

Basic situation of the project

Table 1

| | | | | | |
|--|--|---|-------------------------------|---|--------|
| Project Title | Shanxi Integrated Development Project on Forestry on the Yellow River Basin Financed with EIB Loan | | | | |
| Construction unit | Shanxi International Finance Forestry Project Management Office | | | | |
| Legal person | Meng Xiangang | Liaison | Meng Xiangang | | |
| Address | No. 105, Xinjiannan Road, Taiyuan City, Shanxi Province | | | | |
| Telephone | 0351-7245310 | Fax | 0351-7245310 | Postal code | 030012 |
| Project sites | Linshi County, Fenyang City, Liulin County, Hequ County, Shenchu County, Baode County | | | | |
| Department reviewed and approved project establishment | National DRC | | Document No. of approval | | |
| Project type | Newly built <input checked="" type="checkbox"/> Reconstructed or Expanded <input type="checkbox"/> Technical Renovation <input type="checkbox"/> | | Category and code of industry | A0212 Forest plantation | |
| Area | 19141.19 ha. | | Forest area | 19141.19 ha. | |
| Total investment (10,000 yuan) | 41000 | In which investment on environmental protection (10,000 yuan) | 376 | Percentage of investment on environmental protection with the total | 0.92% |
| Assessment cost (10,000 yuan) | | Date for estimated start-up | 2018 | | |

1 Project Content and Scale

1.1 Project Background

This project proposal is to follow up the policy set by the National Forestry Administration Bureau to encourage utilization of international fund and to implement the objectives and tasks set up in the national forestry development plan for “the Utilization of International Financial Institute Loans during the 12th-Five-Year Plan” . The project will serve the overall development plan on the utilization of international financial funds in forestry in Shanxi and improve the operation standard of Shanxi on foreign funds utilization. We aim at eventually building the project into a real showcase for modern forestry construction and achievement in opening up in the field of forestry. In order to achieve the goals, Shanxi Government has been striking for such projects by consistently applying to the Project Center of National Forestry Administration Bureau.

According to the requirements set by the National Development and Reform Commission, State Ministry of Finance and National Forestry Administration Bureau at the meeting held in Beijing in late July, 2014, Shanxi Provincial Development and Reform Commission, Shanxi Finance Bureau and the Provincial Forestry Administration Department had reissued new documents including project application and the commitment on the repayment of loan during August and September, 2014. The Provincial Forestry Administration Department has conducted meetings focusing on the study of the European investment projects.

Shanxi is one of the qualified provinces in accordance with the terms for the borrowing of the loan from EIB. The Provincial Forestry Administration Department has conducted studies focusing on the applications of the loan from EIB, and has reached the consensus on that the implementation of the European loan project in Shanxi Province to fully meet the requirements in the 12th Five-Year Plan for the development of economy and society in Shanxi Province, as well as the requirements of the development on the construction of new rural areas, adjustment of the rural economic structure and the increase of farmers's income in Shanxi, which will bring great significance for the treatment of water and soil loss and even desertification, and for improvement in the ecological environment.

The project areas are mainly allocated in the gully areas on the loess plateau and the upper reaches of the Yellow River and the branch river of Hai River, where the ecology is important but fragile and where economy is relatively backward. These areas are also the major areas of forestry construction in recent 10 years in the country. Therefore, this project is highly relevant to and consistent with the construction objectives of the recovery of vegetation, increase of income in forestry economy and improvement of ecology, even with the utmost target of the ecological construction and the ecological development strategy of Shanxi Province. The implementation of the project will draw in the advanced international technology and management in up-grading the standards in eco forestry construction and project management and therefore will play an active role in improving regional eco environment, increasing forestry carbon sink, and in improving regional economy.

According to the requirements of the administrative procedure in construction projects and the state regulations in environmental protection, this project should go through environmental impact evaluation. According to the Construction Project Environmental Protection Management Regulations and the Construction Project Environmental Protection Management Regulations Classification List, evaluation of the project's impact on the environment should be presented in form of a report. Shanxi Internationally Funded Project Management Office has entrusted Shanxi Environment Science Research Institute to work out the environmental impact report form. Based on our staff members' site survey and data collection work, we have completed "An Evaluation Report of the Impact on the Environment for the Forestry Ecological Restoration Project along the Yellow River Basin in Shanxi Province, A Project Financed by European Investment Bank Forest Plantation Loan".

1.2 The necessity of the construction of the project

The first is that it will further promote the implementation of the strategy on "Ecologically Prosperous Province" for Shanxi as well as the international commitment made by our country. The central government and the State Council have attached great importance to the development of forestry and the construction of ecology. In recent years, a series of major decisions and deployment have been made. During the UN Summit Conference on Climate Change held in September, 2009, President Hu Jintao put forward that a huge quantity of forest carbon sink must be increased, and he also committed "Double-Increase Targets" in which the forest area of China in 2020 will be increased by 40 million ha., compared with that of in 2005, and the increase of 1.3 billion cubic meters forest reserves. Premier Wen Jiabao emphasized the "Four Key Positions" of forestry at the central government working meeting, i.e. forestry takes the key position in the implementation of the sustainable development strategy, the most important position in the construction of ecology, the essential position in the great development of the west China and the special position in the encountering of the climate changes. Vice Premier Hui Liangyu pointed out that the construction of forestry should fulfil "Four Missions": it is the most important measure in realizing scientific development, a primary task in constructing the ecological civilization, a strategic choice to deal with the climate change and a very important way to address the issues concerning agriculture, rural areas and farmers.

The conference on forestry held by the central government clearly defined the “five major functions” of forestry, concerning its functions in ecology, economy, society, carbon sink and culture. The National Forestry Administration Bureau has actively promoted the construction of modern forestry to establish “three major systems” for forestry with the greatest effort, i.e. the construction of a complete eco-system of forestry, a well-developed industrial system of forestry, and a prosperous system of ecology and culture. The Shanxi Provincial Committee of CCP and the Provincial Government have put forward the strategy of “the Prosperous Province on Ecology” by formulating the development plan and policy for forestry and setting up the targets and arrangement for the development of forestry. Therefore, to actively compete for the approval of the special loan provided by EIB to support the development of forestry is necessary for the promotion of sustainable development of local economy and society, as well as for the implementation of our international commitment.

The second is that it is favorable for regional ecological function and improving the ability to confront with climate change. To apply for the special loan project for forestry plantation from EIB is for the purposes of making full use of the driven function of the project in implementing scientific planning concentrated investment, large scale construction and proper redistribution, during which, forest will be planted for farmland protection, water and soil conservation, wind prevention and sand fixation and forest category will be adjusted. Through large scale forest plantation, ecological and economic profit will be increased, forest coverage rate and reservation will be raised. As a result, the soil will have much stronger abilities in wind prevention, water conservation, flood control and soil fixation, as well as in carbon fixation and oxygenation, forest plantation and beautification of the environment. Diversity of organism will be increased. The structure of tree category and forest category will be improved, the amount of output of forest products, forest biological products and carbon sink will be increased. The functions of self-recovery and self-service of the forests will be enhanced, which will help sustainable growth in coverage of regional artificial forest plantation. If we can maximize the impact of project in forest construction, we can improve our abilities and potentials in tackling climate change problems and in low-carbon economy development. All the above-mentioned proved that this project will play an active role in providing strategic support for a favorable international environment for steady development in China’s economic society and for more discourse power in addressing climate change issues on the diplomatic platform.

The third is that it is favorable for enhancing the integrated benefits and increasing the income of forest farmers. Waste mountain and waste land in the project area are abundant, which are feasible for the construction of ecological forest. At the same time, through the reasonable distribution of the forest variety and tree species, conditions are feasible to increase the forestry output, enhance the income of the forest farmers and promote the early realization of the construction of new rural regions as well as well-off society.

The project area is one of the regions with the best potential for the development of forestry, especially the broad backup resources of the forest land (waste mountain suitable for the forest plantation), there are a great number of slope farming land and low output farmland which can be used for the forest construction with the way of transform of the cultivated land into forest, and this is the best hope for the rapid development of forestry in the whole province. But the forest coverage rate in this area is very low with the single tree species, more shrub and less arbor trees, more single-species forest but less mixed species forest, poor stability of forest structure, low productivity of forest land, poor economic benefit and fragile ability to resist the natural disasters. There are many land plots which can be used for the forest plantation in the project construction area but they are with the heavy task for the tree plantation and ecological recovery, and the demand and willing for the realization of high economic growth and feasibility are very high there relying on the forestry.

The fourth is that it is favorable for strengthening international cooperation and broadening of investment channels. The terms for the loan of EIB are relatively preferential and the procedures are relatively flexible for procurement without any restriction conditions, and the period of preparation of the project is short, which is the preferential foreign fund source Shanxi Province can actively utilize. It will be of great significance for the maintenance of the steady and long-term cooperation between our province and EIB and the promotion of the continuous development on the cooperation between our countries, our province with EU by the successful completion of the construction tasks regulated in the project with high standards.

1.3 The history of international loan utilization in forestry in Shanxi Province

During the period of 12th Five-Year plan, Shanxi Province has implemented the “Forestry Resource Development and Protection Project by EIB Loan”, “Forestry Development Project in Poor Areas”, “Sustainable Development Project on Forestry”, “Shanxi Integrated Development on Forestry on the Yellow River Basin” and Shanxi Tree Plantation and Forest Plantation Project financed by JBAC, the technical assistant project of Germany and financial cooperation projects successively. The introduction and implementation of these international projects have provided strong financial support for the construction of ecological environment in Shanxi Province and effectively enhanced the progress of the construction of ecological environment in Shanxi Province. We can draw in experiences and lessons from the short history of the planning and implementation of the above-mentioned projects of WB loan.

1.3.1 Past experiences and way of operation

(1) We have strengthened the teamwork in environmental monitoring, plant diseases and insect pests forecast and prevention and treatment. We have also improved the construction of the sites for environmental impact evaluation and disease and pests forecast to guarantee the implementation of environmental protection measures.

(2) We have formulated normative regulations and measures for environment protection. The formulation of the framework of rules and regulations strictly abides the safety control policy of the European Investment Bank and the environmental protection laws and regulations of China, under which, we have drawn up the following documents on scientific and normative management regulations: “The Project Management Measures”, “The Management Method in Project Acceptance Inspection”, “Regulations of Environment Protection of the Project”, “The Monitoring of the Project’s Environmental Impact” and “The Plan for Disease and Pest Prevention and Treatment Management”. We have also worked out practical environmental protection measures to control important procedures in project design and construction.

(3) We have tightened up supervision on environmental protection. To guarantee management quality in this regard, we operate in the mode of “offering orientation and training (prior to the project), giving guidance (during the project) and conducting acceptance inspection (end of project) for environment protection management, and we take the measure of “graded inspection and acceptance”. The implementation of the environment protection regulations is one of the requirements to meet in project construction quality acceptance inspection so as to guarantee the implementation of these regulations in the project and good environmental protection effect can be achieved.

(4) We have paid close attention to the training of technical personnels. We send them out or invite experts in for training. We have organized group training, meeting session training and worksite training. We go to the countryside to conduct technical training, distributing technical operation papers to the environment management and operating personnels so as to improve their quality and to guarantee the environmental qualification rate to meet the objectives in the project design requirements.

1.3.2 Important lessons to learn

(1) The forest planters should improve their understanding and operation of the IPM theory. Despite the fact that during the implementation of the WB loan project, the departments of forestry project management of all ranks have strengthened their training and worksite instruction in comprehensive management of forest diseases and insect pests control, and that the forest planters have improved their understanding and operation of the IPM theory to some extent, due to the influence of traditional mode of thinking, they have biases in the selection of prevention and treatment methods such as organic, artificial, chemical, physical, forest culture and management. They need to receive further training to scientifically apply disease and pest forecast to disease and pest prevention and treatment, and to apply the above-mentioned ways of forest disease and pest control.

(2) The farmers have their own customs or ways of using agricultural chemicals. They like to use broad-spectrum biopesticide to prevent and treat forest pests and it is their custom to use the out-of-date varieties of biocide, so their ability in accepting new technology is inadequate. So, it is very difficult to change their old customs and ways of practice with trainings, and instructions in the selection and safe use of biocides alone. Typical case teaching will work better in helping them change their old customs.

1.3.3 Reference and revelation functions of the past projects of Ecological Restoration Forestry Project along the Yellow River Basin in Shanxi Province.

Experiences and lessons, and more importantly, revelation in environment management can be drawn from our past experience in the forest plantation project supported by WB loans.

(1) Matching tree species with the sites is the key to the success of ecology forest plantation by using species or variety of trees are suitable for different site conditions. Only if we make the right decisions in species selection, can the forest grow well and its ability of resistance to disease and insect pests be strong and stable eco system can be formed between well-grown forests and insects pests and natural enemies.

(2) Reasonable collocation of tree species is a prerequisite for ecological stability. Our studies show that the biological property of the 12 species of trees and shrubs we selected are suitable for the site conditions of the project areas. These trees are heliophilous and can stand shade, with broad and narrow crowns and long and shorter roots. Therefore, the arrangement of the species should be reasonable and there should be space between the trees so that they can coexist well.

(3) Acting according to local conditions and rational close planting are the guarantee for maintaining the stability of the ecological forests. The poorer the site condition, the higher the density of the trees and the better the site condition, the lower the density should be. Likewise, the smaller the tree crown, the higher the tree density, and the bigger the crown, the lower the density. The trees that can mix well on one site can be planted more closely. According to the conditions of the project areas, cypress and pine trees have small tree crowns and can grow together well. So they can be planted closely, under the condition that ground vegetation is well preserved.

1.4 The evaluation contents and focus

1.4.1 Evaluation contents

According to national environmental protection regulations and to the requirements of the special loans for forestry of the EIB, the evaluation contents in this report mainly include the following items; background introduction, description of the natural, social and economic environment of the project area, the analysis on the project and its impact on the environment, and proposal in solution of decreasing such impact, the analysis on the rationality of the scheme for implementation of the project, environment management and monitoring plan, the analysis on environmental hazard and public participation in the

survey.

Festibility analysis on the environment of the construction of the project is based on all the above evaluation contents.

1.4.2 Evaluation focus

According to the features of the planned project, the problems of the project's impact on and the protection of the ecological environment are the focus of this evaluation.

1.5 The rationale of the assessment

1.5.1 State laws and regulations.

- (1) The Environmental Protection Law of the People's Republic of China (1989)
- (2) The Forestry Law of the People's Republic of China (1989)
- (3) The Wildlife Protection Law of the People's Republic of China (1988)
- (4) The Water Law of the People's Republic of China (2002)
- (5) The Water Pollution Prevention and Control Law of People's Republic of China (2008)
- (6) The Water and Soil Conservancy Law of the People's Republic of China (1991)
- (7) The Environmental Impact Assessment Law of the People's Republic of China (2002)
- (8) The Regulations on Nature Reserves of the People's Republic of China (the State Council Decree 167, 1994)
- (9) The Regulations on Wild Life Protection (the State Council Decree 204, 1996)
- (10) The Public Notice on Strengthening the Administration of the Nature Reserves Areas (the State Council Decree 111, 1998)
- (11) The Public Notice on the Management of the Environmental Impact Assessment of Projects Funded by International Financial Organizations (State Environmental Protection Administration and other four ministries (1993:No.324)
- (12) The Regulations on Project Management (the State Council Decree 253, 1998)
- (13) The List of Classification Management of Project Construction Environmental Impact Assessment (National Environmental Protection Department Order No. 2008)
- (14) The Regulations on Prevention and Control of Forest Pests (the State Forestry Bureau, 1989)
- (15) The Interim Measures for the Management of Afforestation Quality (the State Forestry Bureau, 2001)

(1)

1.5.2 Local laws and regulations

- (1) Regulations on Environment Protection of Shanxi Province (revised in 1996)
- (2) The Measures for the Implementation of Prevention and Control of Forest Pests (the People's Government of Shanxi Province, 1997)
- (3) The Measures for Plant Quarantine (the People's Government of Shanxi Province, 1997)

1.5.3 Technical specifications

- (1) 《Guidelines for the Management of techniques of Environmental Impact Assessment》, HJ/ton 2.1、2.3-93;
- (2) 《Guidelines for the Management of Technics of Environmental Impact Assessment; atmospheric environment》, HJ2.2-2008;

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- (3) 《Guidelines for the Management of Technics of Environmental Impact Assessment; acoustical environment》, HJ2.4-2009;
- (4) 《Guidelines for the Management of Technics of Environmental Impact Assessment; ecological impact》(HJ19-2011);
- (5) 《The Interim Measures for Public Participation in Environmental Impact Survey》(State Environmental Protection Administration, March, 2006)
- (6) 《Surface Water Environmental Function Zoning in Shanxi Province》(DB14/67-2014) , Feb, 2004
- (7) 《Technology Specification for Water and Soil Conservation Plan for Development and Construction》, GB50433-2008.
- (8) 《Afforestation Technology Specification》(GH/119776-1998);
- (9) 《Technology Specification for Enclosing Hills for Reforestation》(GH/15162);

1.5.4 Related documents of the project construction

- (1) 《FSR on Shanxi Integrated Forestry Development Project Financed by EIB》;
- (2) 《Forestry Development in the 12th Five-Year Plan》 for Shanxi Province.

1.6 Basic situation of the project

- (1) Project title: Ecological Restoration Forestry Project along the Yellow River Basin in Shanxi Province Financed by EIB Loan
- (2) Project site: the project areas covers 3 cities and 6 counties (city, district) in Shanxi Province: Jinzhong City, Luliang City, Xonzhou City, Fenyang City, Linshi, Liulin, Hequ, Shenchu and Baode Counties (See Appendix 1. for geographical sites)
- (3) Project objective

During the construction period of the project, we are going to have a good control on water and soil loss in the project area relying on scientific technology, following the natural pattern, social and economic regulations to allocate the module for forest plantation in a scientific way, through the plantation of ecological forest, the objectives of the increase of forest area and enlargement of forest resource will be achieved, the biodiversity will be recovered and the income of the local farmers will be increased. Through the construction of project, the optimization of rural industrial structure, local production and living modes will be conducted to further improve the ecological condition as well as the environment for people's living to achieve the target of the harmonious coexistence between people and nature and to promote the increase of the people's income and the sustainable development of the local economy.

At the same time with the completion of the task of forest plantation, we are going to further enhance the capacity building for the public organization, promote the implementation of the transform of the collective forestry rights by the government, to increase the employment and income of the local people, to provide different services for the farmers participating in the project construction (such as promotion and training, organization of co-op and federation), to further facilitate the realization of the transform of the rights for the newly planted forest to protect the local forest resource. The technical training will be conducted to farmers to improve their qualification, and the existing farmer economic association will be further perfected, new farmer associations will be organized where the conditions are feasible to let them play an effective role in the construction of forest plantation.

We will try our best to achieve the tree plantation on the waste mountain and land by the treatment and protection of forest, to let the land suitable for forest plantation in the project area be effectively improved, gradually becoming a relatively complete forestry ecological system in the rural areas, enlarge and

consolidate the outcome of the treatment to have a better control on the degeneration of ecological environment caused by the human factors, and the successful improvement of the ecological conditions.

We are planning to complete the treatment scale of forestry covering an area of 19,141.19 ha. and complete the construction of the capacity building for the organizations at the provincial, city and county levels. The construction of the project will upgrade multi-function and integrated benefit of the forests and provide the demonstration of the utilization of EIB loan for the sustainable management and operation for other areas.

(4) Scale and contents of the project construction

The two contents of the project construction include: the newly planted forest and organization support.

① Artificial forest plantation

The total scale of the forest plantation is 19,141.19 ha., including 5,033.02 ha. of walnut, 293.52 ha. of apricot, 24.04 ha. of persimmon, 8561.70 ha. of *Pinus tabulaeformis* Carr, 192.32 ha. of *Pinus bungeana* Zucc, 1,437.81 ha. of *Pinus bungeana* Zucc, 2,354.21 ha. of *Platycladus orientalis* (L.) Franco, 411.76 ha. of *Robinia pseudoacacia* L, 2.40 ha. of *Salix babylonica* L, 111.62 ha. of *Gleditsia sinensis* Lam, 668.98 ha. of *Hippophae rhamnoides* Linn and 49.81 ha. of *Caragana korshinskii* Kom.

The construction contents and scale see Table 1-1

Table 1-1 A table of scale and contents of project construction

Unit: hectare

| Species | | Xinzhuo City | | | | Jinzhong City | | Luliang City | | |
|---|----------|--------------|-------------|--------------|---------------|---------------|---------------|--------------|--------------|---------------|
| | | Sub-total | Hequ County | Baode County | Shenci County | Sub-total | Linshi County | Sub-total | Fenyang City | Liulin County |
| Total | 19141.19 | 10141.61 | 3404.08 | 3143.12 | 3594.41 | 2691.26 | 2691.26 | 6308.32 | 3604.98 | 2703.34 |
| <i>Juglans regia</i> L. | 5033.02 | 160.76 | | 160.76 | | 1877.86 | 1877.86 | 2994.40 | 1125.88 | 1868.52 |
| <i>Prunus armeniaca</i> L. | 293.52 | 229.70 | | 229.70 | | | | 63.82 | 63.82 | |
| <i>Diospyros Kaki</i> L.f | 24.04 | | | | | | | 24.04 | 24.04 | |
| <i>Pinus tabulaeformis</i> Carr. | 8561.70 | 5311.71 | 1702.04 | 2171.86 | 1437.81 | 358.03 | 358.03 | 2891.96 | 2391.24 | 500.72 |
| <i>Pinus bungeana</i> Zucc. | 192.32 | | | | | 192.32 | 192.32 | | | |
| <i>Larix principis-rupprechtii</i> Mayr | 1437.81 | 1437.81 | | | 1437.81 | | | | | |
| <i>Platycladus orientalis</i> (L.) Franco | 2354.21 | 2282.84 | 1702.04 | 580.80 | | 71.37 | 71.37 | | | |
| <i>Robinia pseudoacacia</i> L. | 411.76 | | | | | 77.66 | 77.66 | 334.10 | | 334.10 |
| <i>Salix babylonica</i> L. | 2.40 | | | | | 2.40 | 2.40 | | | |
| <i>Gleditsia sinensis</i> Lam. | 111.62 | | | | | 111.62 | 111.62 | | | |
| <i>Hippophae</i> | 668.98 | 668.98 | | | 668.98 | | | | | |

| | | | | | | | | | | |
|------------------------------|-------|-------|--|--|-------|--|--|--|--|--|
| rhamnoides Linn | | | | | | | | | | |
| Caragana korshinskii Kom. | 49.81 | 49.81 | | | 49.81 | | | | | |

②Capacity building of organization

Mainly includes: promotion of practical technique and consultation, study tour and training, capacity building for organization

The proposed project construction will use the existing roads, so there will be no need to build new roads, so that damage to the original vegetations, new water loss and soil erosion, and the danger of secondary disasters such as debris flow and landslide can be avoided.

(4) Construction organization

In the process of the construction of the proposed project, all kinds of the seeding trees will be purchased locally and in surrounding areas, and over 2195 planting groups will be sharing each of the planting task. The planters will be farmers from nearby. The construction of this project will be accomplished by human labour.

(5) Construction schedule

According to the arrangement of the European Investment Bank special loan project, to the construction tasks and also to the circumstances of the local counterpart funding, the construction schedule will be constructing in batches, investment by stages and carrying on steadily, with a total construction period of 4 years.

The annual forestation task will be as followed. Year 1: new afforestation of 3, 328 hectares (20% of the entire mission); Year 2: new afforestation of 5, 742. 61 hectares (30% of the entire mission); Year 3: new afforestation of 5, 742. 69 hectares (30% of the entire mission); Year 4: new afforestation of 3, 827. 99 hectares (20% of the entire mission).

(6) Project funding and funds raising

Estimatedly, the entire investment going into the construction of the project will reach 410 million Yuan, within which, the proposed investment from the European Investment Bank will be 25 million Euros (This is according to an exchange rate of 1: 8.20; this amount equals 205 million Yuan and it constitutes 50.0 % of the entire investment). The domestic counterpart funding will reach 205million Yuan, covering 50.0 % of the total investment.

(7) Major index of economy and technology

For major index of economics and technology of the proposed project, see Table 1-2

Table 1-2 Major index of economy and technology

| Reference Number | Project Name | Unit | Index | Remarks |
|------------------|---|-------------|----------|---------|
| 1 | Project Construction Scale | | | |
| .1 | Planting Area of Different Models | | | |
| 1.1.1 | Juglans regia L. | hectares | 5033.02 | |
| 1.1.2 | Prunus armeniacaL | hectares | 293.52 | |
| 1.1.3 | Prunus armeniacaL | hectares | 24.04 | |
| 1.1.4 | Pinus tabulaeformis Carr. | hectares | 8561.70 | |
| 1.1.5 | Pinus bungeana Zucc | hectares | 192.32 | |
| 1.1.6 | Larix principis-rupprechtii Mayr | hectares | 1437.81 | |
| 1.1.7 | Platycladus orientalis (L.) Franco | hectares | 2354.21 | |
| 1.1.8 | Robinia pseudoacacia L. | hectares | 411.76 | |
| 1.1.9 | Salix babylonica L. | hectares | 2.40 | |
| 1.1.10 | Gleditsia sinensis Lam | hectares | 111.62 | |
| 1.1.11 | Gleditsia sinensis Lam | hectares | 668.98 | |
| 1.1.12 | Caragana korshinskii Kom | hectares | 49.81 | |
| 2 | Investment Limit | | | |
| | Total expense of the programme | 10,000 Yuan | 41000.00 | RMB |
| 2.1 | Construction expense | 10,000 Yuan | 35425.43 | RMB |
| 2.2 | Others (for construction) | 10,000 Yuan | 1416.97 | RMB |
| 2.3 | Interest rate (during construction) | 10,000 Yuan | 1025.98 | RMB |
| 2.4 | Preparation fee | 10,000 Yuan | 3131.61 | RMB |
| 3 | Source of Funding | | | |
| 3.1 | European Investment Bank loan | 10,000 Yuan | 20500.00 | RMB |
| 3.2 | Domestic counterpart investment | 10,000 Yuan | 20500.00 | RMB |
| 4 | Economic benefits (under estimation) | | | |
| 4.1 | Benefit calculating period | year | 25 | |
| 4.2 | Dried walnut | 10,000 Yuan | 576859.5 | Total |
| 4.3 | Apricot | 10,000 Yuan | 49472.0 | Total |
| 4.4 | Persimmon | 10,000 Yuan | 3894.7 | Total |
| 4.4.1 | Tending of wood (6-14cm) | 10,000 Yuan | 4958.6 | Total |

2 Project construction scheme

2.1 Project Arrangement

2.1.1 Project arrangement principles

- prioritize the ecological and social profit;
- Under the condition that ecological profit is prioritized, consider about the economic principle;
- stick to the principle that measures suiting local conditions must be adopted
- stick to the principle that wasted hills, land and river banks should be given priority to be used

2.1.2 Selecting principle of project area

- Following the voluntary principle, those counties which are willing to attend the project should submit their proposals in written form, and should take their responsibilities according to regular terms of the loan, and to implement the project accordingly.
- Local governmental office of the counties which are willing to join fully support the project, and the local people are very active about the forestation project.
- The counties which implement the project should be with sufficient wasted hills and land suitable for forestation, as well as barren hills.
- The counties should hold the capability to carry out and to manage the project smoothly, and should be with competitive organization and technology capacity, in order to ensure the successful implementation of the project.
- The counties should have strong ability to undertake and clear debts. The county governments are willing to provide package funding for the project, and promise to return the capital and pay the interest.
- The counties should have relevant experiences in forestation project funded by international investment, such as World Bank forestation project, forestation project supported by German and Japanese loan.
- The implementing area should be closely linked geographically, thus to work as models and pulling power.
- The implementing area should have convenient transportation and sufficient labour.

2.1.3 Selecting principle of planting sites

The planting sites should be located within the key areas planned by the governments. The chosen sites should be assessed, considering the site quality, and the assessment work as the rationale of the selecting of tree species and forestation technology approaches.

- (1) Clear ownership;
- (2) Select land that suitable for reforestation (including the deserted lands), barren land (including failed forestation and burned lands) and open forest lands;
- (3) No forestation on basic farm lands and the areas forbidden to be used by the state;
- (4) Select planting plots according to the biological features of the tree species;
- (5) The slope of the planting plot should be no more than 35°;
- (6) Promote the use of improved strong seedlings and measures in water reservation and drought-resistance to improve the effect of forestation.

2.1.4 Project arrangement scheme

We plan to plant walnut, apricot, persimmon on gentle hills and waste lands where the climate and soil condition is favourable and *pinus tabulaeformis*, *platycladus orientalis*, *pinus bungeana*, larch, robinia

pseudoacacia, acacia and willow on lands with good planting conditions. On lands that with poor conditions but suitable for planting, we will plant bushes such as *elaegnus angustifolia* and *aragana korshinskii*. We will improve the ecological environment and water reservation and at the same time increase farmers' income.

According to the above principle for the selection of project areas and the standards of the selection, the project has selected 30 townships in total from 3 cities (Jinzhong City, Luliang City, Xinzhou City) and 6 counties (Linshi County, Fenyang City, Liulin County, Shenci County and Baode County) for the project construction and a total number of 2,195 sub-compartments after the screening. The detailed arrangement of the project is shown in Table 1-3 A Table of the Distribution of Project Construction. The project layout is shown in attached Figure 2.

Table 1-3 A Table of the Distribution of Project Construction

| <i>City</i> | <i>County (district)</i> | <i>Township (town)</i> | <i>Number of township (town)</i> |
|---------------|--------------------------|--|----------------------------------|
| Jinzhong City | Linshi County | Liangjiayin Township, Nanguan Town, Cuifeng Town, Liangdu Town, Duanchun Town | 5 |
| Luliang City | Fenyang City | Jiajiazhuan Town, Lijiazhuan Township, Shizhuan Town, Xinhucun Town, Yangjiazhuan Town, Yudaohu Town | 6 |
| | Liulin County | Chenjiawang Township, Chenjiazhuan Town, Liuyi Town, Jinjiazhuan Township | 4 |
| Xinzhou City | Hequ County | Louziying Town, Xun Town, Shaquan Township, Danzai Township, Qianchuan Township | 5 |
| | Shenci County | Longquan Town, Donghu Township, Dayanbei Township, Bajiao Town, Changzhen Township, Liebao Township | 6 |
| | Baode County | Yaogatai Township, Yaowa Township, Sunjiagou Township, Nanhegou Township | 4 |

2.2 The site conditions of the project construction

The project area has abundant resource of land, covering a total area of 498,646.66 ha., which accounts for 3.18% of the total area of the province, among which the area of land suitable for forest plantation is 82,543.66 ha. (80,600.47 ha. of land suitable for forest plantation and 1943.19 ha. of unstocked land), which is 4 times more than that to be used for the forest plantation in this project. Besides, there are 5% of the slope farmland which can be used for the forest plantation for this project. So, there are abundant land resource can be used for forest plantation but most of the land suitable for plantation is remote, besides the abandoned farmland, the site conditions there is not good. Through the plantation of trees with suitable species in suitable sites, the local species with multi functions should be further developed.

The forest land resources of the project county (city) is shown in Table 1-4.

Table 1-4 A table of summary on forest land and wood resource in the project area

Area: hectare

| Project area | Forest land | Land with forest | Openwood land | Shrub forest | Afforestation | Nursery | Unstocked forest | Suitable land | Coverage rate |
|----------------|-------------|------------------|---------------|--------------|---------------|---------|------------------|---------------|---------------|
| Total | 255519.09 | 68386.57 | 7152.82 | 73210.08 | 23939.32 | 272.64 | 1943.19 | 80600.47 | 14.14 |
| Hequ County | 8292.08 | 350.26 | 96.65 | 2136.26 | 1761.07 | | 48.24 | 3899.60 | 21.08 |
| Baode County | 55709.00 | 10000.00 | 1764.00 | 9892.00 | 9111.00 | 42.00 | 919.00 | 23981.00 | 10.06 |
| Shenchi County | 73018.00 | 11572.00 | 959.00 | 19230.00 | 4510.00 | 85.00 | 865.00 | 35783.00 | 7.86 |
| Linshi County | 78301.54 | 36894.36 | 4057.13 | 24063.61 | 4841.32 | 42.25 | 110.95 | 8291.92 | 30.70 |
| Fenyang City | 30535.29 | 6426.89 | 68.87 | 17876.09 | 1942.88 | 43.25 | | 4177.31 | 6.17 |
| Liulin County | 9663.18 | 3143.06 | 207.17 | 12.12 | 1773.05 | 60.14 | | 4467.64 | 19.76 |

2.3 Seedling Design

2.3.1 Demand amount of seedling

Based on the average density and the total area of all the forest plantation, we can calculate out that the demand of seedling is 25,639,100 roots. According to the plantation timeL the first year and the fourth year, 5,127,600 roots will be needed respectively, and the second and third year need 7,691,900 roots respection.

2.3.2 Species of seedling

The application of fine and strong seedling is essential to ensure the survival of seedling, growing into forest, rich harvesting and high quality. The seedlings selected in the implementation of this project are all grade I seedling, all of them need to be strong, full terminal bud, good lignified, no damage caused from machine or plant disease and pest, without using any gene material, it is strictly forbidden to use seedling being targeted as the test for plant disease and pest for quarantine. Container seedling for *Pinus tabulaeformis* Carr. and *Platycladus orientalis* (L.) Franco older than 2 years; container seedling for *Caragana korshinskii* Kom and *Hippophae rhamnoides* Linn older than one year; grafting seedling for *Juglans regia* L., *Prunus armeniaca*L and *Diospyros Kaki* L.f older than 2 years; transplanting seedling for *Robinia pseudoacacia* L and *Larix principis-rupprechtii* Mayr older than one year. To ensure the survival rate of the seedling in the project area is to ensure the smooth implementation of the project. The quality for the seedling collection should be strictly check, and the testing of the quality of seedling, packing, transportation and storage of seedling shall strictly follow the regulations in GB6000 and LY1000 which can fully meet the requirements of the construction of the project

The detailed species and demand of seedlings is shown in Table 1-5.

Table 1-5 A Table of Demand of Seedling and Species in Project Area

| Species | Amount of demand (10,000 roots) |
|---|---------------------------------|
| <i>Juglans regia</i> L. | 209.88 |
| <i>Prunus armeniaca</i> L. | 16.14 |
| <i>Diospyros Kaki</i> L.f | 1.32 |
| <i>Larix principis-rupprechtii</i> Mayr | 237.24 |
| <i>Platycladus orientalis</i> (L.) Franco | 388.44 |
| <i>Pinus tabulaeformis</i> Carr. | 1412.68 |
| <i>Robinia pseudoacacia</i> L. | 67.94 |
| <i>Pinus bungeana</i> Zucc. | 31.73 |
| <i>Gledisia sinensis</i> Lam. | 18.42 |
| <i>Salix babylonica</i> L. | 0.4 |
| <i>Caragana korshinskii</i> Kom. | 12.46 |
| <i>Hippophae rhamnoides</i> Linn. | 167.26 |
| Total | 2563.91 |

2.3.3 Supply of seedling

The seedlings needed for the project will be under the supervision of the provincial station of forestry seedling and flower, all seedlings for forest plantation shall be qualified with “Four Certifications & One Signature”, the application rate of grade I seedling for forest plantation shall reach 95% or higher. The procurement of seedling will adopt procurement by enquiry, farmers or project villages can adopt the method of community participation procurement according to the annual production plan, and authorize the related supply unit or enterprises to provide qualified seedlings.

According to the update results from the date of the protection plan for forest land in Shanxi Province, there are 135,000 ha. of nursery bases which have already built up in the whole province. And the productivity of grade I seedlings of different kinds can reach 300 million roots or more in 2013, in which: 40 million roots of *Platycladus orientalis* (L.) Franco, 20 million roots of *Larix principis-rupprechtii* Mayr, 60 million roots of *Pinus tabulaeformis* Carr., 8 million roots of *Pinus tabulaeformis* Carr., 10 million roots of *Robinia pseudoacacia* L., 8 million roots of *Caragana korshinskii* Kom, 10 million roots of *Hippophae rhamnoides* Linn, 8 million roots of *Hippophae rhamnoides* Linn, 5 million roots of *Hippophae rhamnoides* Linn and 2 million roots of *Diospyros Kaki* L.f. Therefore, seedling produced in the province can fully meet the demand of the project construction.

The transportation of seedlings shall be strictly carried out by following the regulations issued by Forestry Administration Bureau of Shanxi Province to strengthen monitoring and management, technicians can be dispatched to the nursery for monitoring the seedlings to ensure the qualification of fine seedling meeting the related standards.

2.4 Infrastructure and the matching projects

2.4.1 Protection of forest

To ensure the smooth implementation of the project, it is necessary to conduct a good management for

forest protection. Targeting to the characteristics of large area, long and slow process of growing and frequent activity of human, the protection measures shall be strengthened after the forest plantation, by establishing professional forest protection team, one professional person from each village shall be arranged for this task. Besides, promotion shall be done on the significance of the forest protection and closing of forest to increase the awareness of the whole society on forest closing. Responsibility system for all targets shall be set up and perfected, regulations be made out by the local and people to let every one and every family understand, every one has responsibility. For any damages caused from individual faults or damage of forest, the economic and administrative responsibilities shall be pursued for them responsible for the damages.

2.4.2 Equipment for data management

To actually improve the operation and management level, ensure the smooth implementation of the project construction, separate archives shall be set up for all the technical data including pictures, tables and cards, data platform shall be set up by utilization of modern technique as computer to provide basis for the decision-makers.

2.4.3 Forestry infrastructure equipment

After many year of construction, the project area has set up a certain number of forest roads, bio fire-prevention belt, fire-prevention line and watch towers; the major countries on forestry have set up professional fire-prevention team equipped with fire-prevention facilities. The access of transportation, communication and power supply in project areas generally good, fully equipped with complete infrastructure facilities.

In principle, this project will not construct new forest roads, in case of need, the newly built road should try to reduce the surface for damage and original vegetation shall be protected well, the existing roads shall be fully used and transformed in case of need.

2.5 Forest protection

2.5.1 Forest fire prevention

(1) To enhance the leadership, set up and perfect a complete system for forest fire prevention

Forest fire prevention is an important work for the construction of forest base, it is necessary to persist in the concept that "potential danger is more dangerous than fire, prevention is better than disaster relief, responsibility is heavier than Tai Mountain, to totally prevent the occurrence of forest fire. The forest base in the project implementation shall be included into the local system of forest fire prevention and the persons in charge of the project townships should be the first persons responsible for forest fire prevention and responsibility, rights and benefit of them shall be confirmed; an united organization of forest fire prevention with the neighboring communities shall be set up to define the area of the united prevention, system and measure of united prevention shall be confirmed.

(2) To enhance the promotion on forest fire prevention

Permanent promotion boards on forest fire prevention shall be set up around the bases as well as the main traffic roads; broadcast, TV and slogans shall be used to strengthen the education and promotion to local residents around the project area on the knowledge on forest fire prevention and to increase their awareness on this issue, to let every household in the project area, no matter old or young, understand its

importance to protect the achievement of base construction.

(3) Plan for forest protection staff

They should conduct patrol and inspection to the project area, during the period of forest fire in the special period, no using of fire is allowed; machinery and fire application outside which can easily cause forest fire shall be under strict control

2.5.2 Prevention and treatment of forest disease and insect pests

Following the principle of “prevention is the first, scientific prevention and control be adopted, treatment based on the laws to promote health”, the prevention and treatment of forest diseases and insect pests shall be carried out through the whole process in forestry production. The selection of seedling shall focus on those with strong resistancy to diseases and pests; quarantine for seedlings shall be conducted to prevent the transportation and planting of seedlings with disease and bacteria; the effective control measures shall be taken; the capacity of forest to resist disease and pests shall be strengthened to keep forest in a healthy status; monitoring and forecast on disease and pests shall be enhanced to provide basis for decision makers to prevention and treatment; the integrated prevention and treatment in combination with measure of quarantine, forest management method, physical and mechanical methods, bio and chemical methods shall be used in the prevention and treatment of them. When processing the prevention and treatment, the first choice of the methods shall be physical and bio control measures; once utilization of pesticide, the pesticide without pollution shall be selected to reduce the drug resistancy to disease and pests and avoid pollution to environment.

(1) Focus on the forecast and prediction on diseases and pests, an emergency mechanism to deal with prevention and treatment of diseases and pests shall be set up. The station of prevention and treatment of forest disease and pests at the county level shall inform information on the prevention and treatment of diseases timely to the owners of forest, including objective of control, control measures, technique and pesticide. Once it occurs, prevention and treatment shall be conducted immediately.

(2) The integrated prevention and treatment of diseases and pests shall be well applied: ①to persist in the application of fine seedling without carrying any quarantine targets; fine seedling, variety and fine clone with strong capacity of resistancy to disease and pests shall be selected for forest plantation; ②Through strengthening of operation measures and health management of forest, such as planting suitable species on suitable location, plantation of mixed forest and time logging to improve the capacity to resist disease and pests; ③Adopting the bio-control measure to create an environment favorable for the survival of the natural enemy of the disease and pests, to increase the number of natural enemy of the disease and pests; introducing and protection of birds which eat pests to enlarge the control effect.

(3) Adopting of chemical control measure and combination with other control measure to increase the efficiency of disease and pests control. ①Application of pesticide with high quality, low toxic to human and animal or no toxic, and safe for the plants; ②Application of pesticide with extreme toxic, high toxic or high residue is strictly prohibited; ③Using different pesticide to deal with different kind of diseases and pests; no utilization of broad spectrum pesticide is allowed; ④Frequency of pesticide spraying shall be suitable with suitable amount based on the pattern of the occurrence of disease and pests; ⑤It is encouraged to apply pesticide by mixing of them or using them in turn, such as using carbendazim, dithane Z-78, chlorothalonil and triadimefon to deal with pine needle rust and needle cast of pine trees.

According to the statistics, the project adopts 12 tree species for forest plantation, the records of main pests concerning with these species are fall webworm, *Clostera anachoreta*, *Gypsymoth*, *Apocheima*

cinerarius, Date day obliqua, Dendrolimus spectabilis, mulberry borer and Anoplophora glabripennis.

2.6 Construction of project technical support system

According to the requirements in the project, in the process of the project construction plan and implementation of the project, a scientific and technical promotion system shall be set up under the guidance of management organization for EIB projects at all level and forestry bureau and forestry station, to hold technical training to farmers and professional team for forest plantation, at the same time to perfect the construction of social service system in the project area.

2.6.1. Contents for training and promotion

According to the requirements in the project design, this training and promotion plan will arrange training, technical promotion, mainly including the regulations for the management of EIB loan project (project implementation management and quality control, fund and financial management, goods and equipment procurement), technique for forest plantation, forestry authentication, forest operation plan complement and practical technology, application technique for the prevention and treatment of disease and pests and pesticide, regulations on environmental protection, participation and discussion, and operation support.

2.6.2 A system of promotion and training organization

The training and promotion offices will be set up in the project to completely set up a training and technical promotion support system targeting to the technical staff and farmers in the provincial, county (forestry bureau), township and basic units. The training and promotion offices in all levels shall prepare the promotion plan and implementation for their areas and organize the activities for training and promotion at different levels.

The project management and technical training organizations will be divided into three levels of province, city and county and township, within the project management organization at the same level respectively, and they will carry out the training and related work within their responsibility at their level.

The staff participated in the domestic training and study tour will be arranged in the province, including management staff at all level, 46 persons of training in total will be conducted, overseas training needs 48 persons for training in total

2.6.3 The implementation measure for training and promotion

The implementation measures for training and promotion mainly include the following ways: training program, on-site technical guidance and consultation, domestic training and study tour and overseas training, compiling and distribution of technical reading materials.

2.6.4 Arrangement for the contents of training and technical promotion

The total training and technical promotion in the province is 9,874 person/day, the provincial training is 10 programs, 600 person day, the training time is 2 days; the training of township and farmers by county level is 100 programs, 6,000 person day, training time is one day; overseas training is three groups, 48 participants in total, 720 person day.

2.7 The main technical measures for project construction

2.7.1 Land preparation

Land preparation will be conducted along contour line on mountainous area, in the shape of belt and fish scale, to control water and soil loss. In the process of land preparation, the original vegetable should be preserved as much as possible; basic fertilizer will be used in combination with land preparation, it is encouraged to use organic fertilizer, green fertilizer to reduce the application of inorganic fertilizer. The plan of fertilizer application shall be carried out based on the diagnoses on soil and plant nutrition.

(1) Clearing of forest land

This project belongs to ecological forest plantation project and no large scale of clearing will be carried out, slash burning is totally prohibited, leveling to soil can be done, and weeds around the area can be cleaned, by using manual or machinery to clear the planting pit properly; at the same time, the surrounding vegetable shall be preserved well.

(2) Land preparation and pit digging

The measure for land preparation is mainly used fish shape pit and pit shape mode, when doing on the slope steeper than 16 degree, pit digging and land preparation should be done along contour to preserve vegetation among the pits, the planting should arrange as “品” shape.

The measure for land preparation shall be decided based on the degree of slope, growing of vegetation and water and soil loss, whatever kind of measure used, land preparation shall preserve the original grass and shrub vegetation to the largest extent.

The specification for land preparation is shown in Table 1-5.

Table 1-6 A Table of Specification for Plantation of Main Species

| Series No. | Tree species | Density in preliminary planting | | Specification for land preparation |
|------------|------------------------------------|---------------------------------|--------------------------|------------------------------------|
| | | Space between root line (m×m) | Number of root (root/ha) | Length×Width×Depth (cm) |
| 1 | Larix principis-rupprechtii Mayr | 2×3 | 1650 | 50×50×30 |
| 2 | Pinus tabulaeformis Carr. | 2×3 | 1650 | 50×50×30 |
| 3 | Pinus bungeana Zucc. | 2×3 | 1650 | 50×50×30 |
| 4 | Platycladus orientalis (L.) Franco | 2×3 | 1650 | 50×50×30 |
| 5 | Robinia pseudoacacia L | 2×3 | 1650 | 50×50×40 |
| 6 | Salix babylonica L | 2×3 | 1650 | 50×50×50 |
| 7 | Gleditsia sinensis Lam. | 2×3 | 1650 | 50×50×50 |

| | | | | |
|----|------------------------------|-----|------|----------|
| 8 | Juglans regia L | 4×6 | 417 | 80×80×60 |
| 9 | Prunus armeniacaL. | 3×6 | 550 | 80×80×60 |
| 10 | Diospyros Kaki L.f | 3×6 | 550 | 80×80×60 |
| 11 | Caragana korshinskii Kom | 2×2 | 2500 | 50×50×30 |
| 12 | Hippophae rhamnoides Linn | 2×2 | 2500 | 50×50×30 |

2.7. 2 Planting

(1) Density of forest plantation

Based on the site conditions of the project area and the proposals by experts, the density will be controlled within the bearable load of water resource, to ensure normal growth and stability of forest. The final density for Juglans regia L. is controlled to (4 m x 6 m) 417 root/ ha.; the density for Prunus armeniacaL. And Diospyros Kaki L.f as (3 m x 6 m)550 root/ha; the density for Diospyros Kaki L.f, Larix principis-rupprechtii Mayr, Pinus tabulaeformis Carr, Pinus bungeana Zucc., Robinia pseudoacacia L., Salix babylonica L. and Gleditsia sinensis Lam as (2m x 3m) 2500 root.ha.

(2) Planting

To make full use of natural rainfall water, bare root for forest plantation and the planting shall be conducted in the early spring, by using the time after raining or cloudy day planting; container seedling planting, only needing rainfall to ensure the forest plantation, and forest plantation can be processed in spring, raining and autumn.

The depth of planting shall be adaptable and keeping the root system vertical for the seedling without any damages and tugged root; after filling soil into pits, treading on it with feet. Before planting, bare root seedling shall be processed with yellow mud, rootone and water-retaining agent, and the seedling lifted out shall be planted at the same day completely; if the current day seedlings can not be planted completely, the temporary measure shall be taken to keep seedling root humid. When using container seedling for forest plantation, the container shall be torn, attention shall be paid to prevent loose of nutrition soil and root system be protected.

2.7. 3 Fostering

Fostering of young plant is essential measure to increase the survival rate of forest plantation, consolidate the outcome of forest plantation and promotion of the growth of young plants, growing earlier into crown closure, and the earlier entering into fruit bearing period. Thersfore, it is necessary to carry out these items into the process of forest plantation. Based on the experience of Shanxi Province, the measures for fostering mainly includes the following:

④Soil loosening and weeding

To provide a good environment of growing for plants through losing of soil and weeding. After the forest plantation, soil loosening and weeding should be done once during spring and autumn every year, once weeding in summer, continuously for 2 to e years; for intercropping, cultivation can replace fostering; after crown closure of young plants, once weeding can be done each year, but the frequency of weeding should be done to economic forest.

②Application of fertilizer

It is encouraged to use organic fertilizer and green fertilizer, reduce the application of inorganic fertilizer. The plan for fertilizer application should be worked out based on the diagnoses of soil and plant nutrition. When applying fertilizer, pit application of belt application can be used on the above of the pits and cover with soil soon after application to prevent nutrition loss, and surface fertilizer spreading is strictly prohibited.

③Irrigation

According to the characteristics of less precipitation in spring and winter, and dried climate in Shanxi Province, irrigation should be done to artificial forest plantation timely to ensure water content in soil of the forest land not lower than 60% of that of the field water content.

④Pruning

Reasonable pruning can effectively improve the quality of tree and promote the growing of trees. For the species of poplar tree, pruning can be done only before the crown closure to branches affecting the growing, blocking the next of tree and thick side branch unfavorable for growing in generally, after crown closure, pruning of once or twice is enough, the strength of pruning is suitable for 2:3 to 1:2 with the height of crown. For other broadleaf species as Robinia pseudoacacia L, pruning shall be done in the second year after forest plantation by cutting off the competing branch and double top branch; and pruning 2-3 times 3 years after. The strength is better as a ratio of 1:2 with crown height.

⑤Management and protection

It is said that “30% depends on plantation and 70% on management”, it is the key process to ensure the success of forest plantation. The management measures shall be worked out before forest plantation and staff for management shall be selected. They should be the persons with strong responsibility, good reputation in community, having passion for forestry career and in a good health. They should start their work soon after appointment. Based on the difficult or easy conditions of forest land plot, the area for the staff to be patrolled will be decided. Regular inspection system shall be stipulated, with clear responsibility and benefit, linking directly with the quality of forest under their management.

2.8 Construction of project monitoring system

To have a good control on the status of the project implementation, monitoring and inspection shall be done to the progress of implementation, quality of forest plantation, management and transfer of fund, and implementation of environmental protection measure to find out the problems in time and summarize experience, and adjustment can be conducted based on the results of monitoring to ensure the project will gradually achieve the expected objectives. Starting from the survey, plan and design, geographical information management and computerized archive management shall be used to conduct the monitoring to the ecological environment of forest.

2.8.1 Contents of monitoring

(1) Status of project construction

- ①Progress of construction: including forest plantation and construction of the matching equipment and facilities.
- ②Quality of newly planted forest: including survival rate (preservation rate), utilization rate of grade I seedling, verified area of planting, and the number of young plants meeting the standards.
- ③Environmental protection measures taken for forest land: mainly include the qualified rate of environmental protection, meaning that the construction is in accordance with the requirements in the

design. Monitoring the distribution of “品” pit arrangement, planting along contour, and the status of the preservation of original vegetable on top and foot of mountain located in sub-compartment.

- ④ Fund management: including the investment of EIB and domestic fund (province, city, county and production unit) on their availability, and time of fund transferring.
- ⑤ The situation of construction units: referring the number of the participated units and beneficial.
- ⑥ Others: including overseas training, domestic training and procurement of goods and equipment.

(2) Project outcomes

- ① The increase of forest coverage in the implementation area of the project county
- ② The increased number of different species at project area (in percentage)
- ③ Number of farmers participated in the training.

2.8.2 Methods for monitoring and evaluation

(1) Methods for monitoring on the construction of project implementation

- ① Progress, quality and implementation of the measure for environmental protection for forest plantation, it will be conducted by the staff organized by the county PMO in sub-compartment as unit. The results of the monitoring will be summarized step by step from township, county and province, finally by the provincial PMO.
- ② The data of monitoring will be collected from the inspection and acceptance of the county level, provincial sampling survey and tables of disbursement and it will be summarized and reported to higher level according to the requirement of EIB.
- ③ One year before the completion of the project, the provincial PMO shall organize the project counties to conduct an overall survey and evaluation to the growing status of forest according to the requirements of EIB, national DRC, MOF and national Forestry Bureau and put forward the measures for the management of forest from now on.

(2) Method for the monitoring to the outcomes of project

To test the indicators in the outcomes defined in the logistic framework, and deliver the monitoring data during the middle and final period of project construction. Through analysis to the data, overall evaluation will be processed to the implementation state of the project.

2.9 Project organization and management

2.9.1 Project management organization and its responsibility

(1) The leading group for the construction of Shanxi Integrated Forestry Development on the Yellow River Basin financed with EIB loan, the vice governor in charge of the forestry will assume as the director, the chief leaders from the department of provincial DRC, finance bureau and forestry bureau will be the members to solve and coordinate the key issues occurred in the implementation of the project. There will be an implementation unit under the leading group to deal with the daily business on the project implementation and the connection with the state and the related departments and EIB, and provide guidance, inspection of the work of city and county. The main duties include:

Provincial DRC is responsible for the project establishment and inspection and acceptance upon completion;

Provincial Finance Bureau is responsible for on lending of fund, availability of counterpart fund at different level, financial monitoring, debt management and repayment of capital and interest;

Provincial Bureau of Forestry Administration is responsible for the overall design of the project, organization of the implementation, stipulation of management measures, technical guidance to the annual

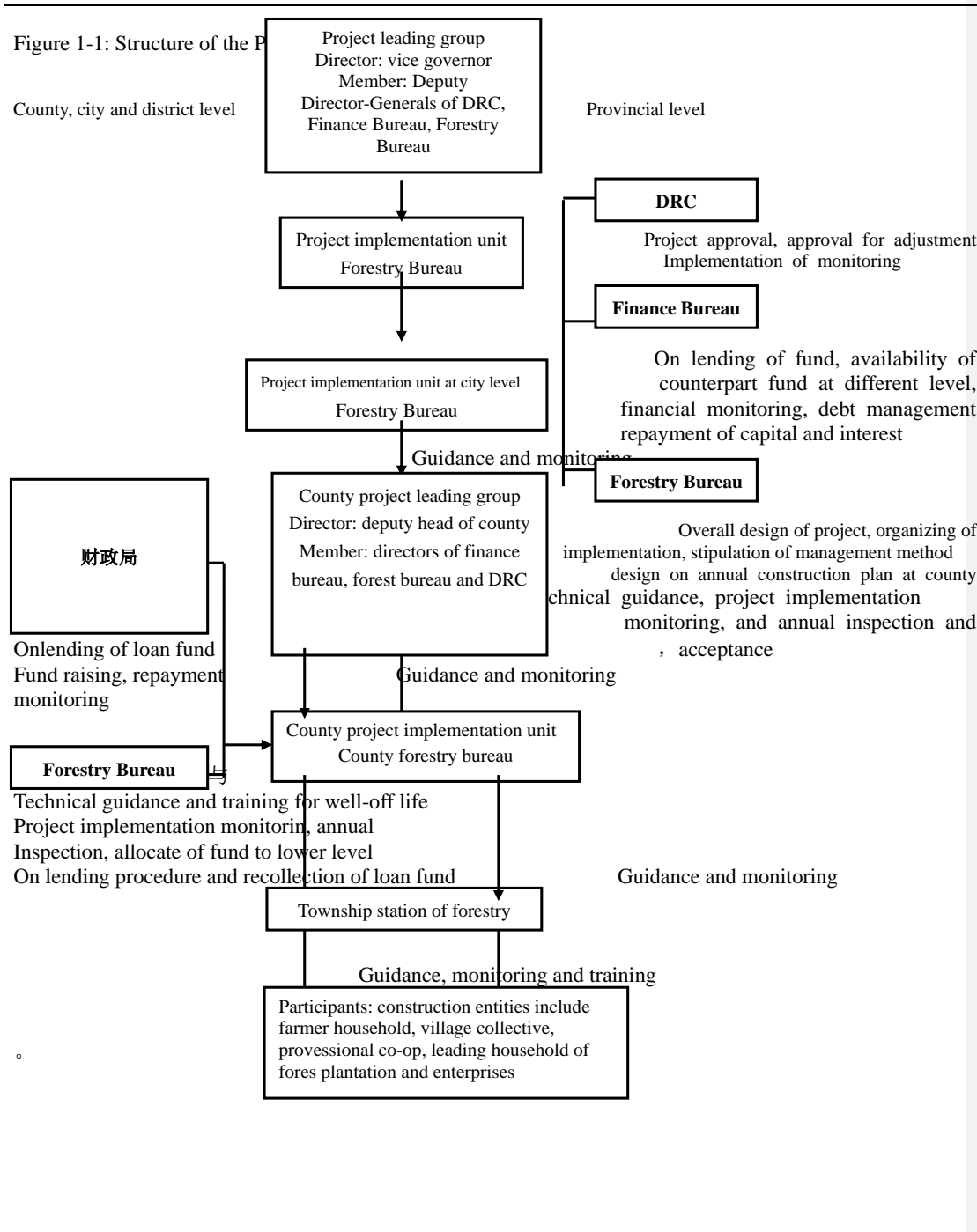
implementation design at county level, management of project implementation, monitoring of county level implementation, annual inspection and acceptance, and inspection and acceptance upon completion. The city level shall set up the related project implementation organization, mainly composed by forestry bureau, in charge of project preparation, implementation, monitoring, inspection, provision of the guidance to the project county under their administration.

(2) The project county shall set up the leading group and the deputy head of the county (city) in charge of the forestry will assume as the director, the chief leaders from the department of DRC, finance bureau and forestry bureau will be the members to solve and coordinate the key issues occurred in the implementation of the project in their counties. There will be an implementation unit, mainly composed with forestry bureau, under the leading group to deal with the daily business as the finalization of the operation entities responsible for forest plantation, arrangement of project plan, annual implementation design and inspection and acceptance, and there will be management teams as finance, technology, information and environmental protection in their units.

(3) The project township shall set up project implementation management groups, composed with the staff of the leader of township, finance, forestry station and different operation units, to deal with the daily work including organization of the project implementation according to the plan, fund transfer, training of farmers, monitoring on environment and technical promotion

(4) The operation units (farmer household) are the main body of project implementation, borrowing of loan and beneficiary, who are in charge of the completion for forest plantation task. They include farmer household, village collective, professional co-op, leading household of forest plantation and enterprises.

The structure of the organization at different levels and the relationship of their work is shown in the Figure 1-1: Structure of the Project Implementation



2.9.2 Project management

2.9.2.1 Project management

Based on the approved FSR of this project, the county PMOs shall compile annual operation design which will be reviewed and approved by city PMO, after the approval, it will be submitted to provincial PMO for reference, and the implementation will be conducted according to the approved operation designed document. Upon completion of implementation, the county PMO will conduct self inspection, after qualified self inspection, it will be submitted to provincial and city PMOs, then they will organize related experts to conduct inspection, after the qualification confirmed, disbursement will be processed according to procedure.

The inspection system shall be strictly checked, the inspection and acceptance will be done by the production itself and the county for full inspection, provincial and city inspection level by level, and the procedures for the inspection and acceptance are:

- ① Upon the basis of receiving the report on the qualification from the self-inspection by the project county, the geographical information system and database will be verified to summarize and classify the category, then the inspection and acceptance plan for the provincial level will be produced, deciding the staff and time, arrangement of vehicle for the inspection.
- ② Upon arrival to project county, to organize the staff from the county PMO first, and to deliver the report on the inspection and acceptance for forest plantation at this time.
- ③ After confirming the amount for this inspection and acceptance for forest plantation (fostering), it will be decided to divide into groups or not and the time for inspection and acceptance for the county.
- ④ Based on different township (town), different species, different year to conduct random sampling according to the area not less than 10%, in a ratio of sub-compartment. By different species, the number of sub-compartment in township and village to be inspected will be decided, and according to the sample plot will be arranged for the sub-compartment, then field inspection will be done to identify the height of seedling, land diameter, quality of planting and density and all indicators will be recorded. Based on the result, the qualified area of the inspected forest (fostering) can be calculated according to ratio for disbursement.

Upon the agreement for disbursement (issue of notice for qualification), the different county shall update the database and report to provincial PMO for reference.

2.9.2.2 Plan management

The principle of the unified planning and management according to different levels is adopted for the management of the project plan. The units in charge of the compilation of the annual plan is the county PMO. The provincial PMO will be in charge of the compilation and approval after the review and approval, balancing of the annual plans among the different project counties, and submission of them to the related departments in the province and the state for reference.

Before November 1st of every year, the city and county PMOs shall submit the annual plan for forest plantation and the investment plan of the next year to provincial PMO level by level. The provincial PMO will issue the annual plan for the implementation of these annual projects in the early period of the next year, and the application of funds shall be approved by the provincial finance bureau. The approved plan for forest plantation and investment plan together with the report on the completion of the preparation for the forest plantation, including the operation design, preparation of seedling and availability of counterpart fund, the provincial PMO will issue the annual plan of this year project before December 15 of every year.

2.9.2.3 Goods management

The PMOs at different levels shall provide their due duty on the procurement, transport, inspection and acceptance, issue and management seriously following their responsibilities to ensure the goods supply needed for the project implementation.

2.9.2.4 Management of information and archives

Through the compilation and issue of the briefing, holding of project coordination meeting, and discussion meeting irregularly, the connection among the project management organization, implementation unit and project construction unit can be strengthened to identify the progress of the project construction and the existing issues, summarize and promote the advance experience. The project information will be published by the medias as internet, TV, newspaper and magazine to promote the outcomes of the project construction and the impact of the project to further popularize the project outcomes.

The archives based on each Sub-compartment will be set up, a complete of record for each sub-compartment on forest plantation during the whole period of project implementation, including the geographical information system and the database contents, and the whole process of forest plantation will be recorded, starting from the land preparation, seedling, planting to the supplemental planting, re-planting and the total amount of labor cost being paid, the results of investigation and acceptance, connecting with the related financial records. The county PMOs shall conduct investigation regularly to these sub-compartments and the status of their implementation and record or update it into the archives (including geographical information system and database). The other materials related with the project shall be summarized and included into the archives according to the regulation, and special person shall be arranged for the management of archives.

9.2.5 Technical management

This project has adopted the management mode from the previous project supported with international fund, to set up a system for the technical support as well as training and promotion system at provincial and county level.

9.2.6 Fund management

The application of EIB loan adopts the disbursement mechanism, referring that implementation first and then disbursement can be processed. The special account for EIB shall set up, unified management, integrated utilization; recording the account separately and settling account individually; the special fund for special purpose, accepting the inspection and monitoring from the higher bureau, auditing from the auditing department. To ensure the full availability of the counterpart fund of the project, the counterpart shall list into the fiscal budget at the same level and allocate it to the project construction unit.

2.10 Safeguard measure

2.10.1 Construction of institutional strengthening

The project city shall set up the leading group composed by city DRC city finance bureau and city forestry bureau for the EIB loan project and PMO to strengthen the project organization, financial

management and technical guidance and inspection of outcomes. And the project county (city) will set up the leading group for the project and the deputy head of the county in charge of the forestry will assume as the director, the chief leaders from the department of DRC, finance bureau and forestry bureau will be the members to solve and coordinate the key issues occurred in the implementation of the project. The project township shall set up project implementation management groups, composed with the staff of the leader of township, finance, forestry station and different operation units, to deal with the daily work including organization of the project implementation according to the plan, fund transfer, training of farmers, monitoring on environment and technical promotion

2.10.2 To strengthen the project whole process management

- (1) Participation type planning, increase of the feasibility of the design

Through the common participation of the project planning unit and project implementation entities ad based on the local site conditions and plantation custom, to analyze the development advantage and potential in the project area, by common selection of location for forest plantation, pattern of forest plantation to ensure the operability, feasibility and scientific nature of the implementation plan for forest plantation.

- (2) Organizing the implementation scientifically and strictly control the quality of forest plantation

Following the requirements of advanced guiding, inspection in the process and inspection and acceptance after completion, the quality management has been penetrated into the plan design, seedling fostering, operation and management; authorized monitoring enterprise with full qualification conducts the monitoring to the whole process according to the procedure, to rectify the problems found in the process and ensure the quality of the implementation of forest plantation.

- (2) Pay attention to follow up management to increase outcome of forest plantation

Following the management method for forest fostering in combination with local climate and site conditions, based on different species and different orientation of fostering, to conduct fostering in time to ensure the effectiveness of forest plantation. At the same time, the mechanism of “Three level monitoring” is realized, i.e. the project county process 100% of self-inspection, the city level conduct sampling monitoring and invite EIB to organize double-inspection to ensure the measures for fostering will be strictly carried out.

- (4) Strict fund management to ensure safe operation of loan

The loan fund is adopted disbursement system, i.e. Implementation first and disbursement later. The special account for the loan will be set up to realize unified management, integrated utilization, separately recording the account, and separately settling account, and separate disbursement; special fund for specialized use, acceptance of the inspection of higher level, monitoring and audit bureau for auditing. To ensure the full availability of the counterpart fund, the counterpart fund shall be included into the fiscal budget at the same level.

The original existing pollution source and main environmental issue concerning with the project:

This project is a newly planted forest plantation project and there is no original existing pollution source or main environmental issue.

The natural and social environments of the project area

Table 2

2.1 Profile of natural environment (Geography, topography, geology, meteorology, hydrology, vegetation and bio diversity):

2.1.1 Geographical location

Located at the area between north latitude 34°34'-40°43' and east longitude 110°14'-114°33', Shanxi is 628 kilometers long from north to south and 385 kilometers wide from west to east, covering an area of 156,600 square kilometers and neighboring with Shaanxi in the west, Henan in the south, Hebei in the east and Inner Mongolia in the north.

The project area is located in the west part of Shanxi Province, where the topography is uneven, the variety of the topography is complex and diversified, mountain land and hill land cover about 80% of the total area of the project area, and the plain and valley area only occupies about 20%.

The project area covers 3 cities (Jinzhong City, Luliang City and Xinzhou City) 6 counties (city)(Linshi County, Fenyang City, Liulin County, Hequ County, Shenci County and Liulin County, the geographical location refers to the attaching map 1.

2.1.2 Topography

Located at the valley between Taihan Mountain and the middle reach of the Yellow River, Shanxi Province is at the frontal zone on the middle of the second terrace of the three major stepped topographies in our country, at the west side of North China great plain, the topography declining from north east to south west. Taihan Mountain and Luliang Mountain are located at the both sides of Shanxi Province, and Zhongtiao Mountain and Hengshan at the south end and north end. A series graben basin is located at the middle part of the province, there are Datong, Xinding, Taiyuan, Linfen and Yuncheng Basins from north to south. The highest location in the province is the north top of Wutai Mountain with 3061 meters above sea level, the lowest place is at Xiyang river mouth in the valley of the Yellow River at Yuanqu County, where the elevation is less than 250 meters, with a distinct difference of 2,800 meters between the highest and lowest. Most part of the area in the province is located at the elevation of about 1,500-2,000 meters. In the mountainous regions at Wutai Mountain, Luyashan, Guangdishan, the relative heights of them with the mountain base amount to 1,500-2,000 meters. The great difference in the topography is the most important cause for the becoming of natural scenic vertical division in these mountain regions.

There are so many varieties of topography in the province, the staggered distribution of mountain land, hill, residual plateau, terrace, valley and plain through out the whole province, especially the mountainous land and hills are the main categories. According to the preliminary measurement, the three categories of topography as mountainous land, hill and plain in the province cover 40.0%, 40.3% and 19.7% respectively, i.e. around the ratio of: 4: 4: 2. For the different cities, the situation of the topographical ratio is so different. Due to the small area of plain, but at the same time they are the main clustered areas for the population and economy activities, where the land available for farming is very limited, restricting the development of cultivation operation. The broad land of mountain and hill is suitable for the development of forestry and grass slope, providing a rich foundation for the development of forestry and animal husbandry; in addition to this, the abundant resources of mineral resources and bio resources do provide prosperous prospect for the development of industry and by-products which are favorable for the integrated development as well as multiple operation.

Shanxi is almost covered by loess everywhere, being regarded as a part of loess plateau. As the rise and fall of topography and the impact of subterrace topography, the loess is mainly centralized and distributed at the different counties along the Yellow River at the west of Luliang Mountain in the province, linking with the main part of loess plateau in the east of Shaanxi Province, with a thickness of loess about 100-150 meters. Besides, the loess is also distributed in the places as diluvial platform, alluvial fan, basin in the mountain, terrace, and broad valley between mountains, usually in 30-50 meter thick. The main configuration category of loess topography includes: loess residual soil, smashed loess source, beam-shape hill, loess hill, gentle slope and loess terrace, there are also loess basin, loess level ground and broad terrace slope. On this land mainly distributed with loess, water and soil are greatly lost, soil fertility decreases, farmland reduces, bringing a great damage to the local agricultural production.

2.1.3 Hydrogeology

The surface water resource in the project mainly includes the Yellow River and the first grade branch rivers of it such as Fen Branch River, Sanchuan River and Xinchui River, and many secondary and thirdly branch rivers; the first grade branch rivers of Hai River basins as Sangan River and Qingzhang River, and so many secondary and thirdly branch rivers, composing a water network crisscrossing all over the area, which are the main water source of the local living and the water source is relatively abundant.

2.1.4 Soil

More than 85% of the project area is covered by loess and secondary loess, most of the soil is loess soil and there are also some distribution of dark loessial soil, cinnamon soil, aeolian sandy soil and meadow soil, the quality of soil is loose with many small holes, easy to be eroded, vertically joint development, the water and soil loss is severe due to the disorderly cultivation and over-exploration and damage of the vegetation.

2.1.5 Climate

The project area belongs to the warm temperate zone, temperate continental monsoon climate zone with the great different temperature between day and night, the south and the north. There are 3 characteristics: the first is the four distinct seasons, the winter is long, cold and dried; the summer is short, hot and rainy; the great difference of temperature in the day time in spring, sandy wind is popular; the temperature in autumn is mild, and the temperature falls rapidly. The second is the great difference of temperature between the south and north, distinct changing during day time. The third is popular dry climate, disastrous climates happen frequently. The annual average temperature of the whole province is 9.8°C, the highest temperature is in July, 22.0~26.0°C, and the lowest temperature is in January, -5.0~-8.0°C. Frost-free season is 110 days to 240 days and the annual average precipitation is 469.6mm.

2.1.6 Vegetation type

The plant community in the project area is diversified, including 1,005 kinds of species, 508 kinds of category and 131 kinds of family. It belongs to the north China geographical part in the floristic, including broad-leaf forest, coniferous forest and the mixed coniferous and broad-leaf forest and meadow forest.

2.1.7 Status of forest resources

According to the 8th national survey on the forest resources conducted in 2010, the total forest area in the province was 2,824,100 ha., (among which there are 2,613,500 ha., of forest land), the forest coverage is 18.03%. The reserve of living tree is 110,393,800 cubic meters and the forest reserve is 97,391,200 cubic meters. Among the area of the forest land, there are 1,295,400 ha. of natural forest and 1,318,100 ha. of artificial forest; Among the forest reserve, there are 70,733,300 cubic meters and 26,657,900 cubic meters. Per ha. reserve of arbor forest is 462,800 cubic meters and the ecological function matching the standard higher than the medium accounts for 85% of the total.

In recent ten years, Shanxi Province has contributed its great effort on the implementation on the forest projects concerning with the Protection of Natural Forest, the Project of Returning farmland to forest and meadow, “the North-West, North China and North-East” Protection Forest Projects, the Tree Plantation Project on Taihan Mountain and the Project of Protection and Treatment of Sand in Beijing Area, and the total area of forest plantation amounts to 3,286,100 ha. *Pinus tabulaeformis* Carr., *Larix principis-rupprechtii* Mayr and *Platycladus orientalis* (L.) Franco are the main tree species selected for the forest plantation in the project area. As the enlargement of the scale of forest plantation, the preserved area of these species have been gradually expanded annually, but they are still the main tree species to be selected for this project area because of the difficult site and forest for water and soil conservation in that area; Due to the continuous increase of the number of the enterprises for lumber processing in recent years, the demand of lumber is increasing and the area of the plantation of poplar tree is still keeping the trend of steady growth; Due to the demand of lumber by the enterprises processing lumber, the area of the plantation of poplar tree will keep increasing continuously; As a major economic tree species in Shanxi Province, the plantation of walnut tree is very popular, maintaining prosperous trend due to the great demand of market. Apricot and persimmon trees are still the major species under the good development in the project area, and the scale of the plantation of them will be increased since the market demand of them is still increasing.

The forest coverage in the 6 cities and counties in the project area is 14.14%, the total amount of forest resource is not abundant, the distribution of them is uneven, the quality is poor and the benefit is low. The data adopted in the planning of Forest Land Protection and Utilization in Shanxi Province shows that there are forest area of 68,386.57 ha., the area of open woodland is 7,152.82 ha., shrub land area is 73,210.08 ha., afforestation land is 23,939.32 ha., and nursery land of 272.64 ha., the unstocked forest is 1,943.19 ha., the land suitable for forest plantation is 80,600.47 ha. in these cities and counties in the project area. The details can be found in the attached Table 2-1.

Table 2-1 A Table of Brief Introduction to Forest Land & Wood Resources in Project Area Unit: Hectare

| Project area | Forest land | Land with | Openwood land | Shrub forest | Afforestation | Nursery | Unstocked forest | Suitable land | Coverage |
|--------------|-------------|-----------|---------------|--------------|---------------|---------|------------------|---------------|----------|
| Hequ | 8292.08 | 350.26 | 96.65 | 2136.26 | 1761.07 | | 48.24 | 3899.60 | 21.08 |
| Baode | 55709.00 | 10000.00 | 1764.00 | 9892.00 | 9111.00 | 42.00 | 919.00 | 23981.00 | 10.06 |
| Shenci | 73018.00 | 11572.00 | 959.00 | 19230.00 | 4510.00 | 85.00 | 865.00 | 35783.00 | 7.86 |
| Linshi | 78301.54 | 36894.36 | 4057.13 | 24063.61 | 4841.32 | 42.25 | 110.95 | 8291.92 | 30.70 |
| Fenyang | 30535.29 | 6426.89 | 68.87 | 17876.09 | 1942.88 | 43.25 | | 4177.31 | 6.17 |
| Liulin | 9663.18 | 3143.06 | 207.17 | 12.12 | 1773.05 | 60.14 | | 4467.64 | 19.76 |
| Total | 255519.09 | 68386.57 | 7152.82 | 73210.08 | 23939.32 | 272.64 | 1943.19 | 80600.47 | 14.14 |

2.1.8 Animal and plant resources

There are 439 kinds of terrestrial vertebrates in Shanxi Province, in which including 13 kinds of grade one wild animals under the national preservation as *Crossoptilon mantchuricum*, *Aquila chrysaetos*, *Ciconia nigra*, leopard, etc; 56 kinds of the grade two wild animals under the national preservation as *Cygnus*, *Grusgrus*, *Pucrasia macrolopha* and all kinds of raptor, *Macaca mulatta*, *Andrias davidianus*, 27 kinds of wild animals under the provincial preservation as *Ardea cinerea*, *Ardeola bacchus*, *Megaceryle lugubris* and *Troglodytes xanthipes* Milne-Edwards; in the agreement between signed by China and Japan to protect the migrant birds, there are 148 kinds of migrant birds in the province.

There are 2,683 species, 762 categories and 177 branches of wild plants in Shanxi Province, in which 90 species are of Pteridophyta, 26 are of gymnosperm and 2,593 are of angiosperm.

There are 2,743 species plants of tracheophyte, growing on the different location and forming different plant communities, becoming an integrated unity with the environment. These species are maintaining an ecological balance in the nature and keeping a harmonious natural environment for mankind and playing an important role in the keeping the protection for the survival of mankind and promotion of the sustainable development for society and economy. As the increase of population and growth of economy, the activities of human is continuously encroaching on the environment of wild plants inhabitation, resulting in the continuously reduction of the living space for these species. Therefore, it is very important to strengthen the protection to these wild animal and plant resources.

Looking at the situation of wild animal and plant resources, at the present, there are 439 species of terrestrial wildlife animal distribution in the province, in which 71 species are of mammal, 328 of birds, 27 species of reptile and 13 species of Amphibia; 34.5% of the community groups of wild animal is showing a declining trend, the distribution space of the wild animals under the national preservation as *Moschus moschiferus* and *Moschus berezovskii* is greatly reducing, about 10 kinds of species of wild animal have already extincted in the province. Even in about more than 200 species of wild animals which number of community is under a slight rising and stable, most of them belong to recovery growth, there is still a great difference for us to meet the requirements of the establishing a stable ecological system and realization of "ecologically fine".

In the boundary of the province, there are 15 species of grade one animal under the national preservation, 54 species of animal of grade two animal under the national preservation and 140 species of migrant birds under the preservation living there; 27 species have been listed into the list for provincial preservation; there are also some endangered animals which are in the situation of extinction still living in the province, such as *Garrulax davidi*, *Phoenicurus alaschanicus*, *Hemiechinus hughii* and *Syrmaticus reevesii*; In the recent 20 years, the some rare species communities of wild animals as *Ciconia nigra*, macaque, *Crossoptilon mantchuricum* and giant salamander meat have achieved recovery growth, the ecological environment in the preservation zone has been greatly improved.

2.1.9 Zoning of ecological function in Shanxi Province

"Zoning of ecological function in Shanxi Province" includes 5 different ecological regions, 15 sub-regions and 44 ecological function regions. Based on the leading ecological functions in the regions, 44 ecological function regions can be divided into 6 kinds of ecological function regions, in which: 8 belong to the ecological function regions for water and soil conservation and wind and sand control, another 8 to the development of coal and nonferrous metal and ecological system recovery regions; another 8 to the ecological functions for water resource on hills and mountainous regions,

diversity of biology preservation and the protection of natural landscape, 13 to the ecological function regions focusing on the production of agriculture and animal husbandry, one to the ecological function region for reservoir water adjustment and water and soil preservation and 6 to the ecological function regions for urban development and agriculture for suburb and basin areas.

Based on a full study on “Zoning of ecological function in Shanxi Province”, the land to be used for forest plantation in Shanxi Province has been divided into 6 grade one area, covering (1)the forest shrub and grass treatment zone in the north of the province, (2) Loess hill protection forest zone in the west of the province, (3) soil and water resource conservation forest area in Luliang, (4) Loess hill water source preservation zone in the east of Luliang Mountain, (5)Farmland and forest network zone in the middle-south basin of the province, and (6)Forest zone for soil and rock water source in the east, paying attention to natural rule, considering integrately for many different factors according to the scientific development view, which are all in full accordance with the requirements in “Zoning of ecological function in Shanxi Province”.

2.2 Profile of social environment (Structure of society and economy, education, culture and historical relics protection):

2.2.1 Administrative division and population:

Shanxi Province covers an area of 156,600 square kilometers with a population of about 36 million people. There are 11 cities, 119 counties (city, district), 1,196 townships and 201 street offices. The project area includes Jinzhong City, Luliang City, and 6 counties in Xinzhou City. The total area of the project is 498,646.66 ha. covering 79.86% of the total population, including rural labor force of 566,500 people, among which 241,000 are women which covers 42.54% of the total labor force.

Table 2-2 A Table of Brief Introduction to Economic & Social Development in Project Area

| 项目区 | Township (town) | Population (万人) | Land 面积 (公顷) | Average income of | GDP 产总值 (万元) |
|---------------|--------------------|--------------------|-----------------|----------------------|-----------------|
| Hequ County | 13 | 13.59 | 11794.03 | 1662 | 1531612 |
| Baode County | 13 | 16.20 | 99419.00 | 3815 | 720288 |
| Shenci County | 10 | 10.73 | 147133.00 | 4782 | 136400 |
| Linshi County | 12 | 26.10 | 120189.95 | 11913 | 1934646 |
| Fenyang City | 12 | 42.58 | 104201.98 | 9933 | 1099236 |
| Liulin County | 15 | 34.40 | 15908.70 | 9167 | 2521000 |
| Total | 75 | 143.60 | 498646.66 | 5137 | 7943182 |

2.2.2 The status of the economical development

According to the statistics, the GDP of the project area in 2013 was RMB 79.432 billion yuan, among which RMB 2.96 billion yuan was from the first industry, which accounted for 3.73% of the GDP in the project area; RMB 59.65 billion yuan was from the second industry, which accounted for 75.1% of the total; and RMB 16.822 billion yuan was from the third industry, which accounted for 21.17%. The average income of farmer in Linshi County is the highest one, i.e. RMB 11,913 yuan, the lowest is in Hequ County, which is RMB 1,622 yuan, even lower than the average income level of the whole province. The economic development in the project county is so different, those with abundant mineral resources are better in economy, but most of the forest plantation areas are relatively backward in economy, and the local farmers mainly rely on the agriculture, forestry and herding, their

living standard is not good enough.

2.2.3 Current situation of land utilization

The project area covers an area of 2,283,182.63 ha., in which 727,823.27 ha. belongs to forest land (including forest land of 473,715.68 ha. and land suitable for forest plantation of 129828.3 ha.), which can fully meet the demand of the project implementation.

2.2.4 Historical relics and tourist resources

There are 5,014 historical and cultural relics of ancient architecture, ancient ruins, ancient grottoes, stone carving and frescos, 133 revolutionary relics and memorial buildings of revolution, and 11 natural scenic spots in the province. They are: Panquangou, locating in the national preservation region, North Wudan Mountain, being listed into national grade famous scenic spot, Qikou, a historical and cultural famous town in the whole country, Xiwan, in the first group of historical and cultural cities, Xinhuaacun, the number one village for famous Chinese liquor, Temple of Wu Zetian, the old building for Jinsui Government, Martyr Garder of Liu Hulan, Cuanerhui Ecological Tourist and Economic Region, and Xuanzhong Temple, which is the original source for the Pure Land Sect of Buddhism in Japan.

The cultural and tourist resources in Jinzhong City are abundant, the natural and cultural scenic spots scattering everywhere in the location. In which, there are 7 cultural protection units under of the state level, 48 cultural relics under the provincial protection and 632 cultural units under the county (city, district) protection. There are two famous historical and cultural cities, Pingyao and Qi County, 3 national forest park of Longquan in Zuoquan, Fangshan in Shouyang, and Wojinshan in Yuci. The ancient city of Pingyao was listed into the list of “World’ Heritages” by UNESCO in 1997. “Two Cities” (Pingyao ancient city and Yuci Old City” representing the famous Shanxi Merchant Culture, “Two Temples” (Shuanglin Temple and Zishou Temple” , “Four Mountains” (Mianshan in Jiexiu, Wojinshan in Yuci, Shigaoshan in Linshi, Fanshan in Shouyang), “Five Courtyards” (The Courtyard of Cao Family, Courtyard of Qiao Family, Courtyard of Qu Family, Courtyard of Wang Family and Garden of Chang Family) are all the hot tourist places in the province of Shanxi.

There are 294 different kinds of tourist places in Xinzhou City, including one historical relic of world landscape, one historical and cultural famous city in the history, one natural preservation zone at state level, 4 national parks, 19 historical units under the national protection, 47 historical relics under the provincial protection and 19,780 (piece) of all kinds of relics, forming five major tourist zones in which Wutai Mountain taking the lead. The main tourist places: Wutai Mountain, Luya Mountain, Yanmen Gate, Yuwang Cave, Dun Village Hot Spring Water Resort Village, Qicun Hot Spring Water Resort, Zhaohao Temple, Hongfu Temple, Laoni Bay and the historical war relics of Xihetou Underground Tunnel War.

2.2.5 Policy conformity

(1) Analysis to the conformity of state industrial policy

The proposed project itself is a newly constructed forestry project, belonging to the article 34: “construction of carbon sink, tree and grass planting and the project of seedlings for forestry” from the first category of the agricultural and husbandry industries in the categories under the encouragement from the “Guiding List for Industrial Structure Adjustment” (2011 version), which is favorable for the promotion of ecological balance and effectively prevention of water and soil loss. Therefore, the project is in accordance with the state industrial policy.

(2) Analysis to the conformity of “Development of 12th Five-Year Plan on Forestry in Shanxi Province”

The objective of the forestry development in 12th Five-Year Plan in this document of the province is: to complete the forest plantation of 22.5 million mu, 6 million mu of forest fostering management, 200 million roots of plantation by citizens voluntarily with the period of five years. The forest coverage rate in the whole province in 2015 shall account for 23%, the forest reserve reaching 130 million cubic meters, the total carbon reserve from forestry industrial output reaching 220 billion tons, to achieve the effective outcome on ecological improvement in the major regions, and the preliminary forming of the national ecological safety barrier, the total forestry industrial output reaches 5 billion yuan, the ratio of the industry with special characteristics and newly rising industries in forestry industry will greatly increase, the distribution of industrial structure and production force will become more reasonable, the preliminary forming of ecological culture system and the broadly promotion of the ecological civilization. The development objective of the proposed project to newly construct 35884.47 ha. os forest is fully in accordance with the national and provincial policies as well as the requirements in the planning.

The status of environmental quality

Table 3

The environmental quality status and key issues of environment in the project area (Environmental air, underground water, surface water, sound environment and ecological environment):

The project areas are allocated in 6 counties (city) in the three prefectural city level, and the environmental quality status in these areas are as the following according to the environmental report of Shanxi Province in 2012:

1. The status of environmental air

The air pollution in the urban environment in Shanxi Province in 2012 belonged to coal soot type pollution in which the main pollutants are PM₁₀ and SO₂, and the three monitoring factor pollution load are PM₁₀ (45.9%) >SO₂ (38.3%) >NO₂ (15.8%) successively.

The annual concentration of SO₂, nitrogen dioxide and PM₁₀ in the whole province in 2012 are 0.040mg/m³、0.022mg/m³、0.080mg/m³ successively, comparing with the last year, the average increase of concentration of PM₁₀ is 11.1% and no obvious change in the average of the concentration of SO₂ and nitrogen dioxide.

Linshi County: the daily average concentration of SO₂ in 2012 was between 0.013~0.243mg/m³, the overexceeding rate was 1.6%, and the annual value of 0.056 mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.007~0.113mg/m³, the overexceeding rate was 0, the annual average value of 0.027mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM₁₀ was between 0.016~0.180mg/m³, the overexceeding rate was 0.3%, and the annual average value of 0.051mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list.

Fenyang City: the daily average concentration of SO₂ in 2012 was between 0.010~0.122mg/m³, the overexceeding rate was 0, and the annual value of 0.049mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.005~0.055mg/m³, the overexceeding rate was 0, the annual average value of 0.022mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM₁₀ was between 0.020~0.140mg/m³, the overexceeding rate was 0, and the annual average value of 0.061mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list.

Liulin County: the daily average concentration of SO₂ in 2012 was between 0.012~0.277mg/m³, the overexceeding rate was 06%, and the annual value of 0.046mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.001~0.050mg/m³, the overexceeding rate was 0, the annual average value of 0.009mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM₁₀ was between 0.026~0.120mg/m³, the overexceeding rate was 0, and the annual average value of 0.056mg/m³ is in accordance with “the Standards for Environmental Air

Quality” (GB3095-1996) and second grade standards amended in the list.

Hequ County: the daily average concentration of SO₂ in 2012 was between 0.005~0.218mg/m³, the overexceeding rate was 1.6%, and the annual value of 0.040mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.005~0.080mg/m³, the overexceeding rate was 0, the annual average value of 0.025mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM 10 was between 0.019~0.192mg/m³, the overexceeding rate was 0.5%, and the annual average value of 0.063mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list.

Shenci County: the daily average concentration of SO₂ in 2012 was between 0.004~0.093mg/m³, the overexceeding rate was 0, and the annual value of 0.025mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.004~0.055mg/m³, the overexceeding rate was 0, the annual average value of 0.016mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM 10 was between 0.006~0.104mg/m³, the overexceeding rate was 0, and the annual average value of 0.024mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list.

Baode County: the daily average concentration of SO₂ in 2012 was between 0.002~0.094mg/m³, the overexceeding rate was 0, and the annual value of 0.0395mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list; the daily concentration value of NO₂ was between 0.002~0.085mg/m³, the overexceeding rate was 0, the annual average value of 0.021mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and first grade standards amended in the list; the average concentration of PM 10 was between 0.015~0.238mg/m³, the overexceeding rate was 0.3%, and the annual average value of 0.049mg/m³ is in accordance with “the Standards for Environmental Air Quality” (GB3095-1996) and second grade standards amended in the list.

2. Acid rain

The results on monitoring of acid rain in 2012 shows that the annual average value of precipitation pH in the whole province was between 5.94~7.07, the acid-causing substance in precipitation mainly composed of sulphate, in which, the annual value of precipitation pH in Jinzhong City was 7.07, the frequency of acid rain is zero; Luliang City 6.70, the frequency of acid rain is zero, Xinzhou City was 6.97, the frequency of acid rain is zero.

3. Environment of surface water

(1) Linshi County

Surface water in Linshi County belongs to Fen River Water System from the Yellow River basin. The main rivers include Fen River and other grade one branch rivers as Jinsheng River, Renyi River, Jiaokou River and Duancun River.

Originated from Guancun Mountain in Ninwu County, in the north of Shanxi Province, Fen River is

running across 34 counties and cities in the province, passing through two major basins of Jinzhong and Linfen, running toward the south and entering into the Yellow River in Wanrong County. The total length of Fen River within the boundary of Linshi County is about 51.8 kilometers, covering 8% of its total length and the average longitudinal slope in the province is 1.7‰.

Originated from Qinyuan County, Jinsheng River is 30 kilometers long, and its length within the boundary of the province is about 18 kilometers, with a basin area of 282 282km², and its basin area within the county is 210km², the average longitudinal slope of the river bed is 13.4 ‰. Jinsheng River is producing clean water annually with an annual average peak flow of 285m³/s.

Originated from Shibandian near Yuerquan in Qinyuan County, Renyi River is 40 kilometers long, flowing through 30 kilometers in the county with a basin area of 257 km², the length of it in the boundary of the county is 189 km², the annual clear water flow volume is 0.156 m³/s and the whole year runoff is 13773 m³.

Originated from Qipan Mountain in the west of Zhongyang County, Jiaokou River is 53 kilometers long and the length of it running through the county is 31 kilometers with a basin area of 475 km², the basin area within the boundary the county is 161 km², the average of longitudinal slope of river bed is 10.56‰. Except Zhuyi River and Woniusheng River running out clean water all the year round, the normal water flow of Jiaokou River is not large, even stop running during the dried season, according to the survey, the annual runoff of the river is about 8.73 million m³.

Duancun River is originated in Quanzaipai Range in the west of Xiaoyuxian, the length of its main river is about 60 kilometers, and 40 kilometers long within the boundary of the county with a basin area of 958km², and the basin area in the county is 156km². The average longitudinal slope of its river bed is 13.4‰. The river has no clear water running, only during the flood seasons, the flood is running off rapidly and then become dried, and it is just a seasonal river and according to the survey the annual runoff is about 12.63 million m³.

According to the result of the monitoring at the south section of Wangzhuang Bridge within the boundary of Linshi County for Fen River (2012), the water quality at this section is poor V category, belonging to severe pollution. In which, the main pollutants ammonia nitrogen exceeding the standards for 15.2 times, the chemical oxygen demand 1.2 times and five day biochemical oxygen demand 0.9 times over the standards.

(2) Fenyang City

The main rivers in the boundary of Fenyang City are: Yudao River, Xiangyang River, Yumen River in the middle part, Yangcheng River in the south, Wenyu River and Ciyao River in the east. Among them, Wenyu River is the largest one, running together with Ciyao River into the city from Wenshui County, and entering into Fen River in the boundary of Xiaoyi County, belonging to the branch river of Fen River. The annual runoff of Wenyu River is 21 million m³. Wenyu River in the boundary of Fenyang City is running from south-west and then turning to south, and there are Yumen River, Yangcheng River and Ciyi River merging into it successively and then entering the boundary of Xiaoyi County.

(3) Liulin County

The main surface water in Liulin County is Sanchuan River, which is the grade one branch river of the Yellow River and it is the largest river in the west of Shanxi province as well as the largest river in

Luliang City.

According to the results of monitoring at the sections of Zaidong Bridge and Lianghekou Village to the river in Liulin County, the water quality at them both belongs to poor V category, it is severe pollution. In which, the main pollutant ammonia nitrogen at the section of Zaidong Bridge is 2.6 times than the standards, and total phosphor 0.5 times and kind of oil 0.2 times than the standard. The main pollutant ammonia nitrogen at the section of Lianghekou Village is 3.6 times than the standard, the chemical oxygen demand 0.3 times and total phosphor 0.3 times.

(4) Hequ County

The main surface water in Hequ County belongs to Yellow River basin, the main rivers within the boundary of the county are Yellow River and Xianchuan River. Xianchuan River is the grade one branch river of the Yellow River, originated from Mafang Township in Shenci County, running through Shenci, Wuzai, Pianguang and Hewu County and entering into Yellow River in Yumiao at Hequ County.

According to the Report on Environmental Quality of Shanxi Province (2012), the results of the monitoring to the section at Yumiao in Hequ County shows that the water quality at this section is II category and the poor quality of water is severe.

(5) Shenci County

There are Zhujiachuan River, Xianchuan River, Yezhukou River and Runkou River in the boundary of Shenci County, all belong to the seasonal rivers. Zhujiachuan River, Xianchuan River and Yezhukou River belong to the Yellow River Water System, Runkou River to Hai River Water System. These four rivers are dried during non-flooding seasons but flooding during the flood seasons, the utilization ratio of water is very low.

Zhujiachuan River is originated from Jintuliang Village in Xiaozao Township of the county, running from north-east to south passing through Xiaozai, Donghu, Yijin and Huzhi Townships in the boundary, going out of the county at Hezhixiang Bridge and Sunjia Bay Villages, finally entering into the Yellow River after flowing through 3 counties of Wuzai, Hequ and Baode. The basin area of it is 784 km², and the main river is 60.6 kilometers long, the river bed is 3-7 meter wide and depth of water is 0.5-2 meters, the annual average runoff during the flood season is 10 m³/s, and the annual amount of sand bringing from it is 700,000 tons and it is the river with the largest amount of sand in Xinzhou area. There are 224 small branches with a length longer than 1 kilometer of the river in the area and it is the largest watershed in the county. Both banks of the river belong to alluvial flat and gentle slope wind and sand area, with a flat topography and fertile soil.

Xianchuan River, originated from Liujiahe Village in Mafan Township in the county, runs from the east to west passing through Mafan, Bajieo, Hongyazi and Changzhen townships in the north-west of the county, and going out of the county at Qianlishuwa Village of Changzhen Township and entering into the Yellow River after running through 3 counties of Pianguan, Wuzai and Hequ. The river basin area of the river is 582km², the main river is 35.5 kilometers long, and the annual largest runoff during the flood season does not exceed 15m³/s. There are 174 channels longer than 1 kilometer in the basin area in the county and it is the second largest basin area in the county, both banks of the river belong to loess hill gully area.

Yezhukou River is originated from Xiejialin Village in Liebao Township of the county, running from

south to north, going out of Shihu Village in Liebao Township and entering into Pinlu County, and finally entering into the Yellow River after running through Pianguan County. The total basin area of the river is 89 km², the length of it within the county is 25 kilometers and the width of river is about 27 meters, annual average runoff during the flood season is 35m³/s. There are 31 channels longer than 1 kilometer in the river basin area and both banks of the river are mostly earth-rock mountain area.

Runkou River is originated from Xiaogouerjian Village in Wenlin Township of the county, flowing from the east, running out of the county at Dagouerjian Village and entering into Hui River. The basin area of the river is 71km² and the length of the river in the boundary is 5 kilometers and the largest runoff during the flood season is 35m³/s. The regions where the river flowing through are all high mountain and deep gully and the flow is so rapid.

(6) Baode County

The surface water in Baode County belongs to the Yellow River Basin, the main surface water includes: the Yellow River, Zhujiachuan River, Shitang River, Xiaohegou River and Yaozhuan River.

The Yellow River enters the county at Tiqinqiao Village of the county, flowing to Fengjiachuan Village in the south and going out the county, running through Xin County continuously. The total length in the boundary of the county is 60 kilometers, the river valley is a "V" shape, with the bottom materials of soil, rock and sand. The period from March to May and October to November are the normal water periods, with a width of 150 to 250 meters, depth of 2-3 meters, flow speed of 1.6-3m/s and runoff of 70-130 m³/s; the period from June to September is the flood period, the width is 500- 1000 meters, depth of 6.5- 10 meters, flow speed of 4.7m/s and runoff of 2000-3000 m³/s, and the period from November to the mid December is the frozen period, the thickness of ice is 3-6 inches, but the river segment in the county is not totally frozen.

Zhujiachuan River in Baode County is as long as to 40 kilometers. The normal period it is a dried river, but during the flood period, the width of the river can reach about 100 meters and the depth 2.5-5.7 meters, flow speed of 5-7 m/s, the occurrence of flood postpones 1-3 days each time.

Shitang River is originated from Xiegou where is the crossing place of Kelan and Baode, flowing into the county at Taiping Village, and running through Huiyanglu River at Qingcaogou, Sunjiagou, Muta and Shitang and entering into the Yellow River at Hanjiachuan Village, the total length of it within the boundary is 25 kilometers. During the normal period, it is a dried river, but during the flood season, the width of the river becomes 25 kilometers and depth to 1.1.5 meters, with a flow speed of 5-7m/s, the occurrence of flood postpones 1 day each time

Xiaohegou River, its another name is Palougou River, originated in Zaiche Mountain in Kelan, the total length of the river is 50 kilometers, entering the boundary of the county at Qinjiahe Village and entering into Yellow River at Shenshan Village after running through Palougou, Nanhegou and Baijia Gou villages. The total length of it within the boundary of the county is 30 kilometers. During the normal season, it is a dried river, but during the flood season, the width of it becomes about 30 meters, the depth 1-1.5 meters, with a flow speed of 6/s, the occurrence of flood postpones about 1-2 day each time.

Originated in the area along Yaozhuan Township Zhuantou and Wangjiali, Yaozhuang River belongs a seasonal river, merging water from Huigougu to Guojaitang and entering into Yellow River. During the dried season, water volume is very small, or even to dried out, and during the raining season, water volume becomes increasing. The total length of the river is 20 kilometers, the total drop is 538 meters, the average slope of the main river bed is 2%, the basin area is 74.5 km².

According to the report on environmental quality in Shanxi Province (2012), the result from the monitoring at the section of Huanyuanzi in the boundary of Baode County for Zhujiachuan River shows that the water quality at this section is category IV, belonging to the slight pollution, in which the main pollutant of ammonia nitrogen exceeds the standard for 0.2 times.

4. Environment of underground water

According to the report on environmental quality in Shanxi Province (2012), the underground water quality in the whole province is good, in which, the underground water at Jinzhong is fine, belonging to category III, that in Luliang City is fine, belonging to the category III.

In 2012, 23 places of centralized water sources for drinking in the province were under monitoring, the qualified rate of the general water quality meeting the standards is 87.2%, in which, the qualification rate of water for drinking in Jinzhong, Xinzhou and Luliang is 100%, the water quality meets “Standards for Underground Water Quality” (GB/ton,14848-1993), meeting the standards of water quality category III.

5. Sound environment

(1) Sound environment in urban area

The average equivalent sound level of urban environmental noise in Jinzhong City is 51.7 dB, the sound environment quality level belongs to the relatively good.

The average equivalent sound level of urban environmental noise in Xinzhou City is 52.0 dB, the sound environment quality level belongs to the relatively good. The average equivalent sound level of urban environmental noise in Luliang City is 54.3 dB, the sound environment quality level belongs to the relatively good.

(2) Sound environment of road traffic

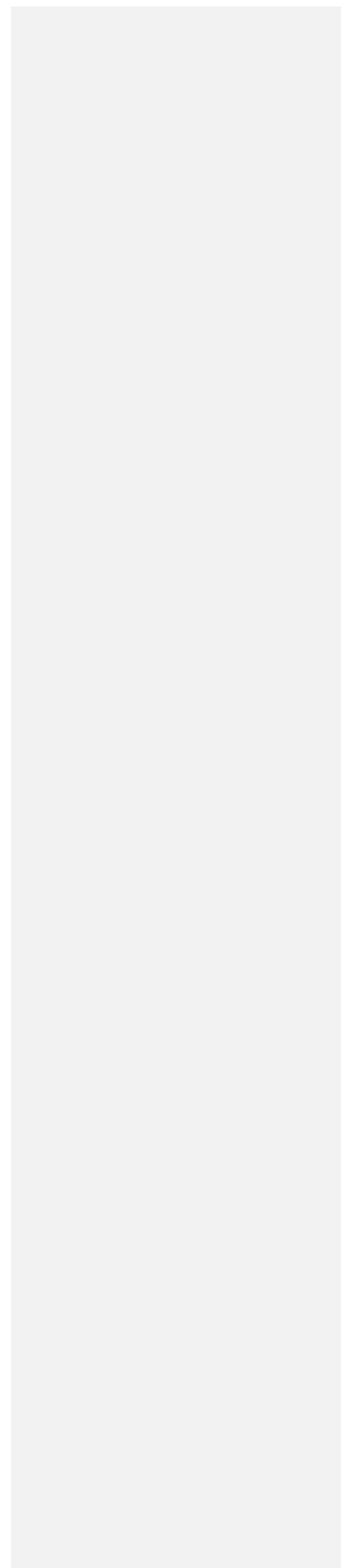
According to the report on environmental quality in Shanxi Province (2012), the average equivalent sound level of urban traffic noise in Jinzhong City is 64.1 dB, the sound environment quality level belongs to the relatively good. The average equivalent sound level of urban traffic noise in Xinzhou City is 66.9 dB, the sound environment quality level belongs to good. The average equivalent sound level of urban traffic noise in Luliang City is 67.3 dB, the sound environment quality level belongs to good.

6. Ecological environment

According to the report on environmental quality in Shanxi Province (2012), the EI of the environment quality in the whole province is 39.9, belonging to the status of “general”, in which the EI of Linshi County is 44.40, belonging to “general; the EI of Shenci County is 41.88, “general”. The EI of Hequ County is 32.04, belonging to “relatively poor”; EI of Baode County is 29.18, “relatively poor”; the EI of Lulin County is 28.76, belonging to “relatively poor” and that of Fenyang City is 46.49, belonging to “general”.

The adaptable standards for assessment

Table 4



1. Environmental air

The grade II standard from “the Standards of Environmental Air Quality” (GB3095-2012) is adopted here, the detailed standards of limited value included in Table 4-1

Table 4-1 Standards for Assessment of Air Environment Air Quality (GB 3095-1996 Grade II) mg/Nm³

| Name of pollutant | Annual average | Daily average | One hour average | Remark |
|-------------------|----------------|---------------|------------------|--------------|
| SO ₂ | 0.06 | 0.15 | 0.50 | GB 3095-2012 |
| NO ₂ | 0.04 | 0.08 | 0.2 | |
| ton SP | 0.20 | 0.30 | - | |
| PM ₁₀ | 0.07 | 0.15 | - | |

2. Surface water

Since this project covers a large variety of aspect, a standard of limited values have been regulated for the different segments of all the rivers within the project area according to the related regulations from the “Zoning of Surface Water Functions in Shanxi Province”, and “the Controlled Standards for Surface Water Environment Quality” (GB3838-2002), and these limited values are shown in the Table 4-2.

Table 4-2 A Table of Limits of Concentration for Surface Water Environment Quality Standards (GB3838-2002): mg/L

| Series No. | Item | Standard value of classification | | | | |
|------------|---------------------|----------------------------------|-------|-------|------|-----|
| | | I | II* | III* | IV | V |
| 1 | pH value | 6~9 | | | | |
| 2 | BOD ₅ ≤ | 3 | 3 | 4 | 6 | 10 |
| 3 | COD≤ | 15 | 15 | 20 | 30 | 40 |
| 4 | NH ₃ -N≤ | 0.15 | 0.5 | 1.0 | 1.5 | 2.0 |
| 5 | volatile phenol ≤ | 0.002 | 0.002 | 0.005 | 0.01 | 0.1 |
| 6 | Ton P≤ | 0.02 | 0.1 | 0.2 | 0.3 | 0.4 |
| 7 | Ton N≤ | 0.2 | 0.5 | 1.0 | 1.5 | 2.0 |
| 8 | SS≤ | 70 | 150 | 400 | — | — |
| 9 | Oil type ≤ | 0.05 | 0.05 | 0.05 | 0.5 | 1.0 |

3. Sound environment

The rural environment from “the Standards of Sound Environment Quality” GB3096-2008 is adopted in this project for its Grade I standards, i.e. daytime: 55 dB, night time: 45 dB; and the transport trunk adopts 4a standards, i.e. day time: 70 dB and night time 55dB.

| | |
|-----------------------------------|--|
| Standards of pollutant emission | <p>During the period of the operation of this project, there is no any emission of pollutants.</p> <p>Other standards:</p> <p>(1) "Standards of Safe Utilization of Pesticide" (GB4285-89)</p> <p>(2) "The Regulations on Forest Fostering" (GB/ton, 15781)</p> |
| Standards of total volume control | None |

5.1 Brief introduction of processing flow (diagram)

The detailed processing flow of the proposed project is shown in Figure 3.

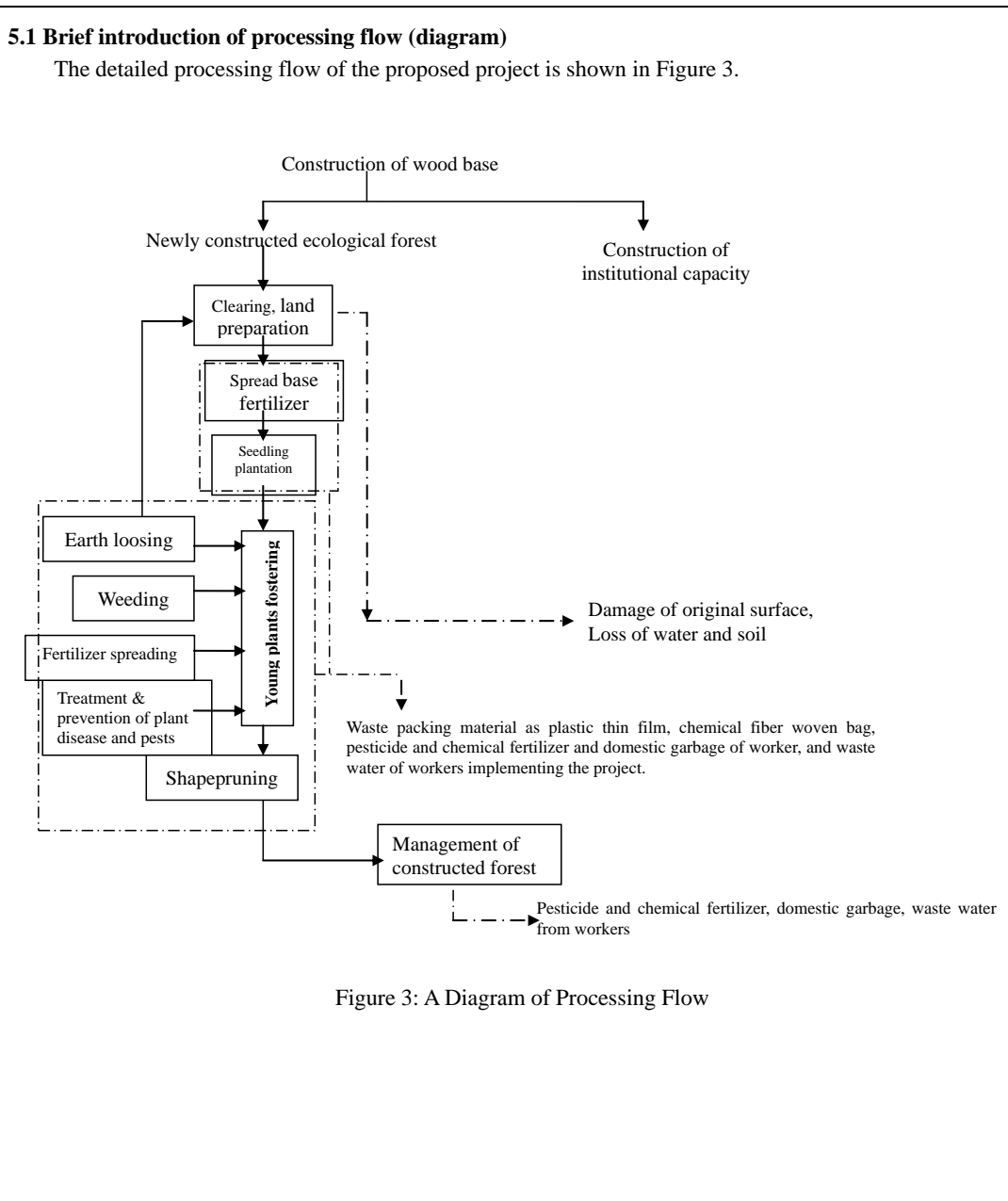


Figure 3: A Diagram of Processing Flow

Explantation of the processing flow:

(1) Clearing of forest land

Since this project belongs to the biological integrated treatment project, no large scale of land clearing will be conducted generally for this project, slash burning is totally prohibited. Only manual or machinery to conduct the clearing to the pit digging, at the sametime, special attention should be paid to protect the vegetation around them.

(2) Land preparation and pit-digging

The method of land preparation includes fish-shape pit and pit-shape land preparation, when land preparation is done on the slope higher than 16 degree, pig-digging and land preparation shall be conduct along the contour, to maintain the vegetation among the belts (pits), and the planting pit should rank according to the shape of “品”.

The methods for land preparation will be defined based on the conditions of slope degree, growth of vegetation and water and soil loss, no matter what kind of mode for land preparation is used, we should try our best to protect the existing original grasses and vegetation.

(3) Planting

To make full use of natural rainfall water, bare root for forest plantation and the planting shall be conducted in the early spring, by using the time after raining or cloudy day planting; container seedling planting, only needing rainfall to ensure the forest plantation, and forest plantation can be processed in spring, raining and autumn.

The depth of planting shall be adaptable and keeping the root system vertical for the seedling without any damages and tucked root; after filling soil into pits, treading on it with feet. Before planting, bare root seedling shall be processed with yellow mud, rootone and water-retaining agent, and the seedling lefted out shall be planted at the same day completely; if the current day seedlings can not be planted completely, the temporary measure shall be taken to keep seedling root humid. When using container seedling for forest plantation, the container shall be torn, attention shall be paid to prevent loose of nutrition soil and root system be protected.

(4) The allocation of the tree species

To ensure the diversity of tree species, the single-species planting area should not be too large.

(5) Fostering (Tendering)

The fostering of young plants mainly includes weeding, scarification, watering, branch cutting and fertilizer spreading, to promote the growth of plants through fostering. Weeding is limited to the necessity of forest plantation, and partial weeding is encouraged to make a full use of the surplus when fostering, keeping in the soil as covering to reduce the evaporation of water in soil. Fertilizer spreading, it is encouraged to use organic fertilizer and green fertilizer, and the spreading of inorganic fertilizer shall be reduced as much as possible. The fertilizer spreading plan shall be done based on the result of diagnosis to nutrition in soil and plants. When spreading fertilizer, pit spreading or belt spreading can be adopted, when pit spreading, the spreading shall be above the pit, and pits shall be covered with soil soon after the spreading to prevent lose of nutrition, land surface spreading is

strictly prohibited.

The national standards of “the Regulations on Forestry Fostering” (GB/ton 15782) shall be strictly carried out. Plan shall be prepared before the forstoring and intermediate cuttings to produce a good operation plan. During the implementation of the plan, the design of it shall be strictly followed to avoid the damage to the maintaining tree and soil, at the sme time, an effective measures should be taken to promote the residues from the intermediate cutting will be quickly decomposed to reduce the occurrence of fire.

Besides, due to all kind of reasons, some part of young trees will die. To ensure the even distribution of trees, the supplemental plantation can be carried out in winter after the year of the plantation or spring next year. The seedlings used for the supplemental plantation shall be adopted pre-planting seedling as much as possible. After the supplemental planting, watering shall be done to ensure the full growth of trees after the supplemental plantation.

5.2 The main pollution procedures

5.2.1 The pollution procedures and variety of pollutant during the implementation

The main impact of pollution will be brought during the process of the project implementation includes:

5.2.1.1 The biological impact and water and soil loss

The proposed project will cover 6 counties (cities) in 3 cities, 2,195 sub-compartments in total. In the early stage of forest plantation, it is necessary to conduct clearing of land, the targets of the clearing include weeds and shrubs growing around the pits to be digged for plantation; Before the transplantation of seedling before forest planting, land preparation needs to be done in the ways of cave soil preparation; in the process of the fostering of young plants and low-productivity forests, supplemental plantation, re-cultivation and dee-digging shall be conducted. Therefore, some damages will be inevitably happen to the original surface vegetation and a certain extent of water and soil loss will occur. Besides, the construction of operation roads and boulevard will certainly bring a certain extent of damage to the original surface, resulting in some degree of water and soil loss. However, these are only temporary and the impact will terminate as the completion of the construction work.

2.1.2 Pesticide and fertilizer loss

In the process of the newly plantation and fostering of young plant of this project, it is necessary to apply manure and part of compound fertilizer. It is estimated, according to FSR, a total amount of 17,700 tons of compound fertilizer (containing N and P at a percertage of 20% and 12%), 5,900 tons of organic fertilizer (containing N and P at a percentage of 9.97% and 1.42%) will be used in the implementation period of the project. According to the documental data, the loss of N and P in fertilizer can be calculated as 1.6% and 0.4%, therefore, the total loss of N and P in the process of the implementation will be 66.08 tons and 85.26 tons respectively.

Plant diseases and insect pests are the most dangerous enemy for the health growing of trees, in case of the severe damage, they will cause the death of large amount of trees, resulting in the great loss

for state and the collective, individual and company who have the rights of these forest. Such as the damage of dioryctria splendidella and pine caterpillar to young forest, glassy wing to poplar trees, white cloudy spotted borer to poplar trees, anoplophora glabripennis, and red tussock moth to Platycladus orientalis (L.) Franco, their damages are very severe.

The prevention and treatment of the plant diseases and insect pests for the proposed project will adopt the bio-prevention and treatment as much as possible, and in the early three years period of the construction, almost no any pesticide will be used. Starting from the fourth year, a few volume of pesticide will be used for the protection of the economical forest, then a small amount of pesticide loss will be occurred. According to FSR, the volume of pesticide application in the implementation period is about 1.14 tons, based on the related records and documents, and calculation as 1% base, the total volume of pesticide loss will be about 0.01 tons.

Therefore, the application of large volume of fertilizer and pesticide (mainly the application of fertilizer) will bring some negative effects to the soil, and cause eutrophication to water body, but this kind of impact can be controlled by the scientific application of fertilizer.

5.2.1.3 Solid wastes

The main solid wastes produced in the period of the project construction include waste packing materials and domestic wastes.

To prevent the dehydration of roots of young seedlings, they will be packed with soil and covered outside with plastic thin film and chemical fiber woven bags to transport them into the site in the process of the transportation of young seedlings; the application of fertilizer with bag will also produce waste thin film, chemical fiber woven bags; Besides, in the process of the application of pesticide, waste packing material and containers will be produced, mainly including glass bottles, plastic bottles and foil bags. These wastes of chemical fiber woven bag and other packing material are not easy to decompose, belonging to the white waste. If they are not collected back in great care, they will produce pollution to the environment. These packing materials has some toxic materials, so they should be collected back by the entities who are in charge of the plantation and authorize these toxic waste to the qualified units to deal with them appropriately, otherwise, they will bring relatively large impact to environment.

The project covers a large of varieties as well as great volume of work is needed, there will be a lot of operation workers participated in the plantation, and a volume of domestic waste will be produced in the construction of the project. Considering that the project areas are all located in the rural area, neighboring with various natural villages, and most of the workers employed are farmers, their living and other activities are all in their homes, therefore, no necessary to set up implementation camp for them and no new domestic wastes will be produced. So the implementation of the project will not bring about the issue of domestic wastes.

5.2.1.4 Waste water

The project covers a large of varieties as well as great volume of work is needed, there will be a lot of operation workers participated in the plantation, and a volume of domestic waste will be produced in the construction of the project. Considering that the project areas are all located in the rural area, neighboring with various natural villages, and most of the workers employed are farmers, their living and other activities are all in their homes, therefore, no necessary to set up implementation camp for them and no new waste water will be produced. So the implementation of the project will not bring

about the issue of waste water..

5.2.1.4 Waste gas

During the process of project construction, the vehicles transporting seedling, fertilizer, implementation workers, construction machinery will produce exhausts and dust on road, but generally speaking, these kind of emission is very small and no serious impact will be brought to the project areas.

5.2.1.5 Noise

In the process of the construction of the proposed project, soil excavation, mainly including digging machine and transportation vehicles. The factor of various noise source is between 70-90 dB (A), which will bring a relatively great impact to the sound environment around the site. The noise source value of the main different construction machinery is shown in Table5-1.

Table 5-1 A Table of Noise Source during the Project Construction of the Proposed Project

| Series No. | Equipment producing noise | Noise value [dB(A)] |
|------------|---------------------------|---------------------|
| 1 | Digging machine | 90 |
| 2 | Transportation vehicle | 80~90 |

5.2.2 Pollution process and pollutants in the operation period

This project is the ecological treatment project and almost no pollution during the operation period, and after the fostering of young plants, about 3-5 years, the forests will become crown closure mode, the ecological and economical benefits will start to present then, mainly on: conservation of water and soil, water prevention and sand fixing, absorption of dust and reduction of noise, some economic forest will bear fruits, and produce some extent of economic benefits. Therefore, during the growing and operation periods, the impact of the project to environment is favorable, the negative impact is due to the application of fostering, i.e. application of fertilizer or pesticide, resulting pollution to water body, but since the climate at the area is dried, with a small precipitation, this kind of impact is very small.

In the process of forest operation, it is necessary to apply fertilizer, conduct daily patrol to strengthen the management of plant disease and insect pests. Therefore, the pollution caused in the operation period mainly includes:

5.2.2.1 Impact of pesticide application when treating and preventing plant disease and insect pests

In the process of forest management and the treatment of plant disease and insect pests, it is inevitable to apply pesticide. Large volume of pesticide application, especially the pesticide with severe toxic and long term of residue, causing the environment pollution easily; at the same time, during the process of pesticide, the waste packing materials, container and toxic materials, will produce severe damage to the local environment if they have not been properly treated.

Based on FSR, the volume of pesticide application during the operation is about 10.22 tons/year, and

according to the records and documents, we can calculate the loss of pesticide as 1%, then the volume of pesticide loss is about 0.1 ton/year.

5.2.2.2 Impact of fertilizer application

After the forest become mature and bearing fruits, organic fertilizer of 25-50 kg will be applied to each root in winter season, and in spring, compound fertilizer of 0.5 to 1 kg will be applied mainly with N and P components. The method of fertilizer application: put basic fertilizer into the open ditch outside the area of tree crown, and fertilizer application is usually conducted by digging shallow ditch outside the area of tree crown and pour fertilizer into the ditch. If fertilizer application is conducted improperly, N and P contents in fertilizer will run easily into water body by surface runoff, in a severe case, it will cause the eutrophication of water body.

According to FSR, it is estimated that a volume of 5,900 tons of compound fertilizer, and 2,000 tons of organic fertilizer will be applied during the operation period. Based on the records and documents, the volume of the loss of N and P in fertilizer can be calculated as 1.6% and 0.4% respectively, therefore, we can find that the volume of loss of N and P in the operation period will be 22.8 tons and 29.6 tons respectively.

5.2.2.3 Domestic waste and waste water produced by the workers for forest management

Upon the completion of forest plantation, it is necessary to arrange staff for the management of forest. According to FSR, we will need 220 persons for the protection of forest in this project. They are all farmers living in the nearby villages and their living activities are mainly in their own villages, and no need to set up the living camp for them. And the waste water and domestic produced can be treated as the same as when they are living in the villages. Therefore, the impact produced from their domestic waste and waste water to environment is very small.

The conditions of production of main pollutants and the estimated emission of them Table 6

| Content Category | Emission source (series No.) | Name of pollutant | Concentration and productivity before treatment (unit) | Concentration and emission volume after treatment (unit) |
|------------------|--|---|--|---|
| Air pollutant | Construction period | Waste gas burning from oil of transportation vehicle | Small amount | The current condition of air quality in construction area is good, small amount of waste gas emission, the impact after the spreading is very small |
| Water pollutant | Construction period | Pesticide and fertilizer | The amount of pesticide loss is about 0.01 ton, and the loss of N、P are 66.0 tons and 85.28 ton respectively | |
| | Operation period | Pesticide and fertilizer | The amount of pesticide loss is about 0.01 ton, and the loss of N、P are 66.0 tons and 85.28 ton respectively | |
| Solid waste | Construction period | Waste packing material as plastic thin film, chemical fiber woven bag, produced in the process of seedling preparation and fertilizer application, domestic waste of workers, and packing materials and container produced in the process of fertilizer application, those can be recycled will be recycled; those can not be recycled, as domestic waste, plastic thin film and chemical fiber woven bag will be collected and treated together. The packing materials and containers of pesticide belongs to toxic materials, they should be collected back and authorize to those who has qualification for treatment of them. | | |
| | Operation period | In the process of fertilizer application at the construction bases, packing materials and containers will be produced, they belong to toxic material and should be collected back and authorize the qualified unit for dealing with them. | | |
| Noise | Noise produced form the construction of the project is very small, especially the operation site is located remote, so the disturbance of noise in this case can be neglected. | | | |
| Others | None | | | |

The main ecological impact (attached pages can be added if it is not enough space)

The implementation of the project will bring a positive ecological benefit for water conservation, purification of air and carbon fixing and producing of oxygen, but in the process of project construction and operation, some negative ecological impact will still be produced such as damage of surface vegetation, water and soil loss and reduction of biodiversity.

Table7 Environmental Impact Analysis

7.1 Analysis of ecological environment impact

The implementation of this project is conducive to demonstrating the various benefits and efficiency of forests, especially in the aspect of increasing the area of forests in the project area, ameliorating the ecoenvironment of the regions. Its construction shows an positive impact in conservation of water and fertilizer and purification of air.

7.1.1 conservation of water and fertilizer

The root systems of different kinds of woods form a network in the soil, according to an analogy, taking up a size similar to that of canopies, enlarging the cavities of soil granules. The retention of twigs, branches and the root system can retain the soil, keeping it from precipitation erosion, thus preventing water loss and soil erosion, keeping the fertility of soil, preventing retention and sedimentation and landslide. According to some related information, under the same conditions, every hectare of forest land shows a reduction of loss of soil by 55.05 tons.

7.1.2 Air purification

Woods of different types can purify the environment through adsorbing dust, poisonous gasses, exterminating bacteria and reducing noise.

Related researches show every hectare of woods can release oxygen by six tons. Upon the completion of the construction of the project, 0.1149 tons of oxygen will be obtained from the project, calculated by 1000 yuan/ton, the benefit from the annual oxygen release will reach 114.8471 million yuan.

7.1.3 Impact of land use

The impact of land use: As this is only temporary in the course of construction, use of the land will only change the use of the land temporarily and affect the original functions of the land. Except for the part to be occupied by the woods, other parts temporarily occupied can be restored to the original shape, and the use of the land will affect the property of the land.

The impact of permernant occupation of the land: The permernant use of the land mainly shows in new forests that occupy the wild mountains, waste land and abandoned land. It starts from the beginning of the construction period, and will last in the operation period, and its impact is lasting and will become timerland, thus showing a comparative small impact on the use of land to the localities. On the whole, the construction of this project is conducive to raising the land use rate of these localities.

7.1.4 Impact on animal coenoses

The project construction will exert certain impact on the animals in the areas of construction. In the period of construction, this impact is small on the animal coenoses in the areas and will not affect the environment of their habitation. Upon its completion, along with the time change, new coenoses will form and develop and new coenoses will increase remarkably compared to those before the construction.

7.1.5 Impact of the diversity of biocoenoses

At the time of land clearing, permernant or temporary disturbance may occure to the resources of fauna and flora, destructing the original vegetation and causing the lass of soild and fertility. At the same time,

improper land preparation at slopes may result in serious water loss and soil erosion. In addition, complementary planting, reclamatory ditching and tunneling and construction of roads will also cause some water loss and soil erosion.

To sum up, to reduce the water loss and soil erosion to the maximum in the construction period, we suggest adopting the following measures:

- ① Organise trainings on preventing water loss and soil erosion to the workers before starting the construction and strengthen the supervision and monitoring in the construction period rectifying improper ways of construction.
- ② Strictly banning land preparation with fire.
- ③ In building new forests and cultivating new woods, total reclamation shall be avoided, but relying mainly on pit reclamation, pit planting along contour lines with trees planted in triangular shapes and retaining vegetation belts of certain width on top and waist and at the foot of mountains, and keeping the original vegetation at steep slopes and on top of mountains and in valleys and on banks of rivers.
- ④ During the reclamation, it will be conducted along the contour lines to avoid water loss and soil erosion as much as possible.
- ⑤ A vegetation protection belt of 10 meters in width shall be kept between the plots for forestation and the farmland.
- ⑥ Decayed leaves and twigs will be kept on the surface of the reclaimed land to avoid exposure of surface soil and reduce water loss and soil erosion.
- ⑦ Some attached construction such as that of roads and tents shall be carried out in compromise with the shapes of mountains to avoid large land mass removals and destruction of land surface.

7.1.6 Carbon emission

① CO₂ to be released in the construction period. Calculation of greenhouse gas will be done by the following formula for the types of fertilizers to be applied in the period of operation, rate of nitrogen content, amount of unit area application.

$$EN_Fere\ tonilizer, ton = [(FSN, ton + FON, ton) * EF1] * MWN2O * GWPN2O$$

$$FSN, ton = \sum MSFi, ton * NCSFi * (1 - FracGASF)$$

$$FON, ton = \sum MOFi, ton * NCOFi * (1 - FracGASF)$$

Of which: FSN, ton—the amount of nitrogen containing compound fertilizer ton/annually in sequence after the evaporation of NH₃ and NO_x (ton N.a-1);

FON, ton—the amount of nitrogen containing organic fertilizer ton/annually in sequence after the evaporation of NH₃ and NO_x (ton N.a-1) =;

EF1—emission factor of nitrogen fertilizer application (IPCC default value 0.01) ;

MWN2O—the proportion of molecules of N₂O to molecules of N is 42/88;

GWPN2O—N₂O contribution to the trend of global warming (IPCC default value 310);

MSFi, ton—amount of compound fertilizer application ton/annually in sequence (ton. a-1);

MOFi, ton—amount of organic fertilizer application ton/annually in sequence (ton.a-1);

NCSFi—the nitrogen content rate in compound fertilizer (value taken as 20%);

NCOFi—the nitrogen content rate in organic fertilizer (value taken as 9.97%);

FracGASF—the evaporation rate of NH₃ to No_x applied in compound fertilizer (IPCC default value 0.1);

FracGASF—the evaporation rate of NH₃ to No_x applied in organic fertilizer (IPCC default value

0.2);

According to the feasibility study, 17700 tons of compound fertilizer and 5900 tons of organic fertilizer will be applied in the period of construction, and 5900 tons of compound fertilizer and 2000 tons of organic fertilizer will be applied in the period of operation. Put together, 23600 tons of compound fertilizer and 7900 tons of organic fertilizer will be used.

Upon calculation, the amount of CO₂ emitted resulting from application of fertilizers within the boundary of the project will be 7217 tons of CO₂-e.

② CO₂ emitted by the transport vehicles

According to the survey, the transport vehicles are mainly used to transport seeds, seedlings and compound fertilizers to the destinations of the project sites with a transport distance of 10 kilometers and the distance of manure transport is five kilometers. At the time of project implementation, due to the restrictions of local topography, generally the vehicles for the transportation are usually three-wheeled vehicles with oil consumption of 20L per hundred kilometers when fully loaded, and 10L when empty, so the oil consumption amount of a return trip for transportation of seeds, seedlings and compound fertilizer will be $(10)/100*20+(10)/100*10=3L$, while that for transportation of organic fertilizer will be $(5)/100*24+(5)/100*20=1.5L$. Calculated by 2.73 kg of CO₂ evaporation for every one liter of diesel combustion, every one return trip for transportation of seeds, seedlings or compound fertilizer 8.19 kg of CO₂ is emitted, and that for transportation of organic fertilizer is 4.1kg. According to the amount of application of compound fertilizer and seeds and seedlings, 28800 return trips are needed with an emission of CO₂ reaching 235.8 tons, while 3950 return trips are needed for transportation of organic fertilizer with an emission of CO₂ reaching 16.2 tons, the amount of total CO₂ emission put together reaching 252 tons.

③ Estimated carbon sink of the project

It is an estimation of the carbon sink of the project.

Actual net carbon sink amount is the variation amount of the carbon reserve of the project minus the emission amount in the project boundary, minus basic variation amount of carbon reserve and minus the increased amount of emission of greenhouse gas outside the boundary of the project (amount of the leak).

$C_{Proj,ton} = \Delta C_{Proj,ton} - GHGE_{,ton} - LK_{ton}$

$C_{Proj,ton}$ ——the net carbon sink amount ton/annually in sequence (ton CO₂ - e·a-1);

$\Delta C_{Proj, ton}$ ——the variation amount of the carbon reserve of the project (ton CO₂·a-1);

$GHGE_{,ton}$ —— the increase greenhouse gas amount withing the project boundary (ton CO₂ - e·a-1);

LK_{ton} ——the amount of tons of CO₂ caused by leaks of the project activities (ton CO₂ - e·a-1);

ton ——the years after the project starts (ton).

The net amount of carbon sink from the project is 690,559 tons CO₂ - e·a-1.

Amount of carbon sins(ton) = timber reserve $381,436m^3 \times 1.83$

Carbon fixation benefit(yuan) = carbon fixation amount $\times 30.5$ yuan

It is calculated that total carbon fixation amount will be 0.698 million tons and the total carbon fixation benefit will be 21.289million yuan.

7.2 An analysis of the impact on water environment

7.2.1 The positive impact

- a) The infiltration function of the polluted water: Forests have a strong purification function to polluted water. According to the researches abroad, when polluted water goes through to the depth of 40 meters in the soil in forests, the bacteria contained in it will be reduced by half, and along with the increase of runoff in the forests, the reduction of bacteria can be reduced as much as above 90 percent.
- b) A forest is like a huge reservoir. When the rain drops fall to the porous soil under the fallen leaves, they will be stored in the way that a reservoir stores water. When it comes to sunny days, a large amount of water will evaporate into the air by evaporation function of woods to increase the humidity of the forest area and the precipitation, so forests play an important role in reduction of droughts and floods.

7.2.2 Adverse impacts

The project has the adverse impacts on water environment in the aspects such as the life sewage, as well as applications of pesticides and chemical fertilizers.

7.2.2.1 Leakage of pesticides and chemical fertilizers

The project involves applications of pesticides and chemical fertilizers in the periods of construction and service, which enrenders leakage of pesticides and chemical fertilizers that will exert some impact on the ground water environment; if improperly applied, the N, P in the compound fertilizers will easily get into the water bodies with the runoff to cause eutrophication of water bodies, so effective measures must be taken against this.

(1) Measures to be adopted to easy the impact of chemical fertilizer application

- ① Strengthen the training of forest building and management on fertilizer application and work out rational plans for the application;
- ② Advocate application of organic fertilizer (farm manure), in land preparation, some organic fertilizer shall be applied in the holes, and grass and leaves shall be buried around trees to increase the organic fertilizer and reduce the application of chemcial fertilizer in the forest plots;
- ③ In accordance with the actual conditions of soil in the project areas, application of fertilizer shall be done after soil tests, and in a way of prescription and rational application in terms of amount and variety to avoid over application and fertilizer loss and environmental pollution thereof.
- ④ Fertilizers shall be applied in holes or in strips and covered immediately after the application to avoid exposure.
- ⑤ The packaging materials shall be properly collected and handled to avoid the residuals to get into the water body to cause environmental pollution.
- ⑥ The plots for forestation shall be not chosen within the area of protection for water resources as defined or designated.

(2) The measures to easy the impact of pesticide application

- ① Do a good job of quarantine of harmful organisms to control the import of harmful organisms with seeds and seedlings of trees.

- ② Clean the environment in the forestation area of the project after a survey of the forestation area and the peripheral area to control the sources of pests and diseases and to do a good job for forest cultivation by paying attention to the hygiene of the forest plots so as to raise the resistance of woods themselves against diseases and pests and reduce the occurrence of such diseases and pests.
- ③ Biological, physical and forest management measures shall be adopted and pesticides shall be reduced in application in prevention and control of pests.
- ④ When it is necessary to apply pesticides, those low in poison content and low in residue in keeping with the requirements of EU or WHO shall be applied in recommendation such as Bordeaux liquid and carbendazim, but pesticides with a high content of poison shall be banned for application so as to reduce the adverse impact on the environment.
- ⑤ The amount, the time for spray and the way of spray shall be given attention at the time of pesticide application to avoid over application at a time and water of pesticide and leakage into the environment.; especially in raining season, application of pesticides shall be banned before a heavy rain. In addition, special attention shall be paid to the mixing and containers' washing and washing venues, which should be chosen away from the drinking water spots of wild animals and human beings.
- ⑥ The waste packaging materials and containers produced in the course of pesticide application must be collected by the building institution of forest bases of various project counties and cities and entrusted with the institutions with required qualifications for proper handling.
- ⑦ The workers and farmers using pesticides must be trained in terms of the safe management and application and storage before using the pesticides so as to avoid polluting water sources and food.
- ⑧ Pesticide application shall keep away from the season of avian breeding as much as possible and apply the pesticides that are less harmful to birds.

7.2.2.2 life sewage

Life sewage can be produced in both the project construction period and service period.

The former mainly comes from working personnel in quite a quantity. Considering the project areas are all located in rural areas close to natural villages and employees hired are all farmers from nearby villages, so no new life sewage will be produced, thus no life sewage coming from the implementation of the project.

After the completion of the project, some managing personnel will be hired. According to the feasibility research, 220 members will be needed, who will all come from local farmers and their residence will be in their respective villages without the need for new residential areas needed. The life sewage and trash produced will be treated in the way already existing in their own villages, therefore the impact of their life sewage on environment will be very small.

7.3 An analysis of impact of solid waste

7.3.1 In the construction period

Solid waste in the construction period is largely from life trash and waste packaging materials by the working personnel.

They will produce a certain amount of life trash. Considering that they are mostly from local villages and the construction areas are located near the villages where they live, they live mainly at their homes, so no construction camps will be built and no new trash will be produced. Therefore the implementation of this

project will not produce the problem of life trash.

In the course of transporting seedlings, to avoid waterloss from the roots of seedlings, they will be transported with earth covered with plastic sheets and sacks of chemical fibre to the destination; the application of sack packed chemical fertilizer will also cause discarded thin plastic film and sacks of chemical fibre, plus waste packaging materials and containers mainly in the form of glass bottles, plastic bottles or sacks of aluminum foils in the course of pesticide application, all being referred to as white trash. If not properly collected, they will cause serious pollution to the environment. Such waste of pesticides are harmful or containing harmful substances, and they should be collected by the building institutions of those forest bases, and then entrust the institutions with corresponding qualifications to handle properly, otherwise there might be great harm to the environment.

To sum up, this assessment report suggests that the following measure be taken to easy the situation.

- ① Collect thin film and sacks of chemical fibre and then reuse them in packing the seedlings.
- ② The thin film and the sacks of chemical fibre broken or hard for reapplication should be collected and be buried in local landfills.
- ③ Pesticide packaging materials after being collected shall be entrusted with the institutions with the corresponding qualifications for proper treatment.

7.3.2 Service period

The solid waste in the service period is largely the life waste of managing personnel.

The former mainly comes from working personnel in quite a quantity. Considering the project areas are all located in rural areas close to natural villages and employees hired are all farmers from nearby villages, so no new life waste will be produced, thus no life waste coming from the implementation of the project, and the impact on the environment will be very small.

7.4 An analysis of noise on environment

This adverse impact exists mainly in the construction period, while the impact in the period of operation is chiefly positive on the environment.

7.4.1 Period of construction

The noise mainly comes form the equipment and machines in the period of construction. At present, the techniques and equipemtn used in domestic construction are largely the same, so the noise survey refers to the noise intensity in analogy. The source of noise is a point source, and according to the mode of noise reduction from the point source, the estimated noise value at different distances is as the following estimation mode shows:

$$L_p = L_{P0} - 20 \log (r/r_0)$$

In the formula: L_p —estimated noise value at distance of a r meters from the noise source;
 L_{P0} —the referential noise grade at a distance of r_0 meters from the noises ource.

For detailed noise value of various kinds of construction equipment or machines, see to the attached Table 8-1.

Attached Table 8-1 **The list of noise value of equipment or machines at different distances**

| Serial number | equipment | Estimated value of noise (dB) | | | | |
|---------------|-------------------|-------------------------------|-----|-----|-----|-----|
| | | 5m | 10m | 20m | 40m | 60m |
| 1 | Transport vehicle | 90 | 84 | 78 | 68 | 58 |
| 2 | Hole borer | 86 | 80 | 74 | 62 | 57 |

According to the above table, the noise thus produced reduces due to distance and building and simple fences in the construction areas, plus the fact the construction sites are in deep mountains or waste shoals far from residential areas, so the noise produced meets the requirement the threshold of noise for construction site (GB12523-90) of ≤ 75 dB (A) during the day time and ≤ 55 dB (A) at night, thus having no obvious adverse impact on the environment.

7.4.2 Operation period

In three to five years after the completion of the project, the closure and growth of the forests will show positive impact on the environment.

Noise is showing an adverse impact on human beings as a result of development of social progress and transportation. According to researches, when the noise is below 50dB(A), it shows no impact on human beings, but when it reaches 70dB(A), adverse impact will appear, when it is above 90dB(A), they can hardly work for a long time. Forests have good effect of noise reduction as a natural muffler. The related experienments show parks or forest of size can reduce noise by 5~40dB(A), 55~25dB(A) more than the reduction through the same distance of empty land; when the noise from the high pitched horns of vehicles through a forest belt of 40 meters composed of lawns, bushes and arbors, the noise is reduced by 10~20dB(A), 7~10dB(A) more than the reduction through the same distance of empty land. In cities, the forest belt 6 meter wide in canopy and 10.5 meters tall is required at least and the belt should be far away from the noise source, generally 6 to 15 meters being appropriate.

7.5 An analysis on air environment

This project is to build 19141.19 hectares of protection forests, and its slight adverse impact on the air environment mainly exhibites in the construction period when land preparation is going on, while its impact on the long term air environment in the period of growth is positive basically without any adverse impact; therefore the analysis on the air environment is aimed at the construction period of this project.

The exhaust gas emission from vehicles transporting seeds, seedlings, fertilizers and workers and equipment will exist plus dust from moving vehicles, but on the whole the total emission in the construction period is very small.

Certain amount of dust and tail gas will be caused in the course of vehicle transportation of earth and stones, thus resulting in some impact on the air quality and environment in the areas of construction and the routes passing by and the sensitive areas. The amount of emission is related to the category of road surface, weather conditions and the speed of vehicles. According to the data abroad, at the speed of 4m/s(14.4km/h), the amount of dust aroused will be 10~15mg/m³, and when the road is a simple one and at the speed of < 15km/h, the dust amount will be <15mg/m³.

To sum up, timely water spraying on the temporary roads for construction and reduce the dust of moving vehicles should be done. When the construction period is over, the impact on the air environment is also

over, thus the impact in the construction period is comparatively small. Besides, the number of vehicles used for the project is not big, mostly being hole borers and vehicle transporting seeds and seedlings and roads located in deep mountains and far away from villages, therefore, the environmental impact is very small.

7.6 An analysis on social environment

In the periods of construction and operation, the phases for forest building, cultivation, management and maintenance, picking and transportation will all need employing a great number of laborers, of whom mostly are local residents in the project areas, so it can greatly reduce the employment pressure from surplus laborers in the rural areas. Meanwhile, its implementation will increase the rent income from the land for the farmers in the area, which will play a positive role in activating rural economy, quickening the pace of poverty alleviation and turning to prosperity and maintaining social stability. It will also be conducive to readjusting the industrial structure of the areas, and spurring the development of agriculture based processing industry, transportation industry, agricultural materials with a strong radiative effect in leading the peripheral areas, which will greatly promote the sustainable and healthy economic development in the project areas and peripheral areas.

7.7 An analysis of the impact on local coenoses

As all the seeds and seedlings are from the local nurturing gardens, and the varieties for the project are of high quality native ones giving no consideration to imported ones, there will not be any invasion of out biological species, which will increase the species of local plants and promote biodiversity.

7.8 An analysis of biological benefit

Upon the completion of the project, there will be an increased forest coverage of 19141.19 hectares, an increase of 3.84 percentage.

7.8.1 The benefit from CO₂ absorption and fixation

Through the project implementation, according to the preliminary calculation, the project forests will produce 0.698 million tons of fixed carbon, thus reducing the greenhouse gas in the region and prevent the warming effect.

7.8.2 The benefit from oxygen release

The related research discloses that every hectare of forest can release 6 tons of oxygen, and upon the completion of the project, it can annually release 0.1149 million tons of oxygen, if calculated by the substitution value of 1000 yuan/per ton. The benefit from the oxygen release can come to 114.8471 million yuan.

7.8.3 The benefit from water resource conservation

The related research discloses that every hectare of forest can increase water storage by 1500 m³, and upon the project completion, it can annually increase water storage amount by 28.7218 m³, if calculated by the substitution value of 0.48 yuan/per ton, the annual forest water storage benefit can come to 13.7817 million yuan.

7.8.4 The benefit of water and soil conservation

Upon the project completion, the function of water and soil conservation will be obviously improved and the phenomena of water loss and soil erosion will be basically under control. The research shows that a fairly good looking forest can reduce water and soil loss by 380 tons/per hectare. It is estimated that 7.2737 million tons of water and soil loss can be reduced annually, if calculated at 0.5 yuan per ton, its annual benefit in water and soil fixation can come to 3.6369 million yuan.

The increased coverage of forest will improve the quality of scenery and make people return to nature. The increased number of visitors and the benefit of entertainment and leisure thereof can bring about a benefit of 95700 yuan annually if calculated by 5.0 yuan per hectare times 19141.19 hectares of increase forest coverage.

7.8.6 Benefit for micro regional climatic improvement

Land preparation and measures taken for water and soil conservation will cause partial changes in the padding layer under the surface ground, and changes in roughness and increase of water storage capacity will lead to the balance relationship between the local atmosphere and the content of water in the padding layer, amount to heat, radiation and other substances, thus affecting the characteristics of the regional micro climate.

(1) Temperature regulation

As the radiation rate of woody vegetation is obviously lower than that of empty land or waste land due to reduced wind speed, weakened exchange between air and ground heat, increased absorption of solar radiation by the forest canopy and humid soil, partial consumption of water from humidity evaporation from leaves and transpiration from pores of leaves, the ambient temperature and ground temperature will stay relatively stable without sudden changes in temperature in the day time and at night, thus reducing the harm from frost and cold.

(2) Increase in humidity and foggy days

With the increase of woody vegetation, retention and storage of rain water and runoff and the transpiration of forest, the moisture cycle speeds up and humidity increases and foggy days also increase. On the other hand, as air circulated continuously, there is consistent expansion and exchange of air bodies and steam, hence the increase of humidity around the forest.

(3) Increase of foggy days

After the implementation of the project, with the increase of local humidity and lowered wind speed and reduction of temperature disparity, the original strong air vertical mix will get weakened to some extent, hence the conditions conducive to the formation of fog.

(4) Increase of precipitation

The amount of regional precipitation mainly involves the general atmospheric circulation and season wind apart from its latitude, distance to the sea and the local topography. But with the change of nature of padding layer under the surface soil, increase of woody vegetation, increase of retained rain water, quickened circulation of regional humidity, rise in the roughness of the padding layer, the uplift function of forest canopies to air currents and the improvement of convection currents, will increase the precipitation in the project area in the warm season and the surrounding areas in the downwind direction.

7.8.7 Benefit of wind disaster prevention

The establishment of an ecosystem for the farmland can effectively raise the capacity of dry and hot wind prevention. Within the system, the overall wind prevention efficiency of a forest belt is 22.4~47%, and within a certain scope, the dry and hot wind prevention capacity will rise with the increase of wind speed and the relative humidity may increase by 3~7.5%. With the reduction of wind speed, the relative humidity will increase, so the condition for the formation of dry and hot wind will not take shape, thus preventing its occurrence, and with the reduction of the harm of dry and hot wind, the efficiency of wind prevention is achieved. The completion of the project will effectively play the role of wind prevention. It is calculated that the territory under protection will reach 0.3 to 0.4 million hectares and raise the grain output by 10%~20%.

7.8.8 Benefit in maintaining biodiversity

The forest environment possesses the function of a gene pool for biological restoration and breeding. The biodiversity will increase with the restoration of forest vegetation. As the implementation of the project on the forest suitable waste land is carried out, with the increase of forest vegetation and scientific management, the biological gene pool in the project area will be better restored and protected and also provide better habitation channels for the wild plant and animal resources of the surrounding areas.

7.9 Environmental measures and investments

For detailed EP measures and investment, please refer to Table 7-1. The investment for environmental protection comes to 3.76 million yuan, about 0.92% of the total investment.

Table 7-1 The list of projected EP measures and investment

| Period | Project name | | Content, amount and scale | Investment volume (10 thousand yuan) | Note |
|---|-----------------------------|--|---------------------------|--------------------------------------|-----------------------------------|
| Construction | Water and soil conservation | Equipment for water and soil conservation | / | 50 | / |
| | Solid waste | Collection and treatment of thin plastic film and sacks of plastic fibre | / | 10 | 4 years of project implementation |
| After being collected together, pesticide packaging materials and containers will be trusted to the qualified institutions for proper handling. | | | | | |
| Service | | | / | 10 | / |

| | | | | | |
|-----------------------------|--|---|----------------|-------|--------------------------------------|
| | | Signboard for awareness | | | |
| Measures for bioenvironment | | Fire prevention and extinguishing devices and equipment | A small amount | 10 | / |
| | | Prevention and pest prevention and control system | / | 50 | Fire prevention |
| | | Monitoring of bio-environment | 1set | 30 | Eco-management and labor control |
| | | Monitoring of eco-environment | 6person | 96 | Four years of project implementation |
| | | 376 | / | 120 | Monitoring of eco-environment |
| Total investment | | | / | 0.92% | / |
| | | | / | 0.92% | / |

7.10 Forest certification

To raise the management proficiency of forest management institutions, promote sustainable operation of forests, stabilize the market share of products of forest enterprises, create entry conditions into new markets, lower the risk of investment, promote the participation of various parties involved and acquire more financial and technical assistance, it is a general tendency to implement forest certification, and the various kinds of work for the certification should be implemented in the different periods of project operation at the same time.

- (1) Establish a management office for forest certification, specially in charge of the related policies, regulation and laws, studies, training and publicity on forest certification.
- (2) The cost and expenses for the management, data, publicity and training concerning forest certification shall be disbursed from the domestic funds at different levels of local finance.
- (3) Personnel training concerning the requirements for forest certification will be implemented in project implementation institutions at four levels: city, county, town and implementation subjects. The trainees are the technical, managerial personnel of forestry and the related institutions that participate in the project, and the operators, technicians and managing personnel of the institutions that are set for forest certification.
- (4) The earlier process management for forest certification and the project implementation process must meet the requirement for forest certification; therefore, the project managers and technicians must act strictly in accordance with the relative requirements and standards to ensure that all the project processes form planning, design, implementation (including forest plot selection, land preparation, way of land preparation, quality of seeds and seedlings, safety of chemical fertilizers and pesticides, environmental protection, ownership of timberland, guarantee of right of laborers, planting techniques and quality of care, maintenance and management) and project management all have to meet the relative requirements for forest certification.
- (5) To realize a sustainable development of forest resources, we require that companies and special professional coops apply for forest certification.

Table 8 The prevention measures and the estimated effects of the construction project management

| Content type | Emission period (serial number) | Name of pollutant | Prevention and control measure | Estimated effect of control |
|------------------|---|--|--|--|
| Air pollutants | Construction | Exhaust gas from vehicles | Select vehicles that meet the emission requirements | Emission in compliance with the emission standards |
| Water pollutants | Construction | Pesticides and chemical fertilizers | Select the kinds recommended by EU and WHO, control the application amount, time and ways of application | Control effectively |
| | Operation | Pesticides | Rationally select the kinds, and control the amount, time and ways of application | Control effectively |
| Solid waste | Construction | Waste from packaging materials like thin plastic film, sacks of chemical fibre | Use as much as possible the recycled waste material, and those that can't be recycled should not be collected together for handling with local life trash. | Not discharged to the outside |
| | | Pesticide packaging | Collect in a unified way and entrust the qualified institutions for proper handling | Not discharged to the outside |
| | Operation | Waste from packaging materials like thin plastic film, sacks of chemical fibre | Use as much as possible the recycled materials, and those that can't be recycled should not be collected together for handling with local life trash. | Not discharged to the outside |
| | | Pesticide packaging | Collect in a unified way and entrust the qualified institutions for proper handling | Not discharged to the outside |
| Noise | Low noise from remote worksite of this project and disturbance to local residents can be neglected. | | | |
| others | No | | | |

Measures for eco-environment and the estimated effect

1. Construction period

① Forest plot selection

- The forest plots should be selected rationally, and no plots shall be selected in the environment-sensitive areas such as the core areas and buffering areas of natural reserves, sites of scenic attraction, forest parks and areas of drinking water sources.
- If necessary to implement forestation in the experimental areas of natural reserves, permission must be granted by the administrative organs of the natural reserves and measures must be taken to ensure that no resources of fauna and flora in the natural reserve will be undermined
- Plots should be arranged rationally and the scale of forestation should be controlled appropriately with each spot less than 35 hm².

② Land clearing, preparing and planting

It is suggested that professionals in forestry be organised to make surveys of the plots for plant resources before land clearing, random timbering be banned, rational land clearing method be adopted, and no controlled

mountain fire be tolerated. After the clearing, the surface soil should be covered with decayed twigs and leaves to avoid surface soil exposure and reduce the occurrence of water loss and soil erosion.

③ Water and soil conservation

To prevent serious water and soil loss in the construction period, the project shall adopt practical measures for water and soil conservation, selecting proper spots suitable for forestation or spots low in grain output for forest cultivation, banning selection of spots at the decline of more than 35 degrees, allowing no complete reclamation in land preparation for forestation, taking hole reclamation in the main, arranging planting holes in triangular shapes along the contour lines, keeping belts of original vegetation of proper width on mountain top, waist and at the mountain foot, no vegetation in the forest on the banks of rivers be cut and cleared, construction avoid raining season, better jobs be done against soil erosion, the earth and stones from land preparation and road building be refilled and reused timely without being piled up randomly; each project county shall formulate its independent plan for water and soil conservation and implement effectively the measures for the conservation.

④ Personnel for the construction project shall be educated for animal protection in the construction period and they shall be prohibited from catching and killing animals.

⑤ Fire prevention work shall be done effectively to avoid forest fires.

⑥ Farmland shall be strictly protected and no farmland shall be allowed for forestation.

⑦ Manual labor shall be adopted as much as possible in the construction period to avoid land surface destruction and comparatively big water and soil loss caused by machine work.

⑧ In the period of land preparation, work hours shall be shortened as much as possible and plastic film be used to cover the reclaimed plots to avoid serious water and soil loss.

2. Operation period

① Forest cutting in the prevention forest shall be conducted alternately, and soil loosening and weeding shall be done partially to retain the ground vegetation as much as possible. Fallen twigs and leaves shall be prohibited from picking so as to promote the conservation capacity of water resources and soil fertility in the forest areas. The timber to fell shall be transported out of the timberland by hand haulage so as to maintain the ecofunction of the timberland.

② The kinds of pesticides recommended for use by EU and WHO shall be selected, the amount, time and ways of application shall be controlled, some organic fertilizer shall be applied in the holes where the surface soil should be returned to the holes, grass and leaves shall be buried around close to the trees in cultivation so as to add the organic fertilizer to the timberland, chemical fertilizers shall be reduced in application and be applied rationally, the kinds and amount of chemical fertilizers shall be determined according to the fertility of soil test to avoid over application of chemical fertilizers and cause pollution to soil, underground water and surface water.

③ Forest fire prevention shall be strengthened in accordance with the related standards for fire prevention, fire isolation belts shall be built, fires shall be forecast for prevention, professional teams shall be established and necessary equipment be furnished so as to put out fires in case they occur, fires shall be controlled in severity and scope in best possibility; management against fires shall be enhanced and regular patrols be organized for fire prevention.

④ Pest quarantine shall be well done to control the import of seeds and seedlings with pests or diseases

from the sources. Surveys shall be carried out of the projected timberland and the surrounding areas before the forestation in a bid to control pest sources and disease sources, timberland cultivation shall be well conducted by paying attention to timberland hygiene to raise the resistance of forests themselves and to reduce the occurrence of pests and diseases.

- ⑤ An advanced monitoring system shall be built for forecasting forest pests and diseased so that pests can be discovered timely and be treated in ways of combination, biological treatment, manual catching and killing and application of pesticides of high efficiency and low poison contents, medical treatment of pests shall be done pursuant to the categories and age of pests, once pests appear, it is the best to apply biopesticides of high efficiency, low poison contents, short period of residual, so as to reduce the harm to beneficial creatures and the environmental pollution, so the pesticides with a high content of poison or banned by China and EU in explicit orders shall not be used.

Table 9 Environmental risks

9 An analysis of project risks

9.1 An analysis of natural environmental risk factors

The natural risks of this project are mainly the environmental pollution problems from fire disasters, pests and diseases.

At present, Shanxi has enhanced its work in forest pest and disease prevention and control and has made some breakthroughs by implementing chieve pest control projects and has basically put the main pests under control. A provincial forecast network against forest pests and diseases has been primarily perfected, being able to forecast accurately and prevent the occurances timely and ensure the environmental security, so the degree of risk is moderate and environmental risk is not particular.

9.2 An environmental risks analysis

9.2.1 The chief environmental risks

The environmental risks of this project are mainly ecological ones, which results from developing trees of a single variety of trees on a large scale. As the variety of trees for man-made multifunctional forests are mainly with local variety of trees, the ecological risk deriving from biological invasion is comparatively low. Yet, there is still certain ecological risk if it is developed without any control on a large scale, which is mainly exhibited in the following aspects:

- a) There will be some negative impact on landscape diversity and genetic diversity.
- b) Large scaled application of man-made monocultured forests and clonal forests will result in a lowering stability and stress resistance of man-made forests and vulnerability to pests and diseases.
- c) There will be certain adverse impact of monocultured man-made forests on the existence and multiplication of wild animals.
- d) The invasion of pests demonstrates mainly by way of ecological problems such pests and diseases in forestry.

9.2.2 Environmental risks under special circumstances

The special circumstances of this project refer mainly to the occurrences of pests on a large scale due to unforeseeable factors, in which the adverse impact may arise on the environment because a large amount of chemicals has to be applied such as pesticides and bactericides.

If such is the case, due to increase of the amount of pesticides and bactericides, the surface water and soil in the areas where pesticides are applied will inevitably be affected; suspended chemical particulates caused by spraying of pesticides and the residuals on the surfaces of crops and evaporation of pesticides in the water, transpiration and expansion of pesticides will also exert an adverse impact on air environment. On the other hand, if there is farmland around the forest, application of pesticides in a large amount will also affect the crops nearby.

9.3 Preventive measures against risks

9.3.1 Chief preventive measures against risks

(1) A forest protection and fire prevention organ shall be established, the construction of a team of forest fire prevention shall be enhanced, the detailed relative laws and regulations based on personal responsibility shall be worked out to effectively protect forests and prevent forest fires. In recent years, the province has implemented comprehensive management projects in key areas for fire prevention in the whole province such as the projects to build fire prevention belts in biological forests and the project to construct a foundation for fire fighting teams, thus achieving remarkable progress in the prevention and fire extinguishing capacity. In recent five years, the province will continue its construction of the forest fire prevention command center, professional forest fire fighting teams, the allocation of basic facilities for communication and fire fighting, watch towers, aviation forest protection bases and fire prevention belts for biological forests, so the forest fire prevention system will be further improved.

(2) A pest forecast system with strict requirements is called for, which is guided by the principle of stressing prevention and implementing comprehensive prevention and control. The forecast and monitoring system against forest pests, and the construction of the quarantine system against forest pests and pest disaster prevention and control system will further be improved; the forest pest prevention and control project in key ecological areas will be implemented; a well aimed research on pest prevention and control techniques will be strengthened to provide technical support and service for forest pest prevention and control.

The characteristics of forest pests, their harms, prevention policies, laws and regulations, techniques shall be made known to the public. The work on pest monitoring and prevention shall be enhanced, and part time forecasters shall be administered and trained. On the basis of regular monitoring and investigations, the investigations and monitoring on the occurrences shall be strengthened if pine moths, *Dasychira axutha* Collenettes, Alder sawflies and pine borers occur in autumn and pine trees wither to death, rational and scientific emergency plans shall be drafted for disaster control, quarantine enforcement shall be enhanced, especially in reinspection of breeding materials for products and seeds and seedling of the pine family introduced from other regions in prevention against invasion of pests. An objective linked responsibility statement concerning the work of forest pest prevention and control shall be signed with each project town to clearly define the responsibilities for preventing the invasion of forest pests.

(3) Prevention of frost, cold and drought shall be carried out chiefly through adoption of cold resistant, drought resistant varieties and fine clonal species for forestation. The measures such as rain collection pools and wells and water saving will effectively reduce the harm of drought. Meanwhile, scientific and technological researches shall be enhanced for breakthroughs to select and cultivate new species of trees that are resistant to cold, drought and diseases.

(4) Single sourced tree species, genealogic species and clonal species should be adopted, and imbedded arrayment of different species of trees be advocated. When popularizing clonal forestation, attention should be paid to clonal genetic diversity, and new sources of species shall be introduced against genic narrowing and simplification.

(5) The work for fine seeds selection and cultivation shall be strengthened and seedlings of fine species shall be popularized and applied. The seeds for the project shall be allocated and procured in a unified way by the station of seeds and seedlings of the PFB, and cultivation of seeds shall be chiefly done by the central nursery garden and the fixed nursery gardens so that the work can be done with a unified planning and seeds and seedlings can be supplied by the appointed suppliers and in a well oriented approach.

(6) Ecological monitoring shall be further strengthened, fixed sample provision points shall be appointed for regular monitoring, the implementation institutions shall enhance their joint ecological monitoring work in cooperation with the related institutes and academies of scientific research and report

the monitoring data regularly to the related administrative organs.

9.3.2 Measures against risks under special circumstances

(1) Strictly control the application of pesticides

- ① Define the object of prevention and control for well prescribed application to the right objects

The sensitivity of different species of trees are different to pesticides, and in case of the pest occurrence, studies shall be made to identify and define the species of pests in accordance with characteristics and symptoms of harm, and then pursuant to the treats and rules of their occurrence to decide the best way of pesticide application, the best time and amount of pesticide application.

- ② Have an appropriate command of the concentration of pesticide and the time for pesticide application.

When the pesticide is prescribed, still one has to make scientific preparations of the pesticides decided upon for application according to the concentration as marked on the package for strict application while paying enough attention to the growth period of trees and severity of pests for the best opportunity of application.

- ③ Prevent the drifting of pesticide solutions

Wind direction shall be given attention at the time of pesticide application in prevention of droplets of pesticides from drifting to other sensitive crops.

(2) Emergency measures against risks

In case that pesticides sprayed affect the surrounding crops due to careless pesticide application, emergency measures shall be taken timely against the consequences.

- ① Spray a large amount of fresh water or water of slight alkalinity to clean the polluted plants.
- ② Immediately apply quick-acting fertilizer.
- ③ Spray solutions that can alleviate the pollution or harm thereof.

Analysis to the Implementation plan

Table 10

10.1 Analysis to “zero” plan

The “zero” here means the plan without project, therefore, analysis can be conducted to compare between the project with plan and the project without plan on their impact to environment. The impact produced from the plans with or without the project to ecological environment is obvious directly or indirectly, the analysis to the impact produced from the plan with or without the project is shown in Table 10-1.

Table 10-1 A Table of Comparison between Environmental Impact from Plan with or without Project

| Environmental impact | With project | Without project |
|---|--|--|
| Direct environmental impact | <p>1. To increase forest resource and forest coverage rate, improve soil and increase land utilization rate in the project area. If the artificial forest plantation is conducted improperly, the negative impact will be brought to ecological environment and risk will occur, such as the single-species, soil loss and water body pollution and the plant diseases and insect pests.</p> <p>2. The selection of tree species for the project construction includes the species mainly focusing on the ecological function to maintain water and soil, and the species both for economical benefit as well as the function of water and soil conservation, in the process of project design, these different species will be allocated by full consideration in the different locations in the basin to form a mixture of different patterns to achieve the best ecological and environmental benefit</p> | <p>1. Due to the lack of management for those waste mountain and grass slope, disasters such as fire or overherding happens very often, causing the severe ecological issues as water and soil loss and land degeneration. If these degenerated forests with low productivity and low efficiency can not be improved, it is easy to cause the happening of plants diseases and sect pests.</p> <p>2. The land located on slope land and terrace is usually planted with agricultural crops and the frequent growing of crops can cause severe ecological issues as water and soil loss and land degeneration.</p> <p>3. Due to the frequent interference of mankind, it is very difficult to realize the effective protection for biodiversity in the protection area.</p> |
| Indirect environmental impact | <p>1. It can bring about conditions for the improvement and protection of the local farmland and production. It can also increase plantation of herbal under the trees and edible mushroom, increase the output of non-wooden forestry products available for farmers, the habitation area for wild animals, forming a bio-channel which is favorable for protection of biodiversity.</p> <p>2. Through the allocation of different tree species by full consideration, mixrue of them, people can find out that a good combination between ecological and economic benefits can be achieved to increase the integrated benefits within the area of the project.</p> | <p>1. As the development of society and economy, the demand of forestry products is increasing, the living standard of the local farmers in the project area is relatively low and the conventional farming method can produce the different extent of damage to natural ecology and biodiversity will be threatened also.</p> <p>2. Without the protection of vegetation and frequent interference of human, the land becomes degeneration continuously and causing water and soil loss, migration or even extinction of animals, in more severe scenario, new ecological disaster will be occurred.</p> |
| Comparison on integrated environmental impact | By adopting the scientific and reasonable technique and management plan for forest plantation, the implementation of the project can increase the forest coverage and improve forest quality, improve and optimize ecological environment, increase the function of forest ecological systemn to absorb CO2 and produce carbon sink function. But if the design and implementation method of forest plantation is improper, the negative risk to ecological environment will occur. | If waste mountain and grass slope do not have plantation and not effective management and protection is conducted to the degenerated forest, retrogression of succession will finally cause the decrease of vegetation coverage continuously and water and soil loss will become more severe, degeneration of ecologicalenvironment, will indirectly cause the poverty of the farmers living in these mountainous area. |
| Plan for recommendation | Recommended | Not-recommended |

Based on the successful experience of the implementation of forestry project in Shanxi Province by utilization international fund from 1995 to 2014, an advanced and scientific technical plan has been designed for the forest plantation project, especially targeting to the basin area to allocate multi-tree species by full consideration to optimize the ecological, economic and social integrated benefits, laying a good foundation for long term stability after the completion of the project implementation of the project. The construction of this project is requested to minimize the impact to environment in the process of the construction and operation and also strict implementation of Regulations on Environment Protection for the Management of the Shanxi Integrated Forestry Development Project for the Yellow River Basin, and to strengthen the monitoring to environment, completely terminate the negative impact to environment caused from the exploitation without the order.

10.2 Analysis and comparison of the project implementation plan

The impact of the design of the project implementation plan to environment includes the selection of the location for forest plantation in the project area, selection of tree species and design of the pattern for forest plantation.

10.2.1 Analysis to the selection of location for forest plantation in project area

The selection of project area: the key areas planned by the government for the project construction, following the principle of the adaptation to the local condition and suitable tree species for the suitable location; to select the land plot based on the site condition, but connecting them into one properly to follow the principle of the scale management; to persist in the principle of coordination of the national economic development with the planning of the land utilization.

Procedure for the selection of the site for forest plantation: project township, village → project area of forest plantation → preliminary selection of the site in the office → conduct field survey to verify the plan practical → planning of sub-compartment, and the design for forest plantation.

The finalization of site category is shown in Table 10-2, the selection of the site is in accordance with the requirements for site selection regulated in “the regulation on environmental protection for the management of artificial forest plantation”.

Table 10-1 A Table of the Category on the Sites in project area

| <i>No. of category</i> | <i>Name of the site category</i> | <i>Site condition</i> | <i>Vegetation coverage</i> | <i>Tree species suitable for forest plantation</i> |
|------------------------|---|---|----------------------------|---|
| 1 | Thick surface soil on loess hills | Below 1400m, smaller than 25°, soil thicker than 60cm | Less than 30% | Juglans regia L., Diospyros Kaki L.f, Prunus armeniacaL. |
| 2 | Thick soil on shady slope of loess hills | Below 1700m, shady slope between 26°-35°, soil thicker than 60cm. | 50%-70% | Pinus tabulaeformis Carr., Robinia pseudoacacia L. |
| 3 | Thick soil on sunny slope of loess hills | Lower than 1400m, sunny slope 26°-35°, soil thicker than 60cm | Less than 30% | Platycladus orientalis (L.) Franco, Robinia pseudoacacia L. |
| 4 | Thick soil on gently shady slope of loess hills | Below 1400m, shady slope 6°-25°, soil thicker than 60cm | 50%-70% | Platycladus orientalis (L.) Franco, Robinia pseudoacacia L. |

| | | | | |
|----|--|---|---------------|---|
| 5 | Thick soil on gently sunny slope of loess hills | Below 1400m, sunny slope 6°-25°, soil thicker than 60cm | 30%-50% | Robinia pseudoacacia L., Juglans regia L., Prunus armeniacaL., Diospyros Kaki L.f, Gleditsia sinensis Lam., Salix babylonica L. |
| 6 | Medium thin soil on rocky mountain slow steep slope | Above 1600m, shady or sunny slope 6°-35°, soil thinner than 60 cm | Less than 30% | Larix principis-rupprechtii Mayr |
| 7 | Medium thick soil on shady steep rock mountain slope | 1400-1700m, shady slope 26°-35°, soil thicker than 30cm | 30%-50% | Pinus tabulaeformis Carr. |
| 8 | Thin soil on rocky mountain shady slope | 1000-1400m, shady slope 6°-25°, soil thinner than 30cm | Less than 30% | Platycladus orientalis (L.) Franco |
| 9 | Medium thick soil on rocky mountain shady slope | Below 1400m, shady slope 6°-25°, soil thicker than 30cm | 30%-50% | Pinus tabulaeformis Carr. |
| 10 | Medium thick soil on rocky mountain sunny slope | Below 1400m, sunny slope 6°-25°, soil thicker than 30cm | 30%-50% | Robinia pseudoacacia L., Juglans regia L., Diospyros Kaki L.f, Prunus armeniacaL., Platycladus orientalis (L.) Franco, Gleditsia sinensis Lam., Salix babylonica L. |
| 11 | Thick soil on gully and terrace | Below 1400m, flat, soil thicker than 60cm | 30%-50% | Juglans regia L., Robinia pseudoacacia L., Diospyros Kaki L.f, Gleditsia sinensis Lam., Salix babylonica L. |
| 12 | Thick soil on loess hill surface | Below 1400m, smaller than 25°, soil thicker than 60cm | Less than 30% | Juglans regia L., Diospyros Kaki L.f, Prunus armeniacaL. |

10.2.2 Analysis to selection of multi-tree species

In the implementation plan of the project, the principles adopted for the selection of the tree species for the project include suitable location for suitable species, sustainable development, prior to selection of local species and diversity of tree species; the principles for society include paying respect to the willingness of local farmers, to select the species with strong adaptability, good resistance to poor soil, drought resistance, prosperous growing and stable, deep root system, develop root system, strong capacity in fixing soil, strong capacity of self-renewal, having abundant leaf fall but easy to decompose. The tree species selected into the project include multi-functional species, such as Juglans regia L., Prunus armeniacaL., Diospyros Kaki L.f, Larix principis-rupprechtii Mayr, Platycladus orientalis (L.) Franco, Pinus tabulaeformis Carr, Robinia pseudoacacia L., Pinus bungeana Zucc., Gleditsia sinensis Lam, Salix babylonica L, Caragana korshinskii Kom, and Hippophae rhamnoides Linn, 12 varieties in total. Forest plantation with multi species can avoid the simplification of variety, it is in accordance with the need of biological diversity and favorable for the improvement of the overall stability of the forest system in the project area.

10.2.3 Analysis to the selection of the pattern for forest plantation

The selection of the pattern for forest plantation, actually is the design for the technical measure on forest plantation, including selection of tree species, selection of location, clearing of forest land, measure of land preparation, density, planting, fostering and fertilizer application. The analysis to tree species and location have already demonstrated above, this part is to analyze the technical design in different items and comparison on different pattern on forest plantation. The results of comparison of

the impact to environment in this plan for forest plantation is demonstrate in Table 10-3.

Table 10-3 A Table on Comparison for Environmental Impacts from different Pattern of Forest Plantation

| Environmental impace | Operation measure | Pattern for forest plantation in the project | Conventional pattern for forest plantation |
|-------------------------------------|------------------------------|---|--|
| Ecological and environmental impact | Allocation of tree species | The project adopts multi-species and mixed pattern to realize multi-function on ecology and economy. | In the past, mostly pure artificial forest pattern has been adopted in a large scale with simple function, resulging poor ecological function of economic forest but ecological forest without better economic benefit. |
| | Clearing of forest land | Grassing cutting or weeding adopts block shape or belt shape to keep grass zone and redue water and soil loss and loss of soil fertile, favorable for protection of biodiversity. | Adopted slash burning, bringing damage to original vegetation, easily causing water and soil loss and loss of soil nutrition, not favorable for protection of biodiversity. |
| | Measure for land preparation | Land preparation is adopted as fish-shape pit, large pit or small pit based on soil quality, thickness of soil and slope condition to reduce broken surface of soil as much as possible, the area of it is 10-25%, and water conservation measure will taken to the broken surface, such as coverage with stone or dried grass to effectively water content of soil and reduce soil erosion. | Fully cultivation, belt-shape land preparation, damaging 30-100% of soil area, vegetation is totally or partially broken, causing severe loss of water and soil. |
| | Density of forest plantation | The density for plantation of <i>Juglans regia</i> L is controlled as 417 root/ha.; and the density of <i>Prunus armeniaca</i> L and <i>Diospyros Kaki</i> L.f as 550 root/ha; density of <i>Caragana korshinskii</i> Kom and <i>Hippophae rhamnoides</i> Linn as 2500 root/ha; and density for <i>Platycladus orientalis</i> (L.) Franco, <i>Larix principis-rupprechtii</i> Mayr, <i>Pinus tabulaeformis</i> Carr., <i>Pinus tabulaeformis</i> Carr., <i>Robinia pseudoacacia</i> L, <i>Salix babylonica</i> L. And <i>Gleditsia sinensis</i> Lam is controlled as 1650 root/ha. Crown of arbor forest is goot at penetrating of light, good for growth of shrub and grass under the trees. It is favorable for the misture of original plants with arbor and shrub, to keep healthy and increase the capacity of resistance for forest. | 2000-3500 root/ha., density is relatively large, light penetration is low, no growing of shrub and grass vegetation under pine tree, poor capacity of resistance for forest, it is easy to cause occurance of plant diseases and insect pests. |

| | | | |
|-----------------------|--------------------------|--|---|
| | Formal planting | The percentage of utilization of grade one seedling is high, when planting and tearing off nutrition bad, it is requested not to loosen nutrition soil, then the survival rate can keep high, young seedling grows fast, early crown closure, good for water and soil conservation. | Low utilization rate of grade I seedling, upon planting, nutrition bag is not tore off as request, resulting loosening of nutrition soil and low survival rate, slow growing of young plant, sloe down its crown closure, not good for water and soil conservation. |
| | Fostering and management | Grass cutting shall be used plot shape or belt shape for water and soil conservation and protection of biodiversity. | Mostly using cutting of whole weed, it is not good for water and soil conservation and protection of biodiversity. |
| | Fertilizer application | Targeting to the need of soil nutrition content and growth of plant, organic fertilizer will be applied in economic protection forest to effectively improve soil, promote growth of plants and crown closure, good for water and soil conservation. | Fertilizer application usually no special target, unpopular utilization of formulated fertilizer (especially by farmers), fertilizer application measure is not reasonable, slowdown crown closure, not good for growing of trees. |
| Integrated assessment | | The whole project adopts multi-species and mixed pattern, favorable for realization of multi-functions of ecology as well as economy. To select species based on site conditions strictly following the indicators regulated in pattern, detailed design on clearing of forest land, land preparation, planting, fostering (weeding, soil loosening, fertilizer application) and measures for environmental protection, using interception of precipitation and water conservation methods, construct strictly according to design. Density is reasonable, growing is fast, providing certain space for other plants for their growing, the different sub-compartments are in a mixed shape, at the same time preserve broad-leaf forest in valley and grass belt to reduce impact to biodiversity, and reduce water and soil loss, to greatly reduce the negative impact to ecology and environment by the project. | In the past, usually pure forest plantation mode was adopted, a large scale area of forest with single species and single function, poor ecological function for economic forest, but ecological forest with poor economic benefit. The design is not reasonable, full cultivation will be occurred, density is too large, unseasonable fertilizer application, extensive management mode, resulting in poor quality of plant growing. Due to close density, growth of plants is restrained, lowering biodiversity, reduce bio-bolume, resulting in the phenomenon of no grass under the trees, not good for water and soi conservation and protection of biodiversity, great potential of ecological danger exits, negative impact to ecologicaan environment is relatively large. |
| Recommendation | | Recommended | Not-recommended |

10.2.3 Integrated assessment

In the process of the selection of the project of “Shanxi Integrated Forestry Development on Yellow River Basin”, scientific and careful consideration have been carried out, at present, the ecological statue in most of the project counties are just general, with a backward society and economy. It is rather difficult for the areas to keep a good self-recovery for their ecological environment and there is a trend of further deterioration of ecologicaan environment in these areas. After the implementation of the project, by adoption of scientific plantation method and utilization of forest land reasonably, the plantation structure in the rural areas will be adjusted to promote the development of rural economy,

improve the quality of living standard. At the same time, advanced concept of living and scientific cultural knowledge will be introduced for the people living in the area to utilize energy reasonably and willingly, also the scientific planting will be favorable for the improvement of the quality of living, improvement of ecological environment for the local farmers.

As demonstration above, the implementation of the project will bring much positive impact to ecological and social environment than negative impact. The implementation plan of the project is feasible from the point of environment.

Environmental monitoring and management plan

Table 11

11.1 Environmental management

To ensure the smooth implementation of the project with the minimized cost of environment, we compile the following environmental management and monitoring plan and it will be carried out the relevant implementation units of the project. The environmental management and monitoring shall become the integrated part of the project and listed as buget item in FSR and Project Implementation Plan for the project.

To ensure the smooth implementation of the environmental management and monitoring plan by following the related regulations of the state, each PMO should designate 1-2 professional persons, at least 4 years before the different periods of the project construction as well as operation period, in charge of the management on environmental impact assessment and the successful implementation of the activities regulated in the monitoring. The county PMOs shall arrange 1-2 professional persons based on the volume of forest plantation to be in charge of environmental protection and participation of training, their responsibilities include the assurance of the full implementation of all the activities on environmental management and monitoring plan at the level of the project county/ field, and submission of report on the issues concerning with environment in the project to the project executive unit in the provincial and city PMOs and county EPB, at the same time, they are in charge of collection of data and provision of technical support to the related staff. PMOs at the different levels (county and city level) designate the person in charge of environment to prepare the document and materials on environmental protection of the project implementation for the preparation of acceptance of the review by EIB and other environmental protection bureaus.

In the operation period, these persons from the different county PMOs in charge of environment shall conduct environmental monitoring plan in association with the related PMOs, and other task included in the environmental management and monitoring plan. However, the final responsibility of the assurance for the realization of all the activities regulated in environmental management and monitoring plan lies on the shoulder of county PMOs, they should ensure the provincial PMO and county PMO can get the environment report/data from county PMOs.

To ensure the effective implementation of the measures taken in the project to relief the environment impace, the environment management plan has been prepared, details refer Table 11-1.

Table 11-1 Environmental management plan

| Environmental issue | Mitigation policy and control measure | Carrier | Responsible unit | Monitoring unit |
|--|--|--|------------------------|-----------------|
| A. Before design/ implementation period | | | | |
| 1. Project plan | 1. Optimize project design and plan to minimize potential negative impact to environment; 2. Project design and plan shall avoid sensitive area, such as natural preservation zone, geographical park, forest park, inhabitation area of wild life, natural and cultural relics, to arrange construction progress to avoid long time occupation of land; 3. To ensure the impact to surface water body, drinkable water source as less as possible; 4. City PMO shall strengthen protection of biodiversity and monitoring within the project area; 5. To ensure migration route and food and water finding route of wild life will not be intercepted; 6. County and related bureaus shall provide management plan for sub-community closing to natural preservation zone/ wild life inhabitation; | County PMO | City PMO | City EPB |
| 2. Land utilization | 1. Design of operation road and management route shall occupy the least space of land to prevent acceleration of soil erosion and damage of vegetation. 2. All land regarded as historical relics or cultural relics shall not be used as project area. 3. Slope steeper than 35° will not be used as project land. | County PMO | City PMO | City EPB |
| 3. Application of pesticide | 1. To inspect situation of pesticide application in all the project area to avoid utilization of any pesticide listed as I category pesticide by WHO. 2. To select the highly effective pesticide regulated by EU as replacement for pesticide, to use pesticide with lower residue. | County station of prevention and treatment of plant disease and insect pests | City PMO | City EPB |
| B. Implementation period | | | | |
| Soil erosion | 1. No full cultivation for land preparation will be conducted, instead pit digging is encouraged, planting along pit contour as “品” shape. 2. Forest plantation on slope shall be completed one month before the arrival of rain season at least. 3. Cultivation, pit digging or ditch digging on slope steeper than 35 degree in rain season shall be avoided, to use sand bag, hay pack to cover lower surface of area after digging to reduce water and soil loss. 4. To adopt measure to maintain and improve soil structure, soil fertility and bio, application of organic fertilizer and green fertilizer is encouraged. 5. Application of organic fertilizer should be adopted as the | Construction team | City PMO County PMO | County EPB |

| | | | | |
|---|--|---|----------|------------|
| | design, by using pit application and belt application, spreading of fertilizer is strictly forbidden. | | | |
| Plant disease and insect pests | 1. To process quarantine to introduced species. 2. To keep original vegetation on valley 3. To avoid large amount application of chemical pesticide. 4. When it is necessary to use chemical pesticide as pesticides, low toxic low residue recommended by EU and WHO shall be adopted and the volume shall be controlled. 5. To reasonably arrange time for application of chemical pesticide as well as the method of application | County PMO | City PMO | County EPB |
| Society | 1. Occupation of farmland is strictly prohibited. 2. Temporary quarantine station shall be set up on site to strengthen monitoring on epidemic disease, sanitation management and promotion on sanitation. | County PMO, Quarantine department | City PMO | County EPB |
| C. Operation period | | | | |
| Community of animal and plant | 1. Based on the related national and local regulation and law and requirement of the report, strictly carry out the measures to protect biodiversity. | County PMO | City PMO | County EPB |
| 2. Plant disease and insect pests and application agro-chemical | 1. Strictly follow the proposed management plan on plant disease and insect pests, to increase the utilization rate of pesticide. 2. To select good measure for plantation to increase forest capacity to resist plant disease and insect pests. 3. To choose pesticide with low residue and low toxic. 4. Regular monitoring to severe disease and pest community. 5. To promote integrated prevention and treatment of disease and pest and reduce the utilization of chemical medicine. | County PMO, Station for prevention and treatment of plant disease and pests | City PMO | County EPB |
| 3. Soil erosion and soil fertility | 1. To protect vegetation on forest land and use thin film to cover plants on soil for protection. 2. To adopt manual weeding to ensure quality of forest fostering and management of environmental impact. 3. To carry out fertilizer application technique by soil testing and formulated fertilizer. 4. Application of organic fertilizer is encourage and promote the use of bacterial manure | County PMO, construction team | City PMO | County EPB |
| 4. Biodiversity | 1. To protect vegetation and dried branch and leaves under the forest, and original vegetation to protect vegetation on forest margin. 2. To promote integrated prevention and treatment of plant disease and insect pests, strengthen management on forest health to reduce the application of chemical medicine. 3. Control materials rolling down from slope. | County PMO and implementation team | City PMO | County EPB |
| 5. Society | 1. To help solve employment issue for surplus rural labor force. 2. To support minority and women for employment 3. To respect customs and tradition of minority | County PMO | City PMO | County EPB |
| 6. Environmental pollution | 1. To reduce application of fertilizer and pesticide, when using, suitable time and suitable volume should be considered. 2. To choose application of organic and green fertilizer. 3. Fertilizer application shall conducted on ditch and pit and cover soil surface with dried branches. 4. To choose pesticide with low toxic. 5. To recycle and treat pesticide bottle and packing materials for fertilizer. | County PMO | City PMO | County EPB |

11.2 Environmental monitoring

Environmental monitoring provides the technical monitoring on the environmental protection for any progress of the construction of the project, coordinates with the department responsible for the environmental protection to conduct monitoring and inspection to the project construction according to the authorization of the construction unit and following the EIA and the documents approved by it.

The farmers are the terminal implementors of the project for the implementation of the project and the each project county, 6 persons in total. Due to the 4 years of construction period, these monitors shall follow up the progress closely to conduct overall monitoring until the completion of the project and inspection and acceptance of the completion, the monitoring period is defined as 4 years.

11.3 Environmental monitoring plan

The main impact of the project to environment is the ecological impace, therefore, the contents for monitoring mainly include the monitoring of ecological environmental results, which refers regular monitoring or urgent monitoring to resources of water and soil conservation and biodiversity, not including the regular plant disease and insect pests forecast and quarantine, which will be carried out according to the regulations.

The detailed monitoring contents and indicators are shown in Table 11-2.

Table 11-2 The Monitoring Plan on Ecology and Environment

| Contents to be monitored | Monitoring indicator | Monitoring frequency | Monitoring spot | Monitoring unit |
|--|--|---|---------------------------------|-----------------|
| Water conservation and fertilizer preservation | Water content in soil, soil nutrition, soil erosion | Each in every year in 1 st year, 3 rd year and 5 th year | One spot in each project county | County PMO |
| Plant disease and insect pests | Variety, frequency of occurrence, extent of harm | Twice every year | 2 spots in each project county | County PMO |
| Biodiversity | Diversity of arbor, shrub and grass | Each in every year in 1 st year, 3 rd year and 5 th year | One monitoring spot | County PMO |
| Carbon sink in forest | Change of carbon reserve, greenhouse gas emission within the boundary of project, related data needed for leak | Each in every year in 1 st year, 3 rd year and 5 th year | One spot in each project county | County PMO |

11.4 Training plan for environment

11.4.1 Objective of environmental training

The objectives of the environmental training is to let the PMO staff at all level who are responsible for environmental monitoring and management to have a further improvement of their capacity to ensure that they are capable of implementation of the mitigation measure and monitoring plan regulated in EIA during the project implementation and operation periods. The trainees can also include forest farmers, people in charge of forest field and enterprises. To ensure the successful completion of the training course, those who are going to participate in the training program should have education background of university, majoring in natural science is the best (such as forestry management, water resource, environmental ecology, soil science and agricultural science).

11.4.2 Training program

Under the leadership of the provincial PMO, the training program for environment will include the

following sectors:

- (1) Understanding and application on the laws and regulation, standards and codes issued by EIB and Chinese government on environment ;
- (2) The environmental management standards applied by EIB ;
- (3) Environmental protection technology and monitoring technique, including :
 - The basic theory on the measures of hydrology and surface water quality;
 - Basic knowledge on environmental monitoring ;
 - Basic understanding on the extent of plant degeneration, different vegetation category and ecological system;
 - Recognition of bird species, including using image and hearing ;
 - Monitoring technique/measures on biodiversity, knowledge and recognition for bird species, amphibians/ reptiles;
 - The theory on the prevention and treatment on soil erosion, the different measures to control soil erosion ;
 - The technique on prevention and treatment on plant disease and insect pests, the principle on IPM ;
 - The basic measures to collect the sample and treatment for soil and sediment defined in EMMP;
 - The compilation of the report on environmental monitoring.

The staff from provincial EPB and forestry bureau will provide the training on the above courses within the boundary of Shanxi Province under the assistance of the provincial academy of forestry science, the general station on promotion of science and technology on forestry, the station of seedling for forestry, survey and planning institute. To reduce the cost for training and play the role of the universities and institutions, the provincial PMO can adopt the method for the arrangement of senior environmental staff coming from the different levels of PMOs, forest fields and natural preservation zone to conduct an integrated training and lecturing. If this suggestion (integrated training and lecturing) is approved, this training program has to be modified into the mode of “training to the trainers”.

Besides, it is suggested that a special training program be conducted to farmers, the contents include the application of pesticide, plan for the prevention and treatment of plant disease and insect pests, and the principle and way for the integrated management, not only targeting to the environmental protection, but also reduction of operation cost. If the county PMO has the suitable qualification, then one day of training (focusing on application of pesticide, integrated management plan for plant disease and insect pests) to the trainees can be conducted by the related experts in the way of “the training to trainers” to train the staff responsible for this area from the different county PMOs, and they will conduct the training to the local farmers on the issue (the integrated management plan on prevention and treatment of plant disease and insect pests and the best way for the safe utilization of pesticide). Another possible scenario is, if these staff on the monitoring have no qualification (capacity), then the training to farmers can be provided by the experts from the station of plant disease and insect pests from the different county PMO.

11. 5 A Table for the Inspection and Acceptance by 3-at the same time Together

This project belongs to non-pollution ecological construction project, and the ecological recovery is the forestry construction project, therefore, the main presentation during the operation period is the forest ecological function for the protection forestry, so the key components to be focused on during the inspection and acceptance is the monitoring and management of ecological environment when conducting it by 3 parties together. The details is shown in Table 11-3.

Table 11-3 A Table for the "3-at the same time"-Inspection and Acceptance

| Period | Item of project | Schedule | Party responsible | |
|---|--|--|--|------------|
| Construction period | Protection measure for water quality | Reasonable application of pesticide and fertilizer | Schedule implementation of forest plantation and fostering | Contractor |
| | Measure for water and soil conservation | Method for land clearing and land preparation | When clearing and land preparation | Contractor |
| | | Bamboo ditch allocation | Implementation when land preparation is conducted | Contractor |
| | | Protection of vegetation for forest land on steep slope, slope top, gully and area along river. | When clearing and land preparation | Contractor |
| | Solid waste | Collection and treatment of plastic thin film, chemical fiber woven bag | When planting seedling and fertilizer application | Contractor |
| | | After collection of pesticide packing and container, to authorize qualified unit for proper treatment. | When application of fertilizer | Contractor |
| | Oil waste gas from transportation vehicle | Vehicle with qualified exhaust emission will be selected | Process of construction | Contractor |
| Measure for protection of water environment | Reasonable application of pesticide and fertilizer | Operation and management period of forest | Operator | |
| Operation period | Solid waste | Collection and treatment of fertilizer packing bag | Operation and management period of forest | Operator |
| | | After collection of pesticide packing and container, to authorize qualified unit for proper treatment. | Operation and management period of forest | Operator |
| | Measure for protection of ecological environment | Promotion on ecological and environmental protection of the project | Operation and management period of forest | Operator |
| | | Fire protection equipment for forest fire prevention | Operation and management period of forest | Operator |
| | | The system on prevention and treatment of plant disease and insect pests in forest | Operation and management period of forest | Operator |
| | | Monitoring on ecological environment | Operation and management period of forest | Operator |

12.1 Objective of public participation

(1) The public participation of the EIA aims to let the community of people living in the scope of the project area have a basic understanding on the project construction and provide both the positive and negative comments to the impact brought by the project and present their view on the environmental impact caused by the project to the surroundings, then the project plan and design will become more complete and reasonable, to ensure the transparency and reputation for the policy making and evaluation.

(2) Shanxi Province is a province with mountainous regions spreading most part of the area and it is also a province with the lack of forest resources and the middle part of China with less developed economy. If the construction of the protection ecological forest in Shanxi Province is complete or not will directly affect the Shanxi Province, and the people's life, safety assurance and social stability for industrial and agricultural production in the large area of Yellow River, the middle and upper reaches of Hai River, it is the most important concern of the people from all level in the province. The implementation of the project is greatly supported by the provincial government and the governments at all level, a leading group has been set up for the active participation and preparation for the project.

12.2 The method of survey for public participation and targets of survey

12.2.1 The method of survey

The survey on public participation adopts different methods as visiting to the local residents, distribution of the questionnaire and posting of notification based on the requirements in "Methods for EIA in PRC" to reflect the comments of the public in the project area on this project. The survey group conducted many interviews to the public and units or organization which will be affected by the construction of the project on their attitude, comments and suggestions and the targets answered the questions individually based on their own feeling. The survey group has summarized and analyzed the results of questionnaire and the records of interviews.

12.2.2 Survey targets

(1) Public and individual

Mainly targeting to the residents living around the project area. The selection of the representatives for the public paid attention to the universality as well as randomness, and also the consideration on the regions, structure of age, cultural structure and the professional. Interviews had been conducted to some typical townships and villages in Linshi County, Fenyang City, Liulin County, Hequ County, Shenci County and Baode County as well as the local farmers.

(2) Organization and unit

Most are the township and villages in the area neighboring with the area of the construction project.

12.2.3 Time for public participation

The first stage: The period in the project preparation, the construction units and related departments and the governments at all level in the project area had already conducted a lot of survey and coordination. After the authorization of the EIA for this project, the construction units posted posters on the township government in all the project areas to public the news on the EIA for this project on September 2014, to widely collect the comments and suggestions from the public on the construction of the project. The poster is shown on Figure 12-1.

The second stage: This period is to collect comments, by the conducting of interviews to households and units.

Under the support and coordination of the construction unit and governments of the different project counties, the assessment unit conducted the field survey to all the townships and villages included in this project on public participation. The field survey included the interviews to households and meeting with the units, and by filling the questionnaire separately.

The third stage: Summary on the feedback collected from the survey. After the completion of field survey and media survey, the assessment unit conducted statistics, summary, and compilation of the results from the field survey for the comments collected on the public participation, and provided the responses concerning the comments and suggestions in written form and sent them back to the construction unit.

12.3 Results and analysis of the public participation survey

12.3.1 Results of the survey to units and organization.

30 copies of questionnaire had been distributed to the units participating in the survey on public participation, the target of the survey in this part are farmer households which will be affected by the project construction. The comments and suggestions from the result of the survey include:

- (1) Most of the targets expressed that they are satisfied with the local environmental quality at present.
- (2) All the units believed that the selection of project location is feasible.
- (3) All the units think that the implementation of the project will bring positive impact to the local forestry plan, no unit think that negative impact will be brought to the local forestry plan.
- (4) All the units agree on the implementation of the project.
- (5) Most of them think that the project will bring positive impact to local economy, no one think that negative impact to economy will be brought.
- (6) Most agree that after the operation of the project, the impact to surrounding environment brought by the project is very small, and not impact to air and surface water.

In general, all the local governments, enterprises and social organizations close to the location of the project construction express their support to the project and their willingness to contribute their efforts for the construction of the project. At the same time, they do believe that in the process of the project construction, special attention should be paid to the protection on ecological environment and prevention of water and soil loss.

12.3.2 Results of the survey to individual

The survey to individual is conducted in the form of the distribution of questionnaire under the situation of full understanding of the public. The selection on the representative of the public, considering different

regions, ages, culture and profession. In this survey, 240 copies of questionnaire had been distributed and 240 copies had been collected, the collection rate is 100%. The results of the statistics on survey is shown in Table 12-1.

Table 12-1 Questionary

| Statistics on survey: | | | |
|---|--|----------------------------------|-------------------------------|
| 1. Do you agree on construction of the project? | Yes: 100% | No: 0 | Whatever: 0 |
| 2. Are you satisfied with local environmental quality? | Yes: 80% | Basically yes: 20% | No: 0 |
| 3. Do you understand the project? | Yes: 75% | A little: 25% | No: 0 |
| 4. Do you think the construction of the project will bring impact to local economy, people living quality? | Improve: 100% | Reduce: 0 | No impact: 0 |
| 5. Do you think that the forestry plan implemented in the project will bring the impact of: | Positive impact: 100% | No impact: 0 | Negative impact: 0 |
| 6. The main environment issues caused from the construction of the project are: | Loss of gro-production and vegetation: 0 | Water & soil loss: 90% | Pollution to water quality: 0 |
| | Pollution of noise: 10% | Air pollution: 0 | Other: 0 |
| 7. What kind of improvement produced from the construction of the project to local environmental quality: (multiple choice) | Increase of foest area: 80% | Adjustment to local climate: 30% | Increase of biodiversity: 20% |
| | Other: 0 | | |
| 8. If feasible or not for the location selected by the project: | Yes: 100% | Basically feasible: 0 | Not feasible: 0 |
| Other comments or suggestions: | | | |
| (1) To avoid pollution to ecological environment as much as possible and achieve sustainable development; | | | |
| (2) To reduce damage to original vegetation as much as possible; | | | |
| (3) In the selection of seedling variety, trial planting should be done first then expanding the planting to large area; | | | |
| (4) To suggest to organize technical training on plantation technique. | | | |

12.4 Summary of public participation

Based on the results from the survey mentioned above, we can find that the public are very concerned with the construction of the project, 100% of the public agree on the project, thinking that it is necessary to implement this project and it will improve the living environment and economic condition to the local people, and they express they can bear the negative impact produced during the construction period of the project. Some of the public hope that this project should be implemented as quickly as possible to increase the vegetation coverage for forestry in Shanxi Province and improve the environment.



Summary and suggestion

Table 13

I: Summary

1. The necessity of the project construction

In order to further develop the critical function of forestry in tackling the climate change in the globe and actively explore the international fund to implement the forest plantation projects, the state DRC has actively organized the different provinces to apply for the EIB special loan project on forestry, and a “Notification on the Report for the Utilization of EIB Loan on Forestry by State DRC” (fagaiwaizi [2012] No. 396). Based on the provincial situation, status of forestry, we now submit this application for the EIB loan project for forestry after the full discussion, to learn the advanced forestry management and operation experience by the introduction of this loan fund to further increase the total volume of forest resource and improve the forestry quality, improve ecological environment and increase the income of farmers to further enhance the sustainable development of the society and economy located in the Yellow River Basin where the ecological environment is fragile..

3. The main contents of project construction

The two contents of the project construction include: the newly planted forest and organization support.

①Artificial forest plantation

The total scale of the forest plantation is 19,141.19 ha., including 5,033.02 ha. of walnut, 293.52 ha. of apricot, 24.04 ha. of persimmon, 8561.70 ha. of *Pinus tabulaeformis* Carr, 192.32 ha. of *Pinus bungeana* Zucc, 1,437.81 ha. of *Pinus bungeana* Zucc, 2,354.21 ha. of *Platycladus orientalis* (L.) Franco, 411.76 ha. of *Robinia pseudoacacia* L, 2.40 ha. of *Salix babylonica* L, 111.62 ha. of *Gleditsia sinensis* Lam, 668.98 ha. of *Hippophae rhamnoides* Linn and 49.81 ha. of *Caragana korshinskii* Kom.

②Capacity building of organization

Mainly includes: promotion of practical technique and consultation, study tour and training, capacity building for organization

3. The conformity of the project with related industrial policy and plan

(1) Analysis to the conformity of the project with the state industrial policy

The proposed project itself is a newly-constructed project, belonging to the article 34: “construction of carbon sink project, forest and grass plantation and seedling project” in the first category of “Agriculture, forestry and animal husbandry” encouraged by the state in “the Guiding Lists for Industrial Structural Reform (2011 version)”, it will be favorable for promotion of ecological balance and effective prevention of water and soil loss. Therefore, the construction

of this project is in accordance with the industrial policy.

- (2) Analysis to the conformity of the “12th Five-Year Plan for the forestry development plan in Shanxi Province”.
- (3) The development objective of forestry in the 12th Five-Year Plan in “12th Five-Year Plan for the forestry development plan in Shanxi Province” includes: to complete the forest plantation of 22.5 million mu, 6 million mu of forest fostering and management, 200 million roots of plantation by voluntary plantation of the people in the province. Up to 2015, the forest coverage rate shall reach 23%, the total forest resource volume reaches 130 million cubic meters, and the total carbon sink from forest vegetation is 220 million tons, the treatment of the severe ecology will achieve great outcome, the national safeguard screen will be preliminary formed. The total output of forestry will reach 50 million yuan and the ratio of the industries with characteristics and newly rising industries will have a large increase, the industrial structure and distribution of productivity will become more rational, the ecological cultural system will be formed and the concept of ecological civilization will be widely promoted. The development objective of the construction of the project for newly planted forest of 35,884.47 ha. is totally in accordance with the objective of the plan.

As the presentation above, this project is totally in accordance with the requirements of the state and provincial policy and related plans.

4. Project implementation plan

The construction of this project designs a scientific and advanced technical plan for forest management based on the successful experience from the previous projects implemented in Shanxi by using international fund on forestry, especially targeting to the river basin, adopting the reasonable mixed distribution of multi-species. Therefore, after the project implementation, by reasonably using forest land and the scientific planting mode, which will be favorable for the adjustment of plant species structure in rural area to promote the economic development and improve living quality. Through the comparison between the forest plantation plan used in the project with the conventional plan and integrated analysis, this implementation plan of the project is feasible.

5. Environmental impact analysis

The implementation of the project will be favorable for playing the multi-function and benefit of the forest land, especially the area to be added in the project, to improve the local ecological environment. It has positive impacts as water conservation, fertile reservation, purification of air, carbon fixing and oxygen releasing.

In the process of project construction, some negative impacts will be produced to environment. During the construction period, damage of original surface, water and soil loss, clearing and cutting of vegetation, and animal will be affected by the activities of construction impact, if improper application of fertilizer, pollution will be occurred to soil and water system, the packing materials as plastic thin film, chemical fiber woven bag and waste packing material and containers of pesticide will cause solid waste pollution; Since no construction camp will be set up, this project will not produce domestic waste and domestic water from the workers; and the waste gas produced from the transportation vehicle will only cause small impact to environment. During the operation period, the main negative impact will be the pollution caused from improper application of fertilizer and pesticide affecting resulting in soil and water body pollution, plant diseases and insect pests or forest fire may cause the occurrence of risk to the

ecological environment, but through the application of mitigation measures, the impact to environment will be very small.

6. Analysis to the prevention and treatment of environmental pollution, protection measure for ecology and their effectiveness

(1) Prevention and treatment of water and soil loss: before the construction, the workers shall be organized to study the knowledge on the prevention of water and soil loss by training program; plantation will be conducted in the place suitable for forest plantation, the area with a slope steeper than 30 degree should not be used for forest plantation; when doing land preparation, slash burning is not allowed, land preparation mainly focuses on pit cultivation, no full cultivation will be done, and the arrangement of seedling shall be along the contour; on the top of mountain, middle part of mountain and the foot of mountain, the original vegetation with certain width shall be preserved; no vegetation on steep slope, top of the slope or valley, close to river bank or forest will be cutted; manual method will be adopted as much as possible to void machinery operation causing the surface damage and large extent of water and soil loss; when doing land preparation, the operation time shall be shorted as much as possible and then cover the opened land with thin film to avoid severe water and soil loss; implementation in raining weather shall be avoid, and necessary work to prevent flowing and losing shall be well prepared; by carrying out the above-mentioned measures, water and soil loss caused from the damage of surface in the process of project construction can be effectively reduced.

(2) Protection of ecology: To select site reasonably, the place with good distribution of vegetation and biologically sensitive place under protection shall not be selected. The clearing of land shall pay attention to the protection of rare plants, it is suggested that professional staff shall be organized before the clearing to conduct a detailed survey on the plant resources where the plantation is going to be constructed, upon finding out the rare plants or species, the original place should be protected or transplanted into other place for protection. No randomly cutting is allowed; using farmland to plant forest shall be prohibited; promotion and education can be conducted to the workers on animal protection, catching or killing of wild animals; fire prevention shall be well prepared during the construction period to avoid the fire disaster. By carrying out these measures, the animal and plant resources will be effectively protected.

(3) Prevention and treatment of pesticide residue: bio-quarantine shall be done during the construction period to control the introduction of hazard bio with seedling; to purify the land environment in the project area, before the forest plantation, survey shall be conducted to forest land and the surrounding area to control insect source and disease source, fostering of forestland shall be well carried to pay attention sanitation to forest land to increase capacity resist hazard bios to reduce the frequency of insect disease; during the implementation and operation and processing the prevention and treatment to bios, the main measures taken shall be bio-prevention and treatment, to reduce volume of pesticide application; when it is necessary to use medicine for prevention and treatment, pesticide with low toxicity, low residue and no pollution will be selected; when applying pesticide, pay attention to the spraying volume, time and mode, to avoid spraying a large volume one time, which will cause the waste of pesticide and surplus pesticide will be lost and they can enter into environment, avoid pesticide application in raining season, especially before the storm rain, and special attention shall be paid to the mixing of pesticide, cleaning of pesticide container and location for cleaning, the water source for wild animal and drinking water for people shall be avoided; for the workers who carry out the pesticide application, training should be done to them on the safe management, storage and application of chemical pesticide before they go to work. Therefore, the negative impact maybe caused from the pesticide application can be greatly mitigated to the largest extent.

(4) Prevention and treatment of the negative impact due to fertilizer application

Training should be strengthened to the management workers for forest plantation on the knowledge of fertilizer, and reasonable plan for fertilizer application shall be formulated; it is encouraged to use organic fertilizer (such as manure), when doing land preparation, and putting back original surface soil back into the pit together with some organic fertilizer, and when fostering, one can bury grasses, leaves at besides the trees to increase the organic fertilizer and reduce the volume of the application of fertilizer; formulated fertilizer can be used based on the actual situation of soil through soil test to reasonably use the variety and amount of fertilizer to avoid overusing, which will cause fertilizer loss and environment pollution; the packing materials of fertilizer shall be carefully collected and treated to avoid the residue on the packing material running into water body together with rainfall. After thoroughly application of above mentioned measures, there would be no serious negative impact to water environment.

(5) Prevention and treatment of solid waste: thin film and chemical fiber woven bag of fertilizer produced in the project implementation can be recycled to use at the packing of seedling, for those already damaged and difficult to recycle, these wastes shall be collected and treated together with the local waste; for the waste packing bag and container produced in the process of fertilizer application during the implementation and operation periods, they should be collected back by the construction units in the different counties and authorize the units with qualification of dealing with them to take good care of them. After the application of the above mentioned measures, we can ensure that no solid waste pollution will be happened.

(6) The control method for environmental risk: To strengthen the control on happening of forest fire, separation belt shall be set up strictly following the requirements from the related regulations. Forest and prevention shall be done, professional fire prevention team will be set up equipped with fire equipment, whenever fire happens they can quickly go to there and distinguish fire to control the damage caused from fire to the smallest extent; management shall be enhanced to conduct regular patrol to prevent the fire disaster. An advanced system for the prediction, forecast and monitoring on the plant diseases and insect pests will be set up to find out those pests; by adopting bio-prevention, catching with hand and utilization of pesticide with low toxic and low residue, to deal with the pests, the medicine prevention and treatment shall be done based on the different age periods of diseases and pests; once disease happens, the bio pesticide with high efficiency, low toxic and low residue and short time of residue can be adopted to reduce the damage and pollution to environment caused by the diseases and pests, to reduce the damage to the beneficial bios. The pesticide with extreme toxic, forbidden by the state and RIB is not allowed to use.

As mentioned above, the assessment regards that the prevention and treatment measures and mitigation techniques requested by the report is feasible.

7. Public participation

Through the participation of the public and the posting of the poster on the project, and also distribution of questionnaire, the survey shows that the public are very concerned with the project construction, 100% of them express their agreement, saying that it is necessary to construct the project and it will improve people's living as well as economic condition, and they can bear the negative impact caused from the project during the construction period. Some of the public hope that it should be started as soon as possible to increase forest coverage and improve environment in Shanxi Province.

8. Integrated summary for the EIA

This project is fully in accordance with the state industrial policy and also the 12th Five Year Plan of forestry development in Shanxi Province. It is very necessary to construct the project. The positive impact of the project is significant, it can not only improve the ecological environment in the project area, but also promote the local development of economy. But some negative impact will be brought, such as water and soil loss, pollution of pesticide and fertilizer, but through adopting of effective prevention measures, the ecological protection measures can be mitigated. The status of environment quality at present in the project is relatively good, the project has no obvious restriction factor. The assessment believes that the project is feasible under the condition of all the protection measures for ecological protection can be really carried out.

II: Suggestions:

1. To seriously carry out the training plan for the staff to ensure that it will progress scientifically, reasonably and orderly.
2. Emergency plan for tackling the environmental risk, such as emergency plan for forest fire shall be formulated.
3. During the process of the project implementation, respect should be paid to the surrounding residents, especially to their way of living, and carefully deal with the relationship with them.
4. When prevention and treatment to plant diseases and pests, the prevention is the most important, to realize the sustainable treatment objective with low input, high efficiency, some pests but not forming into disaster.
5. It is encouraged to use organic fertilizer, green fertilizer and nitrogen fixing plants for counter crop to ensure the supply of nutrition for young plant and seedling for their fast growing.
6. Before the construction of all the sub-compartments, survey shall be conducted to soil monitoring, if the place is with high content of heavy metal or severe air pollution, the place should be readjusted. For the alkali soil not suitable for plant growing, the transform of soil shall be done to ensure the benefit of forest plantation and to meet the demand of green forest production base.

Abstract from

《ENVIRONMENTAL PROTECTION LAW OF THE PEOPLE'S REPUBLIC OF CHINA》

Article 26: Installations for the prevention and control of pollution at a construction project must be designed, built and commissioned together with the principal part of the project. No permission shall be given for a construction project to be commissioned or used, until its installations for the prevention and control of pollution are examined and considered up to the standard by the competent department of environmental protection administration that examined and approved the environmental impact statement.

Article 36: When a construction project is commissioned or put to use in circumstances where facilities for the prevention and control of pollution either have not been completed or fail to meet the requirements specified in state provisions, the competent department of environmental protection administration responsible for the approval of the environmental impact statement on the construction project shall order the suspension of its operations or use and may concurrently impose a fine.

**Abstract
from
《Regulations on Environmental Protection in Shanxi Province》**

第十八条 对环境有影响的建设项目和开发区应先进行环境影响评价、编制环境影响报告书（表），经环境保护行政主管部门批准后，计划、土地、建设、金融等部门方可办理有关审批和贷款手续。

环境保护行政主管部门应及时审批建设项目环境影响报告书（表）。承担环境影响评价的单位，必须持有环境影响评价证书，按规定范围进行评价，并对评价结论负责。

第十九条 建设对环境有影响的项目和开发区，必须保证污染防治设施的投资到位，其污染防治设施必须与主体工程同时设计、同时施工、同时投产使用。

对环境有影响的建设项目在投产或使用前，其污染防治设施必须经环境保护行政主管部门验收，验收合格的发给合格证；验收不合格的，不得投入使用，工商行政主管部门不予核发营业执照。

第三十六条 保护土地资源，科学使用化肥、农药、防止水土流失和土壤污染与破坏，发展生态农业，开发绿色食品。

第三十七条 保护森林资源，禁止乱砍滥伐林木，禁止乱批滥占林地和毁林开荒。植树种草，提高森林覆盖率和植被覆盖率。城市应加强园林建设，逐步增加居民区、工业区和街道的绿地面积。

第三十九条 在自然保护区、水源保护区、风景名胜区和需要特别保护的区域内不得建设污染环境的工业生产设施；建设其他设施，其污染物排放不得超过规定的排放标准。凡已建成的设施，其污染物超过排放标准的必须限期治理。

《建设项目环境保护管理条例》摘录

第二十五条 建设项目环境影响报告书、环境影响报告表或者环境影响登记表未经批准或者未经原审批机关重新审核同意，擅自开工建设的，由负责审批该建设项目环境影响报告书、环境影响报告表或者环境影响登记表的环境保护行政主管部门责令停止建设，限期恢复原状，可以处 10 万元以下的罚款。

第二十六条 违反本条例规定，试生产建设项目配套建设的环境保护设施未与主体工程同时投入运行的，由审批该建设项目环境影响报告书、环境影响报告表或者环境影响登记表的环境保护行政主管部门责令限期改正；逾期不改正的，责令停止试生产，可以处 5 万元以下的罚款。

第二十七条 违反本条例规定，建设项目投入试生产超过 3 个月，建设单位未申请环境保护设施竣工验收的，由审批该建设项目环境影响报告书、环境影响报告表或者环境影响登记表的环境保护行政主管部门责令限期办理环境保护设施竣工验收手续；逾期不改正的，责令停止试生产，可以处 5 万元以下的罚款。

第二十八条 违反本条例规定，建设项目需要配套建设的环境保护设施未建成、未经验收或者验收不合格，主体工程正式投入生产或者使用的，由审批该建设项目环境影响报告书、环境影响报告表或者环境影响登记表的环境保护行政主管部门责令停止生产或者使用，可以处 10 万元以下的罚款。

预审意见：

公 章

经办人：

年 月 日

下一级环境保护行政主管部门审查意见：

公 章

经办人：

年 月 日

审批意见：

经办人：

公 章
年 月 日

注释

一、本报告应附以下附件、附图：

附件 1 委托书

附件 2 项目环境保护技术规程

附件 3 项目病虫害防治管理计划

附图 1 工程地理位置示意图

附图 2：项目区分布示意图

二、如果本报告不能说明项目产生的污染及对环境造成的影响，应进行专项评价。

根据建设项目的特点和当地环境特征，选下列 4 项进行专项评价。

1. 环境风险
2. 项目实施方案分析
3. 环境管理与监测计划
4. 公众参与



The Attaching Map 2: The Distribution of Project Counties

Annex-1

Authorization Letter

Consignor: Shanxi Provincial International Fund Forestry Project Management Office

Consignee: Shanxi Provincial Institute of Environmental Science

According to the related regulations on environmental protection management for the construction project of the state, we herein authorize Shanxi Provincial Institute of Environmental Science for Environmental Impact Assessment of Shanxi Integrated Forestry Development Project on the Yellow River Basin using the loan from the European Investment Bank, and we do hope that your institute will conduct the assessment as early as possible upon receiving this authorization.

Consignor (seal)

*Shanxi Provincial International Fund Forestry
Project Management Office*

Consignee: (seal)

*Shanxi Provincial Institute
of Environmental Science*

