by 1,059,000 Yuan; farmland ecosystem services value increased by 553,369,000 Yuan; residential land ecosystem services value increased by 968,000 Yuan; the water body, salinized land, grassland and forest land ecosystem service value decreased by 48,977,000 Yuan, 10,268,000 Yuan, 295,144,000 Yuan and 29,181,000 Yuan. In the 1985-2011 years, the Yanqi Basin, the ratio of farm land area about 26.4 %, but the value of ecosystem services provided by farmlands, but only 13.8 %; while the ratio of water body area only 14.44 % of the total land use area, but the value of ecological services provided by water body accounted for more than 44.67 % of the total ecosystem services value. Main reason is that most of the land use areas in the study area are desert ecosystem services they have low coefficient value and Kaidu river throughout the study area and thus its larger coefficient value of ecosystem services in waters area relative to other land uses area is large, so its ecosystem service value is higher. This study reveals that water body play an important role on the changes of total ecosystem services value and showed its importance in the arid area such as Yanqi Basin.

The spatial variation of the four counties ecosystem service values in Yanqi Basin at different times can be seen from (Fig. 3), During the 1985-2011 years, the ecosystem services value of Bohu County was highest and a growing trend, increased to 1,396,703,300 Yuan. This is mainly because of these counties in recent years, increasing emphasis on ecological and environmental protection and the water body and wetland areas were increased. The ecosystem services value of Heshuo County was lowest. the reason is the grassland and woodland areas with high coefficient value were decreased, but the farm land area significant increased by 438,512.49 h m^2 and thus the total ecosystem service value of Heshuo County was slightly increased. However, during this period the total ecosystem services value of Hejing County has little change. Although the grassland and woodland areas with higher coefficient value were decreased by 12,555.32 h m^2, 1,362.43 h m^2, respectively and transformed into farm land.

In order to determine the ecosystem services value changes over time as well as the dependence of the value coefficient changes in the study area, we make the ecological service value sensitivity coefficient analysis. The percentage change in estimated total ecosystem service values and the coefficient of sensitivity resulting from a 50 % adjustment in the value of the coefficient were calculated using eqn. 4. In all cases, coefficient of sensitivity was far less than unity and often near zero. This confirmed that the total ecosystem service values estimated in this study area were relatively inelastic with respect to the value coefficients during 1985-2011 years. This study indicating that the total ecosystem service values estimated in this study area was relatively inelastic with respect to the value coefficients. The estimation in this study area was robust in spite of uncertainties on the value coefficients.

Sustainable development in evaluation

Economic development: Yanqi Basin belongs to the temperate arid areas, more vulnerable ecological environment. The current economic development is still in extensive stage, with the development of regional resources, the development of industrialization and population growth, cause the ecological environment of the region face rigorous pressure and also set a higher request to transforms the regional economies growth way and achieve harmony between man and natural environ-



A: Water body; B: Wet land; C: Grassland; D: Forest land; E: Farm land; F: Sandy land; J: Salinized land; H: Barren land; I: Residential land

Fig. 3. Ecosystem services values change at different c unties in Yanqi Basin during 1985-2011

ment. Recently the government establishes a development idea of "Yanqi-Hejing-Heshuo-Bohu economic zone" and the implement a "retreat red white expansion" strategy of modern agriculture and built up some other industrial base for spatial restructuring and further optimize the economic structure. In this study the whole Yanqi Basin and each county unit as a starting point, through the county's GDP and the classification of ecosystem services value, analyzed the harmonious relations between the economic development and ecological environment in Yanqi Basin counties. 1985-2011 years, the Yanqi Basin's GDP increased by 123.2557 million Yuan, a growth rate of 5179.25 %. During the study period, GDP growth of each county in Yanqi Basin were: Yanqi County (5536.81 %) and Hejing County (5132 %) and Heshuo County (4825.41 %) and Bohu County (4805.17 %). Research shows that the Bohu county GDP was minimum value, the lowest level of economic development and Hejing County GDP was maximum value, the highest level of economic development; But the total ecosystem services value of each county in Yanqi Basin were opposite with GDP. The results indicating that there is close relationship between economic development and ecological environment in Yanqi Basin.

Analysis of sustainable development: According to eqn. 5, we calculated the eco-economic coordination degree of Yanqi County, Hejing County, Heshuo County and Bohu County in Yanqi Basin (Table-2). Analysis shows that, 1985-2011 years the overall changing trends of eco-economic coordination degree in Yanqi Basin is "down then up". This is mainly because of the Yanqi Basin counties have accelerated the industrialization and urbanization, which will set the stage for faster for faster growth of economic, it also occupy land use types with high ecosystem service value and causing the decline of land use type with higher ecological service value in the study area. Studies show that in 1985-1990, the ecological economic coordination degree of Yanqi Basin was 0.449, in a low of coordination degree state; while in 1990-1996, ecological economic coordination degree of Yanqi Basin declined to -0.03, reflecting the ecological Conditions of Yanqi Basin is reversible trend, indicating that the socio-economic development of the Yanqi Basin has a negative impact on the ecological environment, ecological and economic development in the study area was at the uncoordinated state and the economic development conflict with the ecological environment protection; in 1996-2000, Yanqi Basin ecological economic coordination degree increased to 0.414, which indicates that the ecological economic coordination degree of Yanqi Basin takes on ascending trend as a whole and from low level conflict coordination to low level coordination, the ecosystem services value is increasing; in 2000-2011 years, the ecological economic coordination degree of Yanqi Basin is decreased. This shows that the region's labour and material resources have been invest in economic development too much and environmental protection issues have not got enough attention, the possibility of no-coordination between ecological environment and economic development still exist. In the future we should put the ecological environment maintenance and conservation at a more important position, otherwise it would hinders the regional sustainable development. Development point of view from Yanqi Basin counties, in 1985-1990, average have low water ecological economic coordination degree of Yanqi County, Heshuo County and Bohu County are at a low level coordination; Hejing County is in a stage of low level conflict coordination; in 1990-1996, ecological and economic coordination degree Yanqi County and Bohu County are declined and in a stage of low level conflict coordination, ecological and economic coordination degree declined -0.094 and -0.07, respectively, indicating that as the development of economic the regional ecological and environmental protection has been ignored; in 1996-2000, ecological and economic coordination degree of Yanqi County, Hejing County and Bohu County are in a stage of moderate and low level coordination, indicating that the present economic development and ecological environment have shown a tendency of well coordination trend, but there is still a potential crisis; in 2000-2011 years, ecological economic coordination degree of Yanqi County, Hejing County, Heshuo County and Bohu County are decreased and in a stage of low level coordination and low level conflict coordination. This shows that in the course of social and economic development, the adverse changes of regional ecological environment caused by human, which will hinder the region's sustainable development and alerts us to should strengthen regional ecological environment protection and restoration, maintaining good ecosystems services in study area.

Conclusions

(1) During the 1985-2011 years, the total ecosystem service value of Yanqi Basin has gradual increased, the main features

TABLE-2
ECOLOGY-ECONOMY COORDINATION DEGREE OF DIFFERENT COUNTIES IN YANQI BASIN DURING 1985-2011

		Yanqi county	Hejing county	Heshuo county	Bohu county	Whole area
1985-1990	EEH	0.128 Low level	-0.306 Low level conflict	0.105 Low level	0.134 Low level	0.449 Low level
1990-1996	EEH	-0.094 Low level conflict	-0.001 Low level conflict	0.142 Low level	-0.070 Low level conflict	-0.030 Low level conflict
1996-2000	EEH	0.577 Moderate	0.190 Low level	0.116 Low level	0.436 Low level	0.414 Low level
2000-2005	EEH	-0.032 Low level conflict	0.100 Low level	-0.178 Low level conflict	-0.070 Low level conflict	-0.045 Low level conflict
2005-2011	EEH	0.023 Low level	-0.048 Low level conflict	0.060 Low level	-0.014 Low level conflict	-0.009 Low level conflict
1985-2011	EEH	0.011 Low level	0.005 Low level	0.009 Low level	0.005 Low level	0.005 Low level

are as follows: the ecosystem service value of water body, wetland, sandy land, farmland increased and residential land, salinized land, grassland, forest land and bare land decreased. The declines of grassland and forest land ecosystem service values have obvious negative contribution to the total ecosystem service value of Yanqi Basin. But their resulting decrease phenomenon is completely swamped ecosystem service value resulting from the expansion of farmland. As a result, the total ecosystem service value of Yanqi Basin is increasing, though there still have a potential ecological crisis. From the analysis of the different counties ecosystem service value, the highest ecosystem services value appears in Bohu County and the lowest ecosystem service value appears in Heshuo County. Meanwhile, with the regional implementation of the economy-development-policies, the economic development in this region has made great progress, however under the negative influence of the population growth, the human activities such as the land resource exploration have made the farm land increasing significantly in Yanqi Basin. Moreover the changes of the reservoirs and channels such as the construction of water conservancy facilities have also caused the significant changes of the ecosystem service value in this study area.

(2) Research shows that, the GDP exist the apparent negative correlation with the ecosystem service value in Yanqi Basin counties: higher GDP of the county, its ecosystem service value is low. This particularly occurred in Yanqi County and Hejing County. This result implies though economy development has pulling the GDP growth effectively, but this development has resulted a significant decline of ecosystem service value in study periods in Yanqi Basin. The ecological economic coordination degree variation of the study area appears "down then up" phenomenon during the 1985-2011 periods. Therefore, in order to maintain the ecosystem services, there need to make appropriate standards for regional economic activities and make a good management, *i.e.*, adjusting the land use structure, controlling the land expansion of the cities and towns effectively and strengthening the water body, grassland management. Then we can keep the good functions of the ecological environment in this region and we can also promote the economic development at the same time. In this paper, spatial and temporal factors on the ecosystem service value were conducted together to made a preliminary exploration of how to fully assess the values of the ecosystem services, then compared with the traditional evaluation method from the perspective of economic development on the environment assessment, this research can support scientific and practical significance to the local area.

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