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IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-79390)

ON A
LOAN
IN THE AMOUNT OF US\$100 MILLION
TO THE
PEOPLE'S REPUBLIC OF CHINA
FOR A
INTEGRATED FORESTRY DEVELOPMENT PROJECT

June 29, 2017

Environment and Natural Resources Global Practice
China Country Office
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective 01/01/2017)

Currency Unit = RMB
RMB 1.00 = US\$0.16
US\$1.00 = RMB 6.85

FISCAL YEAR
January 1- December 31

ABBREVIATIONS AND ACRONYMS

CAFS	Chinese Academy of Forestry Sciences
CPS	Country Partnership Strategy
EIRR	Economic Internal Rate of Return
EMDP	Ethnic Minority Development Plan
EMP	Environment Management Plan
FA	Farmer Association
FIRR	Financial Internal Rate of Return
ha	Hectare
IBRD	International Bank for Reconstruction and Development
ICR	Implementation Completion and Results Report
IFDP	Integrated Forestry Development Project
km	Kilometer
M&E	Monitoring and Evaluation
MTR	Mid-Term Review
NDC	Nationally Determined Contribution
NPV	Net Present Value
PDO	Project Development Objective
PAD	Project Appraisal Document
PES	Payment for Environmental Services
PIP	Project Implementation Plan
PMC	Project Management Center
PMO	Project Management Office
PMP	Pest Management Plan
PPMO	Provincial Project Management Office
RMB	Renminbi (P.R. China's currency)
SFA	State Forestry Administration

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China
Integrated Forestry Development Project

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A. Basic Information			
Country:	China	Project Name:	Integrated Forestry Development Project
Project ID:	P105872	L/C/TF Number(s):	IBRD-79390
ICR Date:	06/29/2017	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	People's Republic of China
Original Total Commitment:	USD 100.00M	Disbursed Amount:	USD 99.09M
Revised Amount:	USD 100.00M		
Environmental Category: B			
Implementing Agencies: State Forestry Administration			
Cofinanciers and Other External Partners: None			

B. Key Dates				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	04/02/2008	Effectiveness:	11/30/2010	10/11/2010
Appraisal:	08/03/2009	Restructuring(s):	NA	NA
Approval:	07/06/2010	Mid-term Review:	05/31/2013	05/20/2013
		Closing:	12/31/2016	12/31/2016

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Satisfactory
Risk to Development Outcome:	Low or Negligible
Bank Performance:	Satisfactory
Borrower Performance:	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance:	Satisfactory	Overall Borrower Performance:	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	None
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes		
	Original	Actual
Major Sector/Sector		
Agriculture, Fishing and Forestry		
Forestry	95	95
Public Administration - Agriculture, Fishing & Forestry	5	5
Major Theme/Theme/Sub Theme		
Environment and Natural Resource Management		
Climate change	50	50
Adaptation	50	50
Mitigation	9	9
Environmental policies and institutions	5	5
Renewable Natural Resources Asset Management	9	9
Biodiversity	9	9
Urban and Rural Development		
Rural Development	77	77
Land Administration and Management	77	77

E. Bank Staff		
Positions	At ICR	At Approval
Regional Vice President:	Victoria Kwakwa	James W. Adams
Country Director:	Bert Hofman	Klaus Rohland
Practice Manager:	Iain G. Shuker	Ede Jorge Ijjasz-Vasquez
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F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document)

The project development objective is to assist the Borrower to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits in the Project Provinces.

Revised Project Development Objectives (as approved by original approving authority)

There was no revision.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Incremental vegetative cover of multifunction forests in selected environmentally degraded areas in project counties (% of vegetative cover per ha)			
Value quantitative or Qualitative)	10%	20%	-	50%
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	<p>This indicator refers to degraded areas voided of vegetation at beginning of the project. There was an increase of 50% in vegetation cover compared to a target of 20%. Thus, the target was exceeded by 300% (30-percentage point increase compared with an original target of 10-percentage point increase from the baseline of 10% of vegetative cover at the beginning of the project). Field survey (random field sampling per the M&S system) showed that the target was exceeded due to excellent growth and recovery of trees, shrubs and grasses (30%, 10%, 10% vegetative cover per hectare respectively) in 93,840 ha of newly planted sites using a mix of indigenous species in areas of basically bare soil at the beginning of the project. These afforestation models demonstrated that an increase in stand diversity (numbers and type of species) in planted areas enhances their multifunction* potential and produces environmental benefits such as enriched biodiversity, better CO₂ sequestration capacity and reduction of soil erosion.</p> <p>These results indicate that the afforestation models adopted in the project have successfully demonstrated that the management of sustainable, multifunction forest plantations provides significant environmental benefits. Further underlining the demonstration effect of the project these afforestation models have already been replicated in around 200,000 ha outside the project areas.</p>			
Indicator 2:	Improvement in the management of forest resources (through sample surveys measuring improvements in tree species diversity, vegetative cover, etc. between project and non-project sites)			
Value quantitative or Qualitative)	N/A	Tree species increased from 1 to 3 per sub-		Tree species increased from 1 species per site to between 3 and 10

		compartment, and other forest functions increased		species per site, with vegetative cover increased to 57%, with soil erosion reduced by 11 to 19%, wind speed reduced by 40% to 55%; and incidence of diseases reduced by 43% comparing with non-project sites.
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	<p>The target was exceeded between 25% and 175% because while 3 tree species were planted per site, the number of species present in year 5 was much higher due to spontaneous natural regeneration promoted by the project intervention, which limited the clearing of areas around the trees and seedlings, and enabled the arrival of naturally dispersed seeds from nearby areas. Field survey of growth and regeneration demonstrated that forest management as defined by stand diversity, vegetative cover, vigor, and lower pest incidence had improved.</p> <p>The presences of these trees and the vigorous growth resulted in an increase of environmental benefits provided by these multifunction forests such as vegetative cover increased to 57%, soil erosion reduced by 11 to 19%, wind speed reduced by 40% to 55%; and incidence of diseases reduced by 43% comparing with non-project sites. These achievements are highly supportive of the multifunction and environmental benefits set in the PDO. These results indicate that the forest improvement models adopted in the project have successfully demonstrated that the management of sustainable, multifunction forest plantations provides significant environmental benefits. Further underlining the demonstration effect of the project these models have already been replicated in around 300,000 ha outside the project areas.</p>			

* Multifunction forests, in the context of this project means forest that would generate ecological/environmental benefits (increased vegetative cover; diversity of plants species, reduce run-off, wind speed) and economic benefits (either directly through the adoption of economic species, or indirectly through the increased yields generated from the environmental benefits).

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Areas of multifunction forests establishment (ha.): a) Windbreak and sandbreak forests			
Value (quantitative or Qualitative)	0	21,380	-	22,370
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	105% of target achieved. Field check and acceptance procedures confirmed that all planting targets were met, while M&E work confirmed the environmental benefits expected regarding windbreaks and sandbreaks. These showed that			

	multifunction forests models established by the project generate positive environmental impacts.			
Indicator 2:	Areas of multifunction forests establishment (ha.): b) Soil and water conservation forest			
Value (quantitative or Qualitative)	0	58,900	-	58,470
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	99% of target achieved. Field check and acceptance procedures confirmed the planting. The shortfall of just under 1% in planting was due to a shortage of degraded monocultures available for planting. Data from monitored runoff plots where the models were established, demonstrated that mixed species planting reduced run off and soil erosion by between 11% and 19%, depending on slope, compared to non-project sites which had the same characteristics of the project sites at the beginning of the project. These results demonstrated that multifunction forests models established by the project generate positive environmental impacts.			
Indicator 3:	Areas of multifunction forests establishment (ha.): c) Farmland shelter belt			
Value (quantitative or Qualitative)	0	12,680	-	13,000
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	103% of target achieved. Field check and acceptance verified that targets were surpassed. M&E system recorded a 40%-55% reduction in wind speed adjacent to shelter belts planted by the project, compared to non-project sites which had the same characteristics of the project sites at the beginning of the project. This demonstrated the environmental benefits of having correctly aligned mixed species shelterbelts with different strata. These benefits include lower wind speeds which reduce the desiccating effect of winds on crops and higher crop yields. These results demonstrated that multifunction forests models established by the project generate positive environmental impacts.			
Indicator 4:	Incremental yield increase of crop benefiting from the protection of windbreak and farmland shelter belt forests (% yield increase per ha)			
Value (quantitative or Qualitative)	0	10%		12%
Date achieved	03/08/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	120% of the target achieved. Field survey (random sampling per the M&S system) of crop yields (rice, maize and peanuts) in fields adjacent to shelterbelts planted by the project showed that targets had been exceeded and demonstrated that correctly positioned shelterbelts (as per project specifications) reduced the damaging environmental effects of wind on crops and increased yields. The local government agencies have expressed interest in extending this program, further underlining the demonstration effect of the project.			
Indicator 5:	Incremental farmer income from economic trees (RMB yuan/ha/year)			
Value (quantitative or Qualitative)	0	480		1,300

Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	170% of the target achieved. Field survey indicated that fruit and nut production had a very positive impact on farmer income, generating an additional 480 (RMB/ha/year) on average. The multiple function forests that the project generated promoted the project sustainability. Where conditions permit, farmers are expanding these activities by planting additional areas with the models demonstrated in the project. The additional incomes generated vary between provinces, depending on different economic crops planted and the weather and soil conditions in different locations. For instance, farmers earned RMB 590 ha/year from walnut production in Shanxi and RMB 1,700 ha/year from hazelnut production in Liaoning.			
Indicator 6:	Improving existing plantation forests: Incremental vegetative cover increase (as % of vegetative cover)			
Value (quantitative or Qualitative)	26%	36%		57%
Date achieved	08/09/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	There was an increase of 57% in vegetation cover compared to a target of 36%. Thus, Thus, the target was exceeded by the 210% (21- percentage point increase compared with an original target of 10- percentage point increase from the baseline of 26% at the beginning of the project). This indicator refers to a specific environmental benefit from improving areas which already had some trees planted before the beginning of the project (PDO Indicator 2) and does not include project activities degraded areas voided of vegetation at beginning of the project (PDO indicator 1). Ground cover in degraded plantations at the beginning of the project was low (average 26%) but random field sampling (per the M&S system) revealed that project planting had, on average, increased ground cover to 57%, which is more than twice the expected target increase. This was due to the vigorous growth of the trees interplanted in degraded monocultures and better retaining underground growth. Mixed species tree cover is more sustainable, more resilient to pests and diseases, and more productive (multifunctional) than monocultures; it also provides better ground cover for increasing soil fertility and reducing water runoff. These results demonstrated that multifunction forests models established by the project generate positive environmental impacts.			
Indicator 7:	Improving existing plantation forests: Increased number of different tree species in project sites (tree species/sub-compartment)			
Value (quantitative or Qualitative)	1	3 or more		3-10
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	100% of target achieved. This indicator refers to a specific environmental benefit from improving areas which already had some trees planted before the beginning of the project (PDO Indicator 2) and does not include project activities in degraded areas voided of vegetation at beginning of the project (PDO indicator 1). The sampling survey in year 5 revealed that species mixtures in many planted areas reached or was higher than expected. Due to the protection afforded by plantation management and the 'nurse effect' of new planting created favorable growing conditions for natural regeneration, which have contributed to the increase of tree species and biodiversity of forest landscape, and paved the basis of stable and			

	resilient forest ecosystem. These results demonstrated that multifunction forests models established by the project generate positive environmental impacts.			
Indicator 8:	Improving existing plantation forests: Number of ha of degraded forest improved (ha)			
Value (quantitative or Qualitative)	0	39,600		38,450
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	97% of target achieved. This indicator refers to specific environmental benefits from improving areas which already had some trees planted before the beginning of the project (PDO Indicator 2) and does not include project activities in degraded areas voided of vegetation at beginning of the project (PDO indicator 1). Check and acceptance operations showed a slight shortfall in enrichment planting (3%) caused by a shortage of suitable planting sites in Anhui and Zhejiang. Despite this, the sustainability and multifunction aims of the PDO were realized by enriching existing degraded monoculture forests. Sampling survey on vegetative cover in areas planted and data from run off plots demonstrated the positive environmental impacts of the project intervention, that is, reduced erosion, enhanced vegetative diversity and lower pest incidence. These results demonstrated that multifunction forests models established by the project generate positive environmental impacts.			
Indicator 9:	Number of farmers and staff trained (person/days)			
Value (quantitative or Qualitative)	0	216,000		323,950
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	150% of target achieved. Project records show that training targets for farmers (around 40% of whom were women) were exceeded by 50%. Over 70% of training participants confirmed that the trainings improved their understanding of the advantages of mixed species multifunction afforestation, and provided them with the capacity to carry out project activities in the field. The intensive training and technical services have contributed the good quality of the planting and forest management, it has also strengthened institutional capacity for long-term forest ecosystem management and sustainability, which is critical to the achievement of PDO.			
Indicator 10:	Number of existing and new Farmer Associations (FAs) supported under the project			
Value (quantitative or Qualitative)	0	20		20
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	Achieved. Project records show that 20 Farmer Associations with 40,000 members were developed/strengthened, and new skills imparted to members. New skills included mixed species planting, management and protection, book keeping, IT, product labelling, product promotion in local fairs, and marketing in both the domestic and regional markets. This has had a positive multiplier effect in farming			

	communities (scaling up) and has contributed strongly to the sustainability and demonstration aims of the PDO.			
Indicator 11:	M&E system generates lessons for up-scaling and transferring lessons to other areas			
Value (quantitative or Qualitative)	NA	system operating		System identified lessons learnt relevant to scaling up.
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	Achieved. Qualified M&E institutions in the provinces were contracted to establish and operate the M&E system. The M&E system monitored physical progress, produced data on costs & benefits, evaluated environmental and social impacts, generated data for project impact analysis, and identified key lessons for scaling up such as the benefits of including economic trees in the planting mix. Thus, the project planting and forest management models have been replicated for around 500,000 ha outside the project areas (200,000 ha using afforestation models, 300,000 ha using forest improvement models), further underlining the demonstration effect of the project.			
Indicator 12:	Areas for which forest right certifications are granted (ha)			
Value (quantitative or Qualitative)	0	55,050		74,900
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	136% of target achieved. Project records show that the target was exceeded by 36% due the popularity of titling with farmers who recognized it as a way of securing land tenure. In all, 74,900 farmers had land titles at the end of the project. This provided valuable lessons to the government on how to accelerate their land tenure reform program, and demonstrated the important role of land tenure in promoting tree planting and forest management.			
Indicator 13:	Number of Forest Management Plans piloted			
Value (quantitative or Qualitative)	0	5		5
Date achieved	08/03/2009	12/31/2016		12/31/2016
Comments (incl. % achievement)	100% of target achieved. Piloting forest management plans' development and implementation at community level successfully demonstrated the integrated and sustainable forest management for collective owned forest land, including environmental benefits and income obtained from wood and non-wood forest products from different models.			

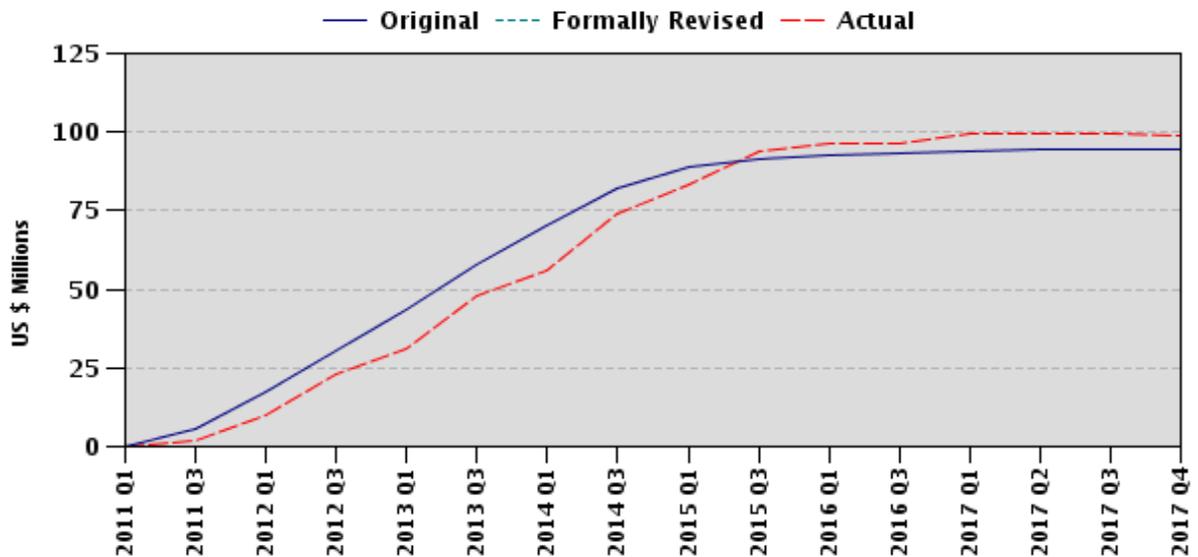
G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/28/2011	Satisfactory	Satisfactory	7.99
2	04/04/2012	Satisfactory	Satisfactory	22.73
3	12/20/2012	Satisfactory	Satisfactory	36.41
4	06/24/2013	Satisfactory	Satisfactory	49.79
5	12/17/2013	Satisfactory	Satisfactory	65.82
6	06/24/2014	Satisfactory	Satisfactory	78.32
7	12/17/2014	Satisfactory	Satisfactory	88.83
8	06/14/2015	Satisfactory	Satisfactory	93.96
9	12/11/2015	Satisfactory	Satisfactory	96.46
10	06/20/2016	Satisfactory	Satisfactory	99.20
11	12/31/2016	Satisfactory	Satisfactory	99.75

H. Restructuring (if any)

No restructuring.

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

1. The People's Republic of China has a forest cover of about 195 million hectares or 20.4 percent, a substantial increase from less than 115.3 million hectares in the 1980s. Forests provide 40 percent of the country's rural energy and about two-thirds of industrial wood consumption (around 225 million m³ out of a total of around 310 million m³), as well as a wide range of important environmental benefits from protecting against soil and water erosion, reducing atmospheric pollution, promoting carbon sequestration, providing habitat for plant and animal species.

2. The sector is also a vital source of employment and income generation, supplying about 3 percent of the nation's jobs and 4 percent of the Gross National Product (GNP). Its importance notwithstanding, the forest resource base in China is small and isolated. Nationally, forest cover amounts to no more than 0.14 hectare per capita, significantly below the world average of 0.62 hectare per capita.

3. In the 1990s, forestry's expansion focused mainly on expanding industrial plantations to provide wood for the wood using industries. Large areas of poplars, conifers and eucalypts were planted in monocultures, and insufficient attention was paid to ecological stability. As a result, pest attacks increased, productivity fell, and biodiversity was lost. Monoculture plantations were also found to be less effective at controlling erosion and desertification, and their declining productivity meant that the benefits enjoyed by rural communities from forestry were going to be short lived. These events helped stimulate a rethink of policy in plantation forestry, and consensus eventually emerged that a shift in focus was needed, one that would place more emphasis on sustainable, multiple use plantation forestry.

4. The shift in focus came in the government's 11th Five Year Plan (2006-2010) which aimed to sustain the rapid and steady development of China's "socialist market economy" while achieving the "five balances;" one of which was a balance between people and the environment. The plan also aimed at increasing forest cover from 20 percent¹ in 2008 to 23 percent by 2020. To achieve these aims, changes were needed to forestry practices that would require the development and adoption of new technical specifications, design, funding and management. For these reasons, the Chinese Government sought Bank support to promote the changes through demonstrating more sustainable afforestation and forest management approaches. This challenge involved not only the development of viable technical packages, but also of convincing decision makers, provincial forestry staff and farmers that multifunction plantations had the potential to provide both economic and environmental benefits on a sustainable basis.

¹ The China forest resources data come from China Seventh National Forest Inventory Results, which was undertaken from 2004 to 2008.

5. To map out the future direction of forestry in China, the project would also support strengthening the government's forestland tenure reform policy implementation, which aims to carry out a "Systematic Reform in China's Collective Forestlands," and provide farmers and farmer groups with the opportunity to obtain forest land user rights over their plantations. Given the importance of tenure in promoting sustainable forestry management, it was agreed that the Bank should strengthen the program by (i) expanding areas covered by forestland use rights certificates; (ii) supporting capacity building in the forest extension service, including training forest extension staff and farmers; (iii) providing technical support for the development of farmer associations in areas where demand was strong; and (iv) piloting forest management plan development in collaboration with local forest authorities, village leaders and farmers to strengthen capacity in forest management.

6. **Rationale for Bank involvement.** The Bank was well positioned to tap international and national experience in demonstrating viable models for the establishment and management of mixed species, multifunction forest plantations with significant environmental protection functions. Given that China had very limited experience in the establishment of forests for environmental purposes with transforming traditional practice (monoculture forests) into cost-efficient, resilient, mixed species forest structure, the Bank's role was crucial to success by introducing new technology and facilitating access to international experience to help facilitate this shift in cultural practice.

7. The Bank was also well placed to enhance the environmental and social efficacy of such a program. A project with such a focus was highly consistent with the Bank's Country Partnership Strategy (CPS 35435-CN, May 23, 2006) of "managing resource scarcity and environmental challenges." It would also be consistent with the Country Partnership Strategy for FY2011–2016 (CPS 67566-CN, October 11, 2012) by lending support to Outcome 1.5, "Demonstrating sustainable natural resources management," under Strategic Theme 1, "Supporting Greener Growth."

1.3 Original Project Development Objectives (PDO) and Key Indicators (as approved)

8. The PDO is to assist the Borrower to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits in the Project Provinces.

9. Multifunction forests, in the context of this project means forest that would generate ecological/environmental benefits (e.g. increased diversity of plants species, decrease run-off) increase forest services (e.g. reduce run off, wind speed) and economic benefits (either directly through the adoption of economic species, or indirectly through the increased yields generated from the provision of forest services). Key Indicators used to measure the achievement of objectives were: (i) increases in diversified forest cover in selected environmentally-degraded project sites; and (ii) improved management of forest resources.

1.4 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification

10. There were no changes to the PDO and key indicators.

1.5 Main Beneficiaries

11. The primary beneficiaries were mainly farmer families and the main project benefits available to them were employment in tree planting, increased farm income from economic tree crops, skills upgrading through training, and support which would enable them to take full advantage of the forest land reform process. The participants comprised of 158,340 individual households, 2,671 cooperatives or farmer associations, 262 collective farms, and seven state owned forest farms. In addition, support was available to farm households to either create 20 new co-ops, or strengthen existing ones. Around 10 percent of primary beneficiaries lived below the poverty line, with the highest poverty rate being in Shanxi (23 percent). State Forest Administration (SFA) staff and staff of participating provincial and county forestry administrations comprised secondary beneficiaries, and they also benefitted through training.

12. The main environmental benefits included increased vegetative cover, reduced soil and wind erosion, improved water quality, increased crop reduction, better air quality (less dust), enhanced biodiversity, an increase in tourism through landscape improvement, and carbon sequestration, which would benefit the people living in the project areas.

1.6 Original Components (as approved)

13. The project comprised three components:

Component One -- Establishment of New Multifunction Forest Plantations (projected base cost US\$115.66 million; US\$67.72 million from IBRD)

14. This component aimed at demonstrating that the establishment and management of multifunction forest plantations in degraded areas voided of vegetation at beginning of the project results in sustainable, multifunction forest plantations with significant environmental benefits.

15. The establishment of new multifunction forest plantations were planned in four of the five project provinces - Anhui (15,800 ha), Hebei (24,600 ha), Liaoning (25,600 ha) and Shanxi (27,000 ha). The project financed the establishment and management of mixed species plantations on degraded and erosion-prone lands. These multifunctional plantations aimed at creating effective windbreaks and sandbreak forests, establishing cover to improve soil and water conservation, and planting shelter belts to protect farmlands, thereby contributing to their sustainability, producing significant environmental benefits.

16. Project funding covered labor, seedlings, fertilizers and two years of plantation maintenance. Representative unit costs were developed for the afforestation of different sites, and field monitoring was provided to ensure that quality standards were met before payments/disbursement were made (output based disbursements). Plantation sites were selected according to clearly defined technical criteria, and planted in accordance with approved silvicultural practices. Planting models were adjusted to fit local conditions, and to address the environmental issues in project areas. Project plantations had two main objectives, namely, to provide environmental protection and to improve the income of project beneficiaries.

17. Land for planting fell into four types of beneficiary tenure: (i) individual households where the land was allocated to individual village farmers; (ii) household group/cooperative where the land belonged to individual village farmers, but where the forest land was managed by the farmer group or farmer cooperative; (iii) villages where land was held communally; and (iv) state forest farms where the land was owned by the state farm. In Shanxi, water collection cisterns were provided to irrigate plantations in dry areas. Beneficiary participation was strictly voluntary.

Component Two -- Improving Existing Plantation Forests (IFDP - projected base cost US\$46.62 million; US\$27.10 million from IBRD)

18. This component aimed at demonstrating that the establishment and management of multifunction forest plantations on areas which already had some trees planted before the beginning of the project, result in sustainable, multifunction forest plantations with significant environmental benefits. This contrasts with the work done under Component 1 above which focused on areas without vegetation cover at the beginning on the project.

19. This component focused in the provinces of Anhui (15,200 ha) and Zhejiang (24,400 ha) where most degraded plantations occurred. Activities comprised the enrichment planting of degraded, low productivity monoculture pine and fir plantations, the aim being to convert them into resilient multifunction plantations with a richer species composition, improved biodiversity and higher resistance to pests and diseases, as well as other natural disasters. The resulting plantations were also expected to reduce erosion and run off, and improve water quality. Individual plantation owners, farm communities and rural dwellers participated in the component, with their participation being strictly voluntary. Project activities were located on land held under the same four categories of land tenure as in component one, and criteria of site selection and quality control procedures were applied. Disbursements were subject to the same quality control procedures as in component one, and based on approved project unit costs.

Component Three -- Institutional Support, Project Management and Monitoring & Evaluation (projected base cost of US\$15.21 million; US\$4.93 million from IBRD)

20. This component supported the government's efforts to strengthen the implementation, management and monitoring capacity of government institutions, state forest farms and farmers in multifunction afforestation and management. It also supported the forestland tenure reform process by helping farmers to better understand the process, and to help them avail themselves of the benefits which came with it. In addition, it aimed to strengthen and expand farmer associations/co-ops with an interest in multifunction plantations. It also had the objective of improving the capacity of beneficiaries to manage their multifunction plantations for both financial and environmental benefits.

21. The main activities financed included: (i) training and technical services to develop project management capacity; (ii) piloting the establishment of farmer associations at the township or village levels within the framework of the Farmer Cooperatives Law of October 2006; (iii) piloting the formulation and implementation of forest management plans on land for which user right certificates had been obtained; and (iv) the establishment

of a M&E system to monitor project implementation and impacts, and to learn lessons useful for scaling up and disseminating project experience.

1.7 Revised Components

22. No changes were made to project components.

1.8 Other significant changes

23. No changes were made to the scope of project activities, the PDO or the Results Framework.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

24. Project preparation took around 14 months from Project Concept Note review to Bank appraisal, which is reasonable for an innovative project located in remote areas of five provinces with differing climatic and social conditions. The quality of preparation was good in that it responded to the client's desire to move away from monoculture plantations to mixed species, multiple use plantations with both environmental and social benefits.

25. Project preparation was analytical, identified the right issues and came up with a carefully balanced mix of innovative interventions needed to pioneer the shift from monoculture plantation forestry to mixed stand, multiple use plantations. It took account of the need to strengthen forest land tenure, provided adequate training to fill skills gaps, included a "learn-by-doing" facility (the demonstration forests) to cater for farmer needs, and recognized that participatory planning was essential if farmers were to embrace project proposals. Preparation also put in place measures to ensure that ethnic minorities (Mongols in Liaoning province) and women had equal opportunities to participate in the project. It also ensured that strong linkages existed between the project and the client's 11th five-year plan 2006–2010, and with the Bank's CPS.

26. Project design was sound in that it focused in provinces where the problem of land degradation was serious, where an over dependence on monoculture plantations was high, and where the commitment to resolve these issues was strong. The mix of activities was also appropriate to attaining the development objective of establishing and demonstrating viable, mixed species multifunction afforestation models in a range of climatic conditions (high and low rainfall areas) and geographical features (northern plain agroforest areas, northwest sand areas, Shanxi loess plateau and southern mountainous areas).

27. The need to encourage innovation was provided for through research, and this helped to develop new technological models and practices (biodegradable pre-fertilized seedling containers, mat mulching, reduced density planting, drip irrigation, mechanized weeding and intercropping) suitable for use in differing climatic conditions. Site selection criteria developed during preparation also ensured that high potential sites were used to showcase project achievements. The multidisciplinary Bank and client teams with national and international specialists in the subject matter such as watershed management and sandy dryland management brought the needed best practice and new technologies to the project design.

28. In addition to innovative technical design and the built-in flexibility which recognized the different characteristics of project areas, an output-based disbursement mechanism was designed to planting and forest management activities, which largely simplified loan disbursement process with a robust internal control system developed to ensure that project funds are used for the purposes intended.

29. Parameters used to monitor project impact were both practical and measurable. Those aimed at assessing the achievement of the PDO were easy to use, and the M&E program was also able to capture additional environmental and social benefits generated by the project; it also produced data needed to compare the relative cost effectiveness of planting models.

30. The Quality Assurance Group did not carry out a Quality at Entry Assessment for the project.

2.2 Implementation

31. Ten multidisciplinary supervision missions visited the project between 2010 and 2016, and these missions concluded that the project had made satisfactory progress throughout. Mission members comprised subject matter specialists from the Bank, FAO, and Chinese Universities. These missions provided guidance on a range of technical issues such as silviculture in mountainous terrain, sand areas and watersheds, species selection and management, cost monitoring, procedures to be followed when dealing with ethnic minorities, farmer association/cooperative development, sustainability, marketing and compliance with the Bank's environmental and social safeguard policies, and procurement and financial probity. In addition, supervision missions paid great attention to improving community participatory planning in particular the involvement of women and Mongol communities, to strengthen record keeping and how models should be evaluated from the point-of-view of their cost-effectiveness. To help project staff benefit from the positive experiences of other Bank assisted projects, supervision missions facilitated visits by project staff to Bank projects in Guangxi and Shandong.

32. The few shortcomings encountered during supervision missions were mainly those which arose in early stage of the project implementation when it became apparent that a culture of conventional planting existed in some counties. The result of this was that the technical specifications of models were not being fully followed in a few sites, such as that species mixtures were sometimes wrong, spacing was irregular and the use of large seedlings to show quick results. To correct this, supervision missions put considerable effort into explaining the importance of the *multifunction and environmental* aims of project planting and requested Provincial Project Management Office (PPMOs) providing extensive training to local forestry staff and farmers on how to adopt the new technologies.

33. The Mid-Term Review (MTR) carried out in May-June 2013 found no major issues which might compromise the realization of the PDO. The main shortcomings at that time were the late arrival of counterpart funds, and the late payment of planting entities and farmers in some project areas. In the case of Hebei, counterpart funding delays were the result of factory shut-downs needed to reduce air pollution, and this led to a steep drop in their tax revenues. In other provinces, administrative bottlenecks were the main cause. To

address the counterpart funding issue, the Project Management Center (PMC) visited senior government leaders in Hebei and Liaoning after the MTR mission to help resolve the issue, and the PPMOs provided the required follow up thereafter. As a result, the relevant provincial and county governments overcame the financial difficulties. Another topic discussed concerned the necessary adjustments of technical design of models in some provinces to meet the local conditions. Provinces proposed modifications to some models to better suit them to local conditions, such as species mixtures and spacing. These adjustments were reviewed by the PMC and the Bank on a timely basis, and were approved for use in the project.

34. The severe drought of 2013 (rainfall down by 50 percent) in Liaoning and Zhejiang resulted in a 40 percent loss in 2013 plantings. However, to the credit of the affected provinces, all seedling losses were made good using local resources and increased contributions (labor) from farmers. The impact of rising labor and input costs, and currency fluctuations were also off-set from the additional sources provided by the governments and farmer labor inputs, and from adopting labor saving innovations in the field (see Efficiency).

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

35. **M&E design.** The environmental monitoring program was designed by the Chinese Academy of Forestry Sciences (CAFS) and proved robust and functional, with clear, relevant and adequate indicators to measure progress towards achievement of the PDO. Baselines and targets were adequately defined and realistic. To cater for local conditions, project provinces designed their own provincial programs following the design framework set out by the CAFS. Monitoring plots were set based on random field sampling in project sites as well as non-project sites to detect changes in vegetative cover, species diversity and project impacts in and outside the project area (with and without project situation), such as runoff plots were used to detect changes in runoff and soil erosion. Household surveys and local market prices for crops were used to monitor the impact of project activities on farmer income. The M&E system worked smoothly throughout and furnished all the required data, together with information on growth which can be used to calculate the project's carbon sequestration benefits.

36. Impact values were calculated for the two Key Performance Indicators, and for the monitoring program (See Annex 2) which generated information on environmental improvements, financial viability, social impacts, physical progress and expenditure. In addition, M&E generated valuable data to assess the project's impact on ethnic minorities, pest incidence, seedling survival, and the cost effectiveness of models.

37. **M&E implementation.** The M&E system worked well, especially with regard to assessing the achievement of the PDO and intermediate outcomes. Reporting was accurate and punctual throughout, physical progress was accurately assessed, so that emerging issues could be promptly dealt with. Data confirmed that the project's positive environmental impacts were being achieved, and that the project has achieved component target values. Monitoring data were also indispensable for assessing the cost-effectiveness and carbon sequestration potential of different planting models by maintaining careful records of plantation costs and growth.

38. Looking ahead, provinces have fully recognized the value of good M&E and have main streamed project M&E procedures into all provincial forest programs. This will ensure that the longer-term impacts of the project will be monitored. Consistency between provinces will be assured by adopting standardized project practice across the board and effective coordination of the national expert team.

39. Data collection and evaluation was the responsibility of each project PPMO's contracted professional institutions using parameters set out in the Project Implementation Plan (PIP). CAFS was responsible for consolidating the project M&E data and analysis work. During project supervision, the Bank team did follow closely the monitoring data collection and evaluation to ensure the quality of the data provided by the PPMOs.

40. **M&E utilization.** Data were interpreted in an objective way to (i) evaluate physical progress, calculate costs, assess efficiency, assess impacts, and measure progress towards the realization of the PDO; (ii) establish a relationship between project activities, results, and outcomes, and to identify additional benefits produced by the project, for example, trends in pest incidence, changes in wind erosion and sand movement, reductions in soil erosion and runoff, and model efficiency relative to the realization of the PDO; and (iii) provide very useful information to adjust the design of models during implementation when needed.

41. M&E also performed the key role in support of the "output-based disbursement" approach whereby quality control in the field (check and acceptance) was used to ensure that the quality of planting was up to the standards to authorize payments, and that the provisions of the Environmental Management Plan (EMP) and the Pest Management Plan (PMP) were being observed.

2.4 Safeguard and Fiduciary Compliance

42. **Safeguards.** The project was classified as a Category B, and triggered safeguards for Forestry (OP 4.36), Environmental Assessment (OP 4.01), Pest Management (OP 4.09) and Indigenous Peoples (OP/BP 4.10). An Environmental Assessment was carried out, after which an EMP was prepared which included Environmental Protection Guidelines for Plantation Establishment and Management, and a PMP. A Social Assessment was carried out in all provinces, which included a specific assessment of Mongol communities needs in Fuxin county, Liaoning province. The Social Assessment confirmed that demand and support existed for project activities in project provinces and, to ensure that the interests of the Mongol communities were being protected, an Ethnic Minority Development Plan was prepared in accordance with OP 4.10. A Participatory Planning Manual (PPM) was also prepared and implemented to ensure that beneficiary participation was strictly voluntary. Consequent to the PPM, 158,340 individual households participated in the project and other households participated in the project under the forms of collective farms and farm cooperatives. During implementation, Bank's supervision missions worked closely with the provincial PMOs to ensure that there were no deviations from safeguard policies and procedures.

43. There were no interventions in native forests and local species were used for planting and these, coupled with strict site selection criteria, ensured that plantations did

not impair or pose threats to either forest ecological functions or biodiversity. Mitigation measures were put in place to offset potential environmental risks associated with soil disturbance and erosion during planting, the possible use of herbicides and pesticides, and irrigation. Some examples of the mitigation measures include the use of fish scale soil conservation techniques, the use of local species, mixed species planting, the avoidance of exotic species, and the adoption of an EMP training for local staff and participating farmers. There were no significant outbreaks of pests in planted areas, but the PMP ensured that patrols quickly detected any possible risks, and that physical control measures (hand picking of insects, insect traps and lights) and biological control (pest predators) were used in place of chemical pesticides. Thus, disease incidence was tightly controlled. Frequent *ad hoc* staff and farmer training also helped ensure compliance with the provisions of the EMP.

44. Ethnic Minority Development Plan (EMDP) implementation. An EMDP was developed for the 41 project villages in Fuxin County (Liaoning Province) populated with Mongols, which accounted for 20 percent of the total project villages in the county. The EMDP was implemented ensuring the Mongol farmers' equal participation in and benefits from the project. 117 Mongol households contracted with the project for planting, accounting for 16 percent of the 716 contracted households in the county; Mongol households also participated in technical training and reforestation for 472 person/days during project implementation and earned RMB 1,237 annually per household from their labor inputs, which represented a 4.5 percent increase in the total household incomes. Meanwhile, products of economic trees and understory livestock raising after project implementation also supplemented their income generation. In addition, plantations established have contributed to sandstorm control (decreased wind speeds and soil and water conservation (reduced run-off), which improved the local peoples' environmental living conditions.

45. To respect the customs of Mongol farmers and have effective communication, the project information was provided to the ethnic minority communities in both Mongolian and Chinese. Mongol farmers were happy with their increased forest property and rehabilitated hometown landscape.

46. **Fiduciary.** All project audits were unqualified, and supervision missions regularly reviewed project accounts and procedures to ensure compliance with fiduciary requirements. Procurement and financial management assessments were carried out during preparation and they concluded that the organization, structure, skills and control systems at provincial, county and forest farm levels were adequate. Financial management risks were rated as "modest" based on the experience gained by implementing agencies under previous Bank projects. A Financial Management Manual and Procurement Guidelines were prepared to guide project implementation and, to supplement these, annual training courses were provided to provincial and county PMOs, and to other project entities. Bank supervision missions regularly reviewed project financial management and procurement procedures being followed in the project to ensure that Fiduciary requirements were being complied with at all levels. The only financial matter requiring attention was that counterpart fund allocations were in arrears on some occasions in Hebei and Liaoning especially at the county level. However, these shortcomings were rectified with around 132

percent of the planned counterpart funding mobilized to fulfill the project tasks accounting for gaps caused by the currency fluctuation, as well as, increased labor and seedling price during project implementation period. The additional counterpart contribution came from participating farmers (increased labor inputs) and additional financial contributions from provincial and county administrations. Procurement followed the Bank's Guidelines and no major issues were identified during supervision.

2.5 Post-completion Operation/Next Phase

47. Project operations comprise mainly tree planting of native species on bare land, and the enrichment planting of degraded monoculture plantations. Once planted, areas must be weeded for two years. Nearly all this work has been completed, so post-project maintenance requirements consists mainly of pest management and fire prevention. The capacity and procedures to handle these are very well established in provincial and county forestry institutions.

48. To ensure that forests in ecologically fragile areas of China are conserved, the "ecological forests" program was introduced. Under this program, national and provincial governments provide a flat-rate subsidy to forest owners of RMB 225/ha/year to maintain forest cover – the aim being to compensate forest owners for the public goods generated by their forests. This will help ensure the continuity of the program in erosion prone areas. In addition, in planted areas needing more intensive management, for example in mixed species forests, additional funding of RMB 1,500/ha/year is available through the National Forest Management Program to cover tending and thinning. With funding from these sources, adequate support is available to cater for future forest management needs.

49. Direct benefits will also accrue to farmers from fuelwood, posts, poles, and timber from thinning and pruning, together with non-wood forest products such as fruits, mushrooms, and nuts from economic tree crops and, possibly, tourism. Income from these activities will help sustain project plantations over the longer term.

50. To guide and backstop the management of planted areas in the future, provincial governments have prepared post-project forest management technical plans, including procedures for M&E, fire control, disease and pest control, and the prevention of theft. Ensuring compliance with the plans will be the responsibility of county forestry authorities who, in collaboration with specialist institutions such as local universities, will provide any technical back-up required.

51. Higher level instruments have also been put in place at provincial levels to promote the continuation of project activities. In Zhejiang, the project concept has been utilized in the 13th Five Year Plan which prescribes broadleaf planting in existing degraded pine stands, the planting of valuable hardwoods to restore the ecology, and the use of project models for coastal protection. In Anhui, the project has helped spawn three programs, namely the Natural Forest Protection Program, the Public Benefit Cultivation Program, and the Important Water Resource Forest Protection Program, all of which promote multifunction afforestation for environmental improvement. In Shanxi, the project has paved the way for the Yellow River Valley Ecological Forest Recovery program to be financed by the European Investment Bank, and Hebei has initiated its National Forest

Storage Construction project (or the Taihang Mountain greening project) based on the IFDP. These initiatives clearly show that IFDP activities will continue.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

Relevance of the Objectives

Rating: **High**

52. The objectives were captured clearly and concisely in the PDO “to demonstrate the establishment and management of sustainable multifunction forest plantations with significant environmental benefits.” At the time of project preparation this initiative received strong support from the Bank through its Country Partnership Strategy (CPS 2006-2010) which comprised five development pillars. The third pillar — “managing resource scarcity and environmental challenges”— was especially relevant to forestry by focusing on the improved management of natural resources such as land, grasslands, forests and water resources; it also focused on involving affected communities.

53. The PDO continues to be highly relevant to the national government’s existing Five-Year Development Plan which aims at achieving more sustainable development by incorporating environmental conservation into development. The PDO also provides support to China’s efforts to fulfill its Nationally Determined Contribution (NDC) under the Paris Agreement to increase the 2005 forest stock volume by 4.5 billion cubic meters by 2030. To achieve this target China needs to expand the focus of its programs from area planted to also include the quality of planted forests which is a direct function of tree survival and growth rates.

54. The project is also relevant to the achievement of the NDC because it demonstrated a more effective and balanced cost-sharing arrangement which would be very useful when scaling up initiatives to achieve the ambitious NDC targets.

55. The project objectives were also supportive and consistent with current Country Partnership Strategy for FY2011–2016 (CPS 67566-CN, October 11, 2012) by lending support to Outcome 1.5, “Demonstrating sustainable natural resources management,” under Strategic Theme 1, “Supporting Greener Growth”, and the cross-cutting climate change mitigation agenda.

3.2 Design and Implementation

Rating: **Substantial**

56. The cost-sharing and demonstration approach taken by the project was highly appropriate given the conceptual changes being pioneered in plantation forestry. This approach proved very effective in involving risk-averse and resource poor farmers in pioneering multifunction plantations. The project’s geographical spread also proved sound in that it focused in provinces with high multifunction potential, in those where environmental gains were achievable, and where interest in multifunction plantations was intensifying. Despite having predetermined technical models for planting, project design was sufficiently flexible to incorporate farmers’ needs, especially the need to include

economic crop species to cater for their short-term income requirements. Similarly, design enabled project staff and farmers to work together to refine models to better suit them to local requirements. For example, Zhejiang developed 14 new enrichment planting models, and Hebei developed additional 4 planting models to better fit the local conditions. In Liaoning and Shanxi, planting densities in models were adjusted to reduce costs and competition for moisture. All such modifications were developed in a collaborative manner at local level, with support from provincial and national expert teams and formal proposals being submitted to the PMC and the Bank for approval.

57. Important contributions to the project's success included the complementarity of components, and the clear linkages created between the PDO and technological innovation (paras 66 and 71), farmer outreach, impact evaluation, demonstration and dissemination. At the field level, the Participatory Planning Manual helped to strengthen farmer confidence in the project, and helped create a strong sense of project ownership.

58. Gender was also adequately covered (43 percent of beneficiaries were women), and the EMDP implementation ensured that the Mongol communities in Fuxin county were able to participate, by virtue of which they developed new forestry skills through 472 person/days of training. The effectiveness of the project's participative approach is evidenced by the fact that, through surveys, all farmers expressed satisfaction with project outcomes at project closure, especially its ability to provide employment and improve their environment and livelihoods.

59. The project's institutional arrangements proved to be very effective. The PMC in the SFA had a long history of managing Bank forestry projects, and proved adept at overseeing the management of the project. It quickly identified emerging issues at provincial levels and took swift action when needed. When Bank guidance was needed, it was taken up quickly. The previous Bank experience enjoyed by the Provincial Project Management Offices (PPMOs) helped to ensure efficient management at provincial levels; and the Project Leading Groups at provincial and county levels also proved helpful, especially when a 32 percent increase in counterpart funds was needed.

60. Including carbon emission reductions as a possible tradeable benefit was a prudent design feature because it demonstrated how these economic benefits can be significant in multifunction plantations. On the other hand, it was not critical to project success, being only one of many possible environmental benefits attainable with multifunction afforestation. Regardless of whether the carbon market develops, the increase in tree and shrub growth due to project will sequester significant amounts of carbon contributing to the achieving NDC targets for forests.

61. Monitoring and Evaluation was carried out by professional provincial consulting institutions approved by the Bank. The system worked well, especially regarding assessing the achievement of the PDO and intermediate outcomes. Reporting was accurate and punctual throughout, physical progress was accurately assessed, so that emerging issues could be promptly dealt with. Data confirmed that the project's positive environmental impacts were being achieved, and that the project has achieved component target values. Monitoring data were also indispensable for assessing the cost-effectiveness and carbon

sequestration potential of different planting models by maintaining careful records of plantation costs and growth.

3.3 Achievement of Project Development Objectives

Rating: **High**

62. The rating for achievement of objectives is based on the objective as captured in the PDO: *to assist the Borrower to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits.*

63. For purposes of rating, the PDO is treated as a single objective with several parameters considered in conjunction to assert the generation of significant environmental benefits. For the purpose of monitoring and evaluating this project the sustainable management of multifunction forest plantations generate the following ecological/environmental benefits: increased vegetative cover; increased diversity of plants species; reduce run off; wind speed; and the resulting economic benefits (either directly through the adoption of economic species, or indirectly through the increased yields generated from the environmental benefits). In some cases, overlapping dimensions or characteristics related to the demonstration, establishment, management, sustainability, multifunctional nature, and environmental benefits of the plantations and forest areas targeted. Discussion of these aspects is presented below. There is strong evidence—both in relation to achievement of the project indicator targets themselves as well as the resulting environmental benefits —indicating that the formally rated objective were fully realized.

64. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - Vegetative cover: The project exceeded the target in both types of areas. The vegetative cover in degraded areas devoid of vegetation at the beginning of the project where new multifunctional forest plantations were established was targeted to improve from 10 percent to 20 percent, an increase of 10 percentage points. The actual average cover achieved was 50 percent, or an increase of 40 percentage points, four times the target. Most of the increase on vegetative cover was due to the strong tree growth (resulting 30 percent trees, 10 percent shrubs, 10 percent grass vegetative cover per hectare respectively).

65. The vegetative cover in areas which already had some trees planted before the beginning of the project where multifunctional forest plantations were established was targeted to improve from 26 percent to 36 percent, an increase of 10 percentage points. The actual average cover achieved was 57 percent, or an increase of 21 percentage points, which is more than twice the expected target increase. The increase on vegetative cover was mainly due to strong tree growth and to a lesser extend due to shrubs, as grasses tend to decrease in areas shaded by trees and shrubs.

66. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - Increase diversity of plant species: This indicator applies to the entire set of target provinces and demonstration models. The target of three species per-sub compartment was exceeded by between 25 and 175 percent. All the models demonstrated in the project included at least three species, but the number of species present in year 5 was much higher due to site management

interventions demonstrated in the project. These interventions, including limited clearing of areas around the trees and seedlings and lower use of pesticides, enabled the arrival of naturally dispersed seeds (by wind or animals) from nearby areas leading to the spontaneous natural regeneration and ensuing increase of tree species. Field surveys carried out as part of the M&E system of growth and regeneration demonstrated that forest management as defined by stand diversity, vegetative cover, vigor, and lower pest incidence had improved.

67. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - Reduce run off. This indicator applies to the entire set of target provinces and demonstration models. Significant reduction was observed in all types of sites covered by the project. At the end of the project the soil erosion was reduced by 11-19 percent in degraded areas devoid of vegetation at the beginning of the project where new multifunctional forest plantations were established, when compared to non-project areas. The soil erosion was reduced by 7-11 percent in areas which already had some trees planted before the beginning of the project where multifunctional forest plantations were established, when compared to non-project forests.

68. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - reduce wind speed. This indicator refers only to the degraded areas devoid of vegetation at the beginning of the project where new multifunctional forest plantations were established the establishment of the windbreak plantations models demonstrated that they can decrease wind speed and generate economic benefits. In Hebei and Liaoning provinces, wind speed was reduced by 40-55 percent benefitting crops' growth with yield increasing by 11-16 percent when compared to non-project areas.

69. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - Increase economic benefits to farmers. These were a direct result from the adoption of economic species, or an indirect one from the increased yields generated from the environmental benefits generated by the multifunction forests demonstrated in this project. Fruit and nut production increased with very positive impact on farmer income generating an additional 480 (RMB/ha/year) on average. Where conditions permit, farmers are expanding these activities by planting additional areas with the models demonstrated in the project. The additional incomes generated vary between provinces, depending on different economic crops planted and the weather and soil conditions in different locations.

70. In summary, the project exceeded both of its outcome-level indicators (Table 1) considering the environmental benefits discussed above: (i) vegetative cover of multifunction forests increased in selected environmentally degraded areas in project counties and (ii) improvement in the management of forest resources as reflected in tree species diversity and other dimensions of forest resilience and environmental services because of adopting technically sound and cost effective forest establishment and management practices.

Table 1. Achievement of PDO and PDO indicators

PDO	Impact Indicator	Baseline Value	Target (PAD)	Actual (ICR)
To assist the Borrower to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits	1 Incremental vegetative cover of multifunction forests in selected environmentally degraded areas in project counties (% of vegetative cover per ha)	10%	20%	50%
	2 Improvement in the management of forest resources (through sample surveys measuring improvements in tree species diversity, vegetative cover, etc. between project and non-project sites)	NA	Tree species increased from 1 to 3 per sub-compartment, etc.	Tree species increased from 1 to 3 or more (3-10) with soil erosion reduced 11%--19%, wind speed reduced 40% to 55%; and incidence of diseases reduced 43%.

71. The effectiveness of the demonstration function of the project is that more than 500,000 ha of project model plantations have been established. This is a considerable achievement given that prior to the project doubts existed at all levels on the viability of mixed species multifunction afforestation on fragile sites and in degraded monoculture plantations.

72. The developed and implemented models demonstrate technical solutions to wide-ranges of climate conditions and geographic areas, which promoted multiple species forest structure, the underground vegetative growth, and well supported the achievement of the PDO—optimized water conservation, soil and wind erosion control and the forest resilience to withstand natural disturbances and changes, as well as to benefit to income generation to local communities. Where the conditions allowed, forest landscape restoration was used with a combination of strategies to generate environmental conservation and landowners’ economic benefits. In Shanxi, the comprehensive watershed management model was adopted to control soil erosion of hilly and gully areas of Loess Plateau. On the upper and middle slopes the focus was on ecosystem restoration and stability. On the low flat areas the focus was on land use for sustainable production to improve the livelihood of local farmers. Therefore, the technical models not only demonstrated the shift from monoculture planting to mixed forest management, but also the development of multifunction forests by taking into consideration community benefits while restoring the forest ecosystems, and agro-ecosystems, and promoting water conservation.

73. Demonstrate the establishment and management of sustainable, multifunction forest plantations with significant Environmental Benefits - Training. Essential to realizing the demonstration function of the PDO was the execution of an effective extension program. With the benefit of courses received under the project, extension workers met with farmer groups to explain, discuss and promote the project concept. Around 323,950 person/days of needs-based training/extension were delivered in this way to farmers, accounting for 127 percent of the PAD target. These courses were complimented by visits to provincial demonstration forests where farmers received practical training in multiple use, mixed

species afforestation and the “learn by doing” approach, done on demonstration sites within the project area. This combination of training and extension proved very effective at promoting the benefits of multiple use afforestation, and at providing farmers with the necessary skills to carry it out.

74. The main impacts of training and extension were: (i) project staff and farmers became competent and more effective at establishing mixed species, multiple use plantations; (ii) new ways of plantation establishment were brought into use; (iii) farmers became aware of the productive potential which multiple use afforestation has in areas of marginal land and degraded plantation monocultures; (iv) beneficiaries became aware that tending/weeding after planting can greatly increase seedling survival rates, which in turn strengthened their interest in multifunction afforestation; and (v) the productivity and marketing capacity of cooperatives and producer associations were vastly improved. Some of the gains resulting from training include a reduction in site clearing costs of 2,600 RMB per ha with mechanization; containerized seedlings in Anhui improved survival rates by 20 percent and thereby saved failure replacement costs of 577 RMB/ha; the use of improved varieties of Hazel raised survival rates from around 70-95 percent; and the adoption of improved field practice and walnut varieties in Shanxi increased yields by 20 percent, and prices by 10 percent.

75. In Shanxi, project training helped walnut producers to identify and enter partnerships with the private sector to produce walnuts for the domestic and international markets. Under the partnership, the private entity undertook the marketing of the walnuts, and the farmers improved the infrastructure around their plantations (access and check dams for irrigation) to improve the reliability and quality of walnut supply. In preparation for the increased output of project produce, the project helped to establish marketing platforms and small trade fairs in Shanxi to promote walnut and other project products from in and around the project area, and this boosted both product sales and prices. In Zhejiang, training and office equipment were provided to cooperatives producing *Vernicia fordii* leaves. The leaves are used in Japan for ritual purposes, but also have good soil stabilization and water retention capacity as understory crops with conifers. Before the project, the annual per capita income of co-op members was less than RMB 10,000. With project training in crop management, harvesting, storage and marketing, the annual per capita income of co-op members has risen to RMB 15,000. The demonstration effect of the project has encouraged the new planting of *Vernicia fordii* totaling 236 ha.

76. Confirmation of the value of project training and extension is borne out by the fact that almost all of participants expressed their satisfaction with the quality (relevance, usefulness and method of delivery) of both the training and extension programs. A questionnaire survey indicated that 78 percent of training participants considered that the overseas training had helped them to change their traditional forest management concepts, improve their work quality, broaden their vision, update the awareness of environmental protection, and learn advanced technologies in plantation establishment and management from other countries. Meanwhile, 76 percent of the participants taught the technologies they learned during the domestic study tour to more than 10 people. The survey findings show that the overseas training and domestic study tours organized under the project were very necessary for project agencies and entities adopting new technologies, transferring the

planting and forest management from conventional monocultural planting to mixed species planting and improving project management.

77. Support to the Forest and Tenure Reform process consisted mainly of providing farmers with awareness training on the objectives of the reform program, the opportunities which come with it, how land titles can be obtained and technical training on multifunction forest establishment and management. Project assistance facilitated the issue of land titles over 74,900 ha of plantations (exceeding the 55,050 planned) in four provinces, where farm families now enjoy the security of land tenure – a key requirement to investing in plantation management and protection. It also included the creation of five pilot areas to demonstrate forest management planning and integrated management approaches. The achievement of this objective reflected the popularity of the demonstrations, through which farmers acquired the skills to manage their areas through a learn-by-doing process.

78. Complimentary to this, farmers also received training in the establishment and management of farmer cooperatives and associations, planting material development, new planting and forest management technologies, Integrated Pest Management and product marketing among others. Two new cooperatives were created and 18 existing cooperatives were upgraded. Project assistance took the form of equipment and training, and technical assistance to standardize farmer cooperative management, improve sustainable forest management, increase productivity, and promote marketing, product labelling and output of their main products. For instance, through the project, hazel nut producers in Liaoning were able to double their productivity by improving hazel nut management and quality, resulting in an additional RMB 5,000 of household income (per household). It also resulted in environmental benefits by providing ground cover in erosion prone sandy areas in semi-arid conditions.

79. Effectiveness of the demonstration. The success of the models demonstrated in the project, combined with the extensive training program have already led to an early and broad adoption of those models on fragile sites and degraded plantations outside the project area in the target provinces. While the total area planted by the project with new multifunctional forest plantations in degraded areas reached 93,840 ha, an additional 200,000 ha have already been planted using the same models in similar areas. Likewise, while the total area planted by the project with multifunctional forest plantations which already had some trees planted before the beginning of the project reached 38,450 ha, an additional 300,000 ha have already been planted using the same models in similar areas.

80. Sustainability. Looking ahead, provinces have fully recognized the value of good M&E and have main streamed project M&E procedures into all provincial forest work programs. This will ensure that the longer-term impacts of the project will be monitored. Consistency between provinces is being assured by adopting standardized project practice across the board and effective coordination of the national expert team.

81. The extent to which interest in the project accelerated over time is shown by the fact that 2,000 visitations were made to the project by persons from 10 different provinces in China, and that 64,000 hits were made on its website.

82. In addition prospects for sustainability are promising because: (i) the institutional capacity has been strengthened at all levels in the provinces; (ii) the incorporation of economic tree crops and understory activities in the models help satisfy the short term income requirements of farmers; and (v) the clear ownership and title to land promoted by the project encourage farmers to undertake follow up management and protection.

3.4 Efficiency

Rating: **Substantial**

83. **Economic Analysis.** A project cost-benefit analysis was carried out using the same methodology as adopted at appraisal. To reflect the different economic conditions at time of project closure, the following adjustments were made to the assumptions and parameters used at appraisal: (i) plantation input costs were increased by 25 percent; (ii) the Bank recommended price for carbon sequestration benefits of US\$30/tCO₂ was used as opposed to US\$7.38 (Yuan 50)/t CO₂ used at appraisal; (iii) the quantities of the main inputs for the production modules were adjusted to reflect actual data collected by PPMOs, while future production projections were based on estimates provided by farmers, extension workers and PMO staff; and (iv) market prices for major inputs and outputs were updated (in 2016 constant prices) to reflect price changes during the project's economic life (22 years for cash flow analysis).

84. It should be noted that the economic analysis only takes account of selected key benefits including: (i) direct production benefits (wood and non-wood forestry product outputs); (ii) productivity increases in farmland adjacent to windbreaks; (iii) carbon sequestration; and, (iv) erosion control and the retention of sediments. The analysis includes the costs of all incremental expenses under every component, including O&M costs after project completion. Using these parameters, the overall project Economic Internal Rate of Return (EIRR) including carbon sequestration, wind protection and sediment retention benefits are estimated at 17.4 percent, which is comparable to the PAD estimation (16 percent) as the adjusted environmental benefits have more than offset the impact of cost increases of major inputs. A summary of EIRRs by province is shown below.

Summary of NPVs and EIRRs At ICR

Project Area	Excluding Environmental Benefits		Including Wind Break Benefits		Including Sediment Retention Benefits		Including Carbon Sequestration Benefits		Including 'Three' Environmental Benefits	
	NPV	EIRR	NPV	EIRR	NPV	EIRR	NPV	EIRR	NPV	EIRR
Anhui	336.7	10.1%	336.7	10.1%	509.3	11.9%	633.4	13.9%	806	15.3%
Hebei	152.2	8.9%	808.2	16.2%	152.1	8.9%	377.6	12.8%	1033.8	18.8%
Liaoning	119.2	9.9%	773.2	21%	119.2	9.9%	344.0	16.9%	998	25.2%
Shanxi	309.5	10.5%	309.5	10.5%	603.8	13.3%	561.8	13.8%	856.8	16.1%
Zhejiang	48.6	7.4%	48.6	7.4%	48.6	7.4%	263.5	13.1%	263.5	13.1%
All Project	966.1	9.6%	2276.2	13.1%	1433.1	11.0%	2180.4	13.8%	3958.1	17.4%

Net Present Value (NPV) in RMB million at OCC=6%.

85. No sensitivity test is warranted as the project EIRRs are estimated at their lowest bounds for (i) carbon sequestration valuation is at lowest value (30 US\$/ton)², and (ii) other substantial but not-readily-quantifiable economic benefits, such as biodiversity conservation, landscape improvements and contribution to agricultural tourism, are not included in the calculation.

86. **Financial Analysis.** The project's objective was to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits. That is, productive and ecological benefits were being sought, not just productive benefits. To determine the Financial Internal Rate of Return (FIRR) for individual models, all cash outflow (investment cost, operating costs, and taxes) and cash inflow (sales of tree products) costs were used. Costs of such activities as capacity building and project management were included in the financial analysis for the project as a whole. Using this approach, the project FIRR is estimated at 9.6 percent, slightly below the 11.8 percent estimated at appraisal. Nearly half the planting models yielded less than 10 percent, and some fell below 8 percent. Those models with the highest FIRRs were hazelnut (36 percent), bamboo (32 percent), poplar and tea (both around 18 percent). The lower FIRR in some models (tree plantations, broadleaf with chestnut, windbreaks) is mainly due to the longer gestation period for these models and the lower product prices expected for their outputs, and this makes them less attractive to farmers. To compensate for this, Bank loan proceeds were made available to farmers as grants to cover establishment costs of forestation models during project implementation in the all five participating provinces and this made them more appealing to farmers (FIRRs above 10 percent). This helped to ensure that all planting targets were met, and that the quality of work was good. On fiscal impact, the government provided sufficient counterpart funding during implementation. No additional fiscal obligations for local governments are expected apart from servicing the Bank loan, which is a small fraction of their treasury revenues.

87. Institutional gains were realized mainly at the farmer level. Better managed and better equipped farmer associations were able to reduce production costs, improve crop quality (walnut and hazel nuts) and open up new markets for their products – often at better prices. Some associations were also able to develop partnerships with the private sector to market their products (walnuts in Shanxi). The use of output based disbursements also served to improve the effectiveness of supervision.

88. The project also had additional ecological and social benefits which cannot be easily quantified and provided in Annex 7 Summary of Borrower's ICR and comments. It was also operationally efficient with no cost overruns or extension of the closing date.

3.5 Justification of Overall Outcome Rating

Rating: **Satisfactory**

² If valued at 7.38 Yuan/ton for carbon sequestration as at appraisal, the project EER would be at 14%.

89. The Overall Outcome is rated Satisfactory on the basis of (i) high relevance of objectives and substantial relevance of design, (ii) high efficacy in achievement of objectives, and (iii) substantial efficiency.

90. In addition, the project achieved or exceeded almost all indicators, its design was sound and strongly aligned with institutional capacity and the PDO, important efficiency gains were realized through innovation during implementation, and prospects for sustainability and scaling up are promising. The project demonstrated and developed a range of viable afforestation models supportive of national and provincial policies, incorporated sufficient flexibility to accommodate a wide variety of growing conditions in the project area, and was fully implemented within the project period. Furthermore, additional benefits not covered by the PDO and not included in the results framework were also realized. These are shown in more detail in Annex 2 – Project Outputs. The project's good performance can be attributed to (i) the clear policy framework established by government and the strong linkages which existed between the project and government policy; (ii) sound project design which provided the right balance of activities to achieve the PDO, with demonstration planting being complemented with model flexibility, well targeted training and pro-active extension; and (iii) regular and supportive inputs provided by Bank supervision missions.

3.6 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts and Social Development

91. Farmers were the main project beneficiaries, which include 158,340 individual households. The number of participating Mongol communities totaled 41 villages, or 16 percent of the 203 total project villages in Fuxin Mongol Autonomous County, Liaoning Province. Working with these beneficiaries, the project demonstrated that multifunction afforestation has the potential to generate additional income for farmer households with environmental dominated afforestation and degraded forest rehabilitation. It has also shown that the most attractive returns are to be had from short rotation economic tree crops which yield saleable, high value commodities over the short term (hazelnut, walnut, bamboo). Models including these species showed highest rates of return.. The project has also demonstrated that improving the capacity of farmer associations/cooperatives can raise farmer income by improving forest and non-forest product quality and increasing product value. This approach opens exciting possibilities of achieving a win-win situation in poor rural areas by combining improvements in farmer and ethnic minority incomes with environmental conservation and restoration.

(b) Institutional Change/Strengthening

92. The main institutional changes brought about by the project were: (i) provincial governments developed and implemented policies which mainstreamed multifunction afforestation into their development programs; (ii) provincial and county level institutions, together with farmers, became protagonists of the multifunction plantations concept as a way of improving income and conserving the environment; (iii) project assisted forest product producer associations and cooperatives strengthened their multifunction afforestation business management skills, and are promoting this institutional model in

other areas; (iv) provincial and county level institutions have developed the capacity to design and implement their own multifunction afforestation programs; (v) consultation and participation have been main-streamed into provincial and county forestry operations; and, (v) provincial and county level institutions are aware of the Payments for Environmental Services concept and are evaluating its potential to expand multifunction afforestation for environmental conservation.

(c) Other Unintended Outcomes and Impacts

93. Evidence of the project's success in convincing farmers and state forest farms of the potential which multifunctional plantations have is evidenced by the fact that the project's technical models have been replicated outside project areas in large areas. Evidence of its impact on decision makers is provided through the various provisional level development initiatives mentioned above.

94. **Payments for Environmental Services (PES) Readiness.** Although not specifically included as a project activity, experience with the project enabled farmers to gain a better understanding of the PES concept, and how it can be used to prepare the way for self-financing multifunction afforestation programs. This is especially important in the context of the rising demand for water and energy in China. With the project, farmers have learnt multifunction afforestation can reduce soil erosion, regulate water flow, control run off, and improve water quality, benefits which can extend the life of reservoirs and irrigation canals, and reduce water treatment costs. The project has also produced data on the costs and benefits of such arrangements to which should help carry forward the PES concept.

95. **Carbon Trading Readiness.** The project has generated useful data on cost-benefit analysis on the carbon sequestration potential in project areas, and the potential which it has to generate financial and economic benefits (Annex 3). This data will prove useful to an ongoing Bank funded project to promote CO₂ trading in China, and will improve provincial readiness to enter the carbon trading market once the national CO₂ emission trading system becomes operational in late 2017.

96. **Spontaneous Natural Regeneration.** Project planting has had an unexpected positive impact on natural regeneration. Having planted a four species mix initially, 10 species were recorded in some areas in years 4 and 5. This is due to the protection (from fire and illegal grazing) afforded by plantation management and the improved conditions (nurse effect) created by the initial plantings which created favorable conditions for other species to proliferate. This resulted in the creation of a richer and denser vegetative cover than expected.

4. Assessment of Risk to Development Outcome

Rating: **Low**

97. The risk to the project's development outcome are considered low because: (i) farmers have a strong incentive to protect and manage their planted areas given that project activities and species selection incorporated their preferences and aspirations; (ii) multifunction plantations are productive in terms of goods (nuts, leaves, seeds, thinning, pruning, and non-wood products) and services (soil conservation, water quality,

microclimate, tourism protection of infrastructure), many models are also very profitable and this will encourage farmers to maintain and protect their plantations; (iii) secure land tenure provides the farmer with the incentive to protect and maintain their areas; and (iv) the potential for PES payments provides additional incentives to farmers to maintain their areas over the longer term.

98. Risks from pest attack will continue to be contained through the routine pest monitoring program carried out by farmers and the provincial forestry administrations under the government pest management systems. This will ensure that pest incidence are quickly identified and dealt with. Having a mixed forest structure also helps reduce pest attacks. Fire is an ever present risk in drier project areas, but the existence of a robust and time-proven fire protection program in China ensures that annual losses are very low – less than 1 percent – so this risk is well catered for. An additional measure of protection is provided by having plantations in small blocks to reduce the risk of wild fires.

99. Changing weather patterns are a possible risk to planted areas, but mixed species stands are more resilient to change so this risk should be minimal. Should significant negative impacts be detected, the option exists to adjust species mixtures in new and existing areas.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: **Satisfactory**

100. The project preparation took around one year from project concept review to appraisal, which is considered reasonable for a challenging project located in five separate provinces with large numbers of beneficiaries, ethnic minorities and very different growing conditions. The proposal was well prepared, clearly focused and thoroughly reviewed. The PDO and related indicators and design of the project were appropriately dimensioned and supportive of national, provincial and county level development priorities. Safeguard policies were applied, consultation was extensive, the needs of ethnic minorities were incorporated, training needs were provided for, and lessons learned from previous projects were considered. Previously tested institutional arrangements were used to good effect, and environmental, social and sustainability issues were well covered. During preparation, the Bank was able to impart some of its global, cross-country knowledge and experience in forestry and natural resources management, in particular on bringing new multiple-function and mixed species planting and forest management models to the project, which enhanced forest ecological functions and resilience, as well as income generation to local people.

(b) *Quality of Supervision*

Rating: **Satisfactory**

101. The project was supervised at six month intervals by Bank staff and consultants with both the experience and skills needed to ensure that project implementation remained on track. Continuity in the composition of supervision missions also helped strengthen the

‘institutional memory’ of the project, and this helped in the resolution of follow-up requirements. Mission reporting was prompt, accurate and constructive. Any issues which arose were promptly identified and the appropriate action was taken. For example, advice was provided on how to deal with rising costs, comply with model specifications, manage ethnic minority participation and mobilize additional counterpart funds. In addition, when, early in the project, it became apparent that model designs could not cater to the demands of all site conditions in a widely dispersed project area with different growing conditions, supervision missions offered support on how to adjust the models without impairing the realization of the PDO. This flexibility in approach proved very beneficial to project outcome.

102. Supervision was especially valuable in capacity building at provincial and county levels, especially about their obtaining a better understanding of the PDO, and the importance of focusing on the collection of key data required to verify progress towards the realization of the PDO. In the early stages of the project, supervision missions provided close guidance to local project agencies and farmers on how to make the move away from traditional monocultures to mixed species, multifunctional afforestation with multiple benefits. It also supported implementing agencies in the adoption of new technologies, and provided guidance on the correct application of technical models; supervision also provided guidance on how to assess the impact of training and stressed the importance of having beneficiary evaluations included in the training program. Help was also provided to resolve *ad hoc* problems in such areas as financial management, procurement and safeguard policies.

(c) Overall Bank Performance

Rating: **Satisfactory**

103. The overall rating of satisfactory is considered appropriate because the project was focused, soundly prepared, appropriately designed, adequately supervised, relevant to country needs, supportive of Bank and country policies and strategies, and compliant with safeguards, to achieve the outcomes

Borrower Performance

(a) Government Performance

Rating: **Satisfactory**

104. Government commitment to the project was strong at all levels throughout implementation. This was due to the firm support provided to the project by the 11th Five Year Plan which established a clear direction for future development through the “five balances”, one of which was the balance between people and the environment. This supportive policy framework proved very favorable to the project throughout. At central government level, the State Forestry Administration (SFA) through its World Bank financed Project Management Center (PMC) was active and assertive throughout implementation, and worked hard to ensure that local preparation tasks were completed on time. During implementation, it showed unwavering commitment to the project, as did the five project provinces and participating counties, and ensured that implementation kept on track. It also ensured that safeguards were complied with and that project experiences were

shared between provinces. Both the PMC and the provinces were punctual in their submission of progress reports to the Bank, and proved disciplined and meticulous in areas of financial management and procurement. At field level, project provinces showed a high level of commitment to the project and its PDO, and proved very resourceful when additional counterpart funds had to be mobilized. Two provinces also showed exceptional resilience when faced with the setbacks caused by the 2013 drought. No serious issues arose with either project management or project performance except for the late arrival of counterpart funding in some provinces.

(b) Implementing Agencies

Rating: **Satisfactory**

105. Promoting a new concept such as mixed species, multifunction afforestation in marginal lands and degraded plantations was a tough challenge in the project provinces, and implementing agencies had to persevere in order to realize the project's goals. They actively involved beneficiaries from the outset by conducting community consultation at all the project villages and by ensuring that farmer preferences for planting were incorporated into technical design. During implementation, they continually assessed technical model performance by providing intensive technical trainings and various technical services to project staff, planting entities and farmers and when necessary proposing adjustments to model specifications to better suit them to local conditions. When faced with the challenges of counterpart funding shortages and drought, they showed considerable dexterity and resourcefulness to overcome them. They managed financial resources prudently and diligently followed up on all matters identified by supervision missions. They carefully monitored project progress, ensured compliance with safeguards, delivered high quality field work, and submitted the necessary reports on time. They also made full use of M&E data to keep implementation on track, to ensure that quality of work was safeguarded and to keep costs under control. Above all, implementing agencies demonstrated strong commitment to the innovative, underlying concept of promoting sustainable multifunction afforestation for both production and environmental benefits, and, despite challenges along the way, showed considerable resolve in getting the job done on time.

(c) Overall Borrower Performance

Rating: **Satisfactory**

106. Borrower performance is rated as satisfactory to reflect the commitment of government and the effective work done by implementing agencies at provincial and county levels. The multifunction project concept and mixed forest structure development were new and challenging, and involved a degree of risk. However, in their determination to improve the sustainability of plantation forestry, and to improve its contribution to environmental and social well-being, government and line agencies at all levels were steadfast in their determination to change conventional plantation practice. Overall, they worked diligently, delivered on time and made every effort to realize the PDO.

6. Lessons Learned

107. The main lessons learned, which may have more general application beyond the project, are as follows:

- (i) Projects which are firmly anchored in national policy frameworks and local development strategies enjoy strong political support and this enhances their chances of success. This was achieved in this project since the central PMO was based in the State Forest Administration responsible for the national level policy, while the project was fully aligned with the provincial forest strategies.
- (ii) When a project contemplates a change of cultural practice, project staff require intensive guidance and training during start up to ensure that they fully understand what is required. This may need time and close monitoring. Site demonstration has proved to be a very effective way to persuade farmers to transfer from conventional monoculture silviculture to multiple use, mixed species forest management.
- (iii) The output-based disbursement used for plantation activities that was conducted by communities is an effective tool to ensure that the required quality standards are achieved in the field. Output based disbursement also simplified the disbursement process which could be useful for broad rural community development projects.
- (iv) Farmers are more willing to adopt multifunction, mixed species afforestation with environmental benefits when short rotation crops with early cash generating potential are included in the planting mix. Forest landscape restoration with a combination of strategies that include both ecological environmental conservation and landowner economic benefits proved to be very effective in maintaining farmer interest. In Shanxi, a comprehensive watershed management approach was adopted to control soil erosion of hilly and gully areas of Loess Plateau, with a focus on ecological system restoration and stability on the upper and middle slopes and land used for sustainable production on the low flat areas to local farmers' livelihood improvement. This also proved to be a suitable model that maintained farmer interest.
- (v) The participation of farmers and ethnic minorities in the project planning process (the bottom-up approach), and including activities which respond to their needs, will strengthen ownership and interest in a project, and enhance its prospects for sustainability and success;
- (vi) In widely dispersed projects with diverse geographical and social conditions, flexibility in project implementation (technical specifications and management arrangements) is needed to ensure that interventions are appropriate to local conditions and needs;
- (vii) In rapidly developing economies where the dynamics of land use are changing, it is challenging for preparation missions to accurately predict land availability for project use (planting) several years into the future. Risk Assessment should pay more attention to this to ensure that adequate mitigation measures are put in place to cater for possible shortfalls;

(viii) Land titling which provides security of land tenure is popular with farmers who regard it as an essential pre-requisite to making long term investments in forestry and tree crops;

(ix) Where farmers wish to form producer associations, helping them to do so through the provision of basic, needs-based training and inputs (computer hardware, office equipment etc.) is an effective way of improving product quality, profitability and farmer income.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

108. The Borrower's completion report and comments on the Bank ICR in Annex 7 are favorable and consistent with the results presented in this report, and did not raise any issues of significant concern requiring comment by the Bank. The overall assessment and rating on the project performance are fully acceptable.

(b) Cofinanciers
Not Applicable

(c) Other partners and stakeholders
Not Applicable

Annex 1. Project Costs and Financing

Project costs and sources of financing are summarized in the following tables.

(a) Project Cost by Component (in USD Million equivalent*)

Component	Appraisal Estimate (US\$ million)	Actual (US\$ million)	Percentage of Appraisal (%)
A. New Multifunction Forest Plantations	115.7	162.0	140.2
B. Improving Existing Plantation Forests	46.6	59.9	128.6
C. Institutional Support, Project Management, M&E	15.2	13.9	91.6
Total Base Costs	177.5	235.9	132.9
Physical Contingencies	4.4	--	
Price Contingencies	11.7	--	
Total Project Costs	193.5	235.9	121.9
Interest during Implementation	6.2	7.4	119.0
Front-end Fee	0.3	0.3	100
Total Costs to be Financed	200.00	243.53	121.8

*Exchange rate at 6.80 Yuan/US\$ at PAD; the weighted average at 6.25 Yuan/US\$ during project implementation.

(b) Financing

Source of Funds	Appraisal Estimate (US\$ million)	Actual (US\$ million)	Percentage of Appraisal (%)
Government/ Beneficiaries	100.00	144.4	144.4
IBRD	100.00	99.1	99.1
Total	200.00	243.5	121.8

* Due to the rapid depreciation of RMB in second half 2016, the IBRD loan saving was US\$ 910 thousand.

Annex 2. Outputs by Component

(a) Overall project outcome is summarized below

Project Outcome	Planned at Appraisal	Actual at Completion
<p>Component One: Establishment of new multifunction forest plantations</p> <p>Sustainable establishment and management of multifunction forest on degraded land implemented:</p> <p>(a) Windbreaks and sand break forest (b) Soil & water conservation forests (c) Farmland shelter belts</p>	<p>Component One:</p> <p>Area of multifunction forests established:</p> <p>(a) Windbreak (21,400 ha) (b) Soil & water conservation forests (58,900 ha) (c) Farmland shelter belt (12,700 ha)</p>	<p>93,840 ha of afforestation (101% of the target) completed, of which;</p> <p>(a) windbreak forests: 22,370 ha (105%) (b) soil & water conservation forests: 58,470 ha (99%) (c) farmland shelter belts: 13,000 ha (103%).</p> <p>The project developed 29 multifunctional broadleaf mixed afforestation models for (i) sandy and flat areas to prevent sand erosion and protect crop land in Liaoning and Hebei provinces; (ii) soil erosion control in Liaoning and Anhui provinces; (iii) integrated management of watershed conservation in Loess Plateau to control soil erosion and increase income of farmers in Shanxi; and (iv) increasing capacity of conserving water resource and improve ecological environment around cultural heritage sites in hilly areas of Anhui.</p> <p>Around 50 species were used for the afforestation. The utilization rate of grade I seedling reached to 95%, the satisfactory rate of environmental protection measure reached more than 90%, the survival rate was 92%, and the tending to young growth was carried out according to the technical design.</p> <p>The planted forests grew very robust and the initial environmental analysis indicated that vegetative cover reached to 50%, which is 29.7% higher than non-project forest. The soil erosion was reduced between 11 to 19% and wind erosion was reduced between 40 to 55% than non-project forest depending on</p>

		the rainfall and vegetative coverage degree. In Hebei and Liaoning provinces, the model of farmland shelter benefitted crops' growth with yields increasing between 10.8 to 15.8% compared with non-project areas.
<p>Component Two:</p> <p>Improving existing plantation forests</p> <p>Up-graded multifunction forests replacing monoculture and/or degraded forest</p> <p>Improved management of existing plantation forests</p>	<p>Incremental vegetation cover, including undergrowth, increases by about 10%</p> <p>Number of ha of degraded forest improved (39,600)</p> <p>Number and variety of tree species increases in each upgraded forest site (from monoculture to about three species)</p>	<p>This component was implemented in Anhui and Zhejiang. A total 38,450 ha (97%) of existing forest plantations were improved, (i) 15,050 ha (99%) in Anhui using with two models including 19 species, and (ii) 23,400 ha (97%) in Zhejiang using 6 models including 35 species. Each site of the forest plantation site has at least 3 species (3 to 10 species).</p> <p>During implementation, the utilization rate of grade 1 seedling was 95%; the satisfactory rate of environmental protection measure reached to 96%; the survival rate was more than 91%, with seedlings being tended according to the technical requests.</p> <p>The implementation of the technical models was successful with the forests ecological environment largely improved and the set targets reached or exceeded. The vegetative cover was increased by 57% more than the baseline of 26% and increased by 4.5% more than non-project forests; the surface runoff was reduced by 7-11%, soil loss reduced by 12-19% and incidence of pest and diseases reduced by 43% more than non-project forests.</p>
<p>Component Three:</p> <p>Institutional support, project management and M&E</p> <p>(a) Households and forest staff trained and improved technologies introduced</p>	<p>No. of farmers and staff trained (216,000 person/day)</p>	<p>Participating farmers and forestry bureau staff received technical and managerial training (total 323,950 person/day completed vs. the planned 216,000).</p> <p>The result of training is very positive. The training program focus on the concept of ecological protection in forest planting, advanced technique for managing forest plantation for technical model implementation, nursery management,</p>

		<p>financial management, procurement, community consultation, social and environmental safeguards implementation. The project staff and farmers have practiced what they have learnt, which insured the appropriate technical models implementation and sound project management.</p>
	<p>No. of existing and new Farmer Associations (FAs) supported under the project (20 associations)</p>	<p>The project has reached the planned target of supporting 20 farm associations, of which 18 already existed and 2 were new. The support included financing for office equipment and providing training and TA in institutional organization, management and operation. The associations have strengthened their institutional organization; improved their charter and the regulations, and expanded their organizational scale. Now these associations are very active in sustainable forest resources management, creating income generation activities while protecting the ecological environment. The associations have become demonstration models to influence surrounding farmers and some members became farmer technicians and leaders.</p>
	<p>No. of forest management plans piloted (one mgt. plan in each of the five provinces)</p>	<p>For supporting the piloting of forest management plans, the project has provided training on how to prepare, use, monitor implementation of plans, and evaluate the effect. As planned each project province has prepared and implemented a forest management plan. The plan becomes a guidance for managing forest resources at community level. Its demonstration function has made contribution to leading sustainable development and utilization of forest resources, and the good practice will help forest farmers and forest farms to manage collective owned forest resources in an integrated and sustainable way.</p>
<p>(b) New forest tenureship supported</p>	<p>Area for which forestland use right certificates are granted (a government program independent of the IFDP)</p>	<p>Forest user right certificates were issued for all forest in project areas 100% of forest land has received. A total 74,900 ha of forest land was granted.</p> <p>To support the forest land tenure reform, Anhui and Hebei also carried out several evaluations of the effects of forest tenure reform. They analyzed the factors that affected the reform and its significance for</p>

<p>(c) Project M&E system established generating lessons for scaling-up and transferring project experiences to other areas</p>	<p>M&E system for physical inputs and outputs and project management established and operated</p>	<p>forest resource management. They also analyzed the development of supporting systems, such as forest land user right reform practice and farm association functions and service models</p> <p>In addition, the four relevant workshops were held to exchange lessons learned on the reform and how the project supported the reform.</p> <p>The studies and workshops summarized experiences and lessons on promoting the reform for government policy maker consideration.</p> <p>The project designed an M&E system for monitoring project progress and evaluating the impacts. The PMC of the SFA (central PMO) and the provincial PMOs have followed the design and closely monitored the project performance. The progress reports have been in good quality and reflected the project implementation status.</p>
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(b) The detailed breakdown of main project outputs

Output Indicator	Unit	PAD Target Value	ICR Achieved Value	% of PAD
1.Incremental vegetative cover of multifunction forests in selected environmentally degraded areas in project counties (% of vegetative cover per ha)	%	20%	50%	300%
2.Improvement in the management of forest resources (through sample surveys measuring improvements in tree species diversity, vegetative cover, etc. between project and non-project sites)	N/A	Tree species increased from 1 to 3 per sub-compartment, etc.	Tree species increased from 1 to 3 or more (3-10) with soil erosion reduced 11%--19%, wind erosion reduced 40% to 55%; and incidence of diseases reduced 43%.	
Indicators for Each Project Component				

Output Indicator	Unit	PAD Target Value	ICR Achieved Value	% of PAD
Component One: (Establishment of new multifunction forest plantations)				
1.1 Area of multifunction forests established:				
(a) windbreak and sand break forests	ha	21,300	22,370	105%
(b) soil & water conservation forest	ha	58,900	58,470	99%
(c) farmland shelter belt	ha	12,680	13,000	103%
1.2 Incremental yield increase of crops benefiting from the protection of wind break and farmland shelter belt forests (% yield increase per ha)	%	10%	12%	120%
1.3 Incremental farmer income from economic trees (RMB Yuan/ha/year)	Yuan/ha/year	480	1,300	This varied from province to province
Component Two: (Improvement of existing plantation forests)				
2.1 Incremental vegetative cover increase (as % of vegetative cover)	%	36%	57%	158%
2.2 Increased number of different tree species in project sites (tree species/sub-compartment)	No.	3	3 or more species	3-10
2.3 Number of ha of degraded forest improved (ha)(Anhui and Zhejiang)	Ha	39,600	38,450	97%
Component Three: (Institutional support and Project Management and M&E)				
3.1 No. of farmers and staff trained (person/day)	Person/day	216,000	323,950	150%
3.2 No. of existing and new Farmer Associations (FAs) supported under the project	No.	20	20	100%
3.3 M&E system generates lessons for up-scaling and transferring lessons to other areas	N/A	System set and operated	System set and operated with lessons generated for scaling up.	
3.4 Area for which forest right certificates are granted	ha	55,050	74,900	136%
3.5 No. of Forest Mgt. Plans developed	No.	5	5	100%

Annex 3. Economic and Financial Analysis

Methodologies

1. Cost-benefit analysis for the project was conducted to re-assess the Project's economic viability at time of ICR. The analysis adopted the same approach as at project appraisal to ensure methodological consistency and comparability. Nevertheless, the following changes to the assumptions and parameters for analysis at PAD were made to reflect the situation at time of ICR: (i) plantation input costs increased by some 25% against the PAD estimation; (ii) on environmental front, while the windbreak protection for agricultural production and sediment retention benefits remain unchanged from PAD, the Bank recommended minimum value for carbon sequestration benefits of US\$30/tCO₂ was adopted against US\$7.38(Yuan 50)/t CO₂ at appraisal; (iii) quantities of major inputs for the production modules were based on actual data collected by local PMOs, while the future production projections were made jointly by the farmers, extension workers and PMO staff; and (iv) market prices for major inputs and outputs have been updated (in 2016 constant prices) to reflect the price trends during the project economic life (22 years for cash flow analysis).

Project Benefits

2. The economic analysis at ICR only considers the quantification of selected key benefits including: (i) direct production benefits (forestry product outputs); (ii) productivity increases in adjacent farmland from the impact of windbreaks; (iii) carbon sequestration; and (iv) the retention of sediments.

3. However, it should be noted that other substantial but not-readily-quantifiable economic benefits, such as biodiversity conservation, landscape improvements and contribution to agricultural tourism, are not included in the calculation of project EIRR, thus rendering the economic return estimation noticeably conservative.

4. Direct production benefits: Input/output plantation models and cash flow models were used to estimate the net value of production from all plantation/rehabilitation activities. These models use quantities of inputs (seedlings, fertilizer, labor, etc.) valued at prevailing market prices. Similarly, outputs such as timber, fruits and non-wood products were estimated and valued at market prices over a period of 20 to 25 years depending on each of the models. For plantations and forest products which are not harvested the market value of the standing volume was estimated at the end of each period. It was assumed that such value would represent a conservative approximation of its real economic value.

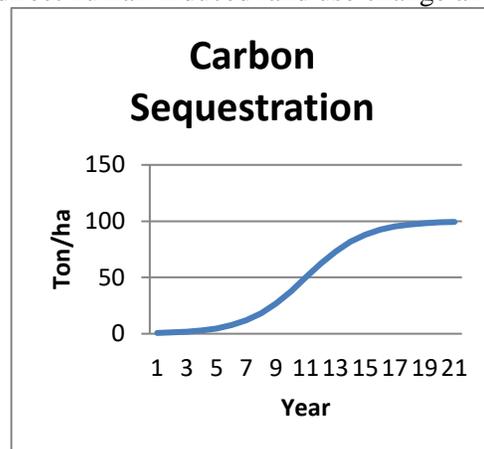
5. Economic price assumptions: It was assumed that the prevailing market prices net of taxes are a sufficiently accurate representation of the economic value. Given the current status of market liberalization in the country no major bias can be observed which would require the calculation of world market reference prices.

6. Agricultural productivity from wind protection: In Hebei and Liaoning Provinces, project plantations were designed to protect surrounding agricultural land and improve agricultural productivity. Empirical data shows that the incremental production for typical crops in Liaoning and Hebei would be around 10% using a plantation design of one hectare of plantation providing protection for some ten hectares of crop land. A conservative economic value of RMB 5,000 per hectare of plantation (RMB 500 per hectare crop land) was assumed taking into account that the design is not always optimized for this function due to availability of land, participation of farmers and an as yet unknown proportion of block planting instead of strip planting. It was further assumed

that the full benefit from wind protection would gradually increase over a period of 20 years following a growth type functional pattern.

7. **Sediment retention benefits:** In Shanxi and Anhui Provinces, one of the key environmental benefits of the forest and shrub plantation is the retention of sediments. Reducing the sediment inflowing into the Yellow River and the Yangtze River and their tributaries has several benefits. Firstly, irrigation systems suffer less from large inflows of sediment that choke the canals and often make it necessary to stop diversions when sediment loads are high. Secondly, river channels become stable and maintenance costs for river draining works are reduced. Thirdly, sediment build up in downstream reservoirs is slowed. Fourthly, the rise of the riverbed in the Rivers will be slowed and the cost of raising the flood embankments can be deferred. The project investment focused on the severely water eroded areas which have an erosion modulus greater than 5,000t/km². It was assumed that over a period exceeding 20 years the project would be able to gradually reduce the sediment run-off by 50% following the pattern of a growth function. Very limited benefits would occur during the first 10 years. The economic value of each ton of sediment retained was estimated at RMB 10. This value is adapted from the Bank’s work in the Loess Plateau Watershed Development.

8. **Carbon sequestration:** Vegetation and soils are widely recognized as carbon storage sinks. Sequestration of carbon in terrestrial ecosystems offers a low-cost means of reducing carbon emissions. The ‘Kyoto Protocol’ makes provisions for direct human-induced land use change and vegetation recovering activities to be considered in relation to each country’s greenhouse gases reduction target. While the species and plantation arrangements under the project would be different, it can be expected that most plantation/rehabilitation activities in the project would generate an estimated incremental amount of dry matter per hectare of between 25 and 100 tons over the next 20 years. This amount would build up following a growth function over a period of 20 years as a one-time increment (see chart). This biomass would be equivalent to an incremental carbon sequestration equivalent of 90 to 400 tons of CO₂-e. Based on latest Bank guidelines³, a lowest economic value of USD 30 /Ton is used in the analysis.



Results of the Economic Analysis⁴

9. The results of the economic analysis using the assumptions described above are shown below (detailed cash flow calculations are available on file).

Summary of NPVs and EIRRs at ICR

³ “Projects use a baseline estimate of social value of carbon starting at US\$30 in 2015 and increasing to US\$80 in real terms by 2050.” quoted from the World Bank’s Guidance Note on Social Value of Carbon in Project Appraisal published on July 14, 2014;

⁴ National Development and Reform Commission mandates that OCC of 6% for public good project, which is line with latest Bank Guidelines on OCC.

Project Area	Excluding Environmental Benefits		Including Wind Break Benefits		Including Sediment Retention Benefits		Including Carbon Sequestration Benefits		Including 'Three' Environmental Benefits	
	NPV	EIRR	NPV	EIRR	NPV	EIRR	NPV	EIRR	NPV	EIRR
Anhui	336.7	10.1%	336.7	10.1%	509.3	11.9%	633.4	13.9%	806	15.3%
Hebei	152.1	8.9%	808.2	16.2%	152.1	8.9%	377.6	12.8%	1033.8	18.8%
Liaoning	119.2	9.9%	773.2	21%	119.2	9.9%	344.0	16.9%	998	25.2%
Shanxi	309.5	10.5%	309.5	10.5%	603.8	13.3%	561.8	13.8%	856.8	16.1%
Zhejiang	48.6	7.4%	48.6	7.4%	48.6	7.4%	263.5	13.1%	263.5	13.1%
All Project	966.1	9.6%	2276.2	13.1%	1433.0	11.0%	2180.3	13.8%	3958.1	17.4%

NPV in RMB million at OCC=6%

10. The overall project EIRR including carbon sequestration, wind protection and sediment retention benefits are estimated at 17.4%, which is comparable to the PAD estimation (16%) as the adjusted environmental benefits have more than offset the impact of cost increases of major inputs.

11. No sensitivity test was warranted as the project EIRRs are estimated at their lowest bounds for (i) carbon sequestration valuation is at lowest value (30 US\$/ton)⁵, and (ii) other substantial but not-readily-quantifiable economic benefits, such as biodiversity conservation, landscape improvements, and contribution to agricultural tourism, were not included in the calculation.

Financial Analysis

12. The project was designed to demonstrate the establishment and management of sustainable, multifunction forest plantations with significant environmental benefits. A total of 29 plantation models and eight forest rehabilitation are developed and over 60 species were used under the project to achieve the project development objectives. Their silvicultural prescriptions with improvement of existing degraded monoculture plantations were designed to maximize the environmental benefits of plantations. This included reduced soil and water erosion, loss of biodiversity and frequency of occurrence of pests and diseases. This was achieved through integrated forest resources management combining ecological services, income generation such as planting fruit and nut trees for harvest, and the increase of vegetative cover and resiliency.

13. As such, the timber production and financial returns, though considered in the design, were not a priority in the development of plantation models and selection of tree species, as with the intensively managed plantations. For calculating the Financial Internal Rate of Return (FIIR) of each model, the calculation covered all cash outflow (investment cost, operating costs, and taxes) and cash inflow (sales of tree products). Other costs including capacity building and project management were added to the financial analysis for the project as a whole. The project's FIRR is estimated at 9.6% with a good part of the planting models generating an FIIR below 10%, against PAD estimation of project FIIR at 11.8% with almost half of the plantation models yielding an FIRR below 12%. The lower returns in general at ICR are mainly attributable to the inputs cost increases, making a good number of models less attractive financially to farmers.

14. In a bid to increase the financial incentives to farmers and achieve sustainable forest management, the World Bank loan proceeds were provided as grant to subsidize the establishment

⁵ If valued at 7.38 Yuan/ton for carbon sequestration as at appraisal, the project EER would be at 14%.

costs of forestation models during project implementation in the all five participating provinces. As such, the plantation models proved financially attractive to famers (all FIRR above 10%, see table below) and all the physical targets of forestation and rehabilitation have been successfully achieved. On fiscal impact, the government provided sufficient counterpart funding during implementation. No additional fiscal obligation for local governments are expected apart from servicing the Bank loan, which is a small fraction of their treasury revenues. In an unlikely event of local government financial crisis, the Ministry of Finance will be the “lender of last resort”.

Financial Cash Flow Calculations (in RMB Million)

#	Plantation Models	On Total Investment		On Beneficiary	
		FIRR(%)		Investment (FIRR%)	
		ICR	PAD	ICR	PAD
1	Conifer and broadleaf tree plantings	10.1	12.4	16.6	18.0
2	Broadleaf plantings	10.4	11.4	17.9	19.5
3	Broadleaf and bamboo plantings	9.9	20.9	32.1	34.9
4	Rehabilitation of conifer stands	10.0	9.9	13.4	14.3
5	Rehabilitation of broadleaf stands	12.9	12.8	19.2	20.8
6	Mixed Windbreak and Sandbreak	6.8	9.3	10.2	11.6
7	Intercropped Windbreak and Sandbreak	8.4	11.4	13.4	15.1
8	Economic Windbreak and Sandbreak	12.6	19.3	21.5	24.8
9	Poplar and Pine	11.5	15.1	18.8	20.4
10	Poplar and Seabuckthorn	11.5	15.1	18.8	20.4
11	Poplar Shrub and Locust mixed forests	11.5	15.1	18.5	20.4
12	Larch and Pine	11.7	11.6	15.4	15.7
13	Apricot	6.8	9.6	15.5	17.7
14	Chinese dates***	N.A	14.9	N.A	23.9
15	Hazelnuts	16.4	13.4	36.2	48.4
16	Forest tree plantations	6.1	7.4	10.5	11.2
17	Shrub plantations	4.8	4.1	11.6	12.7
18	Economic trees A	14.7	11.7	14.1	14.5
19	Economic trees B	12.1	13.8	16.9	17.7
20	Broadleaf in existing pinewood stands	6.5	8.0	20.3	21.3
21	Broadleaf and Mao bamboo in existing pinewood stands	10.2	14.7	24.3	23.6
22	Broadleaf in existing fir wood stands	7.0	8.9	19.7	21.0
23	Broadleaf and Mao bamboo in existing fir wood stands	9.1	16.1	27.5	27.0
24	Broadleaf in chestnut stands	7.9	9.5	11.5	14.6
25	Broadleaf in existing tea orchards	18.9	13.6	18.1	19.6
	Total Project	9.6	11.8	15.7	17

*** Dropped out during implementation.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

(b) Names	Title	Unit	Responsibility/ Specialty
Lending			
Jin Liu	Senior Environmental Specialist	GEN2A	Task Team Leader
Susan Shen	Practice Manager (Lead Natural Resources Management Specialist during preparation)	GSU02	Forest Ecosystem Management
Mohamed N. Benali	Senior Programming Specialist	GEN2A	Project Design
Yi Dong	Senior. Financial Management Specialist	GGO20	Financial Management
Zongcheng Lin	Senior Social Development Specialist	GSU02	Social Safeguards
William B. Magrath	Lead Natural Resource Economist	GFA12	Forestry Policy
Xin Ren	Senior Environmental Specialist	GEN2A	Environmental Safeguards
Baiquan Wang	Senior Watershed Management Specialist	GEN2A	Watershed Management
Jinan Shi	Senior Procurement Specialist	GGO06	Procurement
Josef Ernstberger	Senior Economist	GEN2A	Financial and Economic Analysis
Supervision/ICR			
Garo Batmanian	Lead Environmental Specialist	GEN2A	ICR-Team Leader
Jin Liu	Senior Environmental Specialist	GEN2A	Task Team Leader
Yunlong Liu	Procurement Specialist	GGO08	Procurement
Yi Dong	Senior Financial Management Specialist	GGO20	Financial Management
Xin Ren	Senior Environmental Specialist	GEN2A	Environmental Safeguards
Xieli Bai	Program Assistant	EACCF	Program Assistant
Zongcheng Lin	Senior Social Development Specialist	GSU02	Social Safeguards
Richard Owen	Senior Forestry Specialist	GEN2A	Forestry
Liu Xueming	Senior Economist	GEN2A	Financial and Economic Analysis
Zhong Tong	Senior Monitoring Specialist	GEN2A	Monitoring and Evaluation

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY08	13.92	84.95
FY09	25.28	170.45
FY10	13.57	59.35
Total:	52.77	314.75
Supervision/ICR		
FY11	8.6	26.99
FY12	9.3	29.62
FY13	13.45	44.46
FY14	10.16	34.10
FY15	10.66	46.73
FY16	10.47	62.17
FY17	11.20	68.86
Total:	73.69	312.93

Annex 5. Beneficiary Survey Results

Not Applicable

Annex 6. Stakeholder Workshop Report and Results
(if any)

Not Applicable

Annex 7. Summary of Borrower's ICR and Comments on Draft ICR

Borrower Comments on the ICR

During the project preparation and implementation, the World Bank and the Chinese agencies have carried out a constructive collaboration and as the result, the project development objective with all targets have been achieved. It is concluded that the project is very successful. We have reviewed the project ICR and consider it evaluates project performance and lessons learned objectively and explicitly. We fully agree with the overall assessment and ratings presented in the ICR.

Summary of Borrower's Completion Report

Project Activities and Implementation

Plantation establishment and existing forest management, water cellar construction, and equipment procurement

(a) Plantation establishment and water cellar construction

Under the project, a total area of 132,290 ha of project plantations has been completed, which is nearly 100 percent of the project target of 132,600 ha. Of this, the area of new multifunction plantations is 93,840 ha, accounting for 101 percent of the PAD plan of 93,000 ha and the areas of improved existed plantations is 38,450 ha, accounting for 97 percent of the PAD target of 39,600 ha. The findings of the project monitoring show that plantation quality indicators including the rate of use of first class seedlings, environmental protection compliance rate, planting survival rate, the preservation rate, and the acceptance rate of young plantation tending are all more than 90 percent, exceeding the set project standards.

Also, the project has constructed 1,340 water cisterns—as the project planned, including 417 cellars financed by the project funds and 923 supported by the Water Department of the Shanxi Province.

(b) Equipment procurement

The project has completed the procurement of 859 sets of office equipment, representing 112 percent of the PAD target, including 133 sets for support to farmer associations/cooperatives, which are computers, printers, projectors, global positioning system (GPS), photocopiers, office desks and chairs, file cabinets, and so on.

Institutional Capacity Building and Ethnic Minority Development Plan (EMDP)

Project activities such as institutional support, project management, and monitoring and evaluation (M&E) have been carried out in the light of the project plan, which has contributed significantly to smooth project implementation and effective extension of project experiences. Meanwhile, project training activities have upgraded the management level of project staff, improved the project implementation efficiency, and created demonstration effects within and outside project areas. The strict implementation of the EMDP has ensured the interests and benefits of ethnic minorities in project areas.

(a) Technological training

Various training activities have been organized for project agencies at each level, promoting effective and strict implementation of project provisions and criteria. In total, 323,950 person days of various training, workshops, domestic and overseas study tours, and consultant services have been completed, accounting for 127 percent of the PAD plan. See Table below. The table shows that due to the current restrictive policies, the targets for overseas training and domestic study tours could not be completed. However, remedial measures have been taken through providing more training at national, county, and township levels. The targets of the overall project training plan have been exceeded accordingly.

Completion of Project Technological Training

Monitoring Indicator	Plan (Person day)	Completed (Person day)	Completed/Plan (%)
1. Overseas training and study tour	2,915	1,529	52
2. Domestic study tour	4,212	2,920	69
3. National training	120	2,399	1999
4. Provincial training	10,420	10,911	105
5. County and township training	194,868	259,592	133
6. Domestic consultant service	3,576	3,905	109
7. Training for support to forestry reform	39,320	42,696	109
Total	255,431	323,952	127

The national-level training focus on overall project management and technical road map of multifunction plantations such as tree species composition and species mixed structure, models for the improvement of existing degraded forests, and roles of the project in combating climate change. Meanwhile, the focus of the training organized PPMO to county and township is on technical measures such as project financial management and audit, social assessment, operational design, seedling criteria, planting methods, and environmental protection guidelines, and the training for forest farmers is more on on-site training to help them learn technologies through visible and tangible ways. A questionnaire survey indicated that both the project agencies and forest farmers were generally satisfied with the project training. Of the interviewees, 80 percent considered that project training is helpful. Through training, the survival rate and quality of project plantations have been improved greatly and pest and diseases controlled effectively. The farmer trainees comprise 43 percent women and 57 percent men. These efforts are positive in promoting social fairness and extending women's role in society.

(b) Technological extension

In total, 44 advanced technologies and 52 improved species have been introduced under the project, which is conducive to upgrading forest management and bringing integrated forest resources management to better combine long-term forest management and short-term income generation. In some project areas, intercropping of Chinese medicinal herbs and economic crops under forests have been conducted, creating annual revenues of over RMB 30,000 per ha. These measures have effectively solved the issue that plantations generate profits over many years of growth after being established and are welcomed by forest farmers.

(c) Ethnic Minority Development Plan

There is only one project county having ethnic minority groups, which is Fuxin Mongol Autonomous County (Fuxin County) in Liaoning Province. Fuxin County has 160,000 Mongol people, accounting for 20 percent of the total population of the county. Owing to sufficient publicity and effective social assessment, many Mongol farmers participated in the project on a voluntary basis. The project has provided Mongol people with equal participation opportunity and rights by conducting consultations with the farmers at each of potential project villages. To respect the customs of Mongol farmers and have effective communication, the project information was provided to the ethnic minority communities in both Mongolian and Chinese. Meanwhile, much attention has also been given to encouraging women to engage in project design, training, and implementation.

In Fuxin County, 203 villages participated in the project, of which 41 villages having Mongol communities, accounted for 20 percent of the participating villages. Among 716 contracts that have been signed with farmer households, 117 contracts were signed with Mongol households, taking up 16 percent of the total. The area of the project plantations in the county is 6,711 ha, of which, 899 ha is planted by Mongol households, which is 13 percent of the total.

Support to collective forest land tenure reform

With the focus on activating forestry operational mechanism, the project provided support to the Governmental collective forest land tenure reform. Thus, the enthusiasm of farmers has been greatly aroused and the project targets in this part have been fulfilled. (See Table below)

Activities in Support of Collective Forest Land Tenure Reform

Support Activities	Unit	Plan	Completed	Completed/Plan
1. Area for which forest right certificates are granted	ha	55.050	74,906	136
2. Establishment and upgrading of farmer associations/cooperatives	No.	20	20	100
3. Forest Management Plans (FMPs) developed	No.	5	5	100
4. Workshops	No.	4	4	100
5. Study for forestry reform		4	4	100

(a) Granting of forest right certificates

The project has provided support to granting of forest right certificates carried out under the forest tenure reform, through which local forestry development has been promoted significantly. This is because that forest right certificates enabled farmers to feel relieved on long-terms forest land management, so they have higher enthusiasm in forestry investment and show more interest in plantation management; and the certified forest can be used as mortgage for Bank loan applications, which has expanded the fund sources for forestry development and farmers' livelihood development.

(b) Support to farmer cooperatives/associations

Under the project, the improvement of total of 20 farmer cooperatives/associations has been supported, taking up 100 percent of the project targets. The major business activities of these farmer associations/cooperatives covered planting stock development, planting and forest management, fruit processing and marketing, with the involvement of 7,069 farmer households. The support provided by the project has advanced further development not only in forestry but also in farmer associations/cooperatives institutional capacity building. The key project activities carried out include (i) improvement of institutional structure, regulations, and system of farmer associations/cooperatives to maintain steady and long-term operation; (ii) provision of technical guidance and services to improve the skills of forest farmers; and (iii) organization of forest farmers to engage in profit-generating activities with the premise that the ecological benefits of the project be guaranteed, to accelerate poverty reduction and income increase of farmers.

(c) Development of a Forest Management Plan

Each project province has piloted one FMP. The FMPs are the key documents for community to develop a mid- and long-term forest management plan by which integrated forest management

activities are organized, harvest arrangements determined, and production and investment plans prepared. The activity has promoted the scientific forest management in project areas. Per a survey, project FMPs have not only provided demonstration and guidance to project implementation entities to carry out sustainable forest resources management, but are also more helpful to local farmers outside project areas to carry out forest protection, scientific forest management, and sustainable utilization of forest resources through organizing technical trainings to local people and promoting marketing for forest, in particular, the nut and fruit products.

(d) Studies and workshops related to collective forest land tenure reform

During project implementation, four workshops were organized in project provinces to exchange lessons learned on collective forest land tenure reform. Experts were invited from universities, research institutions, and government agencies to participate in the workshops. Per the project design, Zhejiang Province carried out four studies in the areas of collective forest land tenure reform, farmer cooperatives/associations, and sustainable development and technologies for ecological improvement. These research results have assessed progress and impacts of collective forest land tenure reform in Zhejiang as well as the lessons learned for further improvement of the reform processes. The studies have also analyzed the implementation of the project technical models and confirmed that adopting the Models will promote the technical advance along with the forestry reform processes.

Project Investment

The project investment plan is fulfilled

The project has completed an investment of RMB 1.522 billion, accounting for 112 percent of the planned cost of RMB 1.36 billion, including RMB 1.013 billion for establishment of new multifunction plantations, taking up 129 percent of the plan; RMB 375 million for improvement of the existing plantation forests, 118 percent of the plan; RMB 87 million for capacity building and M&E, 83 percent of the plan, and RMB 48 million for other support activities (see Table below).

Completion of Project Investment by Project Category

Project Category	Total Plan		Completed		Completed/Plan (%)	
	Equivalent to US\$, millions	RMB millions	Equivalent to US\$, millions	RMB millions	US\$	RMB
Total	200.00	1360.00	243.53	1522.00	122	112
Establishment of New Multifunction Forest Plantations	115.66	786.51	162.02	1012.58	140	129
Improvement of the Existing Plantation Forests	46.62	317.00	59.94	374.61	129	118
Institutional Support, Project Management, and Monitoring and Evaluation	15.38	104.57	13.93	87.04	91	83
Contingency Fee	22.34	151.92				
Others (front-end fee, and so on)			7.64	47.77		

The fact is that the investment plan has been overfulfilled for project Component 1 (Establishment of New Multifunction Forest Plantations) and Component 2 (Improvement of the Existing Plantation Forests), however, the plan for Component 3 (Institutional Support, Project Management, and Monitoring and Evaluation) failed to complete fully. The reasons for this are summarized: (i) the project activities of overseas training and study tours and domestic consultant services have not been fully carried out due to restrictive policies imposed by the Chinese Government and (ii) as some project training activities have been conducted together with other projects, it is difficult to separate the costs and recorded under the project.

- (a) The sources of investment costs are composed of the World Bank loan of RMB 623 million equivalent, taking up 41 percent of the completed total investment, which is lower than the planned 50 percent at the project preparation stage; and the domestic counterpart funds of RMB 899 million, 59 percent of the total project costs, which is 9 percent higher than the designed ratio.
- (b) The project investment plan has been carried out well in project provinces. Anhui has completed RMB 376 million which accounts 126 percent of the plan for the province; Hebei fulfilled RMB 301 million, taking up 111 percent of the plan; Liaoning RMB 229 million, Shanxi RMB 322 million, and Zhejiang, RMB 294 million, accounting for 105 percent, 113 percent, and 103 percent of the plans respectively.

The disbursement of the World Bank loan is in consistence with the project plan

The World Bank loan disbursement progress is consistent with the plan during project implementation. Five project provinces including Hebei, Shanxi, Liaoning, Zhejiang, and Anhui have completed US\$99.09 million of the World Bank loan cumulatively. Zhejiang and Anhui have fully used up the World Bank loan allocated for these provinces. Hebei and Shanxi planned to use the World Bank loan in full amount, for which a financing plan in RMB was developed. However, due to the sharp currency fluctuation during the lifetime of the project there was loan surplus in the two provinces. Meanwhile, Liaoning has completed 96.4 percent of the loan plan. The reason for this is that severe drought weather occurring in 2014 badly affected the project progress in the province.

Delivery of project counterpart funds has achieved a higher rate

An amount of RMB 899 million counterpart funds has been delivered under the project, accounting for 132 percent of the planned RMB 680 million. Among which, RMB 990,000 has been provided by the central PMO for the central level training—RMB 192 million from the provincial level, taking up 97 percent of the planned; RMB 197 million; RMB 202 million from the prefecture/city level, taking up 96 percent of the planned; and RMB 211 million and RMB 504 million from the planting entities and other financial sources, taking up 185 percent of the planned amount of RMB 272 million.

Provision of counterpart funds progressed satisfactorily in project provinces. Specifically, Hebei has provided RMB 175.68 million of counterpart funds, occupying 129 percent of the plan for the province; Shanxi delivered RMB 190.97 million, taking up 134 percent of the provincial plan; Liaoning delivered RMB 129.66 million, taking up 119 percent of the plan; Zhejiang delivered RMB 162.51 million, taking up 114 percent of the plan; and Anhui delivered RMB 239.34 million, taking up 160 percent of the plan.

Application of project funds is in compliance with the relevant regulations

During the project implementation, the audit offices of five provinces carried out annual audit for project activities and financial management and delivered audit reports on an annual basis. From these reports, it is observed that the application of the project funds complies with the project requirements and relevant regulations. Project funds are disbursed on time, and good results are

generated. However, some issues are pointed out including the delivery of counterpart funds in a few provinces/prefectures/cities/counties not in full amount and detaining of project funds in several project entities. Remedy actions have been taken promptly and the identified issues have been addressed.

Generally, the application of the World Bank loan is in compliance with the provisions of the Project Loan Agreement. The project financial statements of five project provinces have been developed in accordance with China's accounting standards and the financial system as well as the related provisions in the Project Loan Agreement for financial management. The project financial documents faithfully reflect the project progress, quality of activities, financing and expenditures. In recent years, the Central Government has enhanced its efforts in anticorruption and punishment of illegal behaviors in economic activities. This has created a sound external environment for the implementation.

Major Factors Affecting the Project Implementation

The labor costs are rising sharply

During project implementation, the labor costs in China rose significantly. Based on the survey undertaken in project areas, the labor costs had been increased by around 25 percent. To deal with the unfavorable impact, various measures have been taken by project provinces including the use of project contingency fee, the mobilization of more funds from various financial sources and the adaptation of advanced technologies to reduce the labor costs. For example, Machines have been widely used to site preparation in some flat project areas in Liaoning and Hebei provinces, which has reduced the labor cost by around 15 percent.

Severe droughts occurring in provinces of Zhejiang and Liaoning

During project implementation, severe droughts hit several project areas, as a result, some newly-established project plantations failed to meet the project criteria. However, with the strong support of project implementation entities at all levels, the remedy measures have been taken and issues have been addressed.

In 2013, a drought disaster occurred in Zhejiang and affected an area of 2,357 ha project plantations or 40 percent of the total plantations established in that year. The survival rate was only 71 percent, caused a serious loss. To deal with this situation, the relevant county governments provided additional funds of RMB 1.90 million to farmers to replant the affected plantations and to water and earth-up planted seedlings, which increased the planting survival rate of the affected sites up to the set standards.

In 2014, the drought also occurred in Liaoning Province with rainfall only 50–70 percent of the normal amount. To ensure the smooth project implementation, several effective measures have been adopted including offering county and provincial level financial support to the project entities to carry out patch-up in some effected project plantations or re-establish in the completely failed plantations with the use of containerized seedlings to ensure the quality of newly established plantation.

New restrictive policies have been imposed and affected the implementation of project overseas training and domestic study tours

Since 2013, the Chinese Government has promulgated a series of new regulations to strictly control the numbers of overseas training and study tours as well as the domestic study tours. As a result, the project overseas training has completed only 52 percent of the plan and domestic study tours completed 69 percent of the plan.

To make up for the loss, the PMC has made active efforts to enhance the project trainings through employing experts who have international experience to provide trainings to project staff. More than 1,000 person days of additional training have been provided at national level. Meanwhile, at the provincial and county levels, more than 2, 000 person days of additional trainings were also carried out to fill the gaps accordingly. With the joint efforts, there were no negative impacts caused by the reduced overseas training and domestic study tours.

A questionnaire survey indicated that 78 percent of training participants considered that the overseas training had helped them to change their traditional forest management concepts, improve their work quality, broaden their vision, update the awareness of environmental protection, and learn advanced technologies in plantation establishment and management from other countries. Meanwhile, 76 percent of the participants taught the technologies they learned during the domestic study tour to more than 10 people. The survey findings show that the overseas training and domestic study tours organized under the project were very necessary for project agencies and entities adopting new technologies, transferring the planting and forest management from conventional monocultural planting to mixed species planting and improving project management.

Project Adjustments

To better fit with the local conditions and meet the needs for the changes happened during project implementation, the project provinces have made certain necessary and reasonable adjustments on project design.

One project county withdrew from the project in Shanxi

During project implementation, the number of the project counties (districts/cities) in Shanxi were reduced from 68 to 67, as Jinyuan District of Taiyuan Municipality withdrew from the project because land reallocation in the district led to the change in the use of land originally planned for project activities. A total of US\$520,000 World Bank loan and an area of 1,200 ha of plantations planned for the district were reallocated to other project counties. On project closure, the World Bank loan in Shanxi has been fully disbursed with the planting target reached.

The plantation models and tree species have been optimized

Plantation models introduced to the project have been optimized during project implementation in terms of quantity, seedling specification, planting density, and tree species, to meet the local conditions in project areas and incorporating lessons learned and new technologies. The adjustments that were made include an additional 14 broadleaf plantations used in forest rehabilitation models in Zhejiang, an adjustment in seedling criteria and planting density in some of the plantation models in Shanxi, an increase in new planting models and updating planting density in Liaoning, and an increase in the number of plantation models from 4 to 7 in Hebei. Those adjustments were made based on the actual needs, and the proposed adjustments have been reviewed by provincial expert team and the Bank. With the adjustments, the planting and forest management quality has been improved, mixture forest structure is more stable and cost effectiveness has been improved.

Project Benefits

Financial and Economic Analysis.

During the evaluation of project completion, the project financial and economic feasibility was reviewed. To ensure the consistency and comparability of various results, the same methods have been adopted at project completion, midterm review, and project appraisal. However, the following parameters have been updated to reflect the real situation at project completion.

- (a) The unit labor cost is updated to RMB 80 per day for Anhui, Hebei, Liaoning, and Shanxi

and RMB 95 per day for Zhejiang based on the findings of an investigation;

- (b) Based on several discussions with the relevant consultants, the price of carbon sequestration is US\$30 per ton of CO₂ (equivalent to RMB 204 per ton of CO₂) adopted based on the lowest price proposed in the Carbon Pricing Guidance Note issued by the World Bank on July 14, 2014;

Based on calculations, the financial internal rate of return (FIRR) of the project is 9.6 percent, slightly lower than 11.8 percent at project appraisal mainly due to the rising labor costs while the economic internal rate of return (EIRR) of the project is at 17.4 percent, a little higher than 16 percent at the project appraisal. Both FIRR and EIRR of the project are much higher than 8 percent, the baseline indicator set by the Chinese Government for the forestry projects. This indicates that the project has created not only obvious ecological benefits, but significant social and economic benefits (see Table below). Although the labor costs were rising during project implementation, the growing price of environmental benefits has made up for this gap to some extent.

Project FIRR and EIRR (%) Summary

Province	Project Launching in 2010		Project Completion in 2016	
	FIRR	EIRR	FIRR	EIRR
Anhui	12.0	15.0	10.1	15.3
Hebei	13.0	19.0	8.9	18.8
Liaoning	13.0	21.0	9.9	25.5
Shanxi	9.0	13.0	10.5	16.1
Zhejiang	12.0	13.0	7.4	13.1
Total	12.0	16.0	9.6	17.4

Ecological Benefits

The multifunction plantations established and rehabilitated in the project areas have increased forest cover in environment important areas and improved the quantity of degraded forest land. As a result, biodiversity has increased considerably and the ability to combat climate change has been enhanced. Moreover, the mixed plantation models adopted under the project have reduced the occurrence of forest pests and diseases by 43 percent, decreased the soil and water erosion by around 10–20 percent, and at the same time, increased the growth of the mixed plantations by over 20 percent compared to the non-project plantations.

- (a) **Improved vegetation coverage.** In 2016, the vegetation coverage of the project sites was 57 percent, increasing by 22.1 percent against set target of 36 percent, which indicates that the project implementation has contributed to the increased vegetation cover in project areas and the trend would increase rapidly in the years to come. More specifically, the project has generated the following environmental benefits:
- (b) **Increased tree species.** Generally, the number of tree species used in project plantations were increased from 1 to more than 3 (3 to 10 with average of 5 per sub-compartment compared to the non-project plantations, indicating that the project has promoted an increase in biodiversity in project areas. Meanwhile, the project has provided demonstration for transforming the traditional monoculture establishment into planting and forest rehabilitation with mixed species and stable forest structure.
- (c) **Reduced wind erosion.** According to the monitoring results in 2016, compared to the non-project plantations, the wind erosion was reduced by 40 in Hebei and by 55 percent in Liaoning, which indicate that the project plantations has begun to curb the land from further desertification.
- (d) **Decreased soil erosion and surface runoff.** According to the monitoring results in

2016, the amount of surface runoff of the project sites was 624 cubic meters per ha and the amount of soil erosion was 10.4 ton per ha, both reduced by 7 percent and 12 percent respectively against the non-project sites, which have enhanced the capacity in soil control and water conservation of project areas.

- (e) **Lower occurrence of forest pests and diseases.** The occurrence rate of pest and disease in project plantations was 13.3 percent in 2016 while that of the contrasted plantations was 23.33 percent, with a significant decrease rate of 43 percent compared with non-project areas.
- (f) **Significant benefits of carbon sequestration.** Forest management is a cost-effective approach to fix carbon and a major measure to combat climate change. It is estimated that in 20-year period, the project plantations will form the dry matter at 25–100 ton per ha with each ha absorbing 90–400 tons of CO₂ equivalent, and the plantations established under the project will sequester around 32.41 million tons of CO₂.

Social Benefits.

(a) The Overall Social Benefits.

The concepts introduced by the project of ‘mixed plantation models’ and ‘multifunction plantations’ have created positive impacts on the policies made for forestry development in China. The ongoing 13th five-year Forestry Development Plan issued by the Chinese Government clearly states that “in the newly-planned land designated for plantation establishment, priority should be given to the development of mixed plantations; for the existing monocultural plantations, degraded plantations, management measures should be taken to upgrade the tree composition and improve the stand quality through thinning, supplementary planting and other measures to form mixture forest structure with coniferous and broadleaf tree species, arbor tree and bush species, as well as to improve the quality of forests and stability of forest ecosystem.

Through the implementation of the planting and forest management models and the provision of a variety of technical trainings to local farmers and forest staff, the advanced design concepts, methodologies, and technologies have been demonstrated and disseminated; the community consultation and participatory design process introduced by the project is highly recognized by the Government and this process is adopted by some domestic forestry projects in an attempt to encourage farmers to get involved in the project decision process. It is estimated, the project planting and forest management models have been extended to board areas outside of the project areas, approximately 10 times of the project areas. For instance, the advanced concepts and mixed planting and forest management technologies of the project have been introduced to the national forest programs such as the National Forest Reserves Development Project and Guangxi Forest Development Program financed by the National Development Bank; Forestry Development in Thousands of Mus Program in Anhui, Ecosystem rehabilitation for Greening Mountains and Cleaning Water Program in Zhejiang. It is concluded that the dissemination of the project experience has vigorously promoted the forestry development in China.

(b) Benefits for the Project Beneficiaries.

About 161,282 farmer households and project entities participated in the project, which include 158,342 individual farmer households, 2,671 farmer cooperatives/associations; 262 collective forest farms, and 7 state-owned forest farms. The participatory design process carried out under the project has ensured the ownership of the land owners and the active involvement of the project decision process. Majority of project beneficiaries are farmer households and farmer associations/cooperatives, in that they can participate in the decision-making process on the selection of planting sites and tree species, technical models and operational arrangements. Under the project, marginal groups and vulnerable population such as poor farmer households and women

all have equal opportunities to participate in the project and benefit from it. Although the project itself is not a poverty alleviation one, the attention has been given to equal project participation of poor farmer households and by every means possible has tried to attract these groups to be involved in project activities. Thus, among the total participatory farmer households, 9.4 percent of them are poor. Moreover, special attention has been paid to women's rights and interests. The percentage of women participating in the project is as high as 43 percent. In ethnic minority areas, efforts have been made in ensuring the equal opportunities for ethnic minority groups to participate in the project.

Considerable Economic Benefits

The implementation of project activities needs a lot of rural labor to carry out jobs of establishing new multifunction plantations, improving the existing forests, building infrastructures, and so on. This has provided sufficient employment opportunities for farmers to get additional incomes. During project implementation, the total income generated by farmer labor inputs were RMB 6,415 per participating household in average. Meanwhile, the project plantations have provided effective protection for farmland, resulting in an increase in agricultural output by more than 10 percent. In addition, forest thinning and reeration will generate considerable benefits to the beneficiaries.

- (a) ***Additional incomes from labor inputs.*** The farmers' participation in the project has brought to them additional labor incomes. The findings of social result indicator monitoring show that in project areas, the annual labor income per household is at RMB 1,069 on average, accounting for 2.6 percent of the total revenues of a household, which has contributed to increased rural incomes.
- (b) ***Increased agricultural and economical crop production.*** The findings of M&E in 2016 indicated that with the protection of project plantations, peanut production grew by 11.7 percent against that of those without protection, with an additional revenue of RMB 650 per ha generated.

Per the project implementation plan, some participating project farmer households planted several economic tree crops under the project, which have begun to generate revenues in 2016. In Anhui Province, farmer households obtained RMB 431 per ha from plantations of oil tea, moso bamboo, and tea; farmers in Hebei Province obtained RMB 5,161 per ha from economic trees of vines, pear, and apple; farmers of Liaoning obtained RMB 1,695 per ha from hazelnut soil and water conservation plantations and farmers in Shanxi achieved RMB 589 per ha from walnut production.

Lessons Learned

During the project design, experts of the World Bank and domestic consultants carefully assessed the advanced experiences from China and other countries, based on which, the innovative project design was developed. During project implementation, the project participants demonstrated and summarized the experiences and lessons, continually improved the project technical models, and resolved the issues emerging in the implementation process. As a result, the project has achieved significant progress. The advanced concepts, experiences, and technologies applied under the project have been extended and practiced in a series of major domestic forestry projects.

Innovation and Lessons learned

- (a) ***Sound cooperation and coordination among government institutions contribute to successful project implementation***

An efficient coordination and work mechanism have been set up among the relevant government agencies including development and reform commission, finance department, forestry department and audit bureau, which has greatly promoted effective project implementation. The Development and Reform Commission reviewed the project development framework and key activities to ensure that the project design was consistent with the strategies and policies of the Chinese Government

and the World Bank; the Finance Department worked efficiently to ensure the sound financial management and availability of counterpart funds in full amount with timely deliverable. The Department of Forestry played a professional role in project implementation by organizing project implementation and provide technical assistance. The audit office monitored closely the project activities to ensure the use of project funds in compliance with the related regulations.

(b) Promoting natural rehabilitation with human interventions is an effective approach of forest restoration

During the project preparation in 2010, the project brought the latest concept “close-to-nature forestry development” to the project design. The project, a first in China, practiced the updated plantation models by establishing multifunctional plantations and improving the degraded monoculture forests into mixed species plantation forests with the use of various tree species in the areas with vulnerable eco-environmental conditions. These measures have facilitated the transformation of monoculture commercial plantations into multifunction plantations focused on ecological benefits. On April 25, 2015, the State Council issued ‘Opinions on Accelerating the Ecological Civilization Construction’. It states, “In order to facilitate the ecological rehabilitation, attention should be given to natural restoration, combined with human interventions.” The design concept and technical measures adopted under the project are highly consistent with the principles of China Central Government, and the technical models demonstrated by the project and lessons learned are contributing to promoting sustainable forestry management for China.

(c) The Government takes the responsibility of loan repayment for improvement of ecological environment and participatory farmers benefit from project plantation establishment

In addition to demonstrating the establishment and management of multifunction forest for environment protection, the project has also demonstrated sound public and private partnership investment mechanism. More specifically,

- (i)* As the project would focus on environmental improvement, the county government takes the responsibility of loan repayment and participating farmers manage and benefit from project plantation establishment and long-term forest management. This arrangement has greatly stimulated forest farmers’ enthusiasm in participation in the project.
- (ii)* To improve the effect forest management, the project has provided support to farmer associations/cooperatives to improve their institutional capacity in providing technical services and trainings to local farmers, developing marketing for forest and economic crop products and organizing better planting and forest management. The promotion of farmer associations/cooperatives is approved as an effective way of improving technical services in grassroots level, forest management and product quality, profitability and farmer income.

(d) Participation of communities and households in the project planning process is an effective tool to generate ownership and project sustainability.

The project introduced participatory and “bottom-up” approaches to forest resources planning and management by consulting local communities, planting entities and households early in project design, by involving them in project implementation, and by being responsive to communities’ preferences and needs. This approach greatly enhanced stakeholder ownership in long-term forest management. The more active involvement of local communities will not only lead to better adherence to management prescriptions and effective management, but it will also ensure that the project’s social objective is achieved.

(e) Improved models for formation of mixed multifunction plantation forests have been practiced by use of a variety of broadleaf tree species

In view of the characteristics of the project areas mainly having vulnerable environmental conditions, the project is carried out in plain sandy land, hills, and Loess Plateau in the north and hilly land in the south of China, with priority laid on balanced ecological and economic benefits. The design scheme for project plantations followed the principles of 'low planting density, mixed tree species, multifunction, and sustainability' and introduced improved tree species suitable for environment improvement. A total of 37 technical models for mixed plantations have been developed under the project, including 29 models for establishing new mixed multifunction forest plantations and 8 models for improving the existing plantation forests.

Through simulating the natural generation, the efforts in establishment of mixed plantations and transformation of monocultural plantations to the multifunctional mixed forests have facilitated restoration of the close-to-nature forest system suitable for local natural conditions, which has significantly enhanced the functions of the forests in soil conservation, windbreak and sand fixation and farmland protection, so that the local ecological environment has been improved largely.

(f) The use of containerized seedlings in project plantations is an effective way in promoting growth of plantations

The project is implemented mainly in the areas featured with poor soil conditions and vulnerable environment conditions, so the normal technologies would result in a lower survival rate. In view of these unfavorable factors, several improved technologies and measures have been introduced and practiced about seedling cultivation, site preparation, planting, tending, and plantation management to increase planting survival rate in difficult site conditions. The use of containerized seedling was promoted. In the previous World Bank forestry projects, only around 2 percent of the containerized seedlings being used in project planting. By contrast, this rate in the project was risen to around 20 percent, especially in Zhejiang, almost used planting materials are containerized seedlings. The surveys indicate that compared to the plantations established with the use of bare-root seedlings, the survival rate and growth increment of new plantations established with the use of containerized seedlings are higher by over 17 percent and 30 percent, respectively.

(g) Timely adjustments are critical for accomplishment of the project objectives

In widely dispersed projects with diverse geographical and social conditions, and changes might be occurred during long-term project implementation period, timely adjustments and flexibility in project implementation is needed to ensure that interventions are appropriate to local conditions and needs. During the project implementation, adjustments have been made in plantation models including tree species, composition, planting density, and seedling specifications, to enable these models to be improved to adapted natural conditions of different locations. Moreover, the reallocation on project funds including the World Bank loan has been done for improving the fund efficiency to ensure that the fund disbursement is in compliance with the project progress.

Issues and Recommendations

Although the project has progressed successfully, there still existed some issues that needed close attention for further forestry programs.

(a) More balance should be taken consideration between ecological and economic benefits.

During project implementation, the project staff found that participating farmers prefer to planting more economical crops while they support the ecological afforestation in some project areas. Though the project is promoting the multiple-function plantation establishment and forest management to generate both environmental and economic benefits, in some areas, where the ecosystem is very fragile, the planting dose focus on forest ecosystem restoration. Therefore, it is recommended that more attentions should be given to balance the economic and ecological benefits in those areas in future forestry

projects, in particular in creating incentive mechanism to attract farmers for long-term sustainable forest management as well as for local people livelihood development.

- (b) ***Much attention should be paid to project costs.*** Due project implementation period, the increased financing gap put great pressures to the project agencies. In particular, the USD depreciation against RMB made the World Bank Loan ‘shrinkage’; (b) rapidly raised labor costs caused afforestation and forest management cost increased and (c) and unavailability of project counterpart funds in some project areas effected the funding delivering to planting entities and farmers on a timely basis.

Although these issues have been resolved thanks to great efforts made by the project agencies, it is suggested that close attention should be given to project cost estimation in the design of future forestry projects, by taking consideration of relevant elements and increasing the contingency fee, as well as to reduce counterpart funds ratio to meet poor financial conditions in some project areas.

Assessment of the World Bank and Project Agencies Performance

Assessment of the World Bank

(a) Strict Supervision and Effective Guidance.

During the periods of project preparation and implementation, the World Bank sent several project supervision missions to review the project progress and provide guidance on project design and improvement. The World Bank regularly sent two semiannual supervision missions each year visiting project areas and agencies. The Bank team brought the new project design concept to the project preparation and it is also very accountable in identifying issues emerged during project implementation and help project agencies addressing the issues, as well as provide valuable recommendations and advice for further improvement. The guidance and diligent supervision provided by the World Bank have effectively promoted the smooth project preparation and implementation.

(b) Practical and Flexible Work Style.

During project implementation, China’s forestry sector experienced several major reforms including collective forest land tenure reform. Influenced by changes in policies and market demands, forest farmers proposed several adjustments to project activities considering the actual needs. The World Bank quickly responded to these changes, provided strong support to the proposed adjustments on time, which has ensured the smooth implementation of the project.

Friendly Cooperation between the World Bank and the Borrower.

The successful project implementation has corroborated a friendly and sound partnership between the Chinese Government and the World Bank. During the project implementation, the World Bank supervision missions visited the project townships and villages as well as the plantation plots several times, communicated with grassroots technicians and participating farmers to understand their needs, answered their questions patiently, and provided help to resolve the issues in project implementation. These efforts are conducive to successful project implementation.

Project Agency Performance

With the strong support of the National Development Reform Commission, Ministry of Finance, and National Audit Office, as well as relevant provincial government agencies, the Project Implementation Units set in the forestry sector at central, provincial and county levels have worked hard and efficiently on the project preparation and implementation, in particular on implementing innovated technical design with providing adulated technical services and trainings; ensuring quality project activities and timely disbursement; making every efforts in solving of issues

emerged during the project implementation. Those endeavors have promoted smooth project implementation and contributed to the realization of project development objective. Moreover, the high sense of responsibility showed by the project agencies has built a solid basis for future World Bank loan forestry projects being implemented in China.

Post-Project Management Plan

Clarifying post-management responsibilities of related project institutions

After the project, the administration and management of project plantations have been handed over to county-level forestry authorities and farmers. The County Forestry Bureaus (CFBs) are permanent agency under the local governments, which are responsible for forest resourced management, especially the ecological improvement. Meanwhile, as the forest farmers are land owners and will directly benefit from the project, they are enthusiasm in the management of project plantations. As part of routine work, CFBs would provide technical assistance to planting entities and farmers for the forest management.

The project M&E program has incorporated into the government M&E programs and carried out continuously by the local government and the existing research institutes, as the project planting and forest management are key parts of overall government forest resources management program.

Implementing the ‘three prevention’ responsibilities

The responsibilities of the prevention and control for fire, pest and disease for project plantations have been incorporated into the regular management responsibilities of local government and forestry authorities. All-around fire and pest and disease forecast, prevention and control in project plantations will be conducted by making full use of the existing provincial-level system built for forest pest and disease control including forest fire forecast and prevention stations and forest pest and disease monitoring stations at the county, township, and village levels. Attention will also be given to awareness education to local villages on the prevention of forest fire and relevant regulations, and the monitoring for occurrence of fire and pest. It is expected that the strict controlling of the occurrence of forest pests and diseases and fire will ensure the healthy growth of project plantations and realization of project ecological, economic, and social benefits.

Enhancing post-project management

As the project plantations are mainly managed for ecological environment protection, subsidy funds, which would be provided by national and provincial governments, will be used to carry out forest management. The funding National and provincial government provide a flat rate subsidy to forest owners of RMB 225 /ha/year to maintain forest cover – the aim being to compensate forest owners for the public goods generated by their forests; for the plantations managed for both economic and ecological benefits, more intensive management is needed. The additional funding of RMB 1,500/ha/year is available through the National Forest Management Program to cover tending and thinning cost; and for the economic tree crops, which mainly generate economic benefits, farmers are happy to continue to mobilize funding and labor inputs for the stand management.

Making preparation for timely repayment of the World Bank Loan

Project county governments are responsible to the Bank loan repayment. The repayment plan has been prepared, which will be started from 2020 and the government agencies have made commitment on timely loan repayment.

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Not Applicable

Annex 9. List of Supporting Documents

1. Project Appraisal Document
2. Borrower's Completion Report
3. Aide-Memoires and ISRs
4. Semi-annual Progress Status Reports from Borrower
5. Project Agreement
6. Loan Agreement
7. Project Implementation Plan

