ADB

Completion Report

Project Number: 38660-023
Loan Number: 2436
Grant Number: 0113
August 2018

People's Republic of China: Ningxia Integrated Ecosystem and Agricultural Development Project

Asian Development Bank

CURRENCY EQUIVALENTS

Currency unit – yuan (CNY)

		At Appraisal	At Project Completion
		15 April 2007	30 April 2016
CNY1.00	=	$0.146	$0.149
$1.00	=	CNY6.86	CNY6.70

ABBREVIATIONS

ADB	–	Asian Development Bank
DMF	–	design and monitoring framework
EIA	–	environment impact assessment
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
GEB	–	global environmental benefits
GEF	–	Global Environment Facility
GHG	–	greenhouse gas
HPCMA	–	Helan Mountains Conservation Management Area
IEM	–	integrated ecosystem management
IWRMP	–	integrated water resources management plan
METT	–	management effectiveness tracking tool
NARB	–	Ningxia Agriculture Reclamation Bureau
NEPD	–	Ningxia Environmental Protection Department
NHAR	–	Ningxia Hui Autonomous Region
NFD	–	Ningxia Finance Department
PCR	–	project completion report
PIA	–	project implementing agency
PMO	–	project management office
PPMS	–	project performance monitoring system
PRC	–	People's Republic of China
TA	–	technical assistance
TER	–	terminal evaluation report
TOT	–	training of trainers
WACC	–	weighted average cost of capital
YMG	–	Yinchuan Municipal Government

WEIGHTS AND MEASURES

CO_{2e}	–	carbon dioxide equivalent
ha	–	hectare
km^2	–	square kilometer
m^2	–	square meter
m^3	–	cubic meter
t	–	ton

NOTE

In this report, "$" refers to United States dollars.

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CONTENTS

BASIC DATA

A. Loan and Grant Identification

1.	Country	People's Republic of China
2.	Loan/grant numbers and financing sources	2436 OCR/0113 GEF
3.	Project title	Ningxia Integrated Ecosystem and Agricultural Development Project
4.	Borrower	People's Republic of China
5.	Executing agency	Ningxia Hui Autonomous Region Government
6.	Amount of loan	$100 million
	Amount of grant	$4.545 million
7.	Project completion report number	1699
8.	Financing modality	Loan and grant

B. Loan and Grant Data

1.	Appraisal	
	– Date started	15 April 2007
	– Date completed	27 April 2007
2.	Loan negotiations	
	– Date started	23 April 2008
	– Date completed	24 April 2008
3.	Date of Board approval	29 August 2008
4.	Date of loan agreement	6 March 2009
5.	Date of loan effectiveness	
	– In loan agreement	4 June 2009
	– Actual	3 June 2009
	– Number of extensions	0
6.	Project completion date	
	– Appraisal	31 October 2014
	– Actual	31 October 2015
7.	Loan closing date	
	– In loan agreement	30 April 2015
	– Actual	30 April 2016
	– Number of extensions	2
8.	Financial closing date	
	– Actual for loan	28 October 2016
9.	Terms of loan	
	– Interest rate	London interbank offered rate–based
	– Maturity (number of years)	25
	– Grace period (number of years)	5
10.	Terms of relending	
	– Interest rate	London interbank offered rate–based
	– Maturity (number of years)	25
	– Grace period (number of years)	5
	– Second-step borrower	Ningxia Agricultural Reclamation Bureau Yinchuan Municipal Government

11. GEF cofinancing

– GEF Council Approval	2 August 2007
– GEF CEO endorsement	25 July 2008
– Date of financing agreement	6 March 2009
– Date of effectiveness	3 June 2009
– Closing date in financing agreement	31 July 2014
– Actual closing date	30 April 2016
– Number of extensions	2
– Actual financial closing date	17 October 2016

12. Disbursements

a. Dates – Loan

Initial Disbursement 15 September 2009	**Final Disbursement** 28 October 2016	**Time Interval** 85 months
Effective Date 3 June 2009	**Actual Closing Date** 28 October 2016	**Time Interval** 88 months

b. Dates – GEF Grant

Initial Disbursement 12 November 2009	**Final Disbursement** 17 October 2016	**Time Interval** 82 months
Effective Date 3 June 2009	**Actual Closing Date** 17 October 2016	**Time Interval** 88 months

c. Loan Amount ($ million)

Category	Original Allocation	Last Revised Allocation	Amount Cancelled	Net Amount Available	Amount Disbursed
Works					
Establishment of state farm viniculture	5.35	25.00	–0.06	25.07	25.07
Other civil works	47.44	19.45	0.04	19.41	19.41
Mingcui Lake wetland rehabilitation	–	2.20	0.15	2.05	2.05
Goods and materials	25.70	49.55	–0.26	49.81	49.81
Training and studies					
Implementing agency capacity building	1.75	1.18	0.52	0.65	0.65
Building IEM institutional arrangements	3.46	–	–	–	–
Land and water planning management	0.40	0.40	–	0.40	0.40
Consulting services	0.40	0.12	0.04	0.08	0.08
Interest and commitment charges	10.50	2.10	–	2.10	2.10
Unallocated	5.00	–	–	–	–
Total	**100.00**	**100.00**	**0.43**	**99.57**	**99.57**

IEM = integrated ecosystem management
Numbers may not sum precisely because of rounding.
Source: Asian Development Bank

d. Grant Amount ($ million)

Category	Original Allocation	Last Revised Allocation	Amount Cancelled	Net Amount Available	Amount Disbursed
Works	**0.63**	**2.79**	**0.04**	**2.75**	**2.75**
Yinchuan wetlands and biodiversity conservation	0.40	–	–	–	–
Helanshan nature reserve	0.04	–	–	–	–
Yinxi wetland vegetation restoration	0.19	–	–	–	–
EM demonstration construction and landscaping	_	2.79	0.04	2.75	2.75
Goods	**0.91**	**0.61**	**0.01**	**0.60**	**0.60**
Conservation agricultural machinery	0.13	0.13	–	0.13	0.13
Helanshan nature reserve	–	0.04	–	0.04	0.04
Sand Lake display and education	0.29	0.29	–	0.29	0.29
Yinchuan wetland conservation programs	–	0.15	0.01	0.14	0.14
Yuehai Lake monitoring equipment	0.16	–	–	–	–
PMO monitoring and evaluation and office equipment	0.32	–	–	–	–
Training and fellowships	**1.79**	**0.20**	**0.05**	**0.15**	**0.15**
Workshops, seminars, study tours	–	0.14	0.05	0.09	0.09
Research–Yinchuan wetland conservation	–	0.06	–	0.06	0.06
Consulting services	**1.00**	**0.95**	**0.11**	**0.84**	**0.84**
Training-of-trainers technical service	–	0.81	0.10	0.71	0.71
Project management support	–	0.14	0.01	0.13	0.13
Unallocated	**0.22**	**–**	**–**	–	**–**
Total	**4.55**	**4.55**	**0.21**	**4.34**	**4.34**

Numbers may not sum precisely because of rounding.
Source: Asian Development Bank

C. Project Data

1. Project cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign exchange cost	104.5	103.9
Local currency cost	116.5	114.5
Total	**221.0**	**218.4**

2. Financing plan ($ million)

Cost	Appraisal Estimate	Actual
Implementation cost		
Borrower financed	116.5	114. 5
ADB financed	89.5	97.5
GEF financed	4.5	4.3
Total implementation cost	**210.5**	**216.3**
Interest during construction costs		
Borrower financed	0	0
ADB financed	10.5	2.1
Other external financing	0	0
Total interest during construction cost	**10.5**	**2.1**

3. Cost breakdown by project component ($ million)

Component		Appraisal Estimate	Actual
A.	**Base Cost**		
1.	IEM capacity building and project management	9.3	3.7
2.	Land and water resource management	40.5	31.2
3.	Rural livelihood improvement	100.6	127.5
4.	Ecosystem conservation and tourism	27.6	53.9
	Subtotal (A)	**178.0**	**216.3**
B.	**Contingencies**	32.5	0
C.	**Financing Charges During Implementation**	10.5	2.1
	Total (A+B+C)	**221.0**	**218.4**

4. Project schedule

Item	Appraisal Estimate	Actual
Date of contract with consultants	December 2008	May 2010
Civil works contract		
Date of award	November 2008	December 2009
Completion of work	May 2012	April 2016
Equipment and supplies		
First procurement	November 2008	December 2009
Last procurement	May 2010	February 2016
Completion of equipment installation	October 2014	April 2016
Start of operations		
Completion of tests and commissioning	October 2014	April 2016
Beginning of start–up	March 2009	March 2009

5. Project performance report ratings

	Ratings	
Implementation Period	**Development Objectives**	**Implementation Progress**
From 3 June 2009 to 31 December 2009	Satisfactory	Satisfactory
From 1 January 2010 to 31 December 2010	Satisfactory	Satisfactory
	Single Project Rating	
From 1 January 2011 to 30 April 2016	On–track	

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person–Days	Specialization of Members
Fact-finding	19 November–3 December 2006	4	45	m, p, q, r
Appraisal	16–26 April 2007	5	37	b, m, n, o, p
Inception	1–10 June 2009	5	24	a, b, c, d, e
Review 1	20–29 April 2010	2	20	b, f
Special review 1	21–24 June 2010	2	8	b, f
Review 2	11–15 April 2011	2	10	b, f

Name of Mission	Date	No. of Persons	No. of Person–Days	Specialization of Members
Review 3	22–29 September 2011	5	40	b, c, e, f, g
Special review 2	30 July–1 August 2012	1	3	b
Midterm review	15–20 October 2012	2	12	b, f
Review 4	2–9 July 2013	5	22	b, g, h, I, j
Review 5	23–30 September 2014	2	11	a, b
Review 6	12–16 October 2015	2	10	b, f
Project completion review	18–22 December 2017	4	20	b, f, k, l

a = head of portfolio management unit, b = senior project officer (environment), c = senior financial control officer, d = senior portfolio management officer, e = financial control analyst, f = project analyst, g = senior procurement officer, h = country director, I = external relations assistant, j = senior external relations officer, k = senior safeguards officer (resettlement), l = senior project officer (financial management) , m = principal project specialist (natural resources), n = project officer, o = environment specialist, p = counsel, q = young professional, r = procurement specialist.

I. PROJECT DESCRIPTION

1. The Ningxia Integrated Ecosystem and Agricultural Development project covers 3,655 square kilometers (km^2) of the Yinchuan Plain, extending from the Yellow River in the east to the Helan Mountains in the west of the Ningxia Hui Autonomous Region (NHAR), the People's Republic of China (PRC). The project was designed to introduce an integrated ecosystem management (IEM) approach to combat land degradation.[1] It demonstrated holistic management of water and land, supported sustainable rural livelihoods in poor communities through contracts with commercial enterprises, and linked commercial and conservation values in an approach to rehabilitating degraded ecosystems. The project was cofinanced with a Global Environment Facility (GEF) grant,[2] which secured the implementation of the IEM approach and supported conservation efforts to protect 15 globally threatened species.

2. At appraisal, the project's impacts were improved environmental management to rehabilitate ecosystems and increase rural incomes in the project area. The project's main outcome was to introduce the IEM approach, to provide sustainable livelihoods for the population of the project area. The project delivered four outputs: (i) IEM capacity building and project management, (ii) land and water resource management, (iii) rural livelihood improvement, and (iv) ecosystem conservation.

3. The PRC has some of the worst land degradation in the world, with more than 40% of its land area, or about 3 million km^2, adversely affected. The vast western region accounts for 71% of the country's land area and has a population of more than 350 million, including many of the most poor and vulnerable. A strong correlation exists between land degradation and poverty incidence. The pressures of intensified use and rapid economic growth in recent decades have adversely affected the quality of most farmland, grassland, forests, wetlands, and mountain areas of the western region. To respond to the increasing threat, the Government of the PRC significantly expanded its programs to combat land degradation.

4. In 2003, with the GEF, the central government developed the PRC-GEF Land Degradation Partnership to secure ecosystem services in the western region.[3] The partnership sought to build policy, capacity, and strategy in six key western provinces to address land degradation using ecological management principles. The Asian Development Bank (ADB) provided the leadership with the government and other donors such as the World Bank, the International Fund for Agriculture Development, and the Food and Agriculture Organization. The project was designed as the first comprehensive demonstration investment of the partnership.

II. DESIGN AND IMPLEMENTATION

A. Project Design and Formulation

5. The project was consistent with the ADB's country partnership strategy (2008–2010), which continued support for poorer provinces and for integrated rural development, and with the PRC's contribution to protecting regional and global public goods.[4] The project reflected ADB's

[1] IEM was an operational program in GEF operations during GEF-4 (2006–2010).
[2] Administered by the Asian Development Bank.
[3] The partnership was governed by a country programming framework, which covered a programmatic approach over 10 years (2003–2012) and sought to combat land degradation, reduce poverty, and conserve biodiversity through capacity-building and IEM demonstration investment projects. The partnership was the GEF's first to practice its operational program of IEM. ADB was the implementing agency for the partnership.
[4] ADB. 2008. *People's Republic of China: Country Partnership Strategy 2008–2010.* Manila.

strategic concerns about improving the environment and promoting balanced and inclusive growth, as set out in the strategy. Project activities were aimed at promoting sustainable rural development with an emphasis on managing ecosystems and addressing rural poverty. The project interventions also contributed directly to the ADB's country partnership strategy (2011–2015), which set up three strategic pillars to support the government's goal to build a *xiaokang* society: inclusive growth, environmentally sustainable development, and regional cooperation initiatives. The project was also in line with the GEF's strategic objectives and contributed into global environmental benefits (GEBs) of biodiversity conservation and land degradation.

6. The project fit well into the government's five-year plans. The project implementation period overlapped with the 11th Five-Year Plan (2006–2010) and the 12th Five-Year Plan (2011–2015). The 11th Five-Year Plan aimed to develop a harmonious society through a science-based and people-centered development approach and continued economic reforms. The plan emphasized resource conservation, environmental protection, cleaner production systems, and greater reliance on ecosystem rehabilitation processes. The 12th Five-Year Plan aimed to promote new rural development and green development. In addition, the project was closely linked to the NHAR's 11th Five-Year Plan (2006–2010) and its 12th Five-Year Plan (2011–2015) for social and economic development. The project contributed directly to the goals of both plans for poverty alleviation. The project was also highly relevant to the NHAR's first rural environment protection plan (2011–2020).

7. During project preparation, an environmental impact assessment (EIA) was conducted and the EIA report was approved by Ningxia Environmental Protection Department in February 2007. Based on domestic EIA, a summary EIA report was prepared and disclosed on the ADB website in May 2007. In October 2011, an updated EIA was undertaken for a scope change in accordance with the ADB Safeguard Policy Statement (2009). In addition, during project preparation, a social and poverty assessment was carried out for each subproject.

8. During implementation, three minor changes in scope were made to respond to changes involved in the government's development plans. These changes did not affect the project outputs, and they enhanced the project impact and outcome.[5]

B. Project Outputs

9. **Output 1: IEM Capacity Building and Project Management**. At appraisal, this output targeted to: (i) strengthen the policy, legal, and regulatory framework of the NHAR to enable the implementation of IEM; (ii) provide training and institutional development through on-the-job

[5] The first scope change, approved in March 2011, included (i) cancellation of the Ningxia Administration Bureau's involvement in the project and associated project activities, and reallocation of the funds to sustainable livelihoods efforts implemented by Ningxia Agriculture Reclamation Bureau (NARB); (ii) removal of the Xixia Canal construction and irrigation rehabilitation from the project scope, as they were already funded under the central government's water program, with the saved loan proceeds used for on-farm water-saving irrigation in NARB farms; and (iii) cancellation of planned rehabilitation works for Sanding, Yueya, and Tonggui lakes because they were funded using government funds and reallocation of the funds to habitat rehabilitation and public education in Sand Lake and Mingcui Lake. The second scope change was made during the midterm review in December 2012, to use the unallocated amount and confirmed loan surplus to (i) strengthen the monitoring and management capacity of the Yinchuan Wetlands Management Office; (ii) improve quality control and operational management for NARB vineyards and dairy farms; (iii) promote integrated environment management at NARB vineyards and dairy farms; and (iv) enhance monitoring of and the public education facilities around the Yinchuan wetlands. The third scope change was made in February 2015 to use the loan savings to support additional facilities for (i) public education and environment management at Mingcui Lake, and (ii) improvement of the inferior contents and presence of the IEM demonstration center.

training and study tours; (iii) support IEM information and monitoring systems by developing the operational capacity of the IEM center; and (iv) strengthen project management. By completion, IEM had been mainstreamed effectively into major NHAR development plans, such as the 12th and 13th Five-Year Plans for Environment Protection. Several ecosystem management policies also adopted IEM approaches; for example, the Ningxia Wetlands Management Regulations released in 2009 and the Aiyi River management regulations. Training was carried out productively and improved the institutional capacity of project implementing agencies (PIAs).[6] An IEM data-sharing agreement involving 13 sector agencies was established in July 2010. An IEM demonstration center was established. Project management was strengthened through a well-established project performance management system (PPMS) and timely monitoring and reporting. The project also supported a strategic study on industrial development of wine-making in the NHAR, which established a plan for vineyard plantation and wine making by the Ningxia Agriculture Reclamation Bureau (NARB) in a growing, changing market.

10. **Output 2: Land and Water Resources Management.** At appraisal, the project was planned to support (i) preparation of the integrated water resources management plan (IWRMP), (ii) establishment of three demonstration sites for conservation agriculture, and (iii) design and construction of part of the Xixia Canal, including distribution irrigation networks. At project start-up, the NHAR had developed the IWRMP using government funds, as per the central government's water resources program. Three conservation-agriculture demonstration sites with a total area of 2,299 hectares (ha) were established. Construction of the Xixia Canal was removed from the project scope as it was to be funded by the government. The loan savings were used to support water-saving irrigation for a total area of 2,600 ha (2,400 ha for the NARB and 200 ha for Yinxi). The project supported four experimental demonstrations for land and water resources management: (i) integrated soil and water management at NARB farms, (ii) deficit irrigation of vineyards,[7] (iii) integrated environment management in dairy farms, and (iv) water quality improvement measures in Sand Lake.

11. **Output 3: Rural Livelihood Improvement.** At appraisal, the project was to support (i) expanding beef, dairy, and grape production;[8] (ii) sustainable land management through alternative production systems, including perennial crops and reduction of water and agrochemical use; and (iii) developing two blocks of land with perennial crops together with a beef feedlot, contract fodder, and sustainable livestock production systems for smallholders in poverty-affected areas. By completion, the project had established vineyards of 2,600 ha for the NARB (2,400 ha) and Yinchuan (200 ha), all covered by water-saving irrigation. Meanwhile, the project expanded the grape-processing capacity by 10,000 tons per year, equipped with sufficient quality control facilities. At the NARB's dairy farms, the project added 20,000 head of milk cows by introducing gender control technology for dairy cattle. Breeding and milking facilities and a quality control system were also established. A biogas digester with the capacity to treat 1,500 cubic meters per day (m^3/day) of animal waste was built to supply electricity for the farms. Alfalfa crops were developed on 800 ha using water-saving irrigation. At the NARB's halal beef and sheep

[6] A training-of-trainers (TOT) program was successfully implemented and delivered 74 training workshops to a total of 2,136 persons. The TOT program trained 115 persons as core trainers; they have become trainers in their own engaged entities and are playing an active role in delivering technical training and knowledge to local farmers. In addition, 5 international and 16 national study tours were carried out.

[7] Deficit irrigation is an optimization strategy in which irrigation is applied during drought-sensitive growth stages of a crop. Outside these periods, irrigation is limited or even unnecessary if rainfall provides a minimum supply of water.

[8] Including (a) expansion and upgrading of beef herds and the construction of a halal-certified slaughterhouse, (b) division of dairy herds and the provision of cooperative milking platforms with breeding and technical support, (c) conversion to perennial fodder production systems requiring less water and soil disturbance, (d) conversion of up to 670 ha of flood-irrigated land to small contract-grown vineyards using water-saving irrigation technologies, and (e) the use of biogas, biofertilizer, and water-recycling technology.

farm, a slaughterhouse and processing facilities were established with a capacity of 30,000 head per year. The project established 10 feedlots for finishing livestock with a total area of 15,740 square meters (m^2) and purchased 1,000 head of beef cattle. At Yinxi, the project supported the plantation of 190 ha of ecological shelterbelts and 380 ha of crop trees.

12. **Output 4: Ecosystem Conservation.** At appraisal, the planned conservation covered (i) Sand Lake, with revegetation, viewing galleries and platforms, aquaculture activities, tourist accommodation with a wastewater treatment system, and a scientific education center; (ii) Yuehai Lake, with commercial development of aquatic plants, ecological rehabilitation, a water supply and heating system, and regreening of wetland landscapes; (iii) establishment and management of a protected area in Yinchuan; (iv) rehabilitation and management of six wetlands in the Yinchuan Plain; and (v) implementation of a conservation program for residual habitats of the Yinxi wetlands. By completion, 3,300 ha of wetlands were rehabilitated:

(i) **Sand Lake.** The project supported 3,000 meters (m) of waterway dredging, 8,280 m^2 of viewing galleries and platforms, a bird rescue and research station, a 4,520 m^2 scientific education center for wetland conservation, 230 ha of revegetation, and birdwatching and ecotourism facilities.

(ii) **Yuehai Lake.** The activities planned for the commercial aquatic poultry program were canceled in accordance with the updated government plan for wetland conservation, which prohibits aquatic poultry for the sake of improving the water environment. The project supported water-regulating structures and dredging, ecological rehabilitation, and ecotourism facilities (such as ecological toilets, electric boats, and the like). A total of 260 ha of wetlands were rehabilitated.[9]

(iii) **Yinchuan**. The Helan Mountains Piedmont Conservation Management Area was established under the government program in 2008, as part of the overall Helan Mountains National Nature Reserve. The project funded biodiversity monitoring equipment. An IEM demonstration center was established and serves as an operational hub for management of the conservation area, IEM monitoring and data management, and training activities.

(iv) **Yinchuan wetlands.** The project supported the ecological rehabilitation and dredging of Mingcui, Baohu, and Haibao lakes.[10] Public education facilities were upgraded at Mingcui Lake. A wetland and biodiversity monitoring and information management system was established, hosted by the Yinchuan Wetland Management Office. The project also supported rehabilitation of 250 ha of Yinxi wetlands, including revegetation, dredging, and embankment stabilization.

13. **GEF-Financed Activities.** The key objective of the GEF cofinancing was to ensure that the IEM approach was followed, to contribute to restoring the productive and protective functions of ecosystem resources. At appraisal, the plan was to use the GEF grant to finance complementary activities to ensure achievement of incremental GEBs above the baseline investment. By completion, the grant supported activities across the three outputs: Output 1: establishment of an IEM demonstration center, and consulting services for IEM project management and the training-of-trainers (TOT) program; Output 2: delivery of conservation agriculture machinery and equipment, farmer field school training, and study tours for water-

[9] The administration of Yuehai Lake was transferred to the Yinchuan Municipal Government (YMG) from the NARB in 2010.

[10] In the original project scope, six lakes were included: Mingcui, Baohu, Haibao, Tonggui, Sanding, and Yueya. At the start of project implementation, the wetlands rehabilitation works for Tonggui, Sanding, and Yueya lakes had been financed by the government conservation program and were therefore removed from the project scope.

saving irrigation techniques; and Output 4: public education facilities in Sand Lake and Mingcui Lake, biodiversity monitoring equipment for the Helan Mountains Nature Reserve, a study on Yinchuan wetlands management including wetland monitoring guidelines; and training and study tours related to wetland and biodiversity conservation.

14. The project design and monitoring framework (DMF) was revised to be consistent with the approved scope changes (Appendix 1).

C. Project Costs and Financing

15. The estimated project cost at appraisal was $221.0 million, or CNY1,516.1 million. At completion, the actual project cost was about $218.36 million (CNY1,463.0 million equivalent). At the loan and grant closing, the cancellation of the loan and grant were $429,195.99 and $203,691.95, respectively. Compared with the original cost estimate, the actual project cost is lower by about 3.5%. The reduced project cost resulted mainly from (i) a low contract price from competitive bidding, and (ii) appreciation of the Chinese yuan during project implementation.[11]

16. The financing plan at appraisal included a $100.0 million loan from ADB (about 45.2% of the project cost), a $4.5 million grant funded by the GEF (2.0%), and $116.5 million from government counterparts (52.7%). At the loan and grant closing, $99.6 million of the ADB loan and $4.34 million of the GEF grant had been disbursed, respectively representing 51% and 2% of the project cost. The balance ($114.5 million) was covered by government counterparts.

17. In accordance with the scope change (para. 8), planned ADB financing for components to be undertaken by the Ningxia Administration Bureau and the Water Resources Department were cancelled. The associated loan savings were reallocated for sustainable livelihoods and on-farm water-saving irrigation of the NARB. The loan savings from the wetland conservation efforts for Sanding, Tonggui, and Yueya lakes were reallocated to public education improvement and habitat rehabilitation of Mingcui and Sand lakes. Part of the GEF grant planned for Yinchuan wetland conservation, Yinxi wetland restoration, and fellowship training was reallocated to establish the IEM demonstration center, as the planned activities were funded using government funds. The detailed project costs and financing plan at appraisal and actual are in Appendix 2.

D. Disbursements

18. Disbursement of the loan was made from 15 September 2009 to 28 October 2016. The loan was financially closed on 28 October 2016. Final liquidation of the loan advance account was completed by July 2016, and the unutilized advance was refunded to ADB in October 2016 (including liquidation of the bank charges). Of the total loan amount of $100.0 million, $99.6 million was disbursed. Of the disbursements, $46.5 million was for works, $49.8 million for equipment, $1.1 million for training and studies, $0.1 million for consulting services, and $2.1 million for interests and commitment charges during construction.

19. Disbursement of the GEF grant was made from 12 November 2009 to 17 October 2016. The grant was financially closed on 17 October 2016. Final liquidation of the grant advance account was completed by September 2016, and the unutilized advance was refunded to ADB in October 2016 (including liquidation of the bank charges). Of the total grant of $4.5 million, $4.34

[11] At appraisal, $1 = CNY6.86; at completion, $1 = CNY6.70. The exchange rate of the U.S. dollar to the Chinese yuan ranged from $1 = CNY6.86 to $1 = CNY6.05.

million was disbursed. Of the disbursements, $2.8 million was for works, $0.6 million for equipment, $0.1 million for workshops and research, and $0.8 million for consulting services.

20. Disbursements were made using advance account, reimbursement, and direct payment procedures. The executing agency applied appropriate disbursement procedures, and ADB's disbursement process was efficient. Retroactive financing of $9.40 million was applied to reimburse 16 contracts procured in advance under the loan. The loan and grant closing date were extended for 12 months. The projected and actual disbursements appear in Appendix 3.

E. Project Schedule

21. The project was implemented from June 2009 to April 2016. The actual implementation period was 82 months, 10 months longer than the original planned. The project was approved on 29 August 2008 after the GEF grant approval on 25 July 2008. The loan and the GEF grant were signed on 6 March 2009 and became effective on 3 June 2009. It took 6.2 months from the loan approval to loan signing due to prolonged domestic process of obtaining the required legal opinions from relevant agencies. The first withdrawal application for advance payment was made on 15 June 2009 immediately after the loan effectiveness. The first contract was awarded in December 2009. The consulting services commenced in May 2010. The midterm review was fielded in October 2012, during which additional project activities were added to use unallocated loan proceeds (para. 8). Subsequently, the loan was extended for one year to complete these activities. The loan and grant were closed on 30 April 2016. ADB conducted the PCR mission in December 2017.

F. Technical Assistance

22. Technical assistance (TA) in the amount of $600,000 was provided to the NHAR to strengthen its institutional capacity in IEM to ensure effective implementation of the project. The TA was approved in December 2007 and was implemented from January 2008 to May 2012. The Ningxia Finance Department (NFD) was the executing agency. The TA completion report, circulated in May 2013, concluded that the TA was successful.[12] The TA contributed to effective implementation of the project. Key deliverables included (i) a PPMS with sound indicators to monitor the project performance; (ii) a high-profile international workshop convened in 2012 and brought state-of-the-art knowledge of wetland conservation to Ningxia; (iii) a tracking tool for reporting biodiversity and land degradation indicators following the GEF's guidelines; (iv) international standards for vineyard management and quality control of wine making; and (v) studies on wetland management, which resulted in several knowledge products.[13] Through these inputs, the PIAs were exposed to good practices that did not exist during the design process.

G. Implementation Arrangements

23. The implementation arrangements were appropriate, as shown in the organization chart (Appendix 4). The NHAR government was the executing agency, acting through the NFD. To promote the IEM approach and to coordinate interdepartmental matters, the government established a lead group involving 11 sector agencies in 2004, when it was implementing the

[12] ADB. 2013. *Technical Assistance Completion Report Capacity Building for Integrated Ecosystem Management in Ningxia Hui Autonomous Region (TA 7021-PRC).* Manila.

[13] These included (i) a scientific publication on water balance and quality control of the Yinchuan wetlands, (ii) a handbook of birds in Sand Lake, (iii) a symposium for the international workshop on integrated wetland management, and (iv) Ningxia wetland monitoring guidelines following requirements set out in the Ramsar Convention for Wetlands.

PRC-GEF Partnership (para. 4). The leading group continued its role in coordinating cross-sector matters and decision making for major project plans such as changes in the project scope and institutional arrangements. A project management office (PMO) hosted by the NFD coordinated day-to-day administrative matters during implementation.

24. The PIAs originally included the NARB, the Yinchuan Municipality Government (YMG), the Ningxia Water Resources Department, and the Ningxia Administration Bureau. In accordance with the scope change approved in March 2011 (para. 8), the Ningxia Water Resources Department and the Ningxia Administration Bureau were removed from the project because their respective project components were canceled. The NFD took responsibility for implementation of the IEM demonstration center. Each PIA (i.e. NARB, the YMG) had a PMO to undertake daily administration for their respective components. A procurement agent was engaged during implementation and supported the bidding process. As project manager the NFD retained control over the GEF funds for capacity building, demonstration purposes, and technical support.

H. Consultant Recruitment and Procurement

25. At appraisal, three consulting packages were planned: (i) Package A, to strengthen project management capabilities, comprising 4 international and 7 national person-months of individual consultants' services and financed under the grant; (ii) Package B, to provide technical specialists, also financed under the grant and comprising 12 international and 77 national person-months of consulting services through a firm; and (iii) Package C, for water resource management, financed under the loan and comprising 11 international and 16 national person-months of individual consultants' services. At completion, actual inputs included: (i) Package A for IEM project management with inputs of 4 international and 10 national person-months engaged using individual selection; (ii) Package B, comprising 11 international and 51 national person-months, which delivered a successful TOT program for PIAs by a firm recruited using the quality- and cost-based selection method; and (iii) Package C for a strategy study on development of the wine-making industry, which comprised 4 international and 4 national person-months of individual consultants engaged using individual selection. The scope of Package C was changed from management of water resources to a sector strategy for wine making. The deviation was because the NHAR government had carried out the water resources management design, originally planned under the package, using its own funds. The loan proceeds savings were reallocated to provide consulting services for a strategy for developing the wine-making industry, which had become one of the NHAR's top priorities for rural and agriculture development and received large support from the project for growing grapes. The final person-months were in line with the budget. All consulting services were executed productively.

26. The executing agency and the PIAs managed procurement and administered contracts effectively. During implementation, ADB awarded 288 contracts under the loan and 21 contracts under the GEF grant. The contract packages were procured following ADB's Procurement Guidelines (2007, as amended from time to time). Procurement methods included limited international bidding, community participation, national competitive bidding, and shopping. No international competitive bidding was used. Limited international bidding was used for two contracts to purchase frozen cow sperm. Community participation was used in small works of plantation and land preparation for the total contract amount of about $14.94 million, which gave local farmers and households significant labor opportunities in implementation and operation.

27. In October 2013, ADB's Office of Anticorruption and Integrity conducted a project procurement-related review of the project and inspected 26 contracts for goods and works as a sample. The review concluded that the project has high-quality infrastructure, construction

materials, and equipment. With respect to asset management, the project implementation is generally compliant with relevant requirements. With respect to the project outputs inspected, the deliverables address the wetland conservation, support the ecosystem improvement, and are well integrated within the community. No major problems or issues were noted.[14]

28. The original contract award projections were realistic (Appendix 5). Advance procurement using shopping procedure was applied for 16 contracts (12 for works and 4 for goods) in a total amount of $8.87 million. The overall performance of consultants, contractors, and suppliers was satisfactory. There was no significant delays in contract implementation despite of the loan extension. Equipment suppliers also performed well and provided necessary training on machinery operation and maintenance for local farmers and users. Consultants—particularly for the TOT program—performed well and delivered training and consulting services in a professional manner, which strengthened PIAs' institutional capacity significantly.

I. Safeguards

29. The project was categorized as environment category A. The summary EIA was prepared during project processing. The EIA was updated to reflect the scope change, which involved the cancellation of the Xixia Canal, the only subcomponent for category A in the project. The environmental management plan was implemented satisfactorily, and mitigation measures were undertaken effectively. Monitoring during implementation suggested that no major environmental harms occurred. Environmental management measures were also adopted appropriately during operation. Appendix 6 presents the environmental analysis.

30. The project was categorized B for involuntary resettlement impact, as the component for the Xixia Canal construction and associated irrigation rehabilitation would have resulted in land acquisition of 264.7 ha. A resettlement plan was prepared during project preparation. With the scope change in 2011, the Xixia Canal was removed from the project scope. The funds were reallocated for other subprojects, that did not induce land acquisition or resettlement impacts. The project's involuntary resettlement impact was recategorized from B to C.

J. Monitoring and Reporting

31. The loan covenants were considered adequate, and major covenants were complied with (Appendix 7). IEM principles were mainstreamed in the NHAR's 5-year development plans and legislation. Conservation-agriculture practices are largely applied in the project area as well as in the NHAR government's ecological rehabilitation and restoration programs.[15] Institutional capacity improved significantly through the TOT program, on-the-job training, and study tours.

32. A PPMS was established in 2010 with supporting indicators and a baseline starting in 2008 and with subsequent annual updates. The PPMS adopted the revised DMF as the basis for structuring and defining the indicators. Indicators were developed as part of a capacity-building exercise for measuring project impacts, outputs, and completed activities.[16] They are reported for project impacts, outcomes, outputs, and activity levels in the DMF. During 2011, an additional 80

[14] ADB. 2014. *Project Procurement-Related Review Final Report for Loan 2436-PRC and Grant 0113-PRC: Ningxia Integrated Ecosystem and Agricultural Development Project*. Manila

[15] Conservation agriculture has been stipulated in the PRC's 13th Five-Year Plan Outline for National Economic and Social Development (2016–2020) and is being promoted nationwide.

[16] Including ecological protection and wetland management, tourism businesses, enterprise incomes and financial ratios, economic and agricultural production levels, water resource balances, threatened species, polices and regulations, water and land resource management, household livelihoods, and societal wellbeing.

households outside of the project area were added as a control group. Extensive data sets were collected, updated, and reported annually throughout the implementation period from 2008 to 2016. The PPMS and its findings raised great awareness in the PIAs of key issues.

33. The project accounts for the loan and the grant were audited annually by the China National Audit Office in accordance with auditing standards acceptable to ADB. Seven audit reports were submitted, all on time. No issues were found in the use of loan and grant proceeds or compliance with financial covenants.

III. EVALUATION OF PERFORMANCE

A. Relevance

34. The project is rated *highly relevant*, both at appraisal and on completion. It was highly relevant to the government's development strategy and ADB's country partnership strategy (para. 5–6). The project demonstrated a holistic approach in addressing land degradation and ecosystem management. The project supported wetland conservation, water-saving irrigation, and conservation agriculture. All these elements were highlighted in the government's development plan.[17] The project allocated a significant share of loan proceeds to improving sustainable livelihoods through the establishment of vineyards, dairy farms, and beef cattle breeding. These activities contributed directly and effectively to poverty reduction in NHAR. The components changed for government counterpart funding were actually financed and was able to accomplish and deliver outputs as planned.

35. The rationale for the project was confirmed, because it addressed root causes of land degradation as well as poverty reduction and established a model that can be replicated in larger western provinces in the PRC.

B. Effectiveness

36. The project is rated *effective* in achieving its intended outcome to introduce an IEM approach to provide sustainable livelihoods in the project area. All outcome indicators were achieved or surpassed. At completion in 2016, the IEM approach has been mainstreamed in government policies and was being practiced in government programs. Number of the rural people beneficiaries reached 150,000 from transition to higher-value rural industries. Agrochemical fertilizer usage in the project area was 800 kilogram (kg)/ha and water use was 4,200 m^3/ha, reductions of 69.5% (target: 25%) and 60% (target 10%), respectively. Water balance—between compensated volume and storage capacity—has been achieved in the Yinchuan wetlands and Sand Lake. Reported bird species and populations also increased in the project wetlands. The water quality of monitored lakes has been maintained at Class IV of the National Surface Water Standards, in line with the water function zoning.

37. **IEM Capacity-Building and Project Management**. IEM has been mainstreamed effectively into major NHAR development plans. Several ecosystem management policies also adopted IEM approaches; for example, the Ningxia Wetlands Management Regulations released in 2009 and the Aiyi River management regulations. An IEM data-sharing agreement involving 13 sector agencies was established in 2010. The PPMS was established timely and served as a useful tool for monitoring project performance, which was showcased in ADB's country portfolio review workshop in 2012. The project was named the "best performance" project by ADB in 2014.

[17] PRC State Council. 2016. *The 13th (2016–2020) National Economic and Social Development Plan Outline.* Beijing.

38. **Land and Water Resources Management.** The IWRMP was completed in 2009 using government funds, of which stakeholders have free access to data. Water-saving irrigation systems are in operation at NARB farms and in Yinxi orchards, covering a total area of 2,600 ha. The volume of water saved has reached more than 30 million m^3 per year. Over 6,000 associated households have improved their water use efficiency. Fertilizer application has been reduced by about 69.5% compared to 2009 before the project. Conservation-agriculture demonstrations were implemented in a total area of 2,299 ha. The water quality of farm land drainage and wetlands has remained stable. Land and water management demonstration programs were carried out successfully and significantly improved the scientific research capacity of vineyard and wetland managers. The research results were developed into several provincial technical codes, including two for irrigation management and three related to pest control for grape vineyards.[18]

39. **Rural Livelihood Improvement.** The project expanded the NARB grape-growing area and increased the grape-processing capacity, equipping it with sufficient quality control facilities. Five dairy parks established with project support also involve smallholder or specialized dairy communities. The project established 10 feedlots for finishing livestock and purchased 1,000 head of beef cattle. At Yinxi, the project provided local communities with livelihoods through planting ecological shelterbelts and crop trees. Under the NARB, over 10,000 households benefited from participating in project activities of grape growing, cow and cattle breeding, and milking. Under the YMG, about 17,000 households increased their annual income through participating in sustainable land management, perennial crop plantation, and vocational training. In total, about 140,000 people benefited from the project activities, of which 15,700 were Hui minority.

40. **Ecosystem Conservation.** With the project's support, the wetlands conservation area grew by 25.2% to 7,134 ha in Sand Lake and Yuehai Lake, and the visitor population rose by 91.5% from 2008 to 2016. The wetland conservation area in the Yinchuan wetlands grew to 13,000 ha, and the visitor population rose by 300% to 1.2 million people from 2008 to 2016. The protected area along the Helan Mountains piedmont reached 193,536 ha, an increase of 210%. The conservation and wetlands program has created growing revenue streams from wetland management units, mostly based on increased tourism and recreational visitation and more direct uses such as aquaculture. A real-time monitoring and information system was developed and put into operation (hosted by the Yinchuan Wetland Management Office) for wetland management, including biodiversity monitoring of birds in the Yinchuan Plain.

C. Efficiency

41. The project is rated *efficient*. The reevaluated economic internal rates of return (EIRR) are in the range of 4.4%–18.1% by component. Except for the beef component (4.4%), other components evaluated are in the acceptable range (10.7%–18.1%), higher than ADB's minimum required EIRR of 9%. Compared with the appraisal estimates, the dairy and Sand Lake components indicated comparable results; the beef component's reevaluated EIRR was significantly lower mainly due to the much lower scale and the high production costs and inclusion of cost of carbon emission; the vineyard and wetland components indicated much lower results mainly because of the consideration of the economic cost of water used and removal of the duplication benefit of appraisal estimate. Details of economic and financial reevaluation are provided in Appendix 8.

[18] These technical codes include (i) soil improvement and fertilizer application for vineyards in Helan Mountains East Piedmont; (ii) fertigation and high efficiency vineyard cultivation in Helan Mountains East Piedmont; (iii) grapevine powdery mildew control and prevention technologies; (iv) grapevine leafhopper control and prevention technologies; and (v) grapevine downy mildew control and prevention technologies.

D. Sustainability

42. The project is rated *likely sustainable*. Financial reevaluation was conducted for four subcomponents that generated direct and quantifiable financial benefits. The reevaluated financial internal rates of return (FIRRs) are in the range of 5.3%–12.8%, all above the updated weighted average cost of capital (WACC) of 3.28%, indicating their financial viability. Compared with the appraisal estimates, the vineyard, beef production, dairy production, and Sand Lake components demonstrated comparable results. The vineyard component indicated that strong benefits resulted from the significant saving of irrigation water and labor cost. The beef production component, however indicated a significantly lower FIRR mainly due to shrunk scale of sales and the lower profit ratio, reflecting much higher purchase price for beef cattle and their increasing production cost. Observation of the financial performance of the participating commercial enterprises at completion indicated various results implying that great efforts are needed to strengthen their competitiveness in the face of market risks.

43. As a core project outcome, the IEM approach has been widely applied in the NHAR's legislation, policies, development plans, and programs for ecological restoration and agricultural development. The project promoted institutional coordination across sectors involved in ecosystem management, which has proven consistent with the government's institutional reform enacted in 2018.[19] In this context, the mode demonstrated through the project can be sustained. At the outputs level, the NHAR has established a government bureau called the Ningxia Grape Industry Development Bureau to oversee grape growing and wine making. Water-saving irrigation has been extensively deployed in agriculture farming. Conservation activities are implemented and managed effectively with adequate budgets and through appropriate institutional establishments (i.e. the Yinchuan Wetland Management Office, the Helan Mountains Nature Reserve Management Bureau). The technical capacity of local farmers, land users and managers has been developed effectively through the project TOT program and will be sustained through the two farmer field schools (one for vineyard management and the other for dairy farm operation) established under the project.

E. Development Impact

44. The development impact is rated *highly satisfactory* as most impact indicators have been surpassed. The intended impact of improved environmental management to rehabilitate ecosystems and increase rural incomes in the project area has been realized. During the project reporting period from 2008 to 2016, the number of poor small households linked to commercial enterprises rose from 210 to 2,873. The area under conservation agriculture expanded from 530 ha to 36,350 ha. The area dedicated to wildlife conservation increased from 62,210 ha to 193,536 ha and that dedicated to wetland conservation area rose from 11,566 ha to 13,000 ha. The number of visitors to tourism sites in the project area increased from 0.9 million to 2.4 million. The improved wetland management in Yinchuan enabled the city to be accredited as the first group of the international wetland cities by the Ramsar Convention in 2018. Good practices from the project were widely reported in major national media.[20] The project also contributed greatly to

[19] The reorganization concentrated the scattered responsibilities of government departments into two new ministries: Ministry of Ecological Environment (MEE), and Ministry of Natural Resources (MNR). The MEE adopts most of the responsibilities of the Ministry of Environmental Protection, and incorporates pollution-related functions from National Development Reform Commission, the Ministry of Water Resources and the State Oceanic Administration. The MNR merges natural resources management responsibilities that used to belong to governmental bodies in charge of forestry, agriculture, land resources, etc.

[20] These media included the Xinhua News Agency, China Financial and Economic News, China Environment News, and China Economic News.

GEBs for biodiversity conservation. A GEF terminal evaluation report was prepared following ADB's Guidance Note for GEF-Cofinanced Projects (Appendix 9).

45. **Social and poverty reduction impacts.** The project targeted poor rural communities, especially smallholders in the ethnic minority region. It adopted procedures that generated benefits to the target groups through implementation procedures such as community participation in procurement, and through their integration within stronger, more valuable market channels. Vocational and technical training were provided for rural households through farmer field schools established by the project. Nonfarming jobs were created in livestock, perennial crops, and other agricultural industries. The number of project beneficiaries grew by 5.3 times to 104,120 people in 2016 from 2009, of which 40% were Hui minority people. The annual growth rates of rural farmers' incomes per capita ranged from 10.4% to 15.0% from 2008 to 2016. The average per capita income of project beneficiary households rose by 175% from 2009 to 2015, higher than 160% of the control groups without the project during the same period. During implementation, the project provided work for 414,969 person-days of labor, which came from the local labor market. Among the local workers, 228,233 person-days (55%) of work went to female laborers. Appendix 10 includes details for social and poverty reduction impacts.

46. **Environmental impacts.** The project achieved significant environmental benefits in terms of water saving, reduction in electricity consumption, reduction in agrochemical fertilizer usage, biodiversity and wetland conservation, greenhouse gas (GHG) emission reduction, and land degradation control. Water-saving systems in vineyards reduced water use by 60%. Electricity consumption was therefore also reduced by 60%, saving 3,100 kilowatt hour (kWh)/ha per year. In traditional flood irrigation, a considerable proportion of nitrogen in fertilizer applied to vineyards is lost to the environment and causes soil pollution. In drip irrigation, fertilizer is applied through irrigation pipes (i.e., fertigation), where it is better targeted to vine roots. This reduced chemical fertilizer use by 69.5%, from 2,625 kg/ha under flood irrigation to 800 kg/ha under drip irrigation. An ADB-funded study estimated GHG emissions reductions at 10.5 metric tonnes of carbon dioxide equivalent (tCO_2e)/ha per year and 25,200 tCO_2e in total per year from the vineyards covered by the project.[21] The conservation area for wildlife expanded by 211%.

47. **Institutional impact.** The project promoted and practiced a cross-sector approach to address the root causes of land degradation. Sectoral coordination was mainstreamed in IEM data sharing and in legislation. Further, this integrated and coordinated approach will be enhanced with the government's ongoing institutional reform. The IEM demonstration center serves as an IEM knowledge hub, a training center, and a research and development base, offering opportunities for local and visiting scientists to use demonstration areas and wider farm lands for IEM-related scientific research. The wetland monitoring and management information system has become an effective platform to manage the wetlands in the NHAR. The system has also been highly praised as a good model by central government agencies such as the Ministry of Finance and the State Forestry Administration. Public education facilities established in Sand Lake and Mingcui Lake receive half a million young visitors every year. They have significantly promoted public awareness of biodiversity and wetlands conservation. The TOT program significantly improved the institutional capacity of the participating PIAs. A book summarizing the TOT modules and methodologies was published in 2015 and has been disseminated in other provinces that also are implementing ADB projects.

[21] 2014. *Subproject Calculating Carbon Benefits from Improved Land and Water Resource Management (Consultant Report) RETA 6422: Mainstreaming Environment for Poverty Reduction*. Beijing.

F. Performance of the Borrower and the Executing Agency

48. The overall performance of the borrower and the executing agency was *satisfactory*. The borrower and the executing agency fulfilled their obligations during project implementation. The borrower government has campaigned for ecological civilization greatly since 2012, which is highly consistent with the IEM approach that the project promoted and demonstrated. Institutional reform was carried out effectively and created a sound enabling environment for implementing IEM at various levels. The executing agency has adopted IEM approaches for its relevant legislation, policies, and programs. The NHAR government has prioritized poverty reduction and ecosystem management, such as wetland conservation and nature reserve management, in its development agenda. During project implementation, the executing agency provided sufficient counterpart funds and adequate staff resources to ensure complete delivery of project outputs. The executing agency coordinated effectively with the PIAs to fulfill the compliance requirements set in the loan and project agreements, including safeguards, auditing, and financial management. Effective measures were taken to ensure the project's sustainability.

G. Performance of the Asian Development Bank

49. ADB's performance is rated *highly satisfactory*. ADB fielded 10 review missions during implementation, including the midterm review mission in October 2012. ADB's review and supervision of project implementation was adequate and timely. ADB's response to the inquiries and requests of the executing agency and the PIAs was prompt and constructive. ADB provided strong knowledge support for wetland conservation, sustainable land management, quality control, and capacity development. ADB's TA significantly improved the NHAR's IEM capacity to deliver the project (para. 24). The project preparatory TA was considered relevant and effective. As the implementing agency, ADB administered the GEF grant effectively.

H. Overall Assessment

50. The project is rated *successful*. It has also been rated (i) highly relevant to the government's and ADB's development strategy, (ii) effective in achieving its outcome, (iii) efficient in achieving outcome and outputs, and (iv) likely sustainable (paras. 34, 36, 41, and 42). The project was implemented successfully and delivered outputs completely. It has achieved its outcome to introduce an IEM approach to provide sustainable livelihoods for the population in the project area. It successfully demonstrated a promising model for securing ecological, economic, and social benefits through investing in IEM. It will contribute continuously to regional economic and social development with improved institutional capacity and infrastructure in water-saving irrigation, wetland management, and livelihood businesses.

Overall Ratings

Criteria	Rating
Relevance	Highly relevant
Effectiveness	Effective
Efficiency	Efficient
Sustainability	Likely sustainable
Overall Assessment	Successful
Development impact	Highly satisfactory
Borrower and executing agency	Satisfactory
Performance of Asian Development Bank	Highly satisfactory

Source: Asian Development Bank.

IV. ISSUES, LESSONS, AND RECOMMENDATIONS

A. Issues and Lessons

51. The operation of the IEM demonstration center is an outstanding issue. The center was designated to serve as (i) a clearinghouse to maintain a website for IEM-related projects and programs in the NHAR; (ii) a training center for knowledge sharing and dissemination; and (iii) a research and development base to pilot IEM technologies and approaches. The center was completed in 2015 and has been operated by a private entity, Zhihui Farm, where the center is located. However due to lack of operational funds and institutional setup, the center is not yet fully functional. The PMO proposed a public–private partnership to engage Zhihui Farm to operate the center, given the farm's long engagement in implementing and piloting ecosystem management programs. The proposal has been submitted to the NHAR government for review and endorsement. The final decision will be made accordingly.

52. **Lesson 1: Linking livelihoods to business.** The lack of development assets for rural smallholders was a significant constraint for land users, hindering adoption of sustainable land management. Monitoring results suggested that smallholders with links to market chains and processors were accumulating assets faster. Under the project, the NARB played a critical role as a dragon-head enterprise. It supported various businesses, covering halal meat processing, dairy, and wineries, each supported by several farms. Under supply contracts, smallholders were directed to value added businesses. The project improved rural livelihoods significantly. Growth in commercial enterprises relied on local labor for implementation activities, which provided significant short-run benefits. Livelihood activities not directly linked to commercial enterprises occur but with lower returns due to market risks and the lack of connection to value added benefits. The average per capita income of project beneficiary households increased by 175% from 2009 to 2015, compared with 160% for the control groups, without the project.

53. **Lesson 2: Capacity development involving information, skills, and leadership.** Consulting services focused more on developing capacity based on demand assessment, rather than just fulfilling reporting requirements. Throughout the project implementation, technical support for ensuring innovation was identified and understood. Information systems were strengthened and adapted to the changing needs of producers, supply managers, and value addition and process managers, as well as enterprise management. The project allocated a large amount of resources for building capacity, which included (i) expanding the availability of information for project management through a PPMS with a results focus and accountability for performance; (ii) developing institutional capacity through a TOT program, a sustainable and cost-effective training approach; (iii) demonstrating new training approaches, including interactive farmer field schools, demonstration farms, and vineyards with supporting investment and information systems; and (iv) focusing on effective use of local training resources through the development of the IEM demonstration center, managed by a public-private partnership.

54. **Lesson 3: Responding to changes.** During implementation, three minor changes in scope were made to respond to changes involved in the government development plans. These changes maximized the loan effectiveness and have proven to be successful because they made the project interventions more relevant to the government's development agenda.

B. Recommendations

55. **Project related.** On behalf of the executing agency, the NFD needs to determine the operational plan and arrangements for the IEM demonstration center at Zhihui Farm (para. 51).

The center's operation should also link to the two farmer field schools established under the project. Given that the NFD is coordinating another ADB loan project, follow-up monitoring of operational status is needed. NFD shall also keep close monitoring of the financial performance of the participating commercial enterprises in view of their critical role in addressing the livelihoods improvement needs of the rural population and allocate funds from its budget if necessary for operation and maintenance of project facilities.

56. It is recommended that the project performance evaluation be conducted in 2020. By that time, all businesses or facilities established under the project should have been in operation for 5 years. Their performance can then be evaluated more reasonably.

57. **General.** The PPMS proved to be a very effective and useful tool for monitoring project performance and providing timely and responsive information on the operation. However, the system was not established until 2 years after project start-up, owing to limited awareness of it and low priority for it at the beginning stage. Project design should include a comprehensive PPMS with defined indicators and collection of broader data than the narrow DMF indicators. The PPMS focus should be on how management decision makers are informed, not just how ADB indicators are reported. The resultant management information systems would provide more adequate data for ADB reporting requirements.

PROJECT DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and Indicators		Project Achievements
	Original[a]	**Revised**[b]	
Impact Improved environmental management to rehabilitate ecosystems and increase rural incomes in the project area	• Increased number of poor smallholders linked to commercial enterprises compared to base year of 2007 • Farmland degradation (soil quality) and wetland water quality improved, and conservation agriculture on 35,000 ha • Wildlife conservation area increased to 115,360 ha from 62,210 ha in 2007; wetland conservation of 8,825 ha • Visitors to tourism sites increased to 1.4 million from 0.97 million in 2007	(no change) • Increased number of poor smallholders linked to commercial enterprises compared to base year of 2007 • Farmland degradation (soil quality) and wetland water quality improved, and conservation agriculture on 35,000 ha • Wildlife conservation area increased to 115,360 ha from 62,210 ha in 2007; wetland conservation of 8,825 ha • Visitors to tourism sites increased to 1.4 million from 0.97 million in 2007	In 2016: • Number of poor smallholders linked to commercial enterprises increased from 210 to 2,873 • Conservation agriculture was extended on 36,350 ha • Wildlife conservation area was 193,536 ha • Wetland conservation area was 13,000 ha • Number of visitors was 2.4 million
Outcome IEM approach provides sustainable livelihoods for the population of the project area	• IEM approach demonstrated and adopted • Up to 140,000 rural people, 6 poor communities, and 20 enterprises have increased incomes from transition to higher-value rural industries • Agrochemical usage reduced by 25% and water use reduced by 10% per unit of cultivated area • Nine major lakes and wetland systems have achieved balanced water allocation and reduced agricultural runoff • Fifteen globally threatened wild species protected with improved habitat	• IEM approach demonstrated and adopted • Up to 140,000 rural people, 6 poor communities, and 20 enterprises have increased incomes from transition to higher-value rural industries • Agrochemical usage reduced by 25% and water use reduced by 10% per unit of cultivated area • Nine major lakes and wetland systems have achieved balanced water allocation and reduced agricultural runoff • Fifteen globally threatened wild species protected with improved habitat	• IEM approach have been adopted and demonstrated. • Beneficiary number reached 150,000 from transition to higher-value rural industries; Eight of the 10 monitoring enterprises increased income • Agrochemical fertilizer usage decreased by 69.5% in project area to 800 kg/ha; Water use was reduced by 60% to 4,200m^3/ha • Nine major lakes and wetland systems have achieved water balance and agriculture runoff were reduced. Recharging volume was about 35 million m^3 in six lakes • Habitats were improved considerably for effective protection of 15 globally threatened wild species

Design Summary	Performance Targets and Indicators		Project Achievements
	Original[a]	Revised[b]	
Outputs 1. **IEM Capacity Building and Project Management:** All public and private stakeholders have the capacity, regulations, and information to jointly implement IEM	• Harmonized policy and regulatory framework in place by 2009 • Participating institutions have capacity to understand and implement IEM by 2014 • All stakeholders aware of IEM approach and comply with regulations by 2014 • Timely and informative reporting reflects accurate and timely implementation in line with agreed assurances • Domestic reporting and information systems, including PPMS, operationalized • IEM institutional capacity built and demonstration conducted	• Harmonized policy and regulatory framework in place by 2013 • Participating institutions have capacity to understand and implement IEM by 2015 • All stakeholders aware of IEM approach and comply with regulations by 2015 • Timely and informative reporting reflects accurate and timely implementation in line with agreed assurances • Domestic reporting and information systems, including PPMS, operationalized • IEM institutional capacity built and demonstration conducted	• Ningxia IEM strategy and action plan developed and approved in 2012 • Participating institutions have built capacity to implement IEM in thematic plans and programs since 2015 • Stakeholders have been aware of IEM approach since 2015 • PPMS was established in 2010 and served as a major protocol for reporting the project performance semiannually • IEM institutional capacity improved and demonstrated by project completion: (i) IEM data sharing mechanism built. (ii) Ningxia Wetland Management Regulations following IEM principles released (iii) Integrated management plan for Helan Mountain Pediment Protection Area established
2. **Land and Water Resource Management:** Land users, public and private farmers, and NWRD implement sustainable land and water management.	• Water resource planning achieved and all data freely shared by stakeholders by 2010 • Water use efficiency for 15,000 farmers improved by new Xixia Canal, irrigation system, rehabilitation, and on-farm conservation by 2011 • Water quality of irrigation discharge and wetlands	• Water resource planning achieved and all data freely shared by stakeholders by 2015 • Water use efficiency for 4,000 farmers improved through water saving technologies and increased water use efficient crops by 2015 • Water quality of irrigation discharge and	• Integrated water resource planning was carried out in 2010 and relevant data are shared by stakeholders • Water use efficiency was improved for 8,000 farmers through water-saving irrigation. Water use was reduced by 60% to 4,200 m^3/ha • Agrochemical fertilizer usage decreased by

Design Summary	Performance Targets and Indicators		Project Achievements
	Original[a]	**Revised**[b]	
	improved by introduction of conservation agriculture and sustainable fertilizer balance by 2014	wetlands improved by introduction of conservation agriculture and sustainable fertilizer balance by 2015	69.5% in NARB vineyards to 800 kg/ha; • Water quality of irrigation discharge stabilized at Class III-IV through applying conservation agriculture and fertigation
3. **Rural Livelihood Improvement:** Rural households and smallholders are provided with alternative agriculture-based incomes through links with three enterprise groups.	NARB: • Incomes of up to 8,325 households increased through engagement in beef, dairy, and grapes by 2012, including production, processing, and marketing by 2014 Yinchuan Municipality: • Incomes of up to 12,800 households improved through sustainable land use, perennial crops, and vocational training (2012) • Sustainable farming practices lead to decreased use of water and chemicals with technical training (2014) Ningxia Administrative Bureau: • Smallholders integrated into processing, distribution, and marketing systems • Up to 4,480 households provided with alternative incomes through cattle raising and fodder production, greenhouse, intercropping, and related jobs • Soil quality improved and water usage decreased on up to 6,600 ha through adoption of conservation agriculture	NARB: Incomes of up to 10,200 households increased through engagement in beef, dairy, and grapes, including production, processing, and marketing by 2015 Yinchuan Municipality: • Incomes of up to 17,000 households improved through sustainable land use, perennial crops, and vocational training • Sustainable farming practices lead to decreased use of water and chemicals with technical training	NARB: Incomes of about 10,500 households increased through engagement in cow breeding, dairy producing, and grape growing and processing by 2015 Yinchuan Municipality: • Incomes of 17,500 households increased through their involvement in shelter belt plantation and maintenance and perennial crops including training provided through farmers field schools • Agrochemical fertilizer usage and water use reduced by 69.5% and 60%, respectively

Design Summary	Performance Targets and Indicators		Project Achievements
	Original[a]	**Revised**[b]	
4. Ecosystem Conservation: Commercial enterprises and conservation objectives are linked.	NARB wetlands (Sand and Yuehai lakes): Number of tourists and protected species increased through integrated lake and wetland conservation on up to 4,670 ha; also aquaculture (2012-2013) Yinchuan Municipality: (i) 53,150 ha of sensitive area incorporated into the HPCMA where production activities are prohibited (2012) (ii) Number of waterfowl increased by revegetating 880 ha of Yinxi wetlands (2014) (iii) Number of visitors increased and species protected through sustainable development of up to 3,275 ha of Yinchuan wetlands (2011)	NARB wetlands (Sand Lake): Number of tourists and protected species increased through integrated lake and wetland conservation on up to 5,000 ha; also aquaculture (2012−2013) Yinchuan Municipality: (i) 53,150 ha of sensitive area incorporated into the HPCMA where production activities are prohibited (ii) Number of waterfowl increased by revegetating 1599 ha of habitat (266 ha of Yinxi wetland) (iii) Number of visitors increased and species protected through sustainable development of up to 11,700 ha of Yinchuan wetlands	NARB wetlands: • Number of visitor to Sand Lake reached 1.2 million in 2016 • Wetland conservation area reached 7,134 ha • Bird species increased from 130 in 2008 to 212 in 2016 • Yield of aquaculture was 7,017 tons Yinchuan Municipality: • Helan Mountain Conservation area reached 193,536 ha • 13,000 ha of Yinchuan wetlands were under sustainable management through ecological restoration and rehabilitation. • 1,599 ha of Yinxi wetlands were revegetated • 303 bird species under well protected through conservation of Yinchuan wetlands • Number of visitors to Yinchuan wetlands reached 1.2 million

GDP = gross domestic product; ha = hectare, HPCMA = Helan Mountains Conservation Management Area; IEM = integrated ecosystem management; kg = kilogram; m^3 = cubic meter; NARB = Ningxia Agriculture Reclamation Bureau; PPMS = project performance monitoring system

[a] The performance targets and indicators as approved originally during processing.

[b] The performance targets and indicators were revised consistent with the scope change approved in March 2011.

Source: Asian Development Bank.

PROJECT COST AND FINANCING

Table A2.1 Cost Estimates by Financier at Appraisal

($ million)

	ADB		GEF		Yinchuan Municipality		Ningxia Administrative Bureau		Agricultural Reclamation Bureau		Ningxia Water Resources Department		Ningxia Finance Department		Total
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount
	(A)	(A/H)	(B)	(B/H)	(C)	(C/H)	(D)	(D/H)	(E)	(E/H)	(F)	(F/H)	(G)	(G/H)	(H)
A. Investment Costs															
1. Civil Works	56.7	41.6	0.7	0.5	18.9	13.9	8.8	6.5	22.7	16.6	28.3	20.7	0.3	0.2	136.4
2. Goods and Materials	26.7	77.8	0.9	2.6	0.0	0.0	0.3	0.9	2.5	7.3	0.0	0.0	3.9	11.4	34.3
3. Training and Studies	5.7	72.2	1.6	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	7.6	7.9
4. Resettlement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	100.0	0.0	0.0	2.6
5. Consulting Services	0.4	28.6	1.0	71.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
6. Design and Supverision	0.0	0.0	0.0	0.0	3.0	37.8	0.9	10.9	2.2	27.8	1.9	23.5	0.0	0.0	7.9
7. Staff Costs	0.0	0.0	0.3	9.6	0.0	0.0	0.0	0.0	0.1	1.6	0.1	2.5	2.7	86.3	3.1
Subtotal (A)	**89.5**	**46.2**	**4.5**	**2.3**	**21.9**	**11.3**	**10.0**	**5.1**	**27.4**	**14.1**	**32.8**	**16.9**	**7.5**	**3.9**	**193.6**
B. Recurring Costs															
Operation and Maintenance (B)	**0.0**	**0.0**	**0.0**	**0.0**	**2.8**	**16.6**	**2.3**	**13.6**	**5.7**	**33.7**	**4.8**	**28.4**	**1.3**	**7.7**	**16.9**
Total Project Cost (A+B)	**89.5**	**42.5**	**4.5**	**2.1**	**24.7**	**11.7**	**12.3**	**5.8**	**33.1**	**15.7**	**37.6**	**17.9**	**8.8**	**4.2**	**210.5**
C. Financial Charges during Implementation (C)	**10.5**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**10.5**
Total Project Cost (A+B+C)	**100.0**	**45.2**	**4.5**	**2.0**	**24.7**	**11.2**	**12.3**	**5.5**	**33.1**	**15.0**	**37.6**	**17.0**	**8.8**	**4.0**	**221.0**

Source: Asian Development Bank.

Table A2.2 Cost Estimates by Financier at Completion
($ million)

	ADB		GEF		Yinchuan Municipality		Ningxia Administrative Bureau		Agricultural Reclamation Bureau		Ningxia Water Resources Department		Ningxia Finance Department		Total
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount
	(A)	(A/H)	(B)	(B/H)	(C)	(C/H)	(D)	(D/H)	(E)	(E/H)	(F)	(F/H)	(G)	(G/H)	(H)
A. Investment Costs															
1. Civil Works	46.5	34.4	2.8	2.0	25.5	18.8	0.0	0.0	60.6	44.8	0.0	0.0	0.0	0.0	135.4
2. Goods and Materials	49.8	98.4	0.6	1.2	0.0	0.1	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	50.6
3. Training and Studies	1.1	37.3	0.2	5.1	0.0	0.0	0.0	0.0	1.7	57.6	0.0	0.0	0.0	0.0	3.0
4. Resettlement	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. Consulting Services	0.1	10.6	0.8	89.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
6. Design and Supverision	0.0	0.0	0.0	0.0	1.3	29.6	0.0	0.0	3.2	70.4	0.0	0.0	0.0	0.0	4.5
7. Staff Costs	0.0	0.0	0.0	0.0	0.3	5.0	0.0	0.0	4.8	95.0	0.0	0.0	0.0	0.0	5.0
Subtotal (A)	**97.5**	**48.9**	**4.3**	**2.2**	**27.1**	**11.3**	**0.0**	**0.0**	**70.4**	**14.1**	**0.0**	**0.0**	**0.0**	**3.9**	**199.4**
B. Recurring Costs															
Operation and Maintenance (B)	**0.0**	**0.0**	**0.0**	**0.0**	**2.0**	**12.0**	**0.0**	**0.0**	**14.9**	**88.0**	**0.0**	**0.0**	**0.0**	**0.0**	**16.9**
Total Project Cost (A+B)	**97.5**	**45.1**	**4.3**	**2.0**	**29.2**	**13.5**	**0.0**	**0.0**	**85.3**	**39.4**	**0.0**	**0.0**	**0.0**	**0.0**	**216.3**
C. Financial Charges during Implementation (C)	**2.1**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**2.1**
Total Project Cost (A+B+C)	**99.6**	**45.6**	**4.3**	**2.0**	**29.2**	**13.4**	**0.0**	**0.0**	**85.3**	**39.0**	**0.0**	**0.0**	**0.0**	**0.0**	**218.4**

Sources: Asian Development Bank. Project completion report prepared by the executing agency.

Table A2.3: Project Financing at Appraisal and Completion
($ million)

Source	At Appraisal		At Completion	
	Total	**%**	**Total**	**%**
A. Asian Development Bank	**100.0**	**45.2**	**99.6**	**45.6**
B. Global Environment Facility	**4.5**	**2.0**	**4.3**	**2.0**
C. Government				
1. Yinchuan Municipality	24.7	11.2	29.2	13.4
2. Ningxia Administrative Bureau	12.3	5.6	0.0	0.0
3. Ningxia Agricultural Reclamation Bureau	33.1	15.0	85.3	39.1
4. Ningxia Water Resources Department	37.6	17.0	0.0	0.0
5. Ningxia Finance Department	8.8	4.0	0.0	0.0
Subtotal (C)	**116.5**	**52.7**	**114.5**	**52.4**
Total (A+B+C)	**221.0**	**100.00**	**218.4**	**100.00**

Sources: Asian Development Bank. Project completion report prepared by the executing agency.

DISBURSEMENT OF LOAN AND GRANT PROCEEDS

Table 3.1: Annual and Cumulative Disbursement of ADB Loan Proceeds

($ million)

	Annual Disbursement[a,b]		Cumulative Disbursement[a,b]	
Year	Amount ($ million)	% of Total	Amount ($ million)	% of Total
2009	16.19	16.26	16.19	16.26
2010	6.25	6.28	22.44	22.54
2011	14.50	14.56	36.94	37.10
2012	21.45	21.54	58.39	58.64
2013	17.21	17.28	75.60	75.93
2014	17.47	17.55	93.07	93.47
2015	6.76	6.79	99.83	100.26
2016	(0.26)	(0.26)	99.57	100.00
Total	**99.57**	**100.00**	**99.57**	**100.00**

Note: Numbers may not sum precisely because of rounding.
[a] Includes disbursements to advance accounts.
[b] From eOps after actualization.
Source: Asian Development Bank.

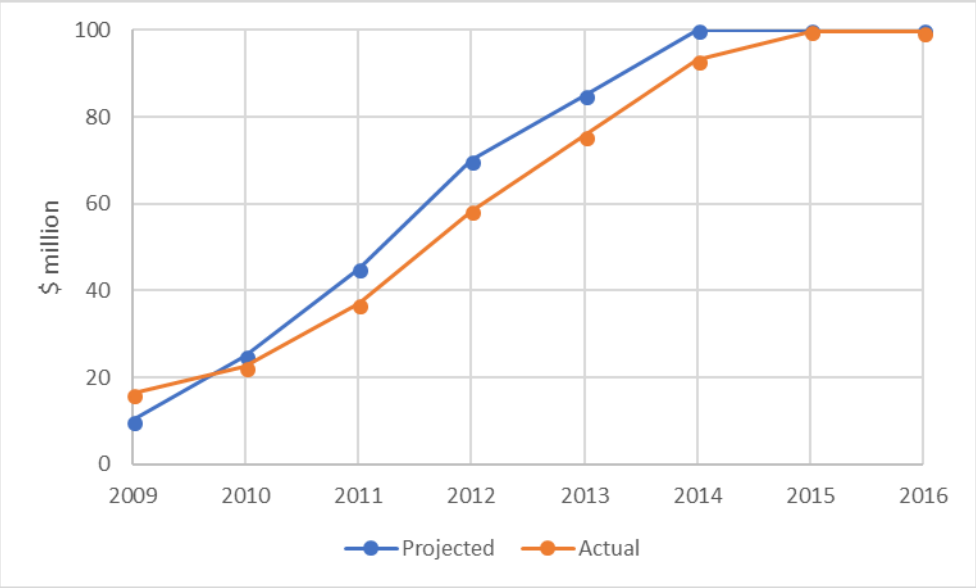
Table 3.2: Annual and Cumulative Disbursement of GEF Grant Proceeds

($ million)

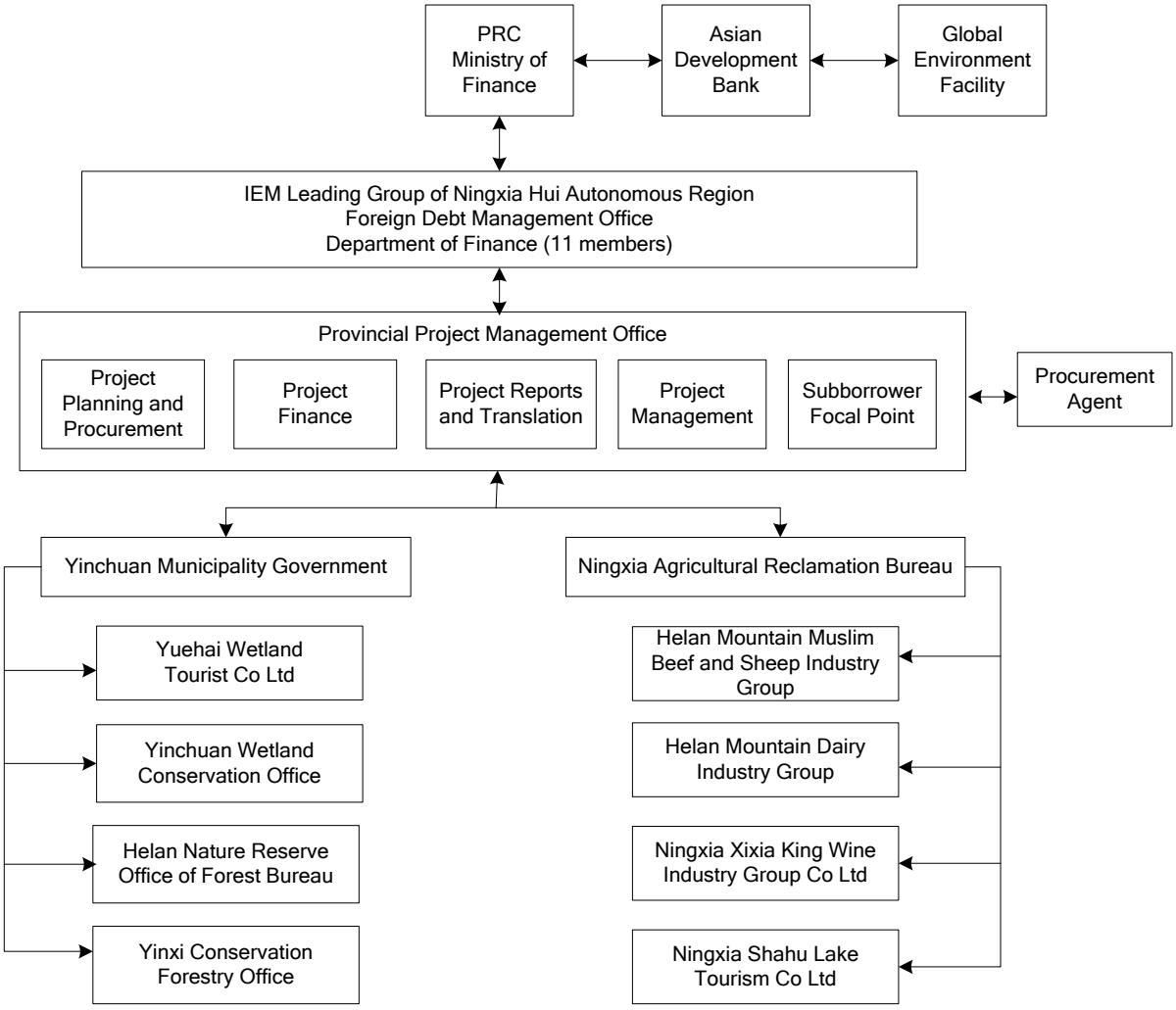
	Annual Disbursement[a,b]		Cumulative Disbursement[a,b]	
Year	Amount ($ million)	% of Total	Amount ($ million)	% of Total
2009	0.46	10.60	0.46	10.60
2010	0.02	0.46	0.48	11.06
2011	0.74	17.05	1.22	28.11
2012	1.49	34.33	2.71	62.44
2013	1.09	25.12	3.8	87.56
2014	0.01	0.23	3.81	87.79
2015	0.27	6.22	4.08	94.01
2016	0.26	5.99	4.34	100.00
Total	**4.34**	**100.00**	**4.34**	**100.00**

Note: Numbers may not sum precisely because of rounding.
[a] Includes disbursements to advance accounts.
[b] From eOps after actualization.
Source: Asian Development Bank.

Figure 3.1: Projection and Cumulative Disbursement of ADB Loan Proceeds
($ million)



PROJECT ORGANIZATION CHART



IEM = integrated ecosystem management, PRC = People's Republic of China
Source: Asian Development Bank.

CONTRACT AWARDS OF LOAN AND GRANT PROCEEDS

Table 5.1: Annual and Cumulative Contract Awards of ADB Loan Proceeds

($ million)

	Annual Contract Awards[b]		Cumulative Contract Awards[b]	
Year[a]	Amount ($ million)	% of Total	Amount ($ million)	% of Total
2009	8.71	8.94	8.71	8.94
2010	6.28	6.44	14.99	15.38
2011	19.23	19.73	34.22	35.11
2012	26.07	26.75	60.29	61.85
2013	23.21	23.81	83.50	85.67
2014	5.40	5.54	88.90	91.21
2015	6.19	6.35	95.09	97.56
2016	2.38	2.44	97.47	100.00
Total	**97.47**	**100.00**	**97.47**	**100.00**

Note: Numbers may not sum precisely because of rounding.
[a] Classified by PCSS dates.
[b] From eOps after actualization.
Source: Asian Development Bank.

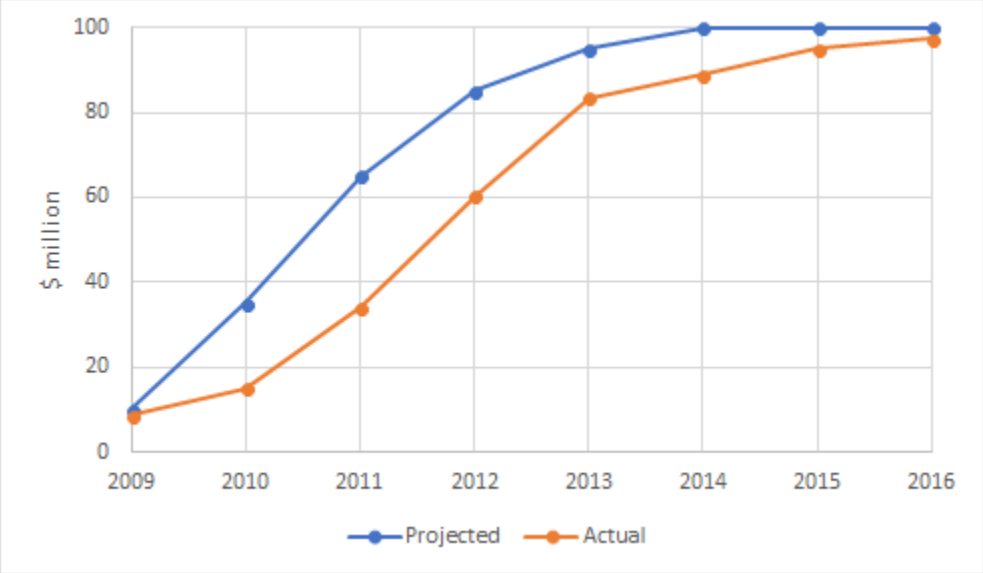
Table 5.2: Annual and Cumulative Contract Awards of GEF Grant Proceeds

($ million)

	Annual Contract Awards[b]		Cumulative Contract Awards[b]	
Year[a]	Amount ($ million)	% of Total	Amount ($ million)	% of Total
2010	0.05	1.15	0.05	1.15
2011	1.73	39.86	1.78	41.01
2012	1.74	40.09	3.52	81.11
2013	0.78	17.97	4.30	99.08
2014	0.00	0.00	4.30	99.08
2015	0.00	0.00	4.30	99.08
2016	0.04	0.92	4.34	100.00
Total	**4.34**	**100.00**	**4.34**	**100.00**

Note: Numbers may not sum precisely because of rounding.
[a] Classified by PCSS dates.
[b] From eOps after actualization.
Source: Asian Development Bank

Figure 5.1: Projection and Cumulative Contract Awards of ADB Loan Proceeds
($ million)



ENVIRONMENTAL ANALYSIS

A. Introduction

1. The project consists of four outputs: (i) building integrated ecosystem management (IEM) capacity and project management. (ii) land and water resource management, (iii) improving rural livelihoods, and (iv) conservation and tourism. In addition, a Global Environment Facility (GEF) grant ensures an IEM approach is incorporated in the project outputs to ensure the expected incremental global environmental benefits.

2. The project was classified as environment category A mainly because the Xixia Canal extension subcomponent under output 2 might have significant impacts on culture relics of Xixia Tombs. Ten other subcomponents were identified as category B and the others as category C. The domestic environmental impact assessment (EIA) was carried out and approved by Ningxia Environment Protection Department (NEPD) in 2007. A consolidated summary environmental impact assessment (SEIA) prepared according to the domestic EIA was disclosed on ADB website in 2007. During the project implementation, the domestic EIA was updated to reflect changes in the project scope, from which the only category A subcomponent was removed. The SEIA was updated in accordance with the ADB Safeguard Policy Statement (2009).

3. Domestic environmental review and acceptance has been conducted for the applicable subcomponents by NEPD in 2015 in terms of the domestic regulations.

B. Institutional Setup and Environmental Management

4. As per the loan agreement, the project management Office (PMO) established under Ningxia Finance Department (NFD) was responsible for the environmental management plan (EMP) implementation. PMO coordinated IEM capacity development during the whole project implementation. Project implementing agencies (PIAs), i.e. Ningxia Agriculture Reclamation Bureau and Yinchuan Municipal Government coordinated EMP implementation for its respective subcomponents. Each PIA had an environmental management unit responsible for implementing the EMP during construction and operation. PMO hosted a grievance redress committee.

5. Under Output 1, policies, regulations and guidelines on IEM were issued during 2008 to 2016. These include (i) the Strategy and Action Plan on Combating Land Degradation in Ningxia, (ii) Ningxia Wetlands Management Ordinance, (iii) ecological system conservation planning and regulations;[1] and (iv) integrated water resources management plan and relevant regulations on water-saving and control of pesticide and fertilizer usage to reduce non-point source pollution. The Helan Mountains piedmont conservation management area was approved as national nature reserve in 2011. Several knowledge products for environment management were produced. In addition, two training/study tours on dairy farm environmental management and six study tours on lake wetlands conservation were conducted.[2]

[1] Yinchuan Municipal People's Congress Standing Committee issued Decision of Strengthening Ecological Protection on Banks of Yellow River, the Decision on Strengthening the Protection of 31 Lakes and Wetlands, Decision on Strengthening the Ecological Protection of Yinchuan Section of Tanglai Canal, Decision on Strengthening the Protection of Water Conservation Area on Helan Mountain East Piedmont, and Decision on Strengthening the Ecological Protection of Ai'yi River during June 2013 to December 2014.

[2] Including Dairy Farm Integrated Environmental Management Model Demonstration Program, Dairy Farm Waste Recycling Research, Sand Lake Water Quality Improvement Program and Implementation Plan, Sand Lake Integrated Water Environment Management Guidelines, Impact Study of Agricultural Irrigation and Tourism Activities on Sand Lake Water Environment, Protection and Sustainable Use of Lake Wetlands in Yinchuan Plain (published).

C. Environment Monitoring

6. Contractors and supervision companies carried out daily on-site monitoring. The contractors' environment specialist conducted periodic internal environmental monitoring and took samples for analysis in accordance with the EMP monitoring procedures and guidelines. Six semi-annual environmental monitoring reports were disclosed on ADB website.

D. Environmental Impacts and Mitigation Measures Undertaken

7. Minor temporary impacts such as dust, wastewater, and solid wastes occurred mainly from construction activities involved in outputs 2, 3, and 4. The project EMP was implemented well in general from the viewpoints of environmental protection and ecological conservation. Neither serious environmental pollution event occurred, nor large amount of gaseous/water pollutant were emitted to the surrounding areas. Neither large amount of solid waste was generated from the construction sites or due to operation activities improperly disposed, nor apparent environmental deterioration was detected, or environmental complaint was made by general public.

8. **Output 2: Land and Water Resources Management.** The originally planned subcomponent Xixia Canal Extension was removed from the project in 2011. The expected adverse impacts or risks to the Xixia Tombs is no longer relevant. Considering potential impact on water balance, a detailed water demand analysis based on water monitoring was carried out during implementation. It predicted reduced water demand despite an increase in the irrigated area. The expected reduction in water demand highlights the importance of the proposed project's investment in water use efficiency throughout the water use infrastructure within the project area.

9. **Output 3: Improving Rural Livelihoods.** No adverse impacts were reported for reduced use of irrigation by cropping adjustment for fodder, grapes and horticulture. The water-saving irrigation programs resulted in substantial improvements of water use efficiency and reduced water logging of soils. A wastewater treatment plant with a capacity of 500 tons per day was built and put into operation in the Xingxia King Winery. Its effluent and sludge after proper treatment is reused for its internal landscaping irrigation. Animal wastes including wastewater from dairy farms and cattle breeding grounds are collected and treated using wet or dry separation equipment. The dry waste materials are composted and sterilized for fertilizer application. The wastewater was treated with anaerobic digester systems, from which biogas is used for power-supply by the farms. After treatment, effluent flow quality meets the national applicable standard Sewage Discharge Standard for Meat Processing Industries (GB13457-92) and is used for irrigating trees and grassland.

10. **Output 4: Conservation and Tourism**. Temporary impacts on water body occurred during wetlands dredging. All excavation works were undertaken in the dry season and frequent monitoring of water quality was undertaken. Excavated materials were reused for planting grounds. Three important physical cultural relics including Xixia king tomb, Jiangjun Tower and the Helankou Rock Carvings are no longer relevant to the project with the scope change that removed Xixia Canal construction and high-tech agriculture activities. Mitigation measures for different types of ecotourism were developed and implemented, such as ecological toilets and well managed garbage collection and transportation systems.

E. Environmental Benefits

11. The project delivered substantial environmental benefits, including rehabilitation and conservation of lake wetland ecosystem and biodiversity, expanded Helan mountain nature

reserve area and increased Helan Mountain forest and vegetation coverage which has further improved regional environmental quality, conservation agriculture effectively preventing water loss and soil erosion. With completion of this project, water use is reduced by 60.2% per unit of grape planting area. Agrochemical usage is reduced by 69% per unit of cultivated area. Nitrogen fertilizer usage is reduced by 60% per unit of cultivated area. Carbon reduction was also made through water-saving irrigation correspondingly. The GHG emissions reduction is estimated at 10.5 tonnes of carbon dioxide equivalent (tCO_2e) per hectare (ha) per year and 25,200 tCO_2e in total from the project vineyards.

12. In 2014, a biodiversity conservation expert was engaged and developed a biodiversity tracking tool according to the GEF requirements (Appendix 9). Management effectiveness for six protected areas in the project area was evaluated. The scoring results show that management effectiveness of Sand Lake increased from 55 to 71 points, Mingcui lake from 53 to 81 points, Helan Mountain Nature Reserve from 43 to 68 points, Yinxi wetlands from 21 to 55 points, Yuehai lake from 52 to 64 points, and Bao Lake from 43 to 59 points, representing the environmental and ecological protection performance of the project area.

13. During 2008 to 2016, both the number and the population of birds in the lakes covered under the project were observed with a significant increase, particularly in Mingcui, Haibao, and Yuehai lakes. Water volume increased in Mingcui, Yuehai, Baohu, Sand Lake, Sanding lakes, and Yinxi wetland and remained stable in Haibao lake. Water storage capacity of six lakes (i.e. Mingcui, Yuehai, Baohu, Sand Lake, Sanding, and Haibao lakes) increased by 22.1%. Overall, all the lakes and wetland systems have reached water balance. Water quality of the lakes are maintained at Class IV of Surface Water Quality Standard (GB3838-2002) adopting integrated environment management measures, such as diverting agricultural discharge and buffer zones.

14. The restoration and protection area of nine wetlands increased by 12.4%, reaching 13,000 ha (8,825 ha as target level at appraisal). The area of Helan Mountain Nature Reserve increased from 62,210 ha to 193,536 ha (115,360 ha as target level at appraisal) or by 211.1%; and the forest coverage rate increased by 7.2%. The establishment of Helan Mountain Piedmont Nature Reserve and wetland conservation have effectively protected 11 threatened animals and 5 threatened plants, among of which, the number of the national Class 2 protected endangered animal (*Pseudois nayaur*) increased by 20%, and the national Class 1 protected plant (*Tetraena Mongolica*) has been effectively protected, covering an area of 393.4 ha.

F. Conclusion

15. The project met the initial objectives and delivered substantial environmental benefits through changes in land, water, wetlands, and conservation management practices in the project area. Environmental management and associated mitigation measures were properly implemented during construction and operation. Environment monitoring was carried out by PMO and PIAs. No environmental complaints were received during the construction and operation stages of all subcomponents.

STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference	Status of Compliance
1. The Borrower shall cause NHARG to carry out the Project with due diligence and efficiency and in conformity with sound administrative, financial, engineering, environmental, integrated ecosystem management and conservation agriculture practices.	LA, Section 4.01 PA, Section 2.01	Complied with. All PIAs fulfilled their responsibility as covenanted.
2. The Borrower shall make the proceeds of the Loan and the GEF Grant available to NHARG upon terms and conditions satisfactory to ADB. Except as ADB may otherwise agree, the terms for making available to NHARG the proceeds of the Loan shall include (i) interest and commitment charge as the same rate as the Loan; (ii) a repayment period including a grace period identical to those of the Loan; and (iii) NHARG bearing the foreign exchange and interest variation risks of such proceeds.	LA, Section 3.01	Complied with. Relending and onlending agreements were signed.
3. The Borrower shall make available to NHARG, promptly as needed, the funds, facilities, services, land and other resources which are required, in addition to the proceeds of the Loan and the GEF Grant, for the carrying out of the Project.	LA, Section 4.02	Complied with. The required funds, facilities, services, land and other resources were timely provided.
4. The Borrower shall ensure that the activities of its departments and agencies with respect to the carrying out of the Project and operation of the Project facilities are conducted and coordinated in accordance with sound administrative policies and procedures.	LA, Section 4.03	Complied with. The PIAs implemented the project activities productively and operated project facilities effectively.
5. The Borrower shall take all action which shall be necessary on its part to enable NHARG to perform its obligations under the Project Agreement and shall not take or permit any action which would interfere with the performance of such obligations.	LA, Section 4.04	Complied with. The executing agency performed its obligations fully.
6. (a) The Borrower shall cause NHARG to ensure that it exercise its rights under the Onlending Agreements in such a manner as to protect the interests of the Borrower and ADB and to accomplish the purposes of the Loan. (b) No rights or obligations under the Onlending Agreements shall be assigned, amended, abrogated or waived without the prior concurrence of ADB.	LA, Section 4.05	Complied with.
7. **Lead Group.** A Lead Group (LG) has been established by NHARG. The Chairman of the LG will be the Governor of NHARG (or his representative) and will comprise the persons in charge of each of the concerned departments of NHARG. The main responsibilities of the LG shall include (i) approving important policies and principles relating to IEM, (ii) reviewing Project plans and ensure that all activities are in accordance with IEM principles, (iii) referring technical	LA, Schedule 5, para.2 PA, Schedule, para.2	Complied with. The lead group provided overall guidance during implementation. The PPMO performed overall responsibility for the Project.

Covenant	Reference	Status of Compliance
plans and sector plans to sector experts for review, (iv) approving final Project work plans, enable coordination and improve inter-agency communications, and (v) providing leadership and guidance to the IEM spatial planning programs. The LG will meet each quarter year and such other times as may be necessary. The LG will be supported by the Provincial Project Management Office (PPMO) for the duration of the Project which will provide secretariat services to the LG.		
8. **PPMO**. NFD has established the PPMO which will have dual role of managing the project and providing necessary support to the LG. NHARG shall ensure that the PPMO will be adequately staffed with full time qualified and experienced personnel to properly carry out the tasks assigned to the PPMO under the project. The PPMO will be equipped with adequate skill sets and human and other resources, including (i) capacity for project administration including, planning, financial management, project and management, (ii) sector focal points for each of the Project Implementing Agencies, and (iii) a group of technical experts who can review plans, proposals and investments to ensure technical correctness and coordination with the relevant departments and agencies. The PPMO will also direct the research and consultancy services of all International and national consultants.	LA, Schedule 5, para.4 PA, Schedule, para.4	Complied with. The PPMO was in place and functioned well during project implementation.
9. **Project Implementing Agencies (PIAs)**. NFD acting through PPMO will be responsible for the implementation of Component 1. Each of NFD, NAB, NARB, NWRD and YMG, shall be PIAs for the remaining three Components, each acting through their respective project Implementation units (PIUs).	LA, Schedule 5, para.5 PA, Schedule, para.5	Complied with. NAB and NWRD were removed from the project as per change in scope memo approved by ADB on 29 March 2011.
10. **Counterpart Funding**. The Borrower shall cause NHARG to ensure that (a) all counterpart financing necessary for the Project shall be provided in a timely manner, and (b) additional counterpart financing be provided in the event of any shortfall of funds or cost overruns in an amount sufficient to ensure that the Project is completed. NHARG shall also allocate and make available for each fiscal year, in a timely manner, sufficient funds from its budget, or shall cause such funds to be so allocated and made available, for the operation and maintenance of Project facilities under each Component and shall ensure that all Project facilities are operated and maintained in accordance with sound administrative and financial practices.	LA, Schedule 5, para.6 PA, Schedule, para.6	Complied with. Counterpart funding was provided in a timely manner in line with implementation progress.
11. **Change in Ownership**. In the event that (a) any change in ownership of the Project Facilities, (b) any sale, transfer or assignment of the shares or assets of any PIU, or (c) any other material organizational change to a PIA or a PIU is anticipated, NHARG shall, and shall cause the concerned Project Implementing Agency to, provide notice to ADB as	LA, Schedule 5, para.7 PA, Schedule, para.7	Complied with. Ownership remained unchanged.

Covenant	Reference	Status of Compliance
soon as possible after such change becomes known, and in any event prior to the approval or implementation of such change, whichever is earlier. NHARG shall, and shall cause the concerned Project Implementing Agency to, ensure that such change be carried out in a lawful and transparent manner. However, if such changes would affect any party's ability to perform the Borrower's obligations under the Loan Agreement or the Project Agreement, NHARG shall ensure that no such change will occur without the prior approval of the Borrower and ADB.		
12. **Project Review**. In addition to regular monitoring reports, Project performance will be reviewed twice per year, jointly by the Borrower (attendance of the Borrower at its discretion), NHARG and ADB, for the first three years of the Project and once a year thereafter. Such reviews will assess implementation performance and achievement of progress towards Project outcomes and outputs, disbursement progress, identify issues and constraints affecting implementation, and work out a time-bound action plan for their resolution.	LA, Schedule 5, para.8 PA, Schedule, para.38	Complied with. Review missions were conducted timely and supported the project implementation effectively.
13. The Borrower, NHARG and ADB shall undertake a comprehensive midterm review three years after the commencement of Project implementation, which shall include a detailed evaluation of (a) scope of the Project, (b) implementation arrangements, (c) implementation of the environmental management plan, (d) resettlement, (e) achievements of the scheduled targets, (f) progress of the agenda for policy reform and institutional development, and (g) reallocation of the Loan proceeds and change to the disbursement percentages. The results of the midterm review shall be discussed by the Borrower, NHARG, and ADB and if required, appropriate corrective measures shall be formulated to ensure successful Project implementation and achievement of the Project objectives by the Loan Closing Date.	LA, Schedule 5, para.9 PA, Schedule, para.39	Complied with. The mid-term review mission was conducted on 15-20 October 2012.
14. **IEM Policy in Project Area**. NHARG shall issue, within five years of the commencement of the Project, an IEM policy (IEM Policy), satisfactory to ADB, which will include, incorporation, for the Project Area, (i) the recommendations of the PRC-GEF Partnership on Land Degradation in Dryland Ecosystems (GEF-OP12), Strategy and Action Plan on Combating Land Degradation in Ningxia (final report); (ii) principles of IEM approach for NHAR, including the items marked (b), (c), (g), (h), (i), and (j) in paragraph 2 (a)(i) of Schedule 1 to the Loan Agreement; and (iii) guidance to NHARG departments and agencies as to the use of IEM practices in their area of responsibilities.	PA, Schedule, para.8	Complied with. NHARG have issued IEM policies and legislations in various aspects, such as wetlands protection (2008), Helan Mountains east piedmont wine region management (2012), Aiyi River regulations (2015), Management Measures for Ningxia Water-efficient Society (2015).

Covenant	Reference	Status of Compliance
15. The PPMO shall, prior to NHARG issuing the IEM Policy, submit to NHARG its recommendations and findings in respect of the implementation of the Project, for the purpose of assisting NHARG in preparing regulations for the implementation of the IEM Policy.	PA, Schedule, para.9	Complied with. Recommendations from the IEM strategy and action plan were taken up by the government prior the project startup in 2009.
16. During the course of the Project, NHARG will formulate and gradually apply principles of conservation agriculture for the whole of the Project Area based on the IEM approach to address land degradation control.	PA, Schedule, para.10	Complied with. Conservation agriculture has been extensively applied in Ningxia.
17. **Improving Environmental Management.** Within three years of the commencement of the Project, or such other period as shall be agreed between NHARG and ADB, NHARG shall prepare and submit legislation recommendation to the Standing Committee of the People's Congress of NHAR, which will include draft regulations relating to Wetlands Management and regulations on water resource zoning, satisfactory to ADB.	PA, Schedule, para.11	Complied with. Ningxia Wetlands Management Regulations was issued in September 2008. Ningxia Water Resources Function Zoning was updated in 2006. Ningxia Integrated Water Resources Management Plan was approved in 2007.
18. Within three years of the commencement of the Project, or such other period as shall be agreed between NHARG and ADB, NHARG shall prepare and submit legislation recommendation to the Standing Committee of the People's Congress of NHAR, which will include draft regulations relating to implementation of the National Water Law (2002), and regulations on the control of pesticide and fertilizer usage to reduce non-point source pollution, satisfactory to ADB.	PA, Schedule, para.12	Complied with Ningxia Regulations to Enforcing National Water Law was issued in September 2008.
19. NHARG will ensure that by no later than 31 December 2008, HPCMA (west of the Xixia Canal) will be classified and gazetted as a provincial nature reserve and will not be used for future activities which will damage original ecological environment, including agricultural, forestry, production or industrial use.	PA, Schedule, para.13	The Xixia Canal and on-farm canals for irrigation were undertaken under the government water resource programs and were removed from the project scope as approved by ADB on 29 March 2011.
20. On the basis of monitoring methods to be agreed between Ningxia Water Resources Department (NWRD) and ADB, and in accordance with IWRMP, NHARG will ensure that the provision of the Xixia Canal will not result in any increased water extraction from the Yellow River consumed	PA, Schedule, para.14	The Xixia Canal and on-farm canals for irrigation were undertaken under the government water

Covenant	Reference	Status of Compliance
by the irrigation system including the Meili, Yaojin, Xigan, and Xixia Canals.		resource programs and were removed from the project scope.
21. NHARG, through NWRD, shall, within 18 months of the Effective Date prepare and issue the IWRMP, including a water pricing mechanism to support water trading in NHARG, satisfactory to ADB. NHARG shall ensure that the necessary regulations with respect to the implementation of the IWRMP will be incorporated in the draft regulations relating to the implementation of the National Water Law 2002 as referred to in paragraph 12 above.	PA, Schedule, para.15	Complied with. NARG approved Ningxia Integrated Water Resources Management Plan in 2007 and released a series of regulations covering water pricing, quotation, and water rights trading.
22. NHARG will procure the necessary approvals from the Ningxia Cultural and Relic Management Bureau for the alignment of the Xixia Canal and report the approval to the State Relics Management Administration.	PA, Schedule, para.16	The Xixia Canal and on-farm canals for irrigation were undertaken under the government water resource programs and were removed from the project scope.
23. **Capacity Building**. NHARG, through the NFD, will ensure that all Project Implementing Agencies, PIUs, enterprises and other relevant stakeholders implement, in accordance with the implementation plan agreed upon by NHARG and ADB, the capacity building and institutional strengthening recommendations made by the consultants.	PA, Schedule, para.17	Complied with. Institutional capacity development activities were designed and conducted with assistance from consultants.
24. NFD will select the most suitable and available trainers and training institutions based upon selection criteria to be agreed by NHAR and ADB.	PA, Schedule, para.18	Complied with. The training of trainers program was conducted by the consultant firm following QCBS recruitment method of ADB.
25. NFD shall ensure that all staff selected for training are suitable for such training and have been selected using a transparent and objective methodology that is satisfactory to ADB. NFD will take such steps as may be reasonable to ensure that staff who have received training under the Project remain available during the period of implementation of the Project.	PA, Schedule, para.19	Complied with. Training participants were all related to the project and were selected through transparent and objective methodology.
26. **Governance and Anticorruption**. NHARG shall cause each of the Project Implementing Agencies to, comply with ADB's *Anticorruption Policy* (1998, as amended from time to time). NHARG agrees (i) that ADB reserves the right to investigate any alleged corrupt, fraudulent, collusive or	PA, Schedule, para.20	Complied with. ADB's anti-corruption requirements were complied with and

Covenant	Reference	Status of Compliance
coercive practices relating to the Project and (ii) to cooperate fully with and to cause each PIA and PIU to cooperate fully with any such investigation and to extend all necessary assistance, including providing access to all relevant books and records, as may be necessary for the satisfactory completion of any such investigation. In particular, NHARG shall (a) conduct periodic inspections on the contractors' activities related to fund withdrawals and settlements and (b) ensure that all contracts financed by ADB in connection with the Project include provisions specifying the right of ADB to audit and examine the records and accounts of the PPMO, each Project Implementing Agency and PIU, and all contractors, suppliers, consultants and other service providers as they relate to the Project.		incorporated in the bidding documents. Domestic prevailing anti-corruption measures were adopted during project implementation.
27. **Gender, Employment and Labor Standards**. NHARG shall implement the Project in accordance with a gender action plan and participation plan to be prepared by NHARG and agreed between and NHARG and ADB within six months from the Effective Date.	PA, Schedule, para.22	Complied with. Women labors are largely employed in dairy farms and grape growing.
28. **Health and HIV/AIDS**. NHARG shall, and shall cause each Project Implementing Agency to, in coordination with the relevant PIUs, (i) ensure that contractors disseminate information on the risks of transmitting and contracting socially and sexually transmitted diseases, including HIV/AIDS, to their employees and workers during Project implementation; and (ii) in coordination with other appropriate agencies identified by NHARG, ensure that public awareness and education programs on health and hygiene behavior and managing wastewater and solid waste disposal will be conducted in Project Area to increase the likelihood that the Project health benefits are realized especially among the poor and vulnerable populations.	PA, Schedule, para.24	Complied with. Measures were planned and undertaken following the EIA requirements.
29. **Land Acquisition and Involuntary Resettlement**. NHARG shall ensure and shall cause each Project Implementing Agency to ensure that: (a) prior to the commencement of civil works, all land and rights-of-way required by the Project be made available in a timely manner in accordance with Borrower's laws and regulations, including land use approvals and agreements with affected persons; (b) the RP be implemented promptly and efficiently in accordance with its terms; and the provisions of the RP be implemented in accordance with all Borrower's applicable laws and regulations, and ADB's *Policy on Involuntary Resettlement* (1995); (c) all affected persons be given adequate opportunity to participate in resettlement planning and implementation; and ensure that they will be at least as well off as they would have been in the absence of the Project; (d) timely provision of counterpart funds be paid for land acquisition and resettlement activities; and (e) any financial obligations in excess of the RP budget estimates be met.	PA, Schedule, para.26	With the removal of Xixia Canal from project scope, the project no longer involved land acquisition and resettlement impacts as envisaged at appraisal. The involuntary resettlement impact has been re-categorized from B to C.

Covenant	Reference	Status of Compliance
30. **Environment**. NHARG shall ensure that each Project Implementation Agency shall construct, operate, maintain, and monitor the Project facilities in strict conformity with: (a) all Borrower's applicable laws and regulations, including national and local regulations and standards for environmental protection, health, labor, and occupational safety and ADB's environmental procedures and guidelines including ADB's *Environmental Policy* (2002); and (b) the environmental mitigation and monitoring measures detailed in the approved Environmental Impact Assessment (EIA), summary EIA (SEIA), and the Environmental Management Plan (EMP) for the Project.	PA, Schedule, para.29	Complied with The EIA and EMP were updated according to ADB's Safeguard Policy Statement (2009).
31. NHARG shall cause each Project Implementing Agency to ensure that any changes to the Project design that may have a potential for causing negative environmental impacts be reviewed by the PPMO with the assistance of environmental management consultants so that EMP monitoring and mitigation measures are adjusted accordingly in consultation with ADB.	PA, Schedule, para.32	Complied with. Environmental due diligence was carried out for all scope changes as required and no environmental harms caused.
32. NHARG shall cause each Project Implementing Agency to submit its monitoring reports to the PPMO, which will coordinate the preparation of a semi-annual environmental report, which will include the implementation of the EMP, in a format acceptable to ADB until Loan Closing Date.	PA, Schedule, para.33	Complied with. EMRs were submitted and disclosed on ADB website as per the EMP.
33. NHARG shall ensure and cause each Project Implementing Agency to ensure that all planting of perennial trees, plants and shrubs in the Project Area will be undertaken on the basis of sound ecological considerations, taking into account efficient water usage and an IEM approach to natural resource management.	PA, Schedule, para.34	Complied with. Water saving was applied for all plantation activities involved in the project.
34. **Monitoring and Reporting**. At the commencement of Project implementation, NHARG shall or shall cause the PPMO to develop and thereafter maintain, a PPMS which will be designed to provide early warning of Project implementation and permit adequate flexibility to adopt remedial actions. The PPMS will adopt the following agreed indicators (i) project progress, (ii) enabling framework improvements (policies legal/regulations harmonization and clear institutional mandates), (iii) results of capacity development, (iv) IEM capacity building performance, (v) progress towards demonstration and field targets, (vi) environment improvements, and (vii) related social impacts of the Project.	PA, Schedule, para.35	Complied with. A PPMS was established at the beginning of project implementation in 2010, including baseline database. The PPMS was updated regularly and served as a major reporting protocol for the project progress and performance.

Covenant	Reference	Status of Compliance
35. NHARG shall ensure that the PPMO will prepare consolidated semi-annual reports indicating progress made, problems encountered during the period, steps taken or proposed to remedy the problems, proposed program of activities, and progress expected for the next quarter. Both the loan and GEF grant will be covered in these reports. Within 6 months of physical completion of the Project, PPMO will submit to ADB a completion report that describes the achievements in relation to the Project's expected impact, outcome and outputs.	PA, Schedule, para.37	Complied with. The project progress reports were submitted as agreed.
36. NHARG shall cause each PIA and PIU to, (i) maintain separate records and accounts for the Project and for each PIA and PIU's overall operations, which such records and accounts shall be established and maintained in accordance with sound accounting principles and internationally-accepted accounting standards and PRC's accounting laws; (ii) have such Project accounts and related financial statements (balance sheet, statement of income and expenses, and related statements) audited annually, in accordance with appropriate auditing standards consistently applied by independent auditors whose qualifications, experience and terms of reference are acceptable to ADB; and (iii) furnish to ADB, promptly after their preparation but in any event not later than 6 months after the close of the fiscal year to which they relate, certified copies of such audited Project accounts and financial statements and the report of the auditors relating thereto (including the auditors' opinion on the use of the proceeds of the Loan and GEF Grant and compliance with the financial covenants of the Loan Agreement as well as on the use of the procedures for imprest account/statement of expenditures), all in the English language. NHARG shall, through the PPMO, furnish to ADB such further information concerning such accounts and financial statements.	PA, Section 2.09 (a)	Complied with. The PIAs and PIUs maintained financial accounts effectively, which were audited annually as per the PA requirements. All the audited reports were submitted on schedule to and reviewed by ADB.
37. NHARG shall enable ADB's representatives to inspect the Project, the Goods and Works financed out of the proceeds of the Loan and GEF Grant, all other plants, sites, properties and equipment of the PIAs, to the extent relevant to the Project, and any relevant records and documents.	PA, Section 2.10	Complied with.

ADB = Asian Development Bank, EIA = environment impact assessment, EMP = environmental management plan, EMR = environmental monitoring report, GEF = Global Environment Facility, IEM = integrated ecosystem management, IWRMP = Integrated Water Resources Management Plan, LA = Loan Agreement, LG = lead group, NAB = Ningxia Administrative Bureau, NARB = Ningxia Agriculture Reclamation Bureau, NFD = Ningxia Finance Department, NHARG = Ningxia Hui Autonomous Region Government, NWRD = Ningxia Water Resources Bureau, PA = Project Agreement, PIA = project implementing agency, PIU = project implementation unit, PPMS = project performance monitoring system, QCBS = Quality- and Cost-Based Selection, RP = resettlement plan, SEIA = Summary Environmental Impact Assessment, YMG = Yinchuan Municipality Government.

Source: Asian Development Bank.

ECONOMIC AND FINANCIAL REEVALUATION

A. General Approach

1. The Project's main outcome was to introduce an integrated ecosystem management (IEM) approach to provide sustainable livelihoods for the population of the project area with targets of (i) demonstration of the IEM approach through policy, regulatory, and institutional reforms; (ii) livelihood improvement for up to 140,000 smallholder farmers and increased income for 20 enterprises through a transition to higher-value and more resource-efficient industries; (iii) reduction of agrochemical and water use per unit of cultivated area; (iv) increase in water allocations for nine major lakes and wetland systems, and less runoff from agriculture; and (v) protection of 15 globally threatened wild species. The reevaluation covered the subprojects that were actually implemented by the time of completion. Consistent with the approaches adopted at appraisal, only those subprojects which generated direct and quantifiable benefits are reevaluated for financial and economic benefits. The remaining, though ensured reforms or provided livelihood improvements, poverty reduction, and sustainable economic development in the project area, are not included in the reevaluation.

2. Specifically, the subprojects that are reevaluated with quantifiable indicators include (i) vineyard and wine; (ii) beef production; (iii) dairy production including fodder production; (iv) Sand Lake; (v) the wetlands component implemented by Yinhcuan Municipality including Mingcui Lake, Yuehai Lake, Baohu Lake, and Haibao Lake; and (vi) Yinxi component which provided shelter and economic trees, only economic reevaluation are conducted. The Ningxia Yinchuan IEM component was not reevaluated for economic benefits because of the difficulties of quantifying the economic benefits.

3. Benefit estimates are based on the actual situation during implementation and the initial years of operation since completion. With- and without-project scenarios were identified for each subproject to quantify the incremental output volume. For the subprojects concerned with agricultural production, the quantifiable benefits are crop or livestock; and subprojects concerned with the wetlands for which the quantifiable outputs were visitor numbers and visitor receipts. Besides, the Project generate many economic benefits accruing from reduction of carbon emission and biodiversity protection. These benefits were quantified in the reevaluation of economic benefits.

4. The financial reevaluation is based on each subproject's financial internal rate of return (FIRR) in accordance with the Guidelines for the Financial Governance and Management of Investment Projects Financed by the Asian Development Bank (ADB). The FIRR is compared with their weighted average cost of capital (WACC) to assess the financial viability. Financial sustainability of the project is assessed through the sensitivity analysis and identification of major potential risk and the mitigation measures. Financial analysis of participating enterprises was conducted upon actual financial statements for the past years since the start of the Project. Though no financial indicator covenant was required on these enterprises, key financial ratios were calculated for assessing the general financial position and prospects of sustainability.

5. Other main assumptions used in the financial and economic analyses are the following:

   (i) Participating agro-enterprises utilized loan proceeds through an onlending agreement which is on the same financial terms and conditions as those of the

ADB loan, with Ningxia Hui Autonomous Region government or Yinchuan Municipality bearing the exchange rate and interest rate variation risks.

(ii) Capital costs were the actual expenditures incurred by the implementing agencies for the project activities which included labor, construction materials, equipment, training, and other related costs. Sources of capital included ADB loan proceeds government financing, and Global Environment Facility (GEF) grants. No residual values were assumed.

(iii) The facilities established under the project became operational in different years during 2009-2011, and the actual operation data were provided by respective implementing agencies.

(iv) Operating costs, including expenditures for labour cost, production materials, and maintenance cost of processing plants, were estimated based on the actual performance of the enterprises.

(v) The after-tax WACC was recalculated based on the actual capital mix and cost of various sources of financing, i.e., ADB loan interest rate based on a LIBOR 10-year fixed swap rate, and the cost for grant and government funds of 8%.

(vi) For all output goods concerned in the project, little or no price distortion is apparent in the market, therefore a conversion factor of 1.0 is used. Tax and other transfer payment were deleted in the economic analysis. A shadow wage rate factor of 0.80 was applied to the price of unskilled labor in the economic analysis.

(vii) Economic cost of water was used for economic reevaluation of vineyard and wetland rehabilitation component. For the vineyard component, the current financial price for irrigation water in the project area is CNY0.3 per cubic meter. Following the same conversion factor used at appraisal, an economic price for water of CNY1.5 per cubic meter was adopted in the reevaluation. For the wetland component, the current financial price for water is CNY0.07 per cubic meter (m^3), an economic price of CNY0.35/m^3 is adopted in the reevaluation.

(viii) Economic cost of carbon emission is considered for beef and dairy production based on assumptions of 1.5 ton and 3.1 ton per year for each beef cattle and dairy cattle respectively. The reevaluation used unit economic price for carbon emission of CNY50 per ton.[1]

(ix) Economic benefit incorporated carbon sink effect of wetland which is valued as 39.24 ton per hectare per year,[2] and the biodiversity conservation benefits valued as CNY2,765.7 per hectare.[3]

B. Financial and Economic Reevaluation

6. The reevaluated financial and economic rate of return are provided in Table A8.1. All the components except the wetland and Yinxi components generated FIRR above the updated WACC of 3.28% (Table A8.2). Compared with the appraisal estimates, the vineyard, beef production, dairy production, and Sand Lake components demonstrated comparable results. The vineyard component indicated strong benefits resulted from the significant saving of irrigation water and

[1] Based on the reference price from PRC's carbon trading network.
[2] BU Xiao-yan. *Research of Evaluation on Carbon Sequestration for Different Types of Wetlands in Yinchuan Plain* [D]. Ningxia University, 2016.
[3] Costanza, R, d'Arge, R, de Groot, R, et al. *The value of the world's ecosystem services and natural capital*. Nature, 1997, 387, 253-260.

labor cost even though the financial price for water increased 5 times since 2006. The beef production component indicated a significant lower FIRR mainly due to shrunk scale and the lower profit ratio reflecting much higher purchase price for beef cattle and increasing production cost. The wetland rehabilitation component invested in wetland environmental and ecological infrastructure, however their financial benefit was insignificant considering the relatively limited tourism potential because of the size and location, and limited size of aqua products for protection of the ecological system. The Yinxi livelihood improvement component provided farmers with young trees for ecological shelterbelt and crop tree development, for which the FIRR was not calculated because there was no adequate information to quantify the financial benefits and also because of the conservation nature of the component.

7. Sensitivity analysis indicates that for the beef and dairy components the FIRR is highly sensitive to the revenue decrease and increase in production cost, and less than 10% of negative changes would make the FIRR decrease to below the level of WACC. The vineyard component remains robust in tested negative changes. The Sand Lake component is highly sensitive to changes in number tourists or ticket price and less than 10% negative changes than 2017 level would make the FIRR decrease to below the level of WACC.

Table A8.1: Reevaluated Financial and Economic Indicators

	FIRR (%)		EIRR (%)	
Subproject	**At Appraisal**	**At Completion**	**At Appraisal**	**At Completion**
Beef Production	25.1	5.3	34.9	4.4
Dairy Production	7.2	7.2	13.8	12.4
Vineyard	19.2	12.8	44.5	18.1
Sand Lake	8.8	9.4	14.8	14.6
Wetland Rehabilitation	14.4	-	40.3	10.7
Yinxi Alternative Livelihoods	15.3	-	11.3	11.3

EIRR = economic internal rate of return, FIRR = financial internal rate of return
Source: Asian Development Bank estimates.

Table A8.2: Weighted Average Cost of Capital

	ADB Loan	GEF Grant	Government Funds	Total
a. Weighting	51.10%	2.20%	46.60%	100%
b. Nominal cost	3.15%	8.00%	8.00%	
c. Income tax rate	25.00%	0.00%	0.00%	
d. Tax-adjusted nominal cost	2.36%	8.00%	8.00%	
e. Inflation rate	1.30%	1.30%	2.30%	
f. Real cost	1.05%	6.61%	5.57%	
g. Weighted component of WACC	0.53%	0.15%	2.60%	
Weighted average cost of capital				**3.28%**

ADB = Asian Development Bank, GEF = Global Environment Facility, WACC = weighted average cost of capital
Source: Asian Development Bank estimates.

8. The reevaluated economic internal rate of return (EIRR) varied from 4.4% to 18.1% by

component. Except the beef component (4.4%), other evaluated components are in acceptable range of EIRR (10.7%- 18.1%). Compared with the appraisal estimates, the dairy and Sand Lake component indicated comparable results. The beef component's reevaluated EIRR was significantly lower mainly due to the much lower production scale, high production costs, and inclusion of cost of carbon emission. The vineyard and wetland component indicated much lower results mainly because of the consideration of the economic cost for the water used. In the case of vineyard component, the appraisal duplicated the benefit by including both the grape and wine products while the grape produced served as the raw material for wine production. It was also noted the high EIRR result at appraisal for wetland (Yuehai Lake in particular) was mainly due to the overly optimistic estimation on the volume of aqua products from the lakes.

9. The EIRR for the whole Project is re-estimated at 14.5% and the net present value at discount rate of 9% is CNY204.4 million. However, it has to be noted that this is a result of combination of the evaluated components as described above without considering the cost and benefit of those project activities that cannot be quantified. Sensitivity analysis by component indicates the beef and dairy components are highly sensitive to negative changes while the rest components are robust in adverse changes in both benefits and costs. The fact that the Project is multifaceted with subprojects across several diverse sectors makes adverse movements in prices or outputs in tandem not likely, thus the effect of variations on the whole Project is limited.

C. Financial Performance of Participating Enterprises

10. The project engaged commercial enterprises to undertake most of agricultural production subprojects utilizing their processing, marketing and institutional capacities to support the project activities. The involvement of enterprises facilitated the transition of traditional farming practices by making more efficient use of land and water, also the market-based solutions that link rural populations with processors and markets are essential for the viable livelihoods and income needs of the rural population. The wetland related components also engaged commercial enterprises which linked the commercial and conservation values in the conservation of ecosystem. It has been noted continuous conservation objectives are being pursued by these enterprises which offers a good opportunity for them to inject returns from tourism to the protection of ecosystem including the water quality and wildlife habitats in the project area.

11. These enterprises include (i) Ningxia Halal Meat Limited Liability Company, (ii) Ningxia Helanshan Dairy Limited Liability Company, (iii) Xixia King Winery Limited Liability Company, (iv) Ningxia Sand Lake Tourism Limited Liability Company, (v) Ningxia Mingcui Lake Company, and (vi) Ningxia Yuehai Company. Their key financial indicators based on their financial statements for period from 2010-2016 are provided in Table A8.3.

12. Although ADB has not required financial covenants on these enterprises, main observations at completion are as follows. Ningxia Halal Meat Limited Liability Company has been in serious situation as indicated by its constant losses, prolonged inventory turnover period, and high level of current liabilities. Outbreak of animal diseases and deteriorating domestic market affected by imports from other countries had been the main reasons. The situation showed sign of recovery in 2016 with sales being almost doubled compared with the previous year. Besides, uncertainty existed as the company replied on fattening young cattle purchased from farmers which were boosted by government's poverty alleviation programs. Ningxia Helanshan Dairy Limited Liability Company is generally in satisfactory situation with steady profit ratio, low debt ratio and improving inventory turnover. Xixia King Winery Limited Liability Company's situation deteriorated significantly during the period manifested by its shrinking sales volume, piling up of inventory, and low level of profit ratio. This was caused by fierce competition on wine market and

the situation have not shown sign of improvement by the time of project completion. Ningxia Sand Lake Tourism Limited Liability Company grew rapidly from 2010 to 2013 however the sales lowered by 23% in 2016 than previous year indicating a compelling task for the company to make efforts to maintain attraction to tourists and explore diversified lines of business. Ningxia Mingcui Lake Company and Ningxia Yuehai Company are in similar situation where the tourism and recreation potential hasn't been fully realized and government subsidies are still the main source of fund for infrastructure construction and operation. It has been observed that government commitment to support these enterprises is strong, benefiting from the IEM principles embedded in the institutional and policy level of the province.

Table A8.3: Key Financial Indicators of Participating Enterprises

Participating Enterprises		2010	2011	2012	2013	2014	2015	2016
Ningxia Halal Meat Limited Liability Company								
	Current Ratio	43.70%	32.17%	30.03%	34.96%	34.23%	29.86%	62.19%
	Inventory Turnover Ratio (days)	236.93	243.60	232.69	433.00	206.12	350.41	260.48
	Long-term Debt to Total Assets	7.83%	9.27%	12.34%	27.76%	39.30%	40.02%	26.09%
	Gross Profit Ratio	-39.27%	-58.77%	-67.02%	-368.56%	-45.48%	-57.60%	-39.32%
	Net Profit Ratio	-21.55%	-51.98%	-54.19%	-579.49%	-22.53%	-44.78%	-24.71%
Ningxia Helanshan Dairy Limited Liability Company								
	Current Ratio	117.56%	188.83%	260.06%	72.39%	39.22%	45.77%	47.10%
	Inventory Turnover Ratio (days)	60.31	130.76	226.70	475.10	216.00	131.79	127.03
	Long-term Debt to Total Assets	9.39%	14.03%	6.06%	8.29%	7.29%	19.85%	20.38%
	Gross Profit Ratio	7.57%	-8.44%	-4.75%	4.43%	2.75%	10.41%	12.28%
	Net Profit Ratio	10.11%	7.78%	7.41%	13.71%	10.76%	7.91%	7.32%
Xixia King Winery Limited Liability Company								
	Current Ratio	63.93%	55.45%	43.27%	3.29%	46.68%	65.87%	78.94%
	Inventory Turnover Ratio (days)	61.60	66.60	72.24	87.88	122.74	806.81	1550.00
	Long-term Debt to Total Assets	20.70%	16.47%	23.98%	22.51%	21.63%	16.27%	15.54%
	Gross Profit Ratio	0.19%	1.44%	0.14%	1.14%	-5.82%	2.09%	3.72%
	Net Profit Ratio	0.15%	1.19%	3.33%	1.46%	-5.48%	1.50%	14.76%
Ningxia Shahu Tourism Limited Liability Company								
	Current Ratio	38.90%	54.48%	64.53%	70.67%	67.40%	89.85%	114.33%
	Long-term Debt to Total Assets	17.55%	11.80%	6.43%	5.80%	10.03%	8.53%	11.09%
	Gross Profit Ratio	10.69%	13.53%	20.83%	16.55%	9.85%	6.40%	-0.35%
	Net Profit Ratio	9.89%	12.08%	14.04%	15.25%	10.03%	7.89%	2.34%
Ningxia Mingcui Lake Company								
	Current Ratio	17.92%	37.41%	32.68%	38.70%	17.05%	12.04%	16.06%
	Long-term Debt to Total Assets	14.72%	14.32%	0.00%	0.00%	1.40%	1.41%	1.41%
	Gross Profit Ratio	-111.67%	-63.72%	-76.80%	-38.38%	-64.68%	-63.09%	-58.52%
	Net Profit Ratio	-75.21%	-46.75%	-49.79%	-21.65%	-58.21%	-58.68%	-37.42%
Ningxia Yuehai Company								
	Current Ratio	17.19%	18.30%	7.06%	14.38%	9.47%	24.33%	18.05%
	Long-term Debt to Total Assets	1.08%	1.17%	0.91%	0.57%	1.87%	8.45%	9.30%
	Gross Profit Ratio	-149.00%	-128.65%	-83.72%	-99.40%	-82.58%	-71.49%	-62.87%
	Net Profit Ratio	-49.38%	-49.05%	-44.09%	-49.50%	-94.96%	-71.60%	-103.36%

Sources: Financial statements of respective participating enterprises for years of 2010-2016.

GLOBAL ENVIRONMENT FACILITY TERMINAL EVALUATION REPORT

A. Global Environment Facility Background

1. The project's outcome is to introduce integrated ecosystem management (IEM) approach to provide sustainable livelihoods based on better land management, biodiversity conservation and ecotourism in Ningxia Hui Autonomous Region (NHAR). The project was expected to deliver four outputs: (i) IEM capacity building and project management, (ii) land and water resource management, (iii) rural livelihood improvement, and (iv) ecosystem conservation. The project contributed to the overarching objectives of People's Republic of China-Global Environment Facility Partnership on Land Degradation in Dryland Ecosystems and China Biodiversity Partnership Framework.

2. The Asian Development Bank (ADB) submitted the work program for the project to the Global Environment Facility (GEF) in June 2007. The GEF Council approved the work program for the project on 2 August 2007. The ADB's loan negotiations took place on 23-24 April 2008. The ADB Board of Directors approved the project on 29 August 2008. However, the ADB Management set a condition that the GEF Chief Executive Officer's (CEO) endorsement should be prior to the ADB board circulation of the project to ensure the coherent cofinancing. The GEF CEO's endorsement was not obtained until 25 July 2008. After the loan approval and the CEO's endorsement, the loan documents were signed on 6 March 2009.

3. At appraisal, the total project cost was estimated $221.0 million, of which the financing plan included an ADB loan of $100.0 million, a GEF grant of $4.5 million, and government counterpart funds of $116.5 million. At completion, the actual project cost was about $218.4 million, for which $99.6 million were financed by the ADB loan, $4.34 million by the GEF grant, and the balance by the government counterpart funds. The ADB loan and government counterpart funds financed the baseline project activities such as works and facilities for land management as well as wetland conservation. The GEF grant financed incremental costs to ensure that the IEM approach was followed to contribute to restoring the productive and protective functions of ecosystem resources.

4. The project is consistent with GEF biodiversity strategic programs (BD-SP), including BD-SP3 (Strengthening terrestrial protected area networks), BD-SP4 (Strengthening the policy and regulatory framework for mainstreaming biodiversity) and BD-SP1 (Sustainable financing of protected area systems at the national level). It incorporated the principles set out under the PRC-GEF Partnership on Land Degradation in Dryland Ecosystems and addressed the key aspects of sustainable land management as recommended in land degradation focal area strategy. Contribution of the project into the GEF strategic objectives and global environmental benefits are summarized below.

Table A9.1 Contribution to GEF Strategic Objectives and Global Environmental Benefits

Output	GEF Strategic Objectives	Global Environmental Benefits
Output 1: IEM Capacity Building and Project Management	• BD-SP 4	• Ecosystem management • Biodiversity conservation • Land degradation
Output 2: Land and Water Resources Management	• BD-SP 4 • Sustainable land management	• Land degradation • Ecosystem management
Output 4: Ecosystem Conservation	• BD-SP 3 • BD-SP 1	• Ecosystem management • Biodiversity conservation

B. Terms of Reference for for Project Completion Review

5. As the GEF grant was integrated with the baseline project, the terminal evaluation report (TER) was carried out as an integral part of the whole project completion review (PCR). The evaluation followed the same methodology applied for the PCR, which included field investigation and desk review on the executing agency's project completion report and project performance monitoring reports (PPMS) regarding the project targets and indicators as set in the design and monitoring framework. Actual project costs and financing plan were re-calculated. In addition, the TER incorporated major findings from the GEF tracking tools established for the project in 2014, which included (i) management effectiveness tracking tool (METT), and (ii) capacity score card developed. ADB fielded two missions in December 2017 and April 2018 and had meetings and interviews with local stakeholders and project implementing agencies. The GEF focal point (i.e. Ministry of Finance) was engaged through regular reporting/consultation and commenting the draft final PCR report.

C. Implementation

6. The financing agreement for the GEF grant was combined with the loan agreement and the project agreement. During implementation, Ningxia Finance Department as the project manager retained control over the majority of GEF funds for capacity building, demonstration purposes and technical support. A project management office (PMO) established under Ningxia Finance Department oversaw daily implementation matters. Two project implementing agencies (PIAs, including Ningxia Agriculture Reclamation Bureau and Yinchuan Municipal Government) executed their respective activities. A leading group chaired by the Vice Governor of NHAR and comprising representatives from 11 sector agencies coordinated cross-sector matters and decision making for major project plans such as changes in the project scope and institutional arrangements. The GEF focal point was engaged through regular reporting/consultation and provided timely and effective support during the implementation, in particular regarding scope changes and extension of the grant closing date.

D. Relevance, Effectiveness and Impact

7. **Relevance.** The project was *highly relevant* with the priorities of PRC's national and regional plans. The project was included as the first demonstration investment under the PRC-GEF Partnership on Land Degradation in Dryland Ecosystems, which was developed in line with United Nations Convention on Combating Desertification and Convention on Biological Diversity. It directly contributed to Ningxia Biodiversity Conservation Strategy and Action Plan (2011-2030). The project fit well into the government agenda of ecological civilization and was highly in line with both national and provincial development plans for ecological and environmental management. During the project processing stage, HARG government issued Ningxia Wetland Management Regulations, which fully adopted IEM approach as the project aimed to promote. During implementation, all the wetlands covered by the project were included in NHAR's priority wetland conservation programs. Amongst, Sand Lake was listed in the national program for key wetlands and lakes environmental improvement.

8. **Effectiveness.** The project was *effective* in achieving its intended outcome to introduce IEM approach to provide sustainable livelihoods for the population of the project area. All outcome indicators were achieved or over-achieved. By the project completion in 2016, IEM approach has been mainstreamed in the government policies and is being practiced in government programs. Beneficiary number reached 150,000 from transition to higher-value rural industries. Agrochemical fertilizer usage in project area was 800 kilogram per hectare (kg/ha) and water use

was 4,200 cubic meters per hectare (m^3/ha), reduced by 50% and 60%, respectively. Water balance in Yinchuan wetlands and Sand Lake has been achieved between compensated volume and storage capacity. Reported bird species and population also increased in the project wetlands. Water quality of monitored lakes have been maintained Class IV of National Surface Water Standards in line with the water function zoning.

9. **Impact.** Most of impact indicators have been overachieved. During the project reporting period from 2008 to 2016, the number of poor small households linked to commercial enterprises increased from 210 to 2,873. Conservation agriculture area expanded from 530 ha to 16,350 ha. Wildlife conservation area increased from 62,210 ha to 193,536 ha and wetland conservation area from 11,566 ha to 13,000 ha. Number of visitors to tourism sites in project area increased from 0.9 million to 2.4 million. The improved wetland management in Yinchuan enabled the city to be accredited as the first group of the international wetland cities by the Ramsar Convention in 2018. All these achievements have contributed to global environmental benefits (GEB) effectively as expected, including ecosystem management, biodiversity conservation, and sustainable land management. As for institutional capacity, IEM principles have been adequately mainstreamed in NHAR's legislation, policy and plans for ecological and environmental management.[1]

E. Global Environmental Benefits and Catalytic Roles

10. At global scale, the project contributed to at least three global environment development objectives. First, it has built up capacity to reserve and wetland park management team in safeguarding globally endangered wild animals, in particular, tens of thousands migratory water birds. With the improvement of management, as well as the extension of protected areas, the population of 15 endangered species maintained. Secondly, the project contributed to the reduction in greenhouse gas emission through applying high efficient irrigation-fertilizing system, as well as the no-tillage model. A study funded by ADB concluded that total reductions in GHG emissions are estimated at 10.5 tonnes of carbon dioxide equivalent per hectare per year (tCO_2e/ ha/ year) and 25,200 tCO_2e per year in total from the vineyards covered by the project. Thirdly, it contributed to the combating of desertification and land degradation through its ecosystem management, restoration, and water resource management. The project supported demonstration of water-saving irrigation and conservation agriculture, which have been largely extended in the government programs.

F. Global Environment Facility Management Effectiveness and Threats Tracking Tools

11. Management Effectiveness and Threats (METT), a compatible tracking tool developed by World Wildlife Fund and World Bank, was used to monitor and report progress in achievements of protected area management effectiveness.[2] Using the METT, the consultant evaluated all nature reserves and national wetlands parks, and resulted mean METT score for all six sites increased by 44.9% from 44.5 in 2007 (inception), to 55.17 in 2014 (midterm) to 66.33 in 2018 (completion). The results suggested a significant improvement in management effectiveness. Threats to biodiversity were tracked from 2014 to 2018 and the results showed threats to

[1] For example, Ningxia Wetlands Management Regulations; Ningxia five-year plans for ecological protection and construction, Ningxia Rural Environmental Protection Plan (2011-2020).

[2] The tool consists of 30 indicators covering protected area management processes from legislation, to planning, implementation and conservation effectiveness, with each indicator distributed for a maximum score of 3. These makes the highest score of 90. Besides, four indicators, including development of management plans, land and water resource use planning, local community participating in decision-making, and the conservation values improvement, receive extra score of 3 for each. In total, the number of score are 102.

biodiversity in the project area reduced slightly while threats to the two sites (i.e. Yuehai and Sand lakes) increased mainly due to rapidly increasing tourism. Details are presented in Table A9.2.

Table A9.2 Management Effectiveness and Threats to Biodiversity

Protected area	Management Effectiveness			Threats to Biodiversity	
	2007	2014	2018	2014	2018
Helan Mountain	43	65 (51.2%)	68 (58.1%)	26	21
Yinxi wetlands	21	43 (104.8%)	55 (161.9%)	15	12
Sand lake	55	68 (23.6%)	71 (29.1%)	30	39
Mingcui Lake	53	72 (35.9%)	81 (52.8%)	27	17
Yuehai Lake	52	40 (-23.1%)	64 (23.1%)	23	25
Bao Lake	43	43 (0)	59 (23.3%)	20	16
Mean	**44.50**	**55.17 (24.0)**	**66.33 (44.9)**	**23.5**	**21.6**

Source: METT report prepared by the consultant.

G. Sustainability

18. The project is likely to be sustainable for its clearly defined project logic framework, which built on capacity building for the effective management of natural ecosystems, as well as farmland and forests. As a core target of the project outcome, IEM approach has been widely applied in NHAR's legislation, policies, development plans, and programs for ecological restoration and agricultural development. The project promoted institutional coordination across sectors involved in ecosystem management and/or land degradation. The practices were consolidated with the PRC's institutional reform enacted in 2018, following which similar re-organization will also take place at provincial level. The effectiveness of protected area management increased by 44.9% in the project areas, which ensured the sustainability of ecosystem services that provide green infrastructure, reduce cost in safeguarding community development, and provide livelihoods.

19. **Financial risks.** The project mainstreamed wetland conservation into national and local development plans. Fund from central government and NHAR has been increased significantly over the project period. For an instance, the wetland conservation and restoration have been promoted into national wetland conservation strategies, and the funds for nature reserve and wetland parks increased at least 10 times, which had been built in national and local budget lines. Therefore, there is no risk in financing nature conservation and integrated ecosystem management in the project areas.

20. **Social-political risks.** The IEM and livelihood development has been the key component of the national ecological civilization, which has been written into the national development plans, and charters of the leading communist party, and the overall management mechanism of Central Government. Therefore, the political support and commitment to IEM and livelihood development, natural conservation will be even stronger in the future. There no social political risk at all.

21. **Institutional framework and governance risk.** The key of the project success has been built on the institutional framework, which is governed by the legislation, regulatory and policy that adopted by the government. All protected areas have management authority that can fully implement governmental policies. The IEM center and its function as training and demonstration on IEM has set for better management and governance. Therefore, no institutional framework and governance risk can be concluded.

22. **Environmental Risk.** The feature of the project activities funded by the GEF grant is characterized mainly as capacity building such as training, study tours, workshops, research, and public education. The IEM center was developed through effective restoration of server degraded land and its operation will be focusing on training, research, and information sharing. No environmental risks are envisaged.

H. M&E Framework and Institutional Arrangement

23. A project performance monitoring system (PPMS) was established at the beginning of the project implementation with supporting indicators and a baseline starting from 2008 along with subsequent annual updates. The PPMS adopted the revised DMF as the basis for structuring and defining the indicators. Indicators were developed as part of a capacity building exercise for measuring project impacts, outputs and completed activities. The PPMS was developed and maintained by PMO with the consultant assistance, which was engaged through ADB's technical assistance. The performance indicators including those for biodiversity and wetlands were updated and reported annually. A comprehensive PPMS report was prepared with the PCR and TER. The indicators for outcome and impact targets are all available in the government statistic books and/or PIA's operation reports.

I. Rating

24. The project is rated *successful*. The project was implemented successfully and delivered outputs completely. Its impact has been overachieved in terms of performance indicators. It has achieved its outcome to introduce IEM approach to provide sustainable livelihoods for the population of the project area. It demonstrated successfully a promising model to secure ecological, economic, and social benefits through investing in IEM. It will contribute continuously to the regional economic and social development in a long run with established institutional capacity of IEM and improved ecosystem services. Detailed rating for each evaluation category is included in the PCR main text (para. 50).

Annex to the GEF Terminal Evaluation Report

A. Project Identification

GEF Project ID: 2788
GEF Agency Project ID: 38660
Country: People's Republic of China
Project Title: Ningxia Integrated Ecosystem and Agricultural Development Project
GEF Agency: Asian Development Bank

B. Dates

Milestone	Expected Date	Actual Date
CEO endorsement		25 July 2008
Agency approval date	July 2008	29 August 2008
Implementation start	August 2008	3 June 2009
Midterm evaluation	June 2010	October 2012
Project completion	July 2014	31 October 2015
Terminal evaluation completion		28-30 March 2018
Project closing	31 July 2014	30 April 2016

Source: Asian Development Bank.

C. Project Framework

Project Component	Activity type (TA or INV)	GEF financing ($)		Co-financing ($)	
		Approved	Actual [a]	Promised [b]	Actual [c]
1. Building IEM Institutions	INV/TA	1,500,000	3,680,000	668,800	0
2. Land and Water Resource Management	INV/TA	1,195,300	130,000	44,022,900	31,030,000
3. Improving Rural Livelihoods	INV/TA	0	0	113,360,000	127,530,000
4. Conservation and Tourism	INV/TA	1,400,160	530,000	29,733,000	53,360,000
5. Project Management		450,000	0	6,681,200	0
6. Charges		0	0	16,181,700	2,100,000
Total		**4,545,460**	**4,340,000**	**210,647,600**	**214,020,000**

Source: Asian Development Bank.

INV = investing; TA = technical assistance.

[a] $220,000 of project management cost is merged into the IEM institutional capacity component.

[b] Including $100,000,000 of ADB loan and $110,647,600 of government counterpart funding ($116,450,000 as shown in the RRP).

[c] Project management cost was distributed with individual components and was not calculated separately.

SOCIAL IMPACT AND POVERTY REDUCTION

A. Introduction

1. A social and poverty assessment was carried out for each of the subprojects during project preparation. The assessment concluded that poverty is linked strongly to insufficient land per capita and other resources, including water, limiting households in building sufficient capital to exit poverty. These underlying causes of rural poverty support the need for a strategy that includes facilitating rural labor to move into off-farm employment. The Project's strategy is to address poverty by (i) addressing the root causes of land degradation, thereby reducing the vulnerability of households to poverty; (ii) increasing incomes by linking producers to higher-value crops and markets; and (iii) providing opportunities for developing skills for off-farm employment. The design of interventions on improving rural livelihoods and poverty reduction will result in productivity improvements and greater market certainty, leading to increased incomes, especially for poor smallholders in previously resettled communities. Conservation agriculture technologies, land use matched to soils and land-use capability, improved water use and nutrient efficiency, strengthened farmer associations, access to rural finance, contract farming agreements linked to processing and market chains, and capacity development will all contribute to improved sustainable livelihoods and improved resilience for poor rural households.

B. Sustainable Socioeconomic Growth in Project Area

2. The project implementation has contributed to regional socioeconomic development in the project area. The statistical data shows that socioeconomic conditions in the project area have improved rapidly in recent years. From 2008 to 2016, the average annual growth rates of per capita gross domestic product in project areas ranged from 7.9% to 14.4% (Table A10.1).

Table A10.1: Growth of Per Capita Gross Domestic Product in Project Area
(CNY/person)

Project Area	2008	2009	2010	2011	2012	2013	2014	2015	2016	Growth	Annual
Xingqing	34,018	42,376	39,675	46,472	56,528	55,943	57,698	60,899	64,489	89.6%	8.3%
Jinfeng	27,157	30,445	31,709	46,472	56,528	48,473	54,007	58,598	64,052	135.9%	11.3%
Xixia	41,702	49,813	47,022	46,472	56,528	74,712	74,944	77,801	85,364	104.7%	9.4%
Yongning	20,354	23,411	27,801	46,472	42,489	45,701	49,893	51,943	52,913	160.0%	12.7%
Helan	17,915	22,081	25,832	46,472	40,761	43,022	43,999	48,726	52,708	194.2%	14.4%
Nongken	9,129	10,057	11,090	12,849	13,658	14,506	15,360	16,250	16,780	83.8%	7.9%
Yinchuan	31,436	38,392	42,771	46,472	56,528	62,437	65,942	69,594	74,288	136.3%	11.3%
Ningxia	17,892	21,777	26,860	33,043	36,394	39,421	41,834	43,805	47,194	163.8%	12.9%

Source: Project Performance Monitoring System report.

C. Increased Rural Income and Poverty Reduction in Project Area

3. The project implementation, particularly rural livelihoods improvement component has contributed to the increase of regional rural income as well as poverty reduction in the project area. According to statistics of the county governments, the average annual growth rates of rural farmers' per capita incomes ranged from 10.4% to 15.0% in the project area from 2008 to 2016 (Table A10.2).

Table A10.2: Rural farmers' Per Capita Income in Project Area
(CNY/person)

Project Area	2008	2009	2010	2011	2012	2013	2014	2015	2016	Growth	Annual
Xingqing	5,618	6,040	6,820	7,804	8,834	9,318	11,677	12,625	13,600	142.1%	11.7%
Jinfeng	4,887	5,307	6,008	6,900	7,866	8,759	9,187	9,941	10,746	119.9%	10.4%
Xixia	3,308	3,655	4,337	5,050	5,828	6,829	8,618	9,334	10,112	205.7%	15.0%
Yongning	4,747	5,127	5,896	6,792	7,764	8,706	10,130	10,995	11,865	149.9%	12.1%
Helan	4,911	5,480	6,214	7,163	8,202	9,147	10,667	11,628	12,560	155.8%	12.5%
Yinchuan	4,917	5,389	6,161	7,070	8,068	8,830	10,275	11,148	12,037	144.8%	11.8%
Ningxia	3,681	4,048	4,675	5,410	6,180	6,931	8,410	9,119	9,852	167.6%	13.1%

Source: Project Performance Monitoring System report.

D. Beneficiaries of Rural Livelihoods Improvement Component

4. The project targets rural poor communities and large numbers of rural smallholders in the ethnic minority region, and specifically designed a key project component for rural livelihoods improvement including contract farming, processing, and alternative livelihoods through links with enterprises in conservation-oriented production of beef, dairy, grapes, and other agricultural activities such as Chinese dates, wolfberry, and other fruits. Vocational and technical training have been provided for rural households and nonfarming jobs were created in the livestock, perennial crops, and other agricultural industries.

5. Nuanquan farm beef production subproject under rural livelihood improvement component has engaged around 3,900 rural households in breeding of beef cattle through either dispersal or central breeding in 2017. Rural household may earn around CNY1,000 from breeding each cattle. Due to urbanization and policy intervention, the beneficiaries of beef production subproject have been extended to Yuanzhou district and Xiji county in Guyuan City, which is one of 14 most poor areas in the PRC.

6. The dairy subproject involves all 14 dairy farms under Helanshan Dairy Group. The beneficiaries of dairy subproject have been shifted from cows breeding to supplying forage and job opportunities in dairy farms due to changes in dairy market in recent years. A total of 80,000 mu lands were used to plant forage in the project areas, around 30,000 local people are engaged in planting forage including silage and alfalfa. In addition, a total of 800 job opportunities in dairy farms were provided to local labors in project area, accounting for 75% of total staff amount with average wage at CNY4,000 per month.

7. The higher-value horticultural production subproject has established a total of 360 thousand mu vineyards, including those established by 1,100 rural households. In addition, planting and maintenance of vineyards have provided around 48,600 person-day temporary job opportunities for rural people, particularly those from previously resettled poor communities. A total of 2,600 rural labors were recruited to work in 5,377 *mu* vineyards in Yuquanyin farm in 2016 with average wage at CNY80 per day.

8. In addition to above livelihoods subprojects implemented by Ningxia Agricultural Reclamation Group, Yinxi Protective Forests Management Office also implemented Yinxi livelihood improvement subproject which provided farmers with young economic forest trees free of charge, including 70 ha red date, 26.5 ha wolfberry, 167 ha grape, and 115 ha mulberry. The

PPMS report indicates that over 100,000 local people has directly benefitted from the rural livelihoods improvement component (Table A10.3).

Table A10.3: Project Beneficiaries
(person)

Items	2009	2010	2011	2012	2013	2014	2015	2016
A. Ningxia Agricultural Reclamation Group	1,479	3,290	3,680	49,216	95,280	99,000	96,080	101,119
In which, Hui Nationality	317	460	560	727	798	41,000	40,300	42,000
B. Yinxi Protective Forests Management Office	450	550	3,000	3,000	3,000	3,000	3,000	3,000
In which, Hui Nationality	100	180	200	210	210	210	210	210
Total Beneficiaries	1,929	3,840	6,680	52,216	98,280	102,000	99,080	104,119
In which, Hui Nationality	417	640	760	937	1,008	41,210	40,510	42,210

Source: Project Performance Monitoring System report.

9. The sampling household survey on the incomes of 80 project beneficial households and 80 control group households indicates that average per capita income of project beneficial households has increased by 175% from 2009 to 2015, which is higher than 160% for those in control group during the same period (Table A10.4).

Table A10.4: Sampling Survey on Households Income
(CNY/person)

Household Income	2009	2010	2012	2014	2015	Growth	Annual
A. Project Group							
Wage Income	2,134.93	2,560.24	4,883.00	9,860.29	11,865.71	456%	33.1%
Business Income	4,111.54	4,443.63	4,827.80	6,741.06	5,878.76	43%	6.1%
Property Income	46.64	51.50	55.20	73.01	72.13	55%	7.5%
Transfer Income	275.90	301.64	271.00	305.64	216.40	-22%	-4.0%
Total	**6,569.00**	**7,357.00**	**10,037.00**	**16,980.00**	**18,033.00**	**175%**	**18.3%**
B. Control Group							
Wage Income	3,435.46	3,673.30	4,766.49	7,219.66	8,758.57	155%	16.9%
Business Income	1,023.23	959.30	1,183.71	1,508.15	1,816.68	78%	10.0%
Property Income	23.15	24.10	113.94	233.52	481.24	1979%	65.8%
Transfer Income	148.16	163.90	265.86	768.67	974.51	558%	36.9%
Total	**4,630.00**	**4,820.60**	**6,330.00**	**9,730.00**	**12,031.00**	**160%**	**17.3%**

Source: Project Performance Monitoring System report.

10. Project-related human capital investments for rural households provided as skills and vocational training have supported the movement of labor into off-farm employment. The analysis of variation in sampling household income structures indicates that the wage income in project beneficial households has significantly increased by 33.3 percentage points from 32.5% to 65.8% (Table A10.5).

Table A10.5: Income Structure of Sampling Households

Household Income	2009	2010	2012	2014	2015	Variation (percentage points)
A. Project Group						
Wage Income	32.5%	34.8%	48.7%	58.1%	65.8%	33.3
Business Income	62.6%	60.4%	48.1%	39.7%	32.6%	-30.0
Property Income	0.7%	0.7%	0.6%	0.4%	0.4%	-0.3
Transfer Income	4.2%	4.1%	2.7%	1.8%	1.2%	-3.0
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0**
B. Control Group						
Wage Income	74.2%	76.2%	75.3%	74.2%	72.8%	-1.4
Business Income	22.1%	19.9%	18.7%	15.5%	15.1%	-7.0
Property Income	0.5%	0.5%	1.8%	2.4%	4.0%	3.5
Transfer Income	3.2%	3.4%	4.2%	7.9%	8.1%	4.9
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**0.0**

Source: Project Performance Monitoring System report.

E. Labor Employment and Training

11. Local employment was promoted during project implementation. According to the PPMS report, project implementation had provided work for 414,969 person-days of labor, they came from the local labor market. With daily wages at CNY80–CNY130. Among the local employment, 228,233 person-days (55%) of work went to female laborers (Table A10.6). In addition, the project has provided training for 6,667 farmers in technical subjects, field schools, and vocational training etc. (Table A10.7).

Table A10.6: Labor Employment
(person day)

Subproject IAs	2009	2010	2011	2012	2013	2014	2015	2016	Total
Ningxia Agricultural Reclamation Group	83,700	89,200	91,300	103,300	12,151	13,600	10,200	942	404,393
Yinchuan Wetlands Management Office	0	0	200	500	550	580	350	0	2,180
Yinxi Protective Forests Management Office	386	2,500	3,000	50	0	0	0	0	5,936
Ningxia Yuehai Co., Ltd	500	1,500	0	260	0	0	200	0	2,460
Total	**84,586**	**93,200**	**94,500**	**104,110**	**12,701**	**14,180**	**10,750**	**942**	**414,969**

Source: Project Performance Monitoring System report.

Table A10.7: Labor Training
(person)

Enterprises	2011	2012	2013	2014	2015	2016	Total
Ningxia Agricultural Reclamation Group	520	1,200	1,748	0	1,120	1,344	5,932
Yinchuan Wetlands Management Office	0	5	0	30	50	0	85
Yinxi Protective Forests Management Office	50	500	0	0	0	100	650
Total	**570**	**1,705**	**1,748**	**30**	**1,170**	**1,444**	**6,667**

F. Ecosystem Conservation and Tourism Development

12. Implementation of ecosystem conservation component and improvement of water quality has contributed to tourism development in the project area. The statics show that the tourism has significantly developed in recent years. From 2008 to 2016, the total number of tourists has increased by 161.4% from 0.93 million to 2.44 million in those lakes financed under the project (Table A10.8). A total of 1,734 poor households have been engaged in project activities including planting aquatic plants, harvesting reeds, farming, raising duck and goose, as well as tourism services (Table A10.9).

Table A10.8: Tourism Development in the Project Area
(1,000 person)

PIUs	2008	2009	2010	2011	2012	2013	2014	2015	2016	Growth	Annual
Sand Lake	633	851	855	1,000	1,170	1,130	1,154	1,185	1,200	89.6%	9.6%
Sand Lake Anglers	3	6	9	30	42	43	41	42	42	1300.0%	45.8%
Yuehai Lake	104	100	60	180	194	200	230	232	236	126.9%	12.4%
Haibao Lake	110	300	500	550	590	610	314	295	650	490.9%	28.9%
Mingcui Lake	40	64	71	80	96	85	97	70	191	377.5%	25.0%
Yueya Lake	45	55	72	75	80	85	95	46	125	177.8%	15.7%
Total	**935**	**1,376**	**1,567**	**1,915**	**2,172**	**2,153**	**1,931**	**1,870**	**2,444**	**161.4%**	**14.7%**

Source: Project Performance Monitoring System report.

Table A10.9: Poverty Households Engaged in Tourism and Ecosystem Conservation
(households)

Enterprises	2009	2010	2011	2012	2013	2014	2015	Total
Ningxia Agricultural Reclamation Group	180	211	200	195	180	150	180	1,296
Yinxi Protective Forests Management Office	30	35	35	35	-	-	-	135
Yinchuan Wetlands Management Office	25	45	0	30	25	-	-	125
Ningxia Yuehai Co., Ltd	40	50	40	48	-	-	-	178
Total	**275**	**341**	**275**	**308**	**205**	**150**	**180**	**1,734**

Source: Project Performance Monitoring System report.

G. Gender Development

13. Women's participation in income-earning activities and women's educational and off-farm opportunities are included in the design, which ensured gender is addressed to achieve equal participation of women in project activities, and equal opportunities for women to access social services, training, employment, and beneficiary agreements including contract farming arrangements. During project implementation, a total of 228,233 person-days of work went to female laborers, accounting for 55% of total laborers recruited. Female employees enjoyed wages equivalent to those of male employees for similar jobs.

H. Conclusions

14. The project has had positive impacts on regional socioeconomic development and poverty reduction, including (i) contribution to growth of gross domestic products, rural income, and

poverty reduction in project area; (ii) implementation of rural livelihoods improvement component has directly increased rural farmers' income in beneficial areas; (iii) labor employment and training were promoted during project implementation; (iv) implementation of ecosystem conservation component and improvement of water quality have contributed to tourism development in the project area; and (v) improved gender development and ethnic minority development.