

**ASIAN DEVELOPMENT BANK
Operations Evaluation Department**

PROJECT PERFORMANCE EVALUATION REPORT

IN THE

PEOPLE'S REPUBLIC OF CHINA

In this electronic file, the report is followed by Management's response.



Performance Evaluation Report

Project Number: PPE: PRC 30066
Loan Number: 1626
May 2007

People's Republic of China: Guizhou Shuibai Railway Project

Operations Evaluation Department

Asian Development Bank

CURRENCY EQUIVALENTS

	Currency Unit	–	yuan (CNY)	
	At Appraisal	At Project Completion	At Operations Evaluation	
	(July 1998)	(April 2005)	(May 2007)	
CNY1.00 =	\$0.1208	\$0.1208	\$0.1306	
\$1.00 =	CNY8.28	CNY8.28	CNY7.66	

ABBREVIATIONS

ADB	–	Asian Development Bank
EA	–	executing agency
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
EMDP	–	ethnic minority development plan
FIRR	–	financial internal rate of return
FYP	–	five-year plan
GDP	–	gross domestic product
GSRC	–	Guizhou Shuihong Railway Company, Ltd. (formerly Guizhou Shuibai Railway Corporation)
LARP	–	land acquisition and resettlement plan
MOR	–	Ministry of Railways
OEM	–	Operations Evaluation Mission
OWA	–	overall weighted average
PCR	–	project completion report
PPTA	–	project preparatory technical assistance
PRC	–	People's Republic of China
RRP	–	report and recommendation of the President
SDB	–	State Development Bank
TA	–	technical assistance

NOTE

In this report, "\$" refers to US dollars.

KEYWORDS

asian development bank, development effectiveness, guizhou province, lessons, operations evaluation, people's republic of china, performance evaluation, railway

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In accordance with the guidelines formally adopted by the Operations Evaluation Department (OED) on avoiding conflict of interest in its independent evaluations, the Director General of OED did not review this report and delegated approval of this evaluation to the Director of Operations Evaluation Division 2. The fieldwork was undertaken by Marco Gatti (mission leader), Peter Darjes and Bingfang Zhong (staff consultants). To the knowledge of the management of OED, the individuals preparing, reviewing, and approving this report had no conflicts of interest.

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BASIC DATA
Guizhou Shuibai Railway Project (Loan 1626-PRC)

Project Preparation and/or Institution Building

TA No.	Technical Assistance Name	Type	Person-Months	Amount (\$000)	Approval Date
TA 2799	Guizhou Shuibai Railway Project	PPTA	19	400.0	22 May 1997

Key Project Data (\$million)	As per ADB	
	Loan Documents	Actual
Total Project Cost	381.0	392.6
Foreign Exchange Cost	170.1	165.6
Local Currency Cost	210.9	227.0
ADB Loan Amount—Utilization	140.0	105.0
ADB Loan Amount—Cancellation		35.0

Key Dates	Expected	Actual
	Fact-Finding	
Appraisal		17 February–3 March 1998
Loan Negotiations		29 June–1 July 1998
Board Approval		18 August 1998
Loan Agreement		23 February 1999
Loan Effectiveness	24 May 1999	24 May 1999
First Disbursement		31 August 1999
Project Completion	December 2002	June 2002
Loan Closing	30 June 2003	15 March 2004
Months (effectiveness to completion)	43.0	37.0

Internal Rates of Return (%)	Appraisal	PCR	PPER
Economic Internal Rate of Return	18.0	20.8	17.4
Financial Internal Rate of Return	6.8	4.2	3.4

Borrower People's Republic of China
Executing Agency Guizhou Shuihong Railway Company, Ltd. (formerly Guizhou Shuibai Railway Corporation)

Mission Data

Type of Mission	No. of Missions	No. of Person-Days
Fact-Finding	1	84
Appraisal	1	52
Inception	1	14
Project Administration		
Review	6	73
Project Completion	1	14
Operations Evaluation	1	30

PCR = project completion report, PPER = project performance evaluation report, PPTA = project preparatory technical assistance, TA = technical assistance.

EXECUTIVE SUMMARY

This report presents the findings of an evaluation of the Guizhou Shuibai Railway Project in Guizhou province of the People's Republic of China (PRC). The Project was the eighth railway infrastructure project of the Asian Development Bank (ADB) in the PRC.

In August 1998, ADB approved a loan for construction of the Guizhou Shuibai Railway Project. The loan was to finance a 121-kilometer (km) standard-gauge, single-track, electrified railway line from Liupanshui to Baiguo in the western part of Guizhou. Additional outputs of the Project included (i) construction of service, access, and link roads; (ii) computerization of management information and financial accounting systems of the railway company; and (iii) institutional development. The construction of the railway line was a major engineering accomplishment. Given the challenging mountainous terrain, 50 tunnels and 102 bridges had to be constructed. The total length of the tunnels was 59 kilometers and that of the bridges 17 kilometers. Their combined length accounted for 64% of the final 118.6 km of the railway line. The loan amount was \$140 million, of which \$105 million was actually disbursed. The cost of the Project was estimated at \$381.0 million, of which 45% was foreign exchange cost. At completion in 2002, the total cost had increased by 3% to \$392.6 million.

The Guizhou Shuihong Railway Company, Ltd. (GSRC) (formerly Guizhou Shuibai Railway Corporation) was the Executing Agency responsible for operating the railway and for carrying out all project implementation activities. GSRC is jointly owned by the Guizhou provincial government and the Ministry of Railways (MOR) and was incorporated during project implementation. All assets and liabilities associated with the Project have been transferred to GSRC. In 2004, GSRC acquired from MOR an additional railway line that extended its route by 43 km. The acquisition increased the equity base of the company, added traffic, and led to a much-needed improvement of GSRC's financial position.

The PRC's Ninth Five-Year Plan (1996–2000) accorded high priority to developing coalmines and constructing railways to transport coal from mines in the western part of the PRC to energy-deficient industrial areas in the coastal regions in the east. Guizhou province was known for its substantial reserves of high-quality coal and the Guizhou Shuibai Railway Project was designed primarily to help increase coal and other minerals and industrial products. A key assumption was that the development of coalmines would be coordinated with the Project's construction. The overall objectives of the Project were to promote economic growth by providing the necessary transport infrastructure in the Project area and to create the conditions necessary to reduce poverty in Guizhou province. The railway investment, along with the developments it was expected to induce, was aimed at significantly improving the living conditions of the poor by facilitating delivery of such services as health, education, and communications. While the rationale for the Project was sound and is still valid today, other factors equally significant for justifying the Project should have been taken into account. Greater attention should have been given to details concerning the structure of the mining industry and investment programs for developing new mines.

The project design was based on MOR standards, and engineering work was carried out by a local design institute. To facilitate project formulation, ADB had provided project preparatory technical assistance in 1997. The construction of the railway line was physically completed in June 2002. While commencement of several components had been delayed, the original implementation schedule was not affected and all project construction work was completed 6 months ahead of the planned completion date. The civil works were of excellent quality and consistent with international standards. The project facilities are being

adequately maintained. Extensive testing delayed the start of commercial freight operations by about 9 months to March 2004. Passenger operations began early in 2005. Overall, the Project was implemented satisfactorily.

Loan-financed international consultants provided assistance and training to procure and install a computerized management information and financial accounting system. The consultants, who trained 40 GSRC staff in using the system, have satisfactorily completed their assignment within the scheduled period. The system is working properly. All project preparatory and management tasks were carried out by national consultants. The consultants were recruited based on widely used domestic procedures acceptable to ADB and were financed from GSRC's own resources. All services were performed satisfactorily.

In general, compliance with loan covenants was satisfactory. While GSRC's operation has not yet achieved full cost recovery, the tariff is being reviewed annually and GSRC's financial statements and accounting framework are aimed at cost recovery. During the first years of operations, GSRC needed to set tariffs in accordance with what the market could bear. This principle is also recognized in the loan covenant. The passenger tariff is designed to make railway services affordable and competitive and is lower than would be required to satisfy the loan covenant.

Overall, the Project is assessed 'successful'. It is considered relevant, effective, efficient, and likely to be sustainable.

The Project's effectiveness is measured by the degree to which it has attained its expected outcome: creation of a cost-effective mode of transport for mining and other industrial outputs and for passengers in the Project area. The Project has by and large achieved this expected outcome. There is substantial freight traffic on the railway. The Project line has been to some extent already instrumental in tapping the large coal reserves in the Project area. Although passenger traffic started with some delay in 2005, its growth rates are significant. Detracting from a higher score was the tardiness in putting the computerized management information and financial accounting systems into place, as well as the fact that the commercialization indicators and targets envisaged at appraisal have not been fully achieved.

Traffic forecasts were adjusted downward to be consistent with a lower-than-anticipated growth trend seen in actual freight volumes during the start-up period from 2003–2006. The Project railway was expected to enable the development of new large coalmines in the Project's influence area, which, in turn, would generate traffic and boost economic activity. Another critical assumption for the development of traffic was that the new mines would come onstream before physical completion of the Project. As major mining projects will not reach completion before 2007—and most likely only by 2010—coal traffic has fallen short of the appraisal forecast. The shortfall has been compensated by a substantial increase in transit traffic that is diverted to the project line from a congested route.

The reestimation of economic rates of return indicates that the railway generates adequate economic returns to ensure the Project's viability. This result needs to be put in perspective. Owing to the highly challenging topography of the Project area and the resulting need to build a large number of tunnels and bridges, the construction cost of the railway line per km is about twice the unit cost of a railway project on a less demanding terrain. The reestimated economic internal rate of return (EIRR) of 17.4%, although lower than the forecasts at appraisal (18.0%) and in the project completion report (20.8%), must therefore be regarded as impressive.

As may be expected from a railway that is dependent on one commodity, the result is sensitive to variations in coal output. A further delay in the implementation of the envisaged coalmine projects could have adversely affected the viability of the Project. Overall, the Project is assessed 'efficient'.

The financial performance of the railway company 3 years after the start of full commercial operations is weak, but improving steadily. The two covenanted financial indicators, the working and debt-service ratios, have been fully met. Moreover, GSRC has demonstrated strong ownership and commitment to the Project, as evidenced by the important partnership that has been forged with MOR and other railway organizations. Although the reestimated financial internal rate of return on investments is calculated as being below the real cost of capital involved in financing the Project, the OEM believes that this is outweighed by the other positive developments. As such, the Project is assessed 'likely sustainable'.

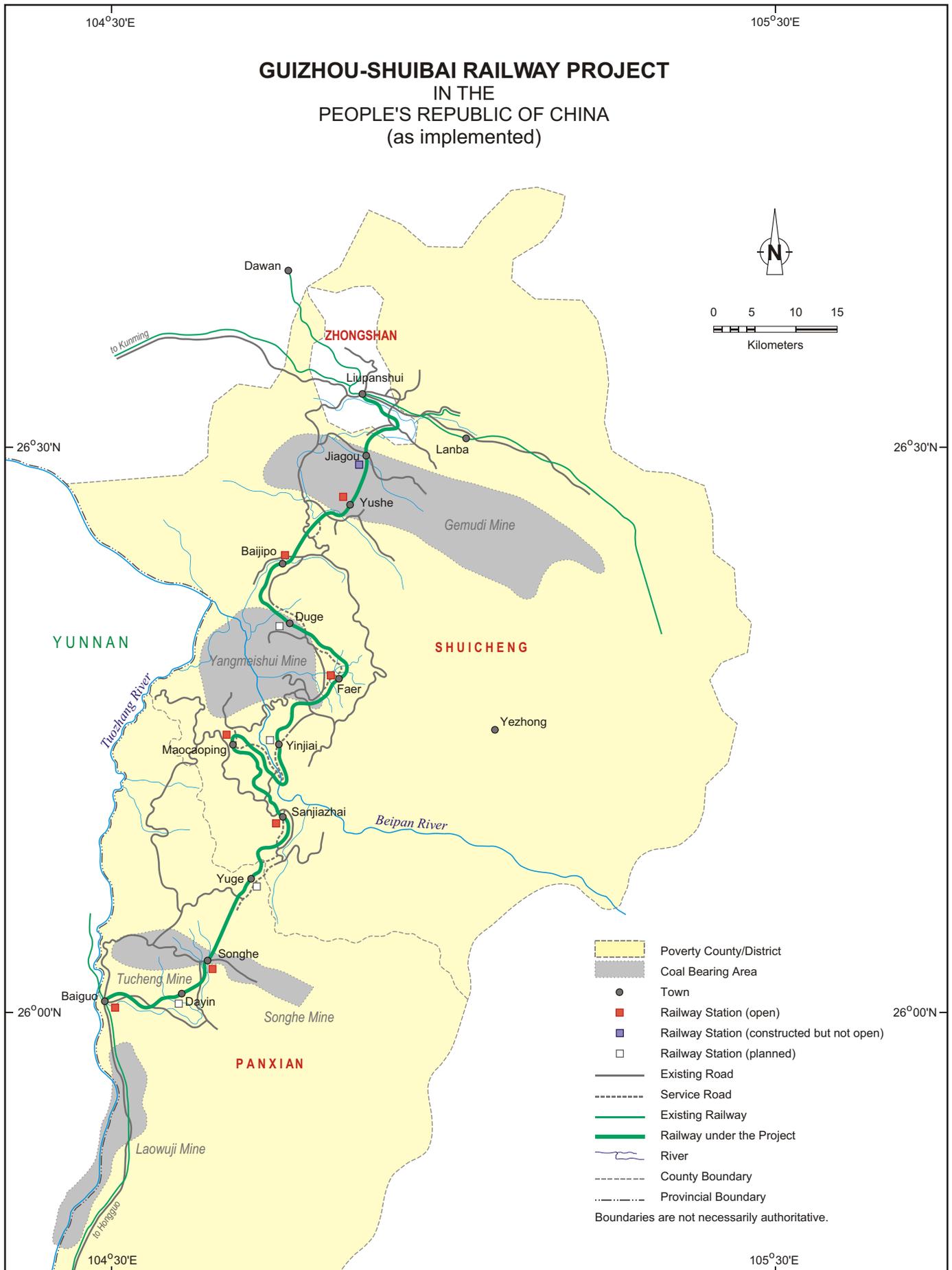
PRC authorities need to improve cost recovery. The overall tariff including both freight rates and passenger fares appears to be less than adequate. Although affordable, passenger fares are too low to achieve cost recovery. Therefore, freight rates need to be set high enough to subsidize passenger tariffs. This puts the railway's freight operations at a competitive disadvantage. While GSRC has the power to set fares, this power is constrained by what the market can bear and its limits are set by the highly competitive fares of bus services. The Operations Evaluation Mission recommends that this issue should be taken up by ADB in policy dialogue with the PRC authorities.

An important lesson is the need for greater attention to market and industry details if the viability of a project depends to a major extent on a single commodity. In this context, the report proposes as a follow-up action the close monitoring of developments in the Project area's mining industry over the next 6 years. Another lesson unique to the PRC's privatization efforts is provided by GSRC's acquisition of an additional line. The case illustrated the financial advantage of large-size corporations and the shortcoming of the frequent PRC practice of forming corporations for projects regardless of their size. A final lesson is that review missions to projects, with significant amounts of resettlement and/or substantial increase in the number of resettled people above appraisal estimates (as was the case with the Project), should include a resettlement specialist in the team.

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	National Capital
	Provincial Capital
	City/Town
	Existing Railway
	Railway Under Construction/Planned
ADB--Financed Railway Project	
	Guizhou-Shuibai Railway
	Open to Traffic
	Under Construction
	River
	Provincial Boundary
	International Boundary
Boundaries are necessarily authoritative.	



I. INTRODUCTION

A. Evaluation Purpose and Process

1. The Guizhou Shuibai Railway Project in the People's Republic of China (PRC) was selected as part of the annual random sample of completed projects postevaluated by the Operations Evaluation Department of the Asian Development Bank (ADB). The Operations Evaluation Mission (OEM) visited the PRC from 30 August to 9 September 2006. By that time, there had been over 2 years of full operations since the start of freight operations, which provided a sufficient basis for evaluating project performance.

2. The evaluation draws upon a review of project documents and other relevant studies, as well as discussions between ADB staff and officials of government agencies concerned with the Project and project beneficiaries. It incorporates the results of the OEM's field inspections of the railway, traffic studies, and a rapid socioeconomic assessment. A copy of the draft evaluation report was shared with ADB's departments and offices concerned, as well as those of the Borrower and of the Guizhou Shuihong Railway Company Ltd. (GSRC), which is the Executing Agency (EA). These parties' views have been incorporated and acknowledged where relevant.

3. In 2005, the project completion report (PCR)¹ rated the Project highly successful. The Project was considered technically sound and highly relevant to the achievement of its development goals at appraisal and at completion. However, the Project was rated only efficient, due to a lower-than-expected recalculated financial internal rate of return (4.19% compared with 6.8% at appraisal) despite a higher-than-expected economic internal rate of return (20.8% compared with 18% at appraisal). The institutional development and other impacts of the Project were deemed to have been significant, taking into account the positive impacts of construction employment for the local population and poverty reduction in the project area. However, the land acquisition and resettlement required under the Project was significantly greater than the appraisal estimate. The total population affected by the Project increased from the 2,466 persons in the resettlement plan prepared by the preparatory project technical assistance (PPTA) consultants to 29,653. Of this larger number, 4,364 were affected by house demolition and 25,289 were affected by land acquisition. The PCR concluded that the large increase was due mainly to poor estimates at the appraisal stage and partly to the need to realign the railway during construction to avoid difficult terrain and areas prone to landslides.

4. The PCR found implementation arrangements to have been adequate and the GSRC's performance highly satisfactory. The planned outputs were completed 7–21 months ahead of the appraisal schedule. The completed civil works were of excellent quality and consistent with international standards. The project facilities were being adequately maintained. The PCR highlighted two lessons, which were the needs to make more realistic projections of (i) traffic, and (ii) land acquisition and resettlement at the time of appraisal.

B. Expected Results

5. The Project was classified as an economic growth project, with a secondary objective of poverty reduction. According to the project framework of the report and recommendation of the

¹ ADB. 2005. *Project Completion Report: Guizhou Shuibai Railway Project (People's Republic of China) (Loan 1626-PRC)*. Manila.

President (RRP),² its expected impact was to promote economic development and reduce poverty in the western region of Guizhou province. Its expected outcome was to improve the capacity and efficiency of railway transportation.³ The project framework identified five categories of expected outputs. The first category, accounting for nearly all of the estimated project cost, was for construction of a 121 km standard gauge, single-track, electrified railway between Liupanshui and Baiguo (both stations on the existing national railway network), including associated roads and other facilities. Four further categories of expected outputs were (i) acquiring land and resettling project-affected persons; (ii) adopting environmental protection and mitigation measures; (iii) providing consulting services for design, procurement, construction supervision, quality control, environmental monitoring, and monitoring of resettlement and social impacts, including poverty reduction and minorities development; and (iv) providing institutional strengthening of GSRC.

6. The statement of project impact in the project framework was well formulated, but the statement of project outcome in that framework was inappropriately formulated since it did not include a quality dimension. The PCR proposed a better formulation “to establish a cost-effective mode of transport for mining and other industrial outputs and for passengers in the Project area.” Many of the project outputs in the RRP’s framework were inserted at the wrong design summary level. Land acquisition and resettlement, as well as adopting environmental mitigation measures should have been included as project activities, not project outputs. Similarly, consulting services should have been a project input, not an output. In its project framework, the PCR proposed better outputs, as follows: (i) construction of a 121 km standard-gauge, single-track, electrified railway from Liupanshui to Baiguo, (ii) procurement of equipment for operations and maintenance, (iii) computerization of management information and financial accounting systems of GSRC, (iv) construction of service and access as well as link roads, and (v) institutional development. The OEM agrees with these new proposed project outputs, except for point (ii) procurement of equipment, which had already been included as an activity in the PCR’s project framework.

7. The RRP’s project framework lacked well-defined indicators/targets suitable for evaluating the success of the impact, outcome, and output statements.⁴ The PCR’s project framework proposed a number of new output indicators/targets to monitor attainment of its new outputs. The revised outcome statement, four revised output statements, new output indicators/targets, and, in some cases, additional indicators/targets, are reflected in the summary design and monitoring framework in Appendix 1.

II. DESIGN AND IMPLEMENTATION

A. Formulation

8. National consultants prepared feasibility studies based on guidelines provided by the Ministry of Railways (MOR). The studies defined the scope of the Project, provided preliminary designs and cost estimates and included economic and financial evaluations.

² ADB. 1998. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People’s Republic of China for the Guizhou Shuibai Railway Project*. Manila.

³ The project goal stated in the RRP is equated with project impact and the project purpose with outcome.

⁴ ADB. 2006. *Project Performance Management System: Guidelines for Preparing a Design and Monitoring Framework*. Manila. According to these guidelines, well-defined indicators have the following critical attributes: (i) specific – relate to the results the project seeks to achieve, (ii) measurable – stated in quantifiable terms, (iii) achievable – realistic in what is to be achieved, (iv) relevant – useful for management information purposes, and (v) time-bound – stated with target dates.

The results of the feasibility studies were reviewed and supplemented by international consultants under project preparatory technical assistance (PPTA) provided by ADB in 1997.⁵ The PPTA (i) refined the domestic feasibility study, (ii) reviewed the environmental impact assessment prepared by MOR's Second Survey and Design Institute, and (iii) assisted in preparing the resettlement plan and the social impact assessment. Reports prepared under the PPTA provided adequate information on the Project. The overall scope and design of the Project were well defined. In the process of project engineering, during which the detailed design and working drawings were prepared, the track alignment was changed and the overall length of the line reduced by 2.5 km to 118.6 km. The outputs of the PPTA together with the feasibility studies constituted an adequate basis for project appraisal.

9. In formulating the Project, ADB followed recognized approaches to implementation arrangements, consulting services, and procurement. It used international competitive bidding and other relevant international standards for civil works contracts. Overall, project formulation benefited from available domestic and international expertise, active participation of, and coordination with, counterpart institutions, affected persons, and development partners.

B. Rationale

10. The Project was intended to provide a more reliable and economic mode of transport for coal to energy-deficient areas in Guizhou and neighboring provinces and was expected to facilitate establishment of related industries. The expected impact was to promote economic development that would help reduce poverty in the project area.

11. The project area in western Guizhou has proven reserves of over 15 billion tons⁶ of good quality coal known for its low atmospheric pollutants and high heat value. Coal mining in the project area was expected to be developed as stipulated in the Ninth Five-Year Plan (1996–2000). The RRP maintained that production of the existing coalmines had been constrained by inadequate transport infrastructure and that road upgrading—a potential alternative to constructing the railroad—would have been a “massive undertaking.”⁷ The project railway was expected to enable the development of new, large coalmines in the Project's influence area, which, in turn, would boost economic activity. Consequently, a portion of the expected economic value generated by the proposed mines was attributed as benefits to the Project. It was further assumed that the new mines would come onstream before the Project's completion.

12. While the Project's rationale was and still is valid, the underlying assumption that the railway investment alone would constitute a sufficient precondition for coalmine development in the project area did not withstand the test of reality. Although the output of coalmines in the Project area has been significant, this development was not solely attributable to the Project. There are presently about 1,700 small, private coalmines with an average output of about 44,000 tons per year in Guizhou province, 150 of which are located in the Project area. The small mines together employ about 125,000 mineworkers and account for almost 75% of Guizhou's total coal production. Due to a rise in energy demand and coal prices, many of the

⁵ ADB. 1997. *Technical Assistance to the People's Republic of China for Guizhou Shuibai Railway Project*. Manila.

⁶ Source: GSRC figures. Both the RRP and PCR had reported a more modest reserve level of 5 billion tons.

⁷ This assumption was valid. The existing roads in the project area would not have had the capacity to accommodate a traffic load that was expected to ensue from developing large-scale mining projects. On the other hand, the validity of the assumption was limited to the projected output of the large mines that had yet to be constructed. Road transport is coping quite well with meeting the demand of the existing small mines that currently dominate the industry. Their share in total output is almost 80%.

small mines have come into existence over the last decade and their overall production since 1999 has increased by about 13% per annum. This development has occurred without adequate transport and the substantial growth of the small-mines sector was not induced by the Project.

13. The rationale of the Project should have taken into account a number of other conditions that were at least equally significant for justification of the Project. These conditions included (i) the substantial investment that would be required to construct several large coalmines,⁸ (ii) the time horizon that should have been applied to implementing the mining program, and (iii) the linkage between developing large mines and restructuring of the small-mines sector. It was assumed at appraisal that development of the new mines would be aligned with implementation of the Project and that the new mines would be readied well ahead of the Project's completion.⁹ In reality, project implementation and mines development have deviated from the government's plans at the time of appraisal. Based on current plans, the majority of the new mines will come onstream from 2007 to 2010, 5–8 years after Project completion. While normal coal traffic originating from existing mines has grown, the Project has so far not benefited from the expected more substantial economic impact of new mine development.

C. Cost, Financing, and Executing Arrangements

14. Overall, actual project cost was reasonably close to the appraisal estimate of \$381.0 million. At completion in 2002, total cost had risen by 3.04% to \$392.6 million. That the increase appears rather insignificant is caused by the "unallocated" cost item, which was fully used and has cushioned the more substantial increases in other items. The more notable overruns included (i) land acquisition and resettlement (by 97.7%); (ii) consulting services and project administration (74.7%); (iii) signaling, telecommunications, and electrification (13.8%); and (iv) civil works (11.1%). The overruns affected local currency costs more than foreign exchange costs. At appraisal, the share of the foreign exchange costs was estimated at 44.6%. Upon project completion, the share was reduced to 42.2%.

15. ADB provided a loan of \$140 million in accordance with the original financing plan. The loan was intended to cover 36.7% of the total project cost and 82.3% of the foreign exchange cost. The balance of the foreign exchange cost was to be financed from GSRC's own resources. Financing of the local currency cost was to be shared between GSRC (\$138.6 million) and the State Development Bank (\$72.3 million). At project completion, \$35 million of the ADB loan had not been used, reducing the loan to \$105.0 million and ADB's actual financing share in total project cost to 26.7%. Underutilization of the ADB loan occurred because tender prices for international competitive bidding civil works contracts had been lower than expected at appraisal. In contrast, GSRC's share had risen to 54.8% and that of the SDB loan to 18.5%. The appraisal and actual financing plans are compared in detail in Appendix 2.

16. Project implementation closely adhered to the arrangements that had been agreed at appraisal. GSRC was the EA and, as such, was responsible for carrying out all project

⁸ To achieve the level of mining output and thus of railway traffic estimated at appraisal, about \$840 million would need to be invested in new mining developments. This amount is more than double the investment in the Project.

⁹ Although the coordinated development of coalmines was mentioned as an assumption and risk in the project framework, that risk was underestimated. The RRP stated: "The two-year gestation period for the development of coal production in medium to large coalmines is significantly shorter than the Project implementation period. As such, delays in the development of the planned production of coal that would affect Project traffic are not anticipated."

implementation activities, including land acquisition and resettlement, procurement of goods and services, civil works implementation, and commissioning of the railway, as well as with operating the completed project railway. GSRC established in a timely manner a project management office and appointed a qualified project manager to oversee the operations of the office. An adequate number of railway professionals were recruited for project implementation and management. At the end of 2004, GSRC underwent a significant restructuring of its assets, during which it acquired additional railway assets from the MOR and in exchange issued shares to MOR corresponding to the value of the new assets.¹⁰ Paragraphs 27–28 further detail the asset restructuring and other institutional developments. The latest organization chart for GSRC is in Appendix 3.

D. Procurement, Scheduling, and Construction

17. **Procurement.** All procurement funded from the ADB loan was in accordance with ADB's guidelines on procurement. GSRC hired a domestic procurement agency for the tendering activities. No significant problems were encountered in the packaging of contracts, preparation of bid documents, bid evaluation, and awarding of contracts. GSRC has in the meantime also installed the computerized accounting system, which had been deferred until full commercial operations had been reached. The system is compatible with that of MOR and feeds data and information to MOR's overall railway management system.

18. **Construction.** The construction of the railway line was physically completed 6 months early, in June 2002. However, the start of commercial freight operations was delayed by 9 months, to March 2004, because of extended safety testing. Although some of the testing operations generated revenue, the prolonged testing caused a financial loss that had to be accepted as the testing helped ensure safe operations of the line. Passenger operations began on 1 February 2005. The civil works contractors performed satisfactorily, with all works being completed well ahead of the schedule agreed at appraisal. Likewise, the track laying was completed satisfactorily about 1 year ahead of schedule. Telecommunications, signaling, and electrification were also completed satisfactorily and ahead of schedule. A chronological narrative of the major events in implementation of civil works is in Appendix 4.

19. **Scheduling.** The loan was approved on 18 August 1998, signed on 23 February 1999, and became effective on 24 May 1999. ADB approved advance action for prequalification of civil works contractors, evaluation of bids, and related activities up to contract awarding. Land acquisition and resettlement began in January 1998 (6 months earlier than expected at appraisal) and were completed by March 2001, almost 2 years earlier than envisaged.

E. Design Changes

20. Detailed designs closely followed the preliminary designs discussed at appraisal. The only design alteration related to an alignment change that was considered necessary to avoid landslides. The actual completed length of the line is 118.6 km, as compared with 121 km at appraisal.

¹⁰ As a result of the restructuring, GSRC's name was changed from its former name, Guizhou Shuibai Railway Corporation, to Guizhou Shuihong Railway Company Ltd.

F. Outputs

21. As per the revised design and monitoring framework in Appendix 1, the outputs of the Project included:

- (i) a standard-gauge, single-track, electrified railway line from Liupanshui to Baiguo;
- (ii) construction of service, access, and link roads;
- (iii) computerization of GSRC's management information and financial accounting systems; and
- (iv) institutional development.

22. Details of the physical accomplishments are summarized in Appendix 5.

23. The principal output was construction of the 118.6 km railway, including 50 tunnels, 102 bridges, 7 stations (of which 6 are operational), service buildings, signaling and telecommunication facilities, operational equipment, associated roads, and other facilities. GSRC plans to open an additional seven railway stations, depending on future demand. Ultimately, there will be 13 stations along the project railway. Activities undertaken for providing the principal output included: (i) civil works construction and equipment procurement; (ii) consulting services for preconstruction activities, construction supervision, and quality control; (iii) acquisition and resettlement of affected people, and monitoring of resettlement and social impacts; and (iv) environmental protection and mitigation measures, as well as environmental monitoring.

24. The technical standards of the project railway correspond to the class 1 standard defined by MOR. The entire route is electrified to allow the operation of locomotives powered by electric engines. For train control, a semiautomatic block relay signal system with electric interlocking and color light signals was installed. Bridges were designed to withstand possible cataclysmic flooding, based on data available for 100 years, and tunnels were built to the standard clearance for national railways. The completed civil works are of excellent quality and consistent with international standards. The project facilities are adequately maintained. Slopes are protected using various technologies, depending on the conditions of the terrain. Plants and environmental protection measures have been integrated into the natural terrain.

25. Service and access as well as link roads were built to facilitate contractors' access to remote construction sites. A total of 220.3 km of service and access roads and 30 km of link roads were constructed by GSRC. The service and access roads were built as per schedule, but there were some delays in constructing link roads. By the time of the OEM, all the roads had been completed. Upon project completion, the roads have taken on a new importance in that the villages in the project area are now using and maintaining them. Thus, the roads have changed their role in the project design from inputs to an unexpected beneficial output. The service and access roads will continue to provide access to the railway line for emergency interventions and to carry out routine and periodic maintenance.

26. Computerization was focused on GSRC's management information system and selected railway management areas. The hardware that was to be procured and financed from the ADB loan has been installed, albeit after some delay, and is functioning well. International consultants' services were financed under the loan to assist and train GSRC staff in designing and implementing computerized management information and financial accounting systems. The consultants trained 40 GSRC staff members in using the system. In 2003, a management seminar was held that focused on railway marketing. Key GSRC staff attended seminars and discussions in the United States (US) with the US Federal Railway

Administration and the Short Line and Regional Railway Association. GSRC staff members were also trained in the US in passenger train management, service facilities, and service quality. GSRC believes these training activities have helped improve its management. The OEM visited Baiguo station and was given a demonstration of the information system. The system enables every station to input data from cargo manifests and passenger traffic data into MOR's main information system. The OEM was impressed by the ease with which GSRC handled the complicated system.

27. GSRC's institutional development included the signing of concession agreements with subcontractors for railway stations and for maintenance operations, as well as its corporatization. These outputs were delivered on time. Convenience shops at stations and routine maintenance have been contracted out to small entrepreneurs. GSRC was incorporated prior to the start of construction, and all assets generated by the Project have subsequently been transferred to the railway company.

28. Following project completion, at the end of 2004, GSRC underwent a significant restructuring of its assets, during which it acquired from MOR the 43 km rail line from Baiguo to Hongguo. As payment, GSRC issued shares to MOR that were supposed to correspond to the value of the newly acquired assets. As Hongguo is an important hub for traffic to the (i) south (to Nanning and from there to the east), (ii) west (Kunming), and (iii) north (Liupanshui–Chengdu), the operational advantages of the restructuring in attracting traffic have turned out to be significant.¹¹

G. Consultants

29. The Project included 12 person-months of international consulting services for (i) development and design of computerized management information and financial accounting systems; (ii) preparation of bid documents and assistance in procuring hardware and software for the systems; (iii) training of GSRC staff to operate, maintain, and update the systems; (iv) preparation of working manuals for the systems; (v) organization of seminars for management and accounting staff in using the systems; and (vi) organization of overseas study tours for GSRC staff. The consultants, who were recruited from a firm, commenced their work in September 2002 and satisfactorily completed their assignment within the scheduled period. For operational reasons, GSRC had decided to defer the procurement and installation of the systems. By the time of the OEM, the systems had been installed and were working properly as witnessed by the OEM.

30. All project preparatory and management tasks were carried out by national consultants. These included (i) detailed design, (ii) supervising international procurement, (iii) construction supervision, (iv) quality control, (v) monitoring environmental impacts and mitigation, (vi) monitoring and evaluating the plans for resettlement and for ethnic minorities, (vii) socioeconomic impact assessment, and (viii) evaluating poverty reduction. The consultants were recruited based on widely used domestic procedures acceptable to ADB and were financed from GSRC's own resources. All consultant services were performed satisfactorily.

H. Loan Covenants

31. No covenant was modified, suspended, or waived during implementation. All remained relevant and appropriate. Most covenants due by September 2006 have been

¹¹ More details of GSRC's restructuring are in Appendix 10 of the PCR.

complied with. GSRC has so far not met the full intent of the covenant requiring the province to set tariffs at full cost-recovery levels.¹² The current overall tariff combining freight rates and passenger fares is inadequate to recover capital and operating costs. While full cost recovery is not yet achieved, the covenant recognizes the need to consider market conditions in addition to the need to recover costs.¹³ During the first 3 years of commercial operation, GSRC could not be expected to be in a position to set rates in isolation from market conditions. Rather, it had to strive to attract traffic through reasonable rates and quality of services. Viewed against these occasionally conflicting exigencies and GSRC's endeavor to recover costs, the OEM agrees with the PCR that the covenant has been met. This is also evidenced by GSRC's financial statements that include all cost items—notably, adequate depreciation and interest—and by the efforts made to meet the other requirements under this covenant. The tariffs charged are based on a tariff study, and GSRC has also reviewed the tariffs as required. Since starting operations, the tariff has been adjusted once consistent with what the market could bear.

32. The covenant requiring GSRC to submit an annual performance assessment for the first 5 years of operations and periodic socioeconomic impact assessments following project completion had not been complied with at the time of the OEM.¹⁴ GSRC indicated that it would undertake to submit the performance assessments on annual basis and would submit the socioeconomic impact assessment in 2008.

I. Policy Framework

33. At appraisal, the Government's policy in the railway sector was focused on (i) physical expansion and removing constraints in the system, (ii) encouraging provincial governments to enter into joint-venture arrangements for railway development, (iii) improving railway efficiency by using new technology and modern management tools, (iv) reducing operating subsidies through appropriate pricing and commercializing services to increase cost recovery and reliance on user-funded investment, (v) institutional and structural reforms to increase autonomy and accountability of enterprises, and (vi) encouraging nongovernment investment in infrastructure and related services. Under the Project, railway management issues have been addressed by focusing on commercializing operation, encouraging more autonomous management of railway operations, developing human resources, improving accounting systems and standards, and responding to the needs of railway planners for training in the areas of network planning. ADB's policy dialogue has revolved around promoting cost recovery, pricing policies to facilitate economic modal choices and enable optimal use of the railway system, and recognizing the social dimensions of railway projects. A discussion of the policy issues is provided below.

¹² There appears to be an inconsistency between the intention of the appraisal report and the loan covenant. While the appraisal report accepts that passenger tariffs may reflect social needs and not the cost-recovery principle, the loan agreement stipulates that tariffs be set at full cost-recovery levels (Loan Agreement, Schedule 6, para. 13).

¹³ This covenant has four requirements, including (i) The Province shall set tariffs on the Project railway at full cost recovery including the operation and maintenance costs of the Chengdu Railway Administration Bureau and the management costs of GSRC, depreciation, debt-service in excess of depreciation, taxes, and a reasonable profit, taking into consideration market conditions. (ii) Tariffs to be charged at the beginning of commercial operations shall be based on a tariff study to be completed by GSRC before the start of commercial operations on the earliest completed sections of the Project railway. (iii) The tariff shall be reviewed annually and revised as necessary to achieve full cost recovery. (iv) Tariff adjustments shall be approved by the Province and implemented by GSRC within 3 months of completion of each such review.

¹⁴ Subsequent to the OEM, GSRC submitted the annual performance assessment for 2006.

1. Physical Expansion and Removing Constraints in the System

34. The Project has addressed this issue in that it has closed a critical gap in the railway network. The project railway provides efficient transportation for the development of natural resources, industry, and services in the project area. With new mining projects to be completed in the medium term, the Project will create new employment and increase income opportunities.

2. Pricing Policies and Full Cost Recovery

35. GSRC's current freight tariff was supposed to be cost-based and responsive to market conditions. The tariff for coal (CNY0.30 per ton-km) reflects both the relatively high value of coal and the high cost involved in its transportation. The rate for general freight (CNY0.12 per ton-km) is based on the average value of railway freight. The weighted average freight rate would be marginally sufficient to recover total costs. However, GSRC is also operating passenger services. These include uneconomical short-distance services from and to the stations along the Project line. The average passenger tariff (CNY0.07 per passenger-km) is too low to contribute adequately towards cost recovery. GSRC's passenger service faces mounting competition from bus transport and is constrained from setting passenger fares close to cost-recovery levels. As a result, passenger services are subsidized by freight. To achieve cost recovery overall, freight rates need to be set where they can cross-subsidize passenger services. Freight tariffs, therefore, tend to be higher than they need to be and place rail transport at a competitive disadvantage. Because the Government accords strategic significance to freight rates, and particularly for coal, the scope for achieving a higher degree of cost recovery is limited.

36. That subsidies may be required in order to make essential services affordable is widely accepted and also recognized by ADB's policy on subsidies.¹⁵ However, subsidies should be transparent and targeted to the poor. Cross-subsidies will not be viable in sectors with competition and free entry to the transport market. This applies to the Project railway, which increasingly has to compete with road transport, and particularly buses, over short distances. Many countries have introduced policies to compensate railway companies for assuming social obligations, which they, if considering only their own commercial interests, would not have accepted. Such policies aim to terminate open-ended subsidies and create mechanisms for identifying and isolating the losses associated with loss-making passenger operations. The policy dialogue at the Project's appraisal should have had a sharper focus on this issue, which, in turn, may have avoided including a blunt cost-recovery covenant in the loan agreement.

3. Enterprise Reform and Institutional Development

37. The Project was designed to promote enterprise reform in local railway operations by commercializing railway operations to achieve greater managerial and financial autonomy. Towards this end, GSRC was incorporated as a joint-stock company with adequate paid-up capital and was intended to apply for listing its shares on a stock exchange. This was to be undertaken after having performed satisfactorily for 3 years consecutively, as required by the PRC stock market regulations. Considering the challenges most railways face in becoming fully commercial and independent enterprises, this policy's objective was ambitious.

¹⁵ ADB. 1996. *Bank Criteria for Subsidies*. Manila.

Currently, GSRC is still far from achieving this objective. ADB's policy dialogue should have paid greater attention to the details and practical steps involved in railway reforms.

4. Mobilizing Nongovernment Financing

38. A key element of ADB's policy dialogue in the PRC has been to encourage nongovernment financing of physical infrastructure. Towards this end, GSRC has mobilized domestic loan funds for the Project through the State Development Bank. However, the related objective of attracting private sector financing for constructing railway stations and freight yards has so far not been pursued.

III. PERFORMANCE ASSESSMENT

A. Overall Assessment

39. The overall assessment of the Project was 'successful'. This was based on separate assessments for the four groups of project outputs (components) (see para. 7). All individual components were rated successful.

40. To arrive at the overall assessment, the individual component ratings were aggregated using weightings developed by the OEM: Railway construction (65%), Service and access as well as link roads (15%), computerization (10%), and institutional development (10%). These reflect the relative importance of the component groupings for expected overall project outcomes, taking into account their contribution to project cost at appraisal. The rating for each component group used four criteria: relevance (20% weight), effectiveness (30%), efficiency (30%), and sustainability (20%). Individual criterion ratings were in whole numbers from 0 to 3, in increasing order of project performance. The overall assessment is summarized in Table 1. Further details are in Appendix 6.

Table 1: Overall Performance Assessment

Criterion	Project Component				Overall
	Railway Civil Works	Service and Access Road Construction	Computerization	Institutional Development	
1. Relevance	2	3	3	3	2.35
2. Effectiveness	2	2	1	1	1.80
3. Efficiency	2	2	2	2	2.00
4. Sustainability	2	2	2	2	2.00
Total Rating ^a	2.0	2.2	1.9	1.9	2.01

^a Highly successful > 2.7; 2.7 ≥ successful ≥ 1.6; 1.6 > partly successful ≥ 0.8; unsuccessful < 0.8.
Source: Operations Evaluation Mission.

B. Relevance

41. The Project was assessed 'relevant'. The rating for the railway civil works subcomponent is relevant, while the ratings for the other three subcomponents are highly relevant.

42. As designed, the Project was to be instrumental in harnessing the vast potential of coal resources in the PRC's southwestern province of Guizhou. Coal is the dominant source

of energy in the PRC, and development of coalmines has been among the priorities of the Government's Ninth Five-Year Plan (FYP) (1996–2000) and Tenth FYP (2001–2005). This is evidenced in the substantial rise in output from 998 million tons in 2000 to an estimated 2.4 billion tons in 2006. Fostering growth in coal production is also an objective of the recently formulated Eleventh FYP (2006–2010). Guizhou province contributes about 4.6% of the PRC's coal requirements, but ranks fifth in terms of established reserves, which are estimated at 53 billion tons. The project area in western Guizhou has proven reserves of over 15 billion tons. Given this potential, along with the Government's declared policy to harness it, the Project's objective was highly relevant.

43. The Project was also highly relevant to the Government's strategy for the railway sector. As rail transport is the most cost-effective mode of long-distance land transport for bulk commodities, the Government's stated objective was to improve the supply of energy deficient provinces in the eastern part of the PRC by making rail transport more efficient. As a key railway section linking two inter-provincial railway lines (the Kunming–Guiyang and the Kunming–Nanning), the Liupanshui–Baiguo railway was intended to improve transport capacity in western Guizhou province. In addition, the railway has had a significant network effect by providing faster transport for goods and passengers traveling north–south along the Chengdu–Nanning corridor. The Project was an important element of the Guizhou Transportation Plan under the Ninth FYP to (i) construct 8,600 km of new railway lines, (ii) electrify key lines to permit the use of heavier and faster trains, and (iii) reduce transportation congestion while increasing railway transport capacity.

44. ADB's country assistance strategy was consistent with the Government's plans and objectives. Among other things, the strategy was aimed at selectively expanding the railway system while focusing on the less-developed inland provinces.

45. The formulation and design of the Project were founded on assumptions that were not sufficiently tested at appraisal and have so far not materialized. This applies mainly to the assumed gestation periods for the coalmines and to the Project risks, which revolved around the coal traffic to be generated by the coalmines (see paras. 12–13). While the Project's development goals have been and are still highly relevant, the process to achieve them is delayed. As a result, the OEM has rated the railway civil works subcomponent as relevant.

C. Effectiveness

46. The Project was assessed 'effective'. The OEM has assessed effectiveness in the light of the outcome of the Project as defined in the reformulated design and monitoring framework shown in Appendix 1.

47. The expected outcome of the Project was to create a cost-effective mode of transport in the project area for mining, other industrial outputs, and passengers. The outcome was to be reflected in greater freight and passenger volumes and in the commercialization of operations. Appropriate financial performance targets were to be used to measure commercialization. The Project has by and large achieved the expected outcome. There is substantial freight traffic on the railway, and the Project line has been already to some extent, and will be increasingly in the future, instrumental in tapping the large coal reserves in the Project area. The line has also facilitated construction of large mines and other industrial development. Although passenger traffic started with some delay in 2005, its growth rates are significant. Detracting from a higher score was the delay in putting into place the computerized management information and financial accounting systems, as well as the

fact that the commercialization indicators/targets envisaged at appraisal have not been fully achieved. While GSRC has a commercial orientation, its financial independence and adherence to cost-recovery principles are constrained by considerations that are common to many railways that have to provide quasi-social services.

D. Efficiency

48. The Project was assessed 'efficient'. The rating applies to all four components.

49. The OEM has collected updated information on traffic growth and composition and on Government plans for developing coalmines in the project area. The picture emerging from this information is significantly different from the traffic and other assumptions underlying both ADB's appraisal and in the PCR. The main difference is that the envisaged development of large mines has not been synchronized with implementation of the Project. As a consequence, the most important benefits of the Project in the form of value-added resulting from increased mining activity will occur much later. The delay has adversely influenced the economic viability of the Project. It is, however, fortuitous that the project line has acted as a relief valve for the heavily congested main west-east route. The traffic that the project line has attracted from this route currently accounts for 53% of total traffic. Due to its positive (cost-reducing) impact on the rail network, this traffic is largely compensating the shortfall in benefits from the coal traffic. In general, benefits accruing from the network improvement play a significant role and may have been underestimated at the appraisal, which had narrowly focused on mining development.

50. The significance of the project railway line at appraisal emanated from its role in coal traffic that was to be generated by mines in the Project area and spillover effects on the local economy. Specifically, the railway was thought to fulfill a critical condition without which coalmine development in the project area would not be possible. Consequently, a portion of the incremental value generated by newly developed mines was attributed as benefits to the Project. Since operations began in 2004, the Project's significance has evolved in a different direction. The line represents a relatively short and heretofore missing link in the PRC's dense railway network. In closing this gap, the Project has created several new options for transit traffic, including the shortest path through the network enabling unbroken traffic between the railway hubs of Chengdu in the north and Nanning in the south. In addition, the line provides an alternative and substantial relief for the highly congested shortest west-east route, which is the principal route to Guangxi and Guangdong provinces. While traffic routed through the Project line has to accept a longer distance, it is less time-consuming and has an overall cost-reducing effect on the network. Specific developments that have impacted on the efficiency are discussed below.

51. The Project railway was expected to enable the development of new large coalmines in the Project's influence area, which in turn would boost economic activity. This assumption was based on the project area's proven reserves of more than 15 billion tons of good-quality coal. It was further assumed that the new mines would come onstream before completion of the Project. In reality, project implementation and the development of mines have largely been uncoordinated. Based on current plans, the majority of the new mines will come onstream by 2007-2010, 5-8 years after project completion. While normal coal traffic originating from existing mines has grown, the Project has so far not benefited from the more substantial economic impact of mine development.

52. Guizhou's coal output for 2006 is expected to reach about 115 million tons. There are about 1,700 small, private coalmines with an average output of about 44,000 tons per year, 150

of which are located in the project area. The small mines together employ about 125,000 mineworkers and account for almost 75% of Guizhou's total coal production. Due to a rise in energy demand and coal prices, many of the small mines have come into existence over the last decade and their overall production since 1999 has increased by about 13% per annum. The rapid growth has been largely unregulated and has seriously compromised safety standards. In 2005, about 500 mine accidents were recorded, claiming the lives of 768 people. The accident record of the small mines has been particularly poor. Accidents occurring in small coalmines account for almost 90% of total accidents. To improve the safety of the mines and to boost the sector's overall productivity, the Government has embarked on a program of industry restructuring and consolidation. This would entail closing about 700 mines that fail to meet safety standards and consolidating small mines into fewer and larger ones.¹⁶ The program started in 2004 and will be completed in 2010. Its impact on the Project has so far been minimal, with the closure of mines only affecting a small portion of the Project's traffic. The end result of the program will be positive. Larger mines will be more profitable and will be able to invest in the facilities that would enable direct rail links to the mines.

53. It was assumed at appraisal that the output of coalmines would be a captive freight for the project railway, considering that about 150 private mines with a combined output of about 3 million tons per year are located in the Project area. The Project has so far captured only a portion of this traffic potential. The reasons were mainly operational and included an acute shortage of bogies and the lack of railway sidings on the mines' premises. With the help of the Kunming Railway Administration Bureau, the supply of bogies has been improved. The average annual output of the small mines is too small to make railway sidings economical. In addition, many of the small mines cater to local consumers and would continue forwarding the coal by truck. The assumptions and methodology used for the revised traffic forecast are in Appendix 7.

54. The traffic developments discussed above and updated data on operating costs and coal prices were used to reestimate the economic internal rate of return (EIRR) as the principal indicator for efficiency. The reestimated EIRR was 17.4%, compared with 18.0% at appraisal and 20.8% in the PCR. The robustness of the EIRR has been tested in a sensitivity analysis accompanying the EIRR recalculation. As could be expected from a Project that accrues most of its benefits from one commodity, the Project is vulnerable to adverse developments in coal mining. This would apply to a further delay in implementing new mines and a shortfall in the projected coal output. The economic analysis conducted at appraisal could have better reflected this risk in the sensitivity analysis by including a scenario where the value-added benefits from coal production were delayed by several years. The assumptions and methodology used for the recalculation of the EIRR are in Appendix 8.

E. Sustainability

55. The Project was assessed 'likely sustainable'. The rating applies to all four components.

56. The Project is technically sound, and adequate maintenance and operating policies are in place. GSRC's strong ownership and commitment to the Project are confirmed by the OEM, as reported in the PCR. In addition, GSRC's shareholders, including MOR, as well as the cooperation with the Chengdu Railway Administration Bureau for freight traffic and the Kunming Railway Administration Bureau for passenger traffic will contribute to sustainability. Government plans indicate that coal production will increase significantly over the next 5 years. The development of larger and more efficient mines is underway. The

¹⁶ The PCR had wrongly assumed that "...all small mines in the area..." were closed in the last 4 years.

establishment of other industrial operations will intensify demand for rail services in the project area. The restructuring of GSRC (see para. 28) has improved operations and is expected to enhance the profitability and sustainability of the company.

57. A financial internal rate of return (FIRR) was reestimated for the Project using updated traffic forecasts and tariffs, as well as actual and forecast operating costs. The reestimated FIRR is 3.4%, compared with 6.8% at appraisal and 4.2% in the PCR. This reestimated FIRR is below the weighted average cost of capital, which is estimated at 4.07% per year. The financial analysis conducted at appraisal could have better reflected single-commodity risks in the sensitivity analysis by including a scenario where the value-added benefits from coal production were delayed by several years. Appendix 9 presents the actual and projected financial performance of GSRC, along with details of the FIRR calculation.

58. GSRC's current financial situation is weak, but is expected to improve. The two covenanted financial indicators, the working and debt-service ratios, are currently being met. The debt-equity ratio is currently unfavorable, reflecting the high capital cost that GSRC incurred with the Project's construction. However, it is projected to improve considerably over the next years to reach just above the target level of 80% in 2013. GSRC's marketing efforts are expected to have a positive impact on financial performance. However, the low passenger fares that are cross-subsidized by the more remunerative freight business remain a concern. This applies in particular to the short-distance passenger traffic in the Project area, which is the most costly and heavily subsidized.¹⁷

IV. OTHER ASSESSMENTS

A. Impact

1. Impact on Institutions

59. **Institutional Capacity.** The Project provided support for institutional development, generally through the international training provided and through domestic staff working with the international consultants on preparing, and supervising the Project. International consultants conducted a total of 29 person-months of overseas training for GSRC staff. The training focused on transport management information systems, financial accounting systems, passenger training management, service facilities, and service quality. Of the 29 staff that underwent training, 21 are still working at GSRC, seven have retired and one has changed job.

60. **Governance.** The project implementation arrangements helped to improve governance of railway construction and operation in Guizhou. Specifically, GSRC was set up to construct and operate the railway, and all assets generated by the Project were subsequently transferred to it. Additional assets were transferred to GSRC during the asset restructuring in October 2004. The use of international competitive bidding for the railway contracts further exposed GSRC to international standards for better access to advanced technologies at competitive prices.

¹⁷ Passenger operations commenced in February 2005 and are outsourced to the Kunming Railway Administration Bureau for 20 years. In 2005, GSRC received CNY9.3 million for two pairs of passenger trains per day operated by the Bureau. In 2006, it increased the frequency to three pairs of passenger trains per day, and the Bureau is paying GSRC CNY14.0 million.

2. Socioeconomic Impact

61. The Project had two main types of socioeconomic impacts: (i) direct impacts in the form of improved transport for communities directly served by the railway and by the service, access, and link roads, and (ii) indirect impacts related to economic growth for a wider impact area. The Project also had impacts on two vulnerable groups in the project impact area: (i) households living below the poverty line, and (ii) ethnic minorities groups.¹⁸

62. In the case of the railway component, there have been fewer than expected immediate benefits along most of the railway alignment. That is due mainly to the fact that only six of the planned 13 railway stations are operational. Faster and cheaper travel has reduced the cost of freight delivery, the benefits of which are gradually being passed down to the people in the Project area. During railway construction, over 4.19 million person-days of local labor were employed. This was paid at the monthly rate of CNY500–CNY600 per capita. Direct benefits to users of the service, access, and link roads constructed are difficult to quantify. Nevertheless, since these roads were turned over free of charge to villages, it is likely that they have provided benefits to the local population.

63. Indirect benefits have arisen through development of businesses, particularly in Liupanshui and Baiguo, which boosts employment demand and general prosperity in the project area. Over the period 1997–2004, GDP has increased by an average 13.2%, per capita GDP by an average 11.2%, and rural per capita income by an average 5.5% in the two counties and one district traversed by the railway. Poverty incidence in Liupanshui municipality as a whole fell from 35% in 1997 to 9.7% in 2004. Given that the railway was strategically important in both the Ninth FYP and the Guizhou province Transport Plan, it is expected that the indirect effects and benefits to people in the project area of more cost-effective transport will continue to grow, in particular during 2007–2010 when several large coalmines are expected to come into production. Appendix 10 provides an analysis of the Project's impact in socioeconomic terms.

64. **Land Acquisition and Resettlement.** Land acquisition and resettlement activities were carried out in accordance with the land acquisition and resettlement plan (LARP). The Liupanshui municipal government was responsible to assist GSRC in land acquisition and resettlement. The Guizhou Provincial Academy of Social Sciences was tasked with monitoring the resettlement activities and, towards this end, submitted semiannual reports to ADB from 1998 to 2001. The PCR reported an eleven-fold increase in the total population affected by the Project—from 2,466 persons to 29,653 (of which 4,364 were affected by house demolition and 25,289 by land acquisition). The OEM reconfirmed these figures with staff of GSRC and the Provincial Academy of Social Sciences. The main underlying causes for the huge increase in the number of project-affected persons were (i) underestimation by the domestic feasibility study, and (ii) an inaccurate appraisal estimate due to lack of cross-checking during the project preparatory phase. Another, secondary reason for the underestimates was the need to realign the railway during construction to avoid landslide-prone areas that caused more people to be relocated. Despite the large discrepancy between the appraisal estimate and the actual figures, the total cost of land acquisition and resettlement increased only by 95% (from CNY36.73 million to CNY71.6 million). Informal discussions with government staff indicate that low compensation rates were the reason for this. The PCR found that resettlement, although much larger in scope than envisaged, has generally been carried out satisfactorily. Although

¹⁸ The ensuing discussion of the Project's socioeconomic impact is limited by the absence of a "without project" assessment that would allow separating impacts due to the Project from impacts due to other developments in the province.

the OEM confirms these findings, it believes that both ADB and the EA should have devoted more attention to resettlement supervision.

65. The OEM conducted interview surveys with county resettlement officers, township and village leaders, and the residents of relocated households. The OEM also visited resettlement villages. A case study¹⁹ on the resettlement experience under the Guizhou Shuibai Railway has been prepared for another Operations Evaluation Department report,²⁰ with a view to identifying lessons and recommendations for future projects. Appendix 11 provides an analysis of the land acquisition and resettlement activities.

66. **Ethnic Minorities.** The Project was approved by the Board in July 1998, a few months after the issuance of the 1998 Policy on Indigenous Peoples²¹ and, hence, implementation of the Project was subject to the Policy. A Minority Ethnic Peoples' Development Plan was prepared and included as a supplementary appendix of the RRP. As envisaged in the RRP, project implementation does not appear to have entailed any negative impact on the ethnic minority population in the Project area. In particular, ethnic minorities who were among the persons affected by land acquisition and resettlement appear to have fared relatively well. The PCR credited the effective monitoring and evaluation under the Ethnic Minority Development Plan for this achievement. A Guizhou Provincial Academy of Social Sciences survey undertaken in 2004 indicated that net income per capita of affected ethnic households increase by 76% between 1997 and 2003 from CNY834 to CNY1,466. A more recent household survey undertaken in September-November 2006,²² indicated that per capita incomes of ethnic households increased by 106% between 1997 and 2005. Moreover, the latter survey indicated that ethnic minorities have equally benefited from the Project in terms of mobility, travel pattern change, construction employment and cash cropping. However, the survey did note that ethnic minorities have been less successful than non-minorities in capturing the coalmining related employment opportunities in the Project area.

3. Environmental Impact

67. The Project had no significant adverse environmental impacts at the time of this evaluation. The mitigation measures and other recommendations of the environmental impact assessment (EIA) and summary EIA were incorporated into the project design and relevant mitigation measures were included in civil works contracts. The monitoring of environmental impact and mitigation measures was carried out by the Guizhou Designing Institute of Environmental Sciences and appears to have been effective. The PCR's environmental impact analysis concluded that the contractors for all contracted sections fulfilled their obligations and the adverse effects of the project construction on the surrounding environment were suitably mitigated. The PCR also found that the Project met its objective of environmental protection in that the railway operation has not affected the habitat of protected species in nature reserves and water quality of Yushe Reservoir as described in the EIA.

68. As a means of improving mine safety standards, the Government in 2004 embarked on a program to restructure and consolidate coal mining (see para. 52). This will entail closing about 700 mines that failed to meet safety standards and consolidating small mines into fewer

¹⁹ National Research Center for Resettlement, Hohai University, Nanjing, PRC. 2006. Special Evaluation Study on Social Safeguards: China Case Studies (Draft) 1626-PRC Guizhou Shuibai Railway. Draft dated April 2006.

²⁰ ADB. 2007. *Special Evaluation Study of Indigenous Peoples Safeguards*. Manila.

²¹ ADB. 1998. *The Bank's Policy on Indigenous Peoples*. Manila.

²² Bingfang Zhong. 2006. *Impact Survey Report for the Guizhou Shuibai Railway Project*. Guiyang, PRC.

and larger ones by 2010. This program is expected to positively affect the quality of the environment in Guizhou and to a lesser extent also in the Project area.

B. ADB Performance

69. ADB's performance was assessed 'satisfactory'. The OEM found that ADB performed satisfactorily in formulating the Project, although the justification based on coal demand was too simplistic (see paras. 12–13). ADB's supervision of the Project was generally satisfactory, with a loan review mission being fielded on average once every year. A midterm review mission was fielded 2 years after inception to monitor project progress and resolve implementation issues. The OEM noted, however, that only one review mission included a resettlement specialist, which is surprising given the large increase in affected persons. It found that ADB should have been much more active in monitoring implementation of resettlement activities (para. 64).

70. The OEM sought the EA's views on ADB's performance. GSRC staff indicated that they were generally satisfied with ADB's performance. They particularly appreciated the expert advice provided by the first project officer assigned to the Project.

C. Borrower Performance

71. The Borrower's performance was assessed 'satisfactory'. The OEM confirms the PCR's finding that the EA's performance was satisfactory. GSRC implemented the project diligently and efficiently, resulting in completion of civil works ahead of schedule. Detracting from a better assessment rating were the lack of attention given to monitoring of resettlement (para. 64) and non-adherence to one of the loan covenants (para. 32).

V. ISSUES, LESSONS, AND FOLLOW-UP ACTIONS

A. Issues

72. The main issue emerging from the OEM is whether GSRC will be able to achieve full cost recovery in the medium term. Two interrelated issues need to be addressed in this context. The first is GSRC's capacity to recover the operating and capital cost of its operations. Meeting the need for cost recovery, which is stipulated in the Loan Agreement, will be challenging. On the one hand, the costs to be recovered, especially capital costs, are substantial. On the other hand, GSRC's pricing policy has to be guided by market conditions in relation to both competition from other transport modes and the conditions in the market for the goods and commodities that are being moved by the railway. Given these two constraints, it may be difficult for GSRC in the medium term to achieve full cost recovery (para. 31).

B. Lessons

73. The economic and financial viability of the Project at appraisal hinged on development of large-scale coalmines in the project area and, thus, on one commodity. While it was fortuitous that unforeseen benefits have emerged since the railway's operation began, the lessons to be drawn from the operational experience so far point to the need for greater attention to market and industry details at appraisal. The risk involved in the dependence on one commodity was underestimated and the sensitivity analyses carried out during appraisal could have been better formulated to reflect this risk (see paras. 54 and 57). As coalmines will provide the Project's main source of traffic and revenue, this risk will remain. It is therefore recommended to closely

monitor the development of the mining industry in the project area over the next 3 years and to report this to ADB through the annual performance assessment (see para. 32). The monitoring should also examine recent and planned complementary investments in the project’s influence areas.

74. The PRC has made credible efforts to impose a commercial regime on the delivery of infrastructure as reflected in the provision of commercial road and rail transport. This has frequently occurred without consideration of scale economies, defined as the capital invested in relation to the returns generated by a corporation. The Project provides an interesting lesson in this regard. GSRC’s initial size was too small to be financially viable. Through the acquisition of an additional line, the revenue base of GSRC increased and made the corporation more viable.

75. Although the number of persons affected by land acquisition and resettlement increased eleven-fold from the appraisal estimates (see para. 64), the PCR’s main text gave scant attention to the lessons to be learned from this unusually large increase. The PCR’s Appendix 7 did, however, mention two important lessons:

- (i) The LARP should specify feasible compensation standards for all the affected categories, especially for such important items as land and dwellings and other buildings. Otherwise, it will be difficult to gauge whether or not the compensation standards conform to the agreement between ADB and the Borrower.
- (ii) Data collection should be systematic and timely, and it should include details about the affected land, dwellings and important land attachments, and people, to allow a more comprehensive review and assessment during the project completion review.

76. The OEM confirms the continuing validity of these lessons. An additional lesson is that early review missions to projects with significant amounts of resettlement and/or substantial increase in numbers of resettled persons above appraisal estimates should include a resettlement specialist in the team.

C. Follow-Up Actions

Table 2: Follow-Up Actions

Follow-Up Action	Responsibility
For Government Consideration	
1. Mining Development in the Project Area. The economic and financial viability of the Project hinge on the completion of large-scale mining projects in the impact area of the railway line. These mining developments should be monitored and new developments reported to ADB through the future annual performance assessments (see para. 73).	GSRC
2. Pricing Policy. Continued review of passenger and freight tariffs and adjustment in accordance with what the market can bear. (see para. 72).	GSRC; Guizhou Provincial Finance Bureau

GSRC = Guizhou Shuihong Railway Company, Ltd., ADB = Asian Development Bank.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators		Data Sources/Reporting Mechanisms	Assumptions and Risks
	Appraisal	Actual		
<p>Impact Increased economic development and poverty reduced in the western region of Guizhou province</p>	<p>To increase per capita incomes</p> <p>To reduce the proportion of the population below the poverty line</p> <p>Per capita rural income in project area will increase by 2010.^a</p>	<p>On target. GDP per capita in Guizhou province and Liupanshui municipality increased by an average of 10.56% and 13.86%, respectively, from 1998 to 2004.</p> <p>On target. The proportion of the population below the poverty line in Liupanshui municipality was reduced from 35% (963,648 persons) in 1997 to 9.7% (291,776 persons) in 2004.</p> <p>On target. Per capita rural income in Guizhou province increased by an average of 4.34% from 1998 to 2004.</p>	<p>Guizhou province Statistics Yearbook and Guizhou Social Sciences Academy statistics</p> <p>Guizhou province Statistics Yearbook and Guizhou Social Sciences Academy statistics</p> <p>Guizhou province Statistics Yearbook</p>	<p>Assumptions Coordinated development of coalmines, industries, physical infrastructure, and social programs</p>
<p>Outcome A cost-effective mode of transport for mining and other industrial outputs and for passengers in the project area</p>	<p>Increased freight and passenger volumes</p> <p>Commercialization of operations; attainment of financial performance targets</p>	<p>Freight volume increased by 119% from 2003 to 2004</p>	<p>GSRC</p>	<p>Assumptions Strong absorptive and implementation capacity. Resolution of cash flow difficulties in first few years of operation</p>
<p>Outputs 1.121-km standard-gauge single-track, electrified railway line from</p>	<p>Construction from July 1998 to December 2002</p>	<p>118.6 km railway line</p>	<p>GSRC completion report</p>	<p>Assumptions Strong implementation</p>

Design Summary	Performance Targets/Indicators		Data Sources/Reporting Mechanisms	Assumptions and Risks
	Appraisal	Actual		
Liupanshui to Baiguo		completed in May 2002		capacity of GSRC
2. Construction of service, access and link roads	Construction of link roads completed by December 2002	220 km of service and access roads, 2 km of link roads completed; another 28 km of link roads being constructed	GSRC and local governments	Adequate counterpart funds
3. Computerization of management information and financial accounting systems of GSRC	Systems design and installation by December 2000	Design completed by February 2003; systems installation to be completed by December 2005	GSRC completion report	Commitment of local government Adequate counterpart funds
4. Institutional development	GSRC corporatized Signing of concession agreement and operation and maintenance	GSRC corporatized Concession agreement signed	GSRC	Government's commitment and ADB assistance in concluding concession agreement

Activities with Milestones		Results
1. Preconstruction activities.	Specific activities to be carried out from January 1998 to June 1999 included: (i) incorporation of GSRC, (ii) arrangement of counterpart funds, (iii) environmental impact assessment, (iv) survey and design; (v) advance action for procurement, and (vi) concession agreement.	Achieved. Activities were generally achieved according to the implementation schedule, except for detailed design, engineering and documentation which was only completed in August 2000.
2. Land acquisition and resettlement.	Specific activities to be carried out from July 1998 to December 2000 included: (i) preliminary survey, (ii) detailed land acquisition plan, and (iii) acquisition of land resettlement of affected persons.	Achieved. Acquisition of land, compensation, and resettlement activities were commenced in January 1998 and completed by March 2001.
3. Civil works construction and equipment procurement.	Specific activities to be carried out from April 1998 to December 2002 included: (i) procurement of civil works, (ii) mobilization of construction of service roads, construction of civil works, (iii) environmental	Achieved ahead of schedule. Civil works, track laying and procurement of equipment were completed by June 2002.

Activities with Milestones		Results
	protection and mitigation measures, and (iv) procurement of equipment.	
4. Computerization and training of GSRC staff.	Specific activities included: (i) hiring of consultants and (ii) design of management information and financial accounting systems.	Achieved with some delay. The computer hardware and software was identified by the international consultants in February 2003, but was not procured and installed until late 2005.
5. Link road construction.	Construction and upgrading of link roads to poor inland areas.	Achieved with some delay. Construction of some of the link roads was delayed until end-2005.

^a Performance indicator added at evaluation stage to better measure the attainment of design summary statement.

ADB = Asian Development Bank, GDP = gross domestic product, GSRC = Guizhou Shuihong Railway Company, Ltd., km = kilometer.

Source: Project completion report with revisions and updates by Operations Evaluation Mission.

APPRAISAL AND ACTUAL COSTS AND FINANCING

Table A2.1: Project Cost
(\$million)

Component	Appraised			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
A. Base Cost						
1. Railway civil works	104.4	110.6	215.0	116.0	122.9	238.9
2. Railway track work	14.2	22.7	36.9	17.6	28.5	46.1
3. Buildings and facilities	1.5	6.2	7.7	0.8	3.4	4.2
4. Signaling, telecoms, electrification, other equipment	13.5	18.4	31.9	15.4	20.9	36.3
5. Land acquisition, compensation, and resettlement	0.0	4.4	4.4	0.0	8.7	8.7
6. Administration, consultants, and miscellaneous costs	0.4	15.4	15.8	0.4	27.2	27.6
			0.0			0.0
Subtotal (A)	134.0	177.7	311.7	150.2	211.6	361.8
B. Contingencies						
1. Physical	11.5	15.1	26.6	0.0	0.0	0.0
2. Price	7.2	9.0	16.2	0.0	0.0	0.0
Subtotal (B)	18.7	24.1	42.8	0.0	0.0	0.0
C. Interest during construction and other charges	17.4	9.1	26.5	15.3	15.5	30.8
Subtotal (C)	17.4	9.1	26.5	15.3	15.5	30.8
Total (A+B+C)	170.1	210.9	381.0	165.5	227.1	392.6

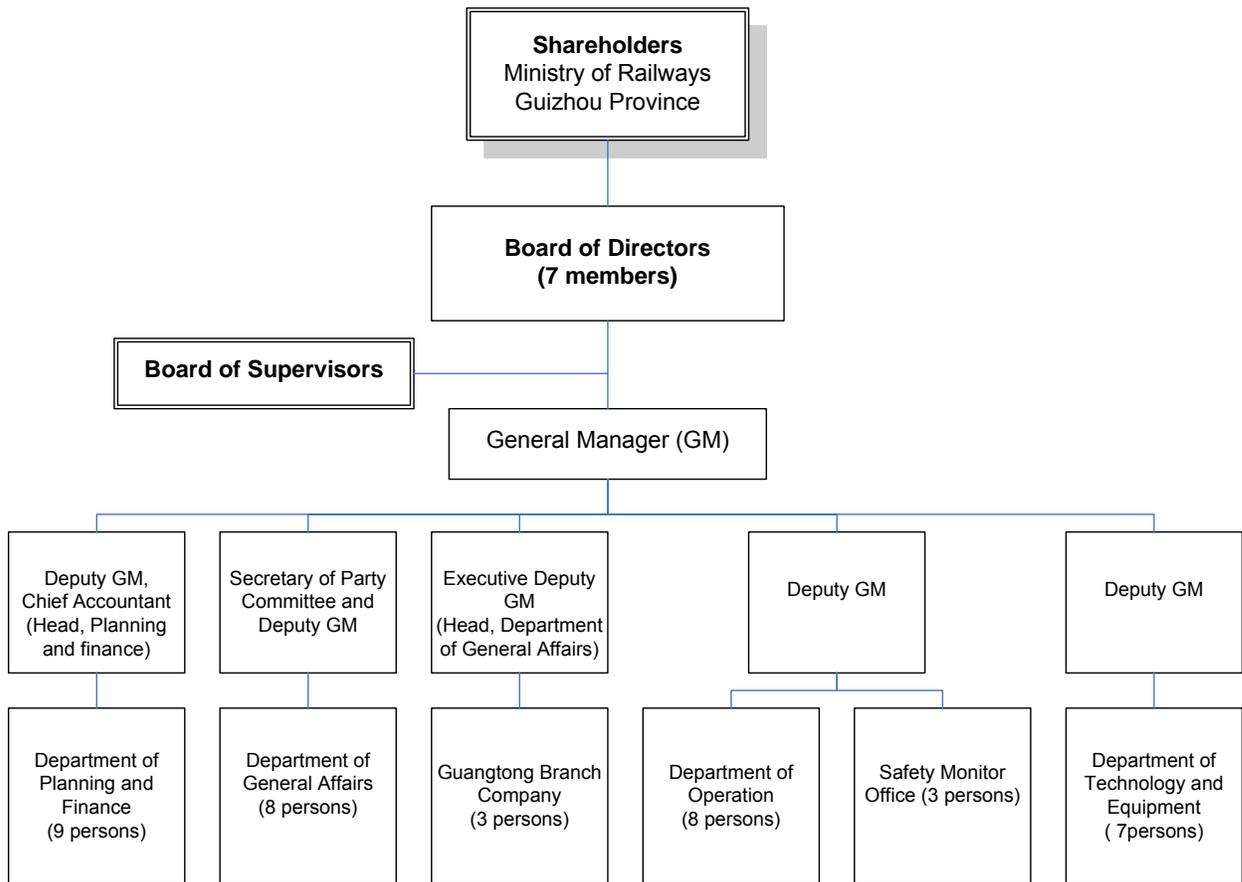
Source: Project completion report.

Table A2.2: Financing Plan
(\$million)

Sources	Appraisal			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
Asian Development Bank	140.0	0.0	140.0	105.0	0.0	105.0
Guizhou Shuihong Railway Company Ltd.	30.1	138.6	168.7	60.6	154.4	215.0
State Development Bank	0.0	72.3	72.3	0.0	72.6	72.6
Total	170.1	210.9	381.0	165.6	227.0	392.6

Source: Project completion report.

ORGANIZATION CHART OF GUIZHOU SHUIHONG RAILWAY COMPANY, LTD.



Source: Guizhou Shuihong Railway Company, Ltd.

CHRONOLOGY OF MAJOR EVENTS IN THE PROJECT'S HISTORY

Year	Date	Event
1997	1 October	Start of loan Fact-Finding Mission
1998	13 February	Management review meeting; approval of advance procurement action
1998	17 February	Start of loan appraisal
1998	18 March	Signing of agreement between Guizhou Shuibai Railway Corporation and Guizhou Designing Institute of Environmental Sciences for environmental monitoring and supervision
1998	28 March	Signing of agreement between Guizhou Shuibai Railway Corporation and Guizhou Social Sciences Academy for resettlement monitoring and supervision
1998	15 April	Signing of concession agreement between Guizhou Shuibai Railway Corporation and Chengdu Railway Administration Bureau
1998	29 June	Start of loan negotiations
1998	18 August	Loan approval
1998	14 October	Bid opening date for procurement of civil works packages
1998	3 November	Start of Inception Mission
1998	10 December	Approval of change in implementation arrangements
1998	18 December	ADB approval of bid evaluation report for civil works
1999	23 February	Loan signing
1999	24 May	Loan effectiveness
2000	19 July	Start of midterm review of the Project
2001	19 June	First partial cancellation of loan proceeds
2002	June	Physical completion of railway line
2002	11 September	Turnover of Project to Chengdu Railway Administration Bureau
2002	26 September	Opening ceremony for the Project
2002	13 November	Ministry of Railways announcement No. [2002] 1363 opening freight transport on the Shuibai Railway Line
2002	20 November	Effectivity of commercial tariff notification
2002	1 September	Start of trial operation
2003	12 September	Final reallocation of loan proceeds
2003	11 June	Approval of extension of loan closing date
2003	30 June	Original closing date
2004	1 March	Start of freight operations
2004	15 March	Final disbursement and actual closing date
2004	31 October	Asset restructuring and renaming of Guizhou Shuibai Railway Corporation to Guizhou Shuihong Railway Company, Ltd.
2005	1 February	Start of passenger operations
2005	10 April	Start of Project Completion Review Mission
2006	September	Operations Evaluation Mission

ADB = Asian Development Bank.

Source: Project completion report.

SUMMARY OF PHYSICAL ACCOMPLISHMENTS

1. The railway line closes a gap in the railway network by connecting Liupanshui in the north and Baiguo in the south. This provides direct access to the Guiyang–Kunming and Nanning–Kunming railway lines and the recently completed Neijiang–Kunming railway line. These combined lines provide a shortcut for transporting export goods from Sichuan, Guizhou, and other provinces in northwest People’s Republic of China to the nearest seaports.

2. A summary of the physical accomplishments under the Project is provided below. In general, the completed civil works are of excellent quality and consistent with international standards. All project measures and facilities have adhered to sound environmental protection practices, have been integrated with the natural terrain, and are adequately maintained.

- (i) The primary accomplishment is the construction of a new, 118.6-kilometer (km) railway line that has a standard-gauge single track. The entire route is electrified to allow the operation of electric locomotives.
- (ii) Under the Project, seven railway stations have been built, of which six are operational. The construction of an additional six stations is envisaged for the next 10 years, depending on the development of traffic and coal mining in the project area.
- (iii) The line’s total length of 118.6-km includes 50 tunnels with a combined length of 59.3 km and 102 bridges totaling 17.2 km. Bridges were designed to withstand possible cataclysmic flooding, based on data available for 100 years.
- (iv) The technical standards of the project railway correspond to the class 1 standard of the Ministry of Railways. The standard gradient is 1.2%, with some short sections having a gradient of 2.3%. For train control, a semiautomatic block relay signal system with electric interlocking and color light signals was installed.
- (v) The civil works for construction of the railway line were spread over 17 contract packages that included all tunnels, bridges, earthworks, and culverts.
- (vi) These contracts were completed in July 2001. Laying track was completed in December 2001, and installation and testing of signaling, telecommunications, electrification, and power supply facilities were completed in August 2003. Service roads to the project sites were built by Guizhou Shuihong Railway Company Ltd. to provide access to the civil works contractors. The roads total 220.3 km in length and will be used upon project completion for routine and periodic maintenance interventions. Beyond their importance for railway operations, the roads are highly beneficial to the villages in the project area.
- (vii) The Project involved a substantial amount of land acquisition and resettlement. At project completion, 539.8 hectares had been permanently acquired or temporarily occupied for railway construction.

ASSESSMENT OF OVERALL PERFORMANCE

Table A6.1: Railway and Equipment
(65% weighting in overall rating)

Criterion	Weight	Assessment	Rating Value (0-3)	Weighted Rating
1. Relevance	20%	Relevant	2	0.4
2. Effectiveness	30%	Effective	2	0.6
3. Efficiency	30%	Efficient	2	0.6
4. Sustainability	20%	Likely	2	0.4
Total	100%			2.0

Table A6.2: Service, Access and Link Road Construction
(15% weighting in overall rating)

Criterion	Weight	Assessment	Rating Value (0-3)	Weighted Rating
1. Relevance	20%	Highly Relevant	3	0.6
2. Effectiveness	30%	Effective	2	0.6
3. Efficiency	30%	Efficient	2	0.6
4. Sustainability	20%	Likely	2	0.4
Total	100%			2.2

**Table A6.3: Computerization of Management Information
and Financial Accounting Systems**
(10% weighting in overall rating)

Criterion	Weight	Assessment	Rating Value(0-3)	Weighted Rating
1. Relevance	20%	Highly Relevant	3	0.6
2. Effectiveness	30%	Less Effective	1	0.3
3. Efficiency	30%	Efficient	2	0.6
4. Sustainability	20%	Likely	2	0.4
Total	100%			1.9

Table A6.4: Institutional Development
(10% weighting in overall rating)

Criterion	Weight	Assessment	Rating Value(0-3)	Weighted Rating
1. Relevance	20%	Highly Relevant	3	0.6
2. Effectiveness	30%	Less Effective	1	0.3
3. Efficiency	30%	Efficient	2	0.6
4. Sustainability	20%	Likely	2	0.4
Total	100%			1.9

Table A6.5: Overall Rating

Criterion	Weight ^a	Assessment	Rating Value(0-3)	Weighted Rating
1. Relevance	20%	Relevant	2.35	0.47
2. Effectiveness	30%	Effective	1.80	0.54
3. Efficiency	30%	Efficient	2.00	0.60
4. Sustainability	20%	Likely	2.00	0.40
Total	100%	Successful		2.01

^a Weighted average of rating values for each component rounded to whole numbers.

Highly successful > 2.7; 2.7 ≥ successful ≥ 1.6; 1.6 > partly successful ≥ 0.8; unsuccessful < 0.8.

Source: Operations Evaluation Mission.

TRAFFIC ANALYSIS

1. The traffic analysis is based on updated traffic data provided by Guizhou Shuihong Railway Company, Ltd. and mining data obtained from the Provincial Mining Bureau. Traffic flows were verified through a sample of freight manifests reviewed at Baiguo station. The assignment of traffic to routes was based on this review, other data, and expected network developments. The latter includes the scheduled upgrading of the key west–east route to double-track standard. As this route is currently congested, traffic is diverted to the less heavily used project railway (see forecast for route I in Table A7.3 below). This traffic currently accounts for more than 50% of total traffic but will not be sustainable. It is expected to return to its original route when the upgrading is completed in 2015. By that time, the new coalmines will have started operations and will thus generate traffic that can compensate the loss in diverted traffic (see table A7.1).

Table A7.1: Projection of Coal Mining Output
(million tons)

Year	Yushe West	Yushe Middle	Yushe East	Yushe Miluo	Yushe Total	Faer	Songhe	Others	Total
	1.20	0.60	2.40	1.20	5.40	3.00	2.40	3.20	10.80
2007	0.40				0.40			0.30	0.70
2008	0.45	0.22			0.67			0.35	1.02
2009	0.51	0.25			0.76	0.65		0.41	1.82
2010	0.58	0.29			0.87	0.75	0.55	0.48	2.64
2011	0.65	0.33	0.50	0.20	1.68	0.85	0.62	0.56	3.71
2012	0.73	0.38	0.58	0.23	1.93	0.97	0.69	0.66	4.24
2013	0.83	0.44	0.66	0.27	2.20	1.09	0.77	0.77	4.83
2014	0.94	0.51	0.76	0.31	2.52	1.22	0.87	0.90	5.50
2015	1.06	0.59	0.87	0.36	2.88	1.36	0.97	1.05	6.27
2016	1.20	0.60	1.01	0.42	3.23	1.53	1.09	1.23	7.07
2017	1.20	0.60	1.16	0.49	3.44	1.71	1.22	1.44	7.81
2018	1.20	0.60	1.33	0.57	3.70	1.92	1.36	1.69	8.66
2019	1.20	0.60	1.53	0.66	3.99	2.15	1.53	1.97	9.63
2020	1.20	0.60	1.76	0.76	4.32	2.41	1.71	2.31	10.74
2021	1.20	0.60	2.02	0.88	4.71	2.65	1.91	2.70	11.97
2022	1.20	0.60	2.33	1.02	5.15	2.99	2.14	3.16	13.44

Source: Guizhou Provincial Mining Bureau.

2. Table A7.2 shows the current traffic flows. The most substantial is the traffic out of Hongguo station, which is located south of Baiguo and outside of the project line. The traffic generated by Hongguo consists mainly of coal destined for the eastern coastal provinces. Thus, it would go south to Nanning and from there to the east. Due to heavy congestion on this route, the traffic is currently routed through the project line to the north and from Liupanshui to the west. This route is longer but less time consuming. Local traffic is also mainly coal traffic. Existing mines along the project line generate this traffic. These mines existed before the Project's construction. The Project has made the transport of coal more efficient. The Chengdu–Nanning route is significant in that it carries substantial general freight, notably equipment and construction material, for the development of new mines and construction of a power station. Table A7.3 shows the traffic forecast for each route in ton-kilometers.

Table A7.2: Traffic Flows – 2005

Transit type and route or direction	Tons ('000)	Share (%)	Distance (kilometers)	Ton-kilometers (million)	Share (%)
Transit					
Hongguo northbound (I)	4,697	60	118.5	556.59	55
Chengdu–Nanning (II)	2,469	32	118.5	292.58	29
Liupanshui–Kunming (III)	617	8	59	36.40	4
Subtotal	7,783	100		8,85.57	87
Local					
Yushe northbound (IV)	300	17	30	9.00	1
Faer northbound (V)	300	17	60	18.00	2
Songhe northbound (VI)	1,000	56	93	93.00	9
Other traffic (VII)	172	10	55	9.46	1
Subtotal	1,772	100		129.46	13
Total Output				1,015.03	100

Note: Totals may not add due to rounding.

Sources: Guizhou Shuihong Railway Company, Ltd. and Operations Evaluation Mission analysis

3. The growth in coal output, and thus traffic growth on the key routes (routes IV–VI), was determined by increasing in stages the rated output of the mines over the evaluation period until the mines' capacity would be reached. This assumption is in line with the capacity of railway yards at the main dispatch stations. Growth in passenger traffic was based on the scheduled increase in passenger trains and growth rates that would be consistent with economic growth in the region. Passenger traffic is composed of through-traffic and traffic originating from the stations along the project railway. While this traffic is substantial, its average distance is relatively short so that its contribution to traffic output in terms of passenger kilometers is limited.

4. Traffic growth is forecast to be driven by two major factors: (i) route conditions during 2005–2010, and (ii) mining development during 2011–2022. During the first period, traffic will grow by about 3.5% per year. After 2010, the railway line will lose transit traffic to the newly upgraded southeastern traffic corridor. In the same year, traffic generated by the new coalmines will set in and will from thereon be the major source generating traffic. The capacity of the project line can accommodate a maximum of 64 pairs of freight trains per day. This is equivalent to about 5 billion ton-kilometers per year. Based on the above 20-year forecast, traffic will not exceed the rated capacity of the line.

Table A7.3: Traffic Forecast
(million tons and passenger-km)

Year	Route I	Route II	Route III	Route IV	Route V	Route VI	Route VII	Total	Passengers
03	113.71	59.77	3.70	0.47	1.86	14.91	0.90	195.33	-
04	249.52	131.16	8.13	1.02	4.09	32.72	1.97	428.60	-
05	556.59	292.58	36.40	9.00	18.00	93.00	9.46	1,015.03	139.83
06	567.73	318.91	38.22	9.27	21.24	55.80	9.82	1,020.99	149.62
07	579.08	347.61	40.13	12.00	25.06	33.48	10.19	1,047.56	160.09
08	590.66	378.90	42.14	20.15	29.57	20.09	10.58	1,092.09	171.30
09	602.48	413.00	44.25	22.89	39.00	12.05	10.98	1,144.64	183.29
10	614.53	450.17	46.46	26.00	44.85	51.15	11.40	1,244.55	196.12
11	626.82	490.68	48.78	50.53	51.13	57.29	11.83	1,337.06	209.85
12	648.75	534.84	51.22	57.77	58.29	64.16	12.28	1,427.32	224.54
13	671.46	582.98	53.78	66.04	65.28	71.86	12.75	1,524.15	240.25
14	694.96	635.44	56.47	75.50	73.12	80.49	13.23	1,629.22	257.07
15	719.29	692.63	59.30	86.33	81.89	90.14	13.74	1,743.32	275.07
16	179.82	754.97	62.26	96.77	91.72	100.96	14.26	1,300.76	294.32
17	186.12	822.92	65.37	103.31	102.72	113.08	14.80	1,408.32	314.92
18	192.63	896.98	68.64	110.86	115.05	126.65	15.36	1,526.17	336.97
19	199.37	977.71	72.08	119.56	128.85	141.84	15.95	1,655.36	360.56
20	206.35	1,065.70	75.68	129.59	144.32	158.86	16.55	1,797.05	385.80
21	213.57	1,161.62	79.46	141.15	158.75	177.93	17.18	1,949.66	412.80
22	221.05	1,266.16	83.44	154.49	179.39	199.28	17.83	2,121.63	441.70

Sources: Guizhou Shuihong Railway Company, Ltd. and Operations Evaluation Mission analysis.

ECONOMIC REESTIMATION

A. Approach

1. The economic viability of the Project was reevaluated in the light of updated information on traffic and the development of coalmines in the project area. The methodology followed the approach adopted at appraisal and by the project completion report (PCR), and it is based on with-project and without-project scenarios. In the without-project case, existing traffic would have to use roads and alternative and longer railway routes. A portion of the traffic is assumed to be induced by the Project. This traffic is related to coal output of new mines. In the without-project case, new mines would not come into existence. Thus, with the Project, a portion of the value added generated by the new mines is attributable to the Project. Without the Project, such developmental benefits would not occur. The with-project scenario assumes a diversion of traffic from other routes in the rail network and from local roads to the Project.

B. Economic Cost

2. The actual investment cost for the Project was converted to economic cost reflecting consumption of economic resources. Taxes and duties were eliminated from the cost, and wages were adjusted to reflect opportunity cost indicating the actual scarcity of labor in the project provinces. Based on these considerations, a conversion factor of 0.95 was used to convert financial to economic costs. For recurrent cost items, data obtained from the Guizhou Shuihong Railway Company Ltd. for administration and maintenance were applied together with other operating costs. The cost for building an additional station was included under the investment cost for the Project.

C. Project Benefits

3. The benefits generated by the Project include (i) a portion of the value added by new coalmines, which would not have been developed without the Project; (ii) savings in the cost of freight train time resulting from the avoidance of congestion; (iii) savings in interest on capital (mainly financing coal) that would be tied up in longer transit times resulting from congestion; and (iv) time and cost savings. These benefits are explained below:

- (i) It is reasonable to assume that large-scale coal mining in the project area would be contingent on the availability of a railway line and sidings linking the line with the new mines. The volume of the envisaged output of the mines would exclude road transport as an alternative to the railway. The value added generated by the new mines was attributed to both the investment in constructing the mines, estimated at \$50 per ton of output, and to the Project. To quantify the value added, border prices for coal were used (currently about \$55 per ton). Capital and annual operating costs of the mines were distributed over the economic life of the mines, discounted at a 12% rate to obtain a present value of the total cost and then divided by the sum of annual outputs to obtain a unit cost per ton. The unit cost was deducted from the price of coal to obtain the net value added per ton.
- (ii) The project line relieves the congested southeastern route and generates time savings for railway rolling stock, enhancing in the process its turnaround and productivity. Without the Project, trains would spend 22% more time for an average trip of 500 kilometers. Train cost per ton-kilometer was calculated for the with- and without-project scenarios based on realistic operating

assumptions and the capital cost involved in a typical goods train. The difference in the unit cost between the with- and without-project scenarios was applied as a benefit for the Project.

- (iii) Consistent with the calculated time savings computed for a goods train, interest savings were calculated in relation to the value of freight forwarded by train. As coal is the dominant railway freight, interest on the value of coal delayed in transit was derived.
- (iv) The project line has created a shorter connection between the cities of Chengdu in the north and Nanning in the south. The shorter distance has caused traffic to divert from the longer route via Liupanshui and Kunming. Distance savings are related to both passengers and freight traffic. For passengers, they were quantified in terms of time savings and for freight in terms of cost savings.

D. Reestimation of the Economic Internal Rate of Return

4. The reestimated economic internal rate of return (EIRR) for the Project was 17.4% compared with 18.0% estimated at appraisal and 20.8% in the PCR. The significantly higher EIRR in the PCR was due to the expectation that the large mining projects would come onstream earlier than current plans would indicate. The diversion of traffic from a shorter route to the Project line is a fortuitous development that could not have been foreseen at appraisal. Without this, the reestimated EIRR would fall below the threshold level of 12%.

5. The sensitivity analysis shows that the viability of the Project is sensitive to a reduction in benefits and less so to a reduction in traffic. The reason for this is the dependence of the viability on the value added of coal mining, rather than on efficiency gains reflected in traffic.

Table A8.1: Sensitivity Tests

Test	Variation	EIRR (%)
(a) Best estimate	17.4	
(b) Benefits	(10)	14.10
(c) Benefits	(20)	12.60
(d) Traffic growth	10	16.90
(e) Traffic growth	(20)	14.30
(f) Operating costs	50	15.40
(g) Combination of (e) and (f).		12.90

() = negative, EIRR = economic internal rate of return.

Source: Operation evaluation mission estimates.

Table A8.2: Calculation of Economic Internal Rate of Return
(CNY million)

Year	Project Cost			Gross Benefits				Net Benefits	
	Capital	Operating	Total	Mining Value Added	Congestion	Cost Savings Diversion	Capital Benefits		
1998	853.78		853.78					(853.78)	
1999	521.66		521.66					(521.66)	
2000	616.71		616.71					(616.71)	
2001	569.18		569.18					(569.18)	
2002	284.59		284.59					(284.59)	
2003		18.85	18.85	6.96	72.23	20.66	45.23	145.08	126.23
2004		41.36	41.36	15.27	158.50	45.33	99.25	318.34	276.98
2005		111.44	111.44	49.68	353.55	101.11	221.38	725.72	614.28
2006		112.96	112.96	36.89	360.62	110.20	225.81	733.53	620.57
2007		116.54	116.54	101.91	367.84	120.12	230.33	820.20	703.66
2008		121.92	121.92	148.88	375.19	130.93	234.93	889.94	768.02
2009		128.15	128.15	265.48	382.70	142.72	239.63	1,030.53	902.39
2010	55.79	139.02	194.81	385.02	390.35	155.56	244.42	1,175.36	980.54
2011		149.28	149.28	540.83	398.16	169.56	249.31	1,357.87	1,208.59
2012		159.40	159.40	617.97	412.09	184.82	258.04	1,472.92	1,313.52
2013		170.27	170.27	703.42	426.52	201.46	267.07	1,598.46	1,428.20
2014		182.03	182.03	800.90	441.45	219.59	276.42	1,738.35	1,556.33
2015		194.77	194.77	912.15	456.90	239.35	286.09	1,894.49	1,699.72
2016		153.93	153.93	1,029.67	114.22	260.89	71.52	1,476.31	1,322.39
2017		166.29	166.29	1,137.60	118.22	284.38	74.03	1,614.22	1,447.93
2018		179.79	179.79	1,261.05	122.36	309.97	76.62	1,769.99	1,590.20
2019		194.54	194.54	1,402.31	126.64	337.87	79.30	1,946.11	1,751.58
2020		210.64	210.64	1,564.01	131.07	368.27	82.07	2,145.43	1,934.78
2021		227.98	227.98	1,742.16	135.66	401.42	84.95	2,364.19	2,136.21
2022	(569.18)	247.36	(321.82)	1,957.27	140.41	437.55	87.92	2,623.14	2,944.97
SHARE IN TOTAL BENEFITS (%)				39.0	28.6	14.5	17.9	EIRR	17.4%
								NPV (12%)	1,644.73

() = negative, EIRR = economic internal rate of return, CNY = yuan.

Sources: Operations evaluation mission.

FINANCIAL REESTIMATION

A. General

1. The Guizhou Shuihong Railway Company, Ltd. (GSRC) was established in 1998.¹ GSRC is responsible for the operation and management of the railway. In December 2004, passenger operations were contracted out to the Kunming Railway Administration Bureau, which started passenger services at the beginning of 2005. At the end of 2004, GSRC acquired from the Ministry of Railways (MOR) the 43 km rail line from Baiguo to Hongguo and at the same time underwent a significant restructuring of its assets. As payment, GSRC issued shares to MOR that were supposed to correspond to the value of the newly acquired assets. GSRC has a board of directors and a board of supervisors. The board of directors is composed of representatives of the two shareholders—the MOR (with four members) and the Guizhou provincial government (with three members). In addition to representatives of MOR and the provincial government, the supervisory board includes members of GSRC's management.

B. Financial Projections

2. Cost and revenue data for 2005 were used to project GSRC's financial performance. In projecting revenues, the revised tariffs shown in Table A9.1 were applied. Maintenance and other operating costs were based on the actual figures in 2005. For the costs projection, the forecast traffic (see Appendix 7) and unit operating cost per ton-km were used. The cost of one passenger-kilometer was considered to be equal to that of one freight ton-kilometer. This assumption was necessary because of cost items that are indivisible and cannot be attributed to either operation. Based on the composition of traffic output, the weighted average rate per unit of traffic output is CNY0.19. Depreciation was based on an assumed useful life of 30 years across all facilities. Rolling stock is leased and not owned by GSRC. The lease cost was incorporated as part of the operating cost used in the projection. Debt service was based on actual interest rates and amortization schedules. Loans were received from two lenders, the Asian Development Bank and the State Development Bank.

Table A9.1: Revised Freight and Passenger Tariffs
(CNY)

Item	Per passenger-kilometer or ton-kilometer
Passenger	0.07
General freight	0.12
Coal	0.30

CNY = yuan

Note: Tariffs were revised in September 2006

Source: Guizhou Shuihong Railway Company Ltd.

3. Based on the above parameters, GSRC's current financial situation is weak, but is projected to improve to an acceptable level by 2013. The two covenanted financial ratios are currently being met; these being the working and debt-service ratios. The debt-equity ratio is currently unfavorable, reflecting the high capital cost that GSRC incurred with the Project's construction. However, it is projected to improve considerably over the next years to reach just above the target level of 80% in 2013. The actual and projected performance of financial ratios is shown in Table A9.2.

¹ Formerly called Guizhou Shuibai Railway Corporation.

Table A9.2: Financial Ratios

Item	Target	Actual	Projection	
		2005	2009	2013
Debt/equity	below 80%	144%	103%	90%
Working ratio	below 70%	42%	43%	43%
Debt service	above 1.2	1.36	1.49	1.98

Debt/equity: Total debt over total equity

Working ratio: Operating cost over EBDIT

Debt service: EBDIT over debt service

EBDIT = earnings before depreciation, interest and tax.

Source: Operations Evaluation Mission estimates.

4. Table A9.4 shows financial projections for 2005–2013, which reflect the developments of income, cash flow, and assets. Operating earnings before depreciation, interest, and tax are positive throughout the forecast period.

C. Financial Internal Rate of Return

5. The financial internal rate of return (FIRR) was reevaluated based on the latest financial and operational information from GSRC and largely followed the same methodology as in the project completion report. Capital cost was based on actual expenditures incurred for the Project, excluding depreciation, debt service expenditures, and financial charges during construction. The evaluation period covered the construction phase and 20 years of operation after the start of commercial operations in 2004. The reestimated FIRR of 3.4% is low and reflects GSRC's recent weak financial performance (see Table A9.5). The weighted average cost of the capital involved in financing the Project is estimated at 4.07%, which is well above the reestimated FIRR (see Table A9.3).²

Table A9.3: Weighted Average Cost of Capital

Item	ADB	SDB	GSRC	Total
Amount (CNY million)	869.40	601.13	1,780.20	3,250.73
Weighting	0.27	0.18	0.55	1.00
Interest (%)	5.00	4.72	7.00	
Tax Rate (%)	15.00	15.00		
Nominal Cost (%)	4.25	4.01	7.00	
Inflation (%)		3.00	3.00	
Real Cost (%)	4.25	0.25	1.00	
Minimum Rate (%)	4.25	4.00	4.00	
WACC (%)	1.14	0.74	2.19	4.07

ADB = Asian Development Bank, CNY = yuan, GSRC = Guizhou Shuihong Railway Company, Ltd., SDB = State Development Bank, WACC = weighted average cost of capital.

Source: Operations Evaluation Mission estimates.

² The calculation of the weighted average cost of capital (WACC) was discussed with staff of the Transport Division (EATC) and PRC Resident Mission (PRCM) in the East Asia Regional Department. The OEM originally calculated the WACC as 5%. EATC staff suggested that the WACC should be closer to the PCR's level of 2.83%, while PRCM staff calculated the WACC as 3.88%. The OEM has taken these views into consideration in the above calculation.

Table A9.4: Financial Projections
(CNY million)

I. INCOME STATEMENTS	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Operating Revenues										
Revenue	121.10	293.40	294.34	301.40	313.76	328.44	357.23	383.70	409.38	436.90
Income Tax	6.66	16.14	16.19	16.58	17.26	18.06	19.65	21.10	22.52	24.03
Net Operating Revenues	114.44	277.27	278.16	284.82	296.50	310.38	337.58	362.60	386.86	412.87
Operating Expenses										
Operation & Maintenance Costs	43.51	117.24	118.84	122.60	128.26	134.81	146.25	157.04	167.69	179.12
Total Operating Expenses	43.51	117.24	118.84	122.60	128.26	134.81	146.25	157.04	167.69	179.12
Operating EBDIT	70.93	160.03	159.32	162.22	168.25	175.57	191.33	205.56	219.17	233.75
Depreciation	222.91	279.59	192.42	180.87	170.02	159.82	150.23	144.82	136.13	127.96
Operating EBIT	(151.98)	(119.56)	(33.10)	(18.65)	(1.77)	15.75	41.10	60.74	83.04	105.80
Interest Charges on ADB loan	43.47	42.16	40.05	38.05	36.14	34.34	32.62	30.99	29.44	27.97
Interest charges on domestic loan (CDB)	30.06	29.15	28.24	27.28	26.28	25.24	24.14	22.99	21.78	20.52
Total financing charges	73.53	71.30	68.29	65.33	62.43	59.57	56.76	53.98	51.22	48.49
Operating EBT	(225.51)	(190.87)	(101.38)	(83.98)	(64.20)	(43.82)	(15.66)	6.76	31.82	57.31
II. CASH FLOW STATEMENTS	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cash Inflows										
Operating EBDIT	70.93	160.03	159.32	162.22	168.25	175.57	191.33	205.56	219.17	233.75
Total cash inflow	70.93	160.03	159.32	162.22	168.25	175.57	191.33	205.56	219.17	233.75
Cash Outflows										
Disbursements towards construction account							60.00			
Interest charges on loans and bonds	73.53	71.30	68.29	65.33	62.43	59.57	56.76	53.98	51.22	48.49
Principal on ADB loan	26.29	27.61	29.72	31.72	33.62	35.43	37.14	38.77	40.32	41.80
Principal on CDB loan	18.18	19.09	20.00	20.95	21.95	23.00	24.10	25.25	26.45	27.71
Total debt services	118.00	118.00	118.00	118.00	118.00	118.00	118.00	118.00	118.00	118.00
Total cash outflow	118.00	118.00	118.00	118.00	118.00	118.00	238.00	118.00	118.00	118.00
Net cash flow	(47.07)	42.03	41.32	44.22	50.25	57.57	(46.67)	87.56	101.17	115.76
III. BALANCE SHEET	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Assets										
Short term assets	118.32	70.85	83.19	85.82	89.78	94.37	102.38	109.93	117.38	125.38
Work in progress	3.27	2.38	3.00	3.00	3.00	3.00	60.00	3.00	3.00	3.00
Fixed assets	3,482.62	3,486.54	3,206.95	3,014.53	2,833.66	2,663.64	2,503.82	2,413.59	2,268.78	2,132.65
Depreciation	222.91	279.59	192.42	180.87	170.02	159.82	150.23	144.82	136.13	127.96
Other assets	163.62	142.49	92.62	60.20	39.13	25.44	16.53	10.75	6.99	4.54
Total net assets	3,423.33	3,349.44	3,107.15	2,893.86	2,702.77	2,529.26	2,370.13	2,279.52	2,139.64	2,009.23
Liabilities										
Short term liabilities	93.19	608.64	426.05	298.23	208.76	146.13	102.29	71.61	50.12	35.09
Long-term liabilities										
ADB loan	843.11	800.95	760.90	722.86	686.72	652.38	619.76	588.77	559.33	531.37
SDB loan	582.95	564.77	545.68	525.68	504.73	482.78	459.78	435.68	410.43	383.98
Total liabilities	1,519.25	1,974.36	1,732.63	1,546.77	1,400.21	1,281.29	1,181.83	1,096.06	1,019.89	950.44
Equity										
Paid-in capital	2,129.59	2,147.02	2,147.02	2,147.02	2,147.02	2,147.02	2,147.02	2,147.02	2,147.02	2,147.02
Losses/earnings	(225.51)	(190.87)	(101.38)	(83.98)	(64.20)	(43.82)	(15.66)	6.76	31.82	57.31
Total equity	1,904.08	1,375.08	1,374.52	1,347.09	1,302.56	1,247.97	1,188.29	1,183.46	1,119.74	1,058.80
Total capital	3,423.33	3,349.44	3,107.15	2,893.86	2,702.77	2,529.26	2,370.13	2,279.52	2,139.64	2,009.23
RATIOS										
Debt-equity ratio (%)	79.79	143.58	126.05	114.82	107.50	102.67	99.46	92.61	91.08	89.77
Debt-service ratio (%)	0.60	1.36	1.35	1.37	1.43	1.49	1.07	1.74	1.86	1.98
Working ratio (%)	38.02	42.28	42.72	43.04	43.26	43.43	43.32	43.31	43.35	43.38

() = negative, ADB= Asian Development Bank, CDB = China Development Bank, EBDIT = earnings before depreciation, interest and tax, EBIT = earnings before interest and tax, EBT = earnings before tax.

Sources: Guizhou Shuihong Railway Company, Ltd. for 2004-2005. Projections are operations Evaluation Mission estimates.

Table A9.5: Financial Internal Rate Of Return
(CNY million)

Year	Project Cost			Revenues				Net Revenues
	Capital	Operating	Total Cost	Coal	Reg Freight	Passenger	Total Revenues	
98	898.68		898.68					(898.68)
99	549.10		549.10					(549.10)
00	649.15		649.15					(649.15)
01	599.12		599.12					(599.12)
02	299.56		299.56					(299.56)
03		19.83	19.83	39.29	15.90		55.19	35.36
04		43.51	43.51	86.20	34.89		121.10	77.59
05		117.24	117.24	202.98	80.64	9.79	293.40	176.16
06		118.84	118.84	196.21	87.66	10.47	294.34	175.51
07		122.60	122.60	194.89	95.31	11.21	301.40	178.80
08		128.26	128.26	198.14	103.63	11.99	313.76	185.50
09		134.81	134.81	202.92	112.68	12.83	328.44	193.63
10	60.00	146.25	206.25	220.96	122.55	13.73	357.23	150.98
11		157.04	157.04	235.73	133.28	14.69	383.70	226.66
12		167.69	167.69	248.69	144.97	15.72	409.38	241.68
13		179.12	179.12	262.39	157.69	16.82	436.90	257.78
14		191.49	191.49	277.22	171.55	18.00	466.76	275.27
15		204.90	204.90	293.29	186.63	19.25	499.18	294.28
16		161.93	161.93	140.78	203.06	20.60	364.44	202.51
17		174.94	174.94	151.57	220.95	22.04	394.56	219.62
18		189.14	189.14	163.55	240.43	23.59	427.57	238.43
19		204.65	204.65	176.89	261.64	25.24	463.76	259.11
20		221.60	221.60	191.73	284.74	27.01	503.48	281.88
21		239.83	239.83	207.42	309.90	28.90	546.22	306.38
22	(599.12)	260.22	(338.90)	226.26	337.30	30.92	594.48	933.38
							FIRR (%)	3.4%

() = negative, CNY = yuan, FIRR = financial internal rate of return.

Sources: Guizhou Shuihong Railway Company, Ltd., Asian Development Bank and consultants estimates.

SOCIOECONOMIC DEVELOPMENT IN PROJECT IMPACT AREAS

A. Socioeconomic Development of Guizhou Province

1. Guizhou province is located in the southwest of the People's Republic of China (PRC). With a population of 39 million at the end of 2004, it was the 15th-largest of the PRC's 31 provinces. Since 1997, when the Asian Development Bank approved the project preparatory technical assistance, the province's gross domestic product (GDP) grew at an average rate of 10.5% per year. The rural economy also developed, increasing rural per capita income from CNY1,299 in 1997 to CNY1,722 in 2004. Despite the recent strong growth, Guizhou currently ranks last in terms of per capita GDP among all 31 provinces in the PRC. As shown in Table A10.1, Guizhou's GDP per capita was only CNY4,215 in 2004, which is less than half of the national average of CNY10,561.

Table A10.1: Guizhou Province Socioeconomic Indicators

Indicator	Unit	1990	1995	1997	2000	2002	2003	2004
Population	million	32.68	35.08	36.06	37.56	38.37	38.70	39.04
GDP	CNY billion	26.01	63.01	79.30	99.35	118.50	135.61	159.19
GDP per capita	CNY/person	810	1,853	2,215	2,662	3,153	3,603	4,215
GDP growth rate ^a	%	10.30	20.90	11.11	8.96	9.23	14.44	17.39
Rural net income	CNY/person	435	1,087	1,299	1,374	1,490	1,565	1,722
Fiscal revenue	CNY billion	4.94	8.74	11.62	15.30	20.30	23.66	29.65
Coal production	million tons	36.95	54.72	65.97	36.77	50.01	78.16	97.57
Foreign trade	\$million	218	681	631	660	691	985	1,514

CNY = yuan, GDP = gross domestic product.

^a Over previous year.

Source: Guizhou Statistical Bureau, 2005, *Guizhou Statistical Yearbook*, China Statistics Press.

B. Socioeconomic Development of Liupanshui municipality

2. Lack of transportation capacity had been a bottleneck for scaling up the coal mining and energy industries in Liupanshui municipality in the past. Construction of the Guizhou Shuibai Railway Project has greatly relieved that bottleneck, and that has facilitated industrial development in the Municipality. Recent industrial development activities along the railway include

- (i) expansion of the Songhe and Yushe large-scale coalmines to a combined capacity of over 3.6 million tons from current 0.5 million tons,
- (ii) scaling up the Faer and Panxian coalmines to supply the thermo power plants mentioned below,
- (iii) construction of the Faer thermal power plant with four generators (0.6 million kilowatts each), and
- (iv) scaling up Panxian thermal power plant with three additional generators (0.6 million kilowatts each).

3. The Project has also provided a large number of employment opportunities to the local population. According to a recent household survey, on average 40% of the project impact area households had benefited from employment as unskilled laborers for the Project. On average, each household obtained total income of about CNY12,000 during 1998–2002 from providing

labor and services for the Project, and this represented about 40% of their total household income during that period.

4. As shown in Table A10.2, the Project has provided employment opportunities for 0.5% of adults in the project area. Based on this figure, it is estimated that the railway has employed some 400 local people (not necessarily fulltime) from the project impact area, especially from four of the townships where there are stations. As more stations are to be opened in the future, it is estimated that the railway will eventually directly employ about 1,000 local people.

Table A10.2: Employment Estimations Based on Household Survey Results

Household location	Sector	Unit	1997	2006
Sample Project Area	Railway	Adults %	0.2	0.5
	Coal mining	Adults %	1.7	2.7
Railway Corridor	Railway	Persons	150	400
	Coal mining	Persons	2,400	3,800

Source: Household questionnaire survey and consultant's estimations.

5. The household survey data show that 2.7% of local labors were employed by the coal mining sector in 2006. This indicates that about 3,800 labors from the railway corridor were employed in the sector as of 2006 (see Table A10.2). This turns out to be almost identical to what is seen in local statistical data (Table A10.3). Based on local planning, another 5% of local laborers will be employed in this sector by 2010.

Table A10.3 Employment Estimations Based on Statistics and Group Interviews

Indicator	Shuicheng and Panxian (2005)	Railway Corridor			
		2005		2010	
		Shuicheng	Panxian	Shuicheng	Panxian
Number of large-scale coalmines	18	0	1	2	2
Number of small coalmines	260	10	5	10	5
Total coalminers	22,000	1,000	2,500	6,000	3,500

Source: Consultants' estimates based on local statistics and township and village group interviews.

6. The Guizhou-Shuibai Railway Project traverses Zhongshan District, as well as Shuicheng and Panxian counties of Liupanshui municipality. Indirect socioeconomic benefits of the Project have arisen through development of businesses that have boosted employment demand and general prosperity in the Project's impact area. Over the period 1997-2004, GDP has risen by an average 13.2%, per capita GDP by an average 11.2%, and rural per capita income by an average 5.5% in the counties and district traversed by the railway. Poverty incidence in Liupanshui municipality as a whole fell from 35% in 1997 to 9.7% in 2004. Details of recent socioeconomic development in Liupanshui municipality and the three counties and district in Liupanshui are shown below in Table A10.4.

Table A10.4: Socioeconomic Indicators of Liupanshui Municipality

Indicators	Year	Liupanshui	Impact Area		
			Zhongshan	Shuicheng	Panxian
Population ('000)	1997	2,747	393	689	1,075
	2003	2,945	427	748	1,164
	2004	3,008	432	759	1,175
GDP (CNY million)	1997	6,339	2,324	653	2,254
	2003	11,708	4,313	1,312	4,197
	2004	15,110	5,800	1,810	5,320
Per capita GDP (CNY)	1997	2,400	6,158	960	2,182
	2003	3,956	10,156	1,764	3,618
	2004	5,051	13,498	2,402	4,548
Per capita rural income (CNY)	1997	1,151	1,265	1,072	1,171
	2003	1,502	1,758	1,389	1,566
	2004	1,672	1,981	1,569	1,737
Poverty incidence (%)	1997	35.08	0	47.35	42.31
	2003	10.29	7.34	12.52	10.34
	2004	9.70	6.90	11.80	9.80

CNY = yuan, GDP = gross domestic product

Source: Final monitoring report; *Guizhou Statistical Yearbook 2005*.

C. Socioeconomic Development of in the Project Impacted Areas

7. The Project also had an important impact on local townships. Table A10.5 below shows selected indicators for three selected project townships. The financial revenues of the three project area townships increased by more than 10 times from 1997 to 2005, due to increased coal mining. By contrast, revenue of the control area township,¹ even though it had the highest financial revenue in 1997 because of its large area of tobacco cultivation, dropped by 42% due to an absence of coal mining and the nationwide abolition of agricultural tax. According to discussions with government officials, most of the local revenues were invested in rural infrastructure constructions (roads, water supply, telecommunication, markets, and education and healthcare facilities). In other words, scaling up of coal mining has indirectly improved local infrastructures and public services. Using its local financial revenue, for instance, the government of Shuomi township is currently cofinancing rehabilitation of the link road from the Shuomi Railway Station (which is at the township's center) to the existing Class II provincial highway (from Liupanshui to Panxian county).

¹ The control area township is 50 km distant from the northern end of the railway. It has a huge coal reserve (600 million tons), but no mining at all.

Table A10.5: Socioeconomic Indicators for Selected Townships in the Project Impact Area

Indicator	Year	Unit	Shuomi Township	Yushe Township	Songhe Township
Raw coal output	2006	million	0.600	1.2	0
	2005	tons	0.445	0	0
Local financial revenue	2005	CNY	6.94	7.20	10.67
	2000	million	1.54	1.58	1.28
	1997		0.68	0.55	0.542
	1997-2005 increase		921%	1,209%	1,869%
Main sources of revenue	2005		Coal mining	Coal mining	Coal mining
	1997		Agriculture tax	Agriculture tax	Agriculture tax
Per capita income	2005	CNY	1,589	2,372	2,160
	2000	CNY	1,242	1,819	1,280
	1997	CNY	865	1,079	950

CNY = yuan

Source: Liupanshui Statistical Yearbook 2005.

D. Ethnic Minorities in the Project Impact Area

8. In 2005, the two counties and one district in the project impact area had a total population of some 1.97 million, of which 28% are ethnic minorities. That percentage is somewhat lower than the provincial average of 38%. The railway alignment traverses 12 townships, of which 10 are designated as minority townships.² The minority townships include all eight townships in Shuicheng County and two of three townships in Panxian county. According to the sample household survey conducted during the project preparatory technical assistance, minority populations accounted for 34% of the persons affected by land acquisition and resettlement. The affected ethnic groups are mainly Yi (67%), Miao (21%), Bai (7%), and Buyi (5%).

9. As a result of mutual assimilation over hundreds of years, the Yi and Buyi minorities are now intermixed, as well as mixed with the Han majority. Inter-marriage among these three groups is very common. The concept of ethnic identity is not very strong. According to some Yi and Buyi farmers, over 70% of the Yi and Buyi people in the project impact area cannot speak and understand their own language (including the elders). The Miao ethnic group, however, is still rather isolated in its own communities high in the mountains. The Miao people speak their own language, and there is almost no interaction between Miao and other groups.

10. In January 1998, the Guizhou Shuibai Railway Corporation prepared a simple ethnic minority development plan (EMDP)³ of eight pages. The EMDP targeted the resettlement of affected minority households and included very general mitigation measures and external monitoring. A subsequent EMDP monitoring report⁴ from 1999 indicated that 189 out of the 612 relocated households (30%) had minority status. This figure approximates closely the 34% minority figure mentioned in the sample household survey conducted under the project

² If a township's minority population exceeds 20%, it can be recognized as a minority township and obtain preferential policy support.

³ Guizhou-Shuibai Railway Corporation. 1998. *Indigenous People's Development Plan of the Guizhou Shuibai Railway Project*. People's Republic of China.

⁴ Guizhou Provincial Academy of Social Sciences. 1999. *Ethnic Minority Development Plan: Implementation Monitoring Report*. People's Republic of China.

preparatory technical assistance. According to the EMDP monitoring report, no special treatment was given to ethnic minority households during project implementation or through the whole process of land acquisition and resettlement. This is understandable since the Government had not mandated the railway company to tackle minority development issues. As also indicated by the same report, however, the Government continued to provide regular support to ethnic minorities through other channels (e.g., microcredit, free education for Miao and for the poorest of the poor, terracing of sloping land, technical training).

11. During September–October 2006, a household questionnaire survey was conducted to study the Project's impact on the ethnic minorities living in the project area.⁵ The survey found no significant differences between Hans (60% of the affected persons) and ethnic minorities (40%) in terms of land losses due to the Project or of poverty levels. The study found that the most important factors explaining the poverty reduction in the project area appeared related to (i) national economic growth filtering through to rural areas; (ii) proximity and connectivity of rural areas to population centers; and (iii) national policies, and to a lesser extent project policies, favorable to ethnic minorities.

⁵ The survey was conducted to provide information for a case study of the Guizhou Shuibai Railway under the Special Evaluation Study on Indigenous Peoples Safeguards.

LAND ACQUISITION AND RESETTLEMENT

A. Scope of Land Acquisition and Resettlement

1. At appraisal, the land acquisition and resettlement plan (LARP) envisaged that 435 hectares (ha) of land would be required permanently, 124 ha would be required temporarily, and 2,466 people would need to be resettled. By project completion, the actual land acquisition was 540 ha, a decrease of about 3%. The reason for the reduced land acquisitions was that the railway line was shortened by about 3 kilometers (km) due to alignment adjustment. The area of demolished dwellings totaled 108,144 square meters, an increase of more than 186% compared to 37,774 square meters estimated in the resettlement plan. The reason for that big increase was due to underestimation in the domestic feasibility study¹ and lack of cross-checking during implementation of the project preparatory technical assistance. About 4,364 and 29,653 persons, respectively, were affected by house demolition and land acquisition. Table A11.1 shows the variances of resettlement impacts between the resettlement plan and actual implementation, as reported in the project completion report (PCR).

Table A11.1: Resettlement Impacts: Variances and Causes

Impact	Unit	Resettle- ment Plan	Actual (by 2006)	Variance (%)	Cause
Permanent land acquisition	ha	435	540	(3)	Underestimation in domestic feasibility study and improper method during project preparation
Temporary land acquisition	ha	124			
Building demolition	m ²	37,774	108,144	186	
Total population affected	persons	2,466	29,653	1,102	
By land acquisition	persons	997	25,289	2,436	
By house demolition	persons	1,469	4,364	197	

() = negative, ha = hectare m² = square meter.

Sources: land acquisition and resettlement plan (1998), project completion report (2005), final monitoring report (Chinese).

B. Resettlement Costs and Compensation Rates

2. Actual compensation rates are shown in Table A11.2. The overall land acquisition and resettlement cost of CNY71.6 million, was only 43% more than the CNY50.1 million estimated in the LARP, although demolition of structures and other land attachments more than doubled.

3. It should be noted that the LARP compensation rates for land acquisition in the following table are much higher than are those cited in Table A7.3 of the PCR. According to Table A7.3 of the PCR, the actual land compensation rates were above those set in the LARP, but this appears to have been incorrect. Discussions with the monitoring team, which is the staff of the Guizhou Provincial Academy of Social Sciences, revealed that the actual compensation rates were lower than those set in the LARP.

¹ Almost all expressway and railway feasibility studies purposefully underestimated the impacts of land acquisition and resettlement in order to obtain approval more easily.

Table A11.2: Land Acquisition and Resettlement Rates and Cost

	Item	Unit	LARP	Actual	Variations (%)
Compensation Rates (CNY)	Irrigated land	ha	218,897		(73)
	House plot	ha	302,344		(80)
	Dry land	ha	52,008	60,000	15
	Forest land	ha	54,422	On average	10
	Orchard land	ha	181,407		(67)
	Waste land	ha	42,828		40
	Brick mixed building	m ²	415	140~210	(58)
	Brick and wood structure	m ²		105~145	
	Earth tile building	m ²	170	60~140	(29)
Overall compensation cost (CNYmillion)			50.1	71.6	43

() = negative, ~ = ranging between, CNY = yuan, ha = hectare, m² = square meter, LARP = land acquisition and resettlement plan.

Sources: land acquisition and resettlement plan (1998), project completion report (2005), final monitoring report (Chinese).

C. Livelihood Restoration

4. Results of the household questionnaire survey are given in the following tables. The survey targeted 194 households affected by land acquisition and resettlement and 227 non-affected households. As shown, both the affected and non-affected households had experienced significant increases in per capita income over the period of 1997–2005. Yet, the affected households seemed to be doing better, indicating that restoration of incomes and livelihood had proceeded well.

Table A11.3: Per Capita Income and Income Distribution

Household Type	Sample Size (households)	Year	Per Capita Income (CNY)	Income Distribution (population %)			
				<CNY 1,000	CNY1,000-2,000	CNY2,000-3,000	>CNY 3,000
Land acquisition and resettlement affected	194	2005	2,632	24.2	19.6	22.6	33.5
		1997	1,420	58.8	18.1	9.8	13.4
		Change (%)	85				
Non-affected	227	2005	2,434	28.6	20.7	18.1	32.7
		1997	1,227	56.8	18.9	15.0	9.3
		Change (%)	98				
Total	421	2005	2,526	26.6	20.2	20.2	33.0
		1997	1,320	57.8	18.5	12.6	11.2
		Change (%)	91				

CNY = yuan

Note: T-test results for all households (comparison from 1997 to 2005): T= 15.31, P= 0.000< 0.05, significant.

Source: Households questionnaire survey.

5. Further assessment among the affected households suggested that the overall impact of land acquisition and resettlement had been basically positive. Nevertheless, there are still some households—exclusively belonging to the low-income group of Table A11.3—which regarded themselves as negatively affected. Informal discussions with local government officials also revealed that a certain number of project-affected persons had been adversely affected due to low compensation rates and the lack of non-farm employment opportunities.

Table A11.4: Perceptions on Overall Impact of Land Acquisition and Resettlement
(%)

Item	Overall Impact				Level of Impact		
	Positive	Negative	Unknown	Significant	Moderate	Minor	Unknown
Respondents ^a	60.3	12.9	26.2	13.4	29.4	33.0	26.2

^aRespondents were households affected by land acquisition and resettlement.

Source: Households questionnaire survey.

**MANAGEMENT RESPONSE TO THE PROJECT PERFORMANCE EVALUATION
REPORT FOR THE GUIZHOU SHUIBAI RAILWAY PROJECT IN THE
PEOPLE'S REPUBLIC OF CHINA (Loan 1626-PRC)**

On 14 June 2007, the Director General, Operations Evaluation Department, received the following response from the Managing Director General on behalf of Management:

1. We appreciate OED's evaluation of Guizhou Shuibai Railway Project. We agree with the overall findings and assessment of the above Project Performance Evaluation Report. We support the proposed follow-up actions relating to mining development in the project area and pricing policy.
2. We note that the pricing policy issue in the railway sector in the PRC has been an important element of ADB policy dialogue in recent years. The Guizhou Shuihong Railway Company Ltd. has fixed and adjusted its tariffs based on market and the two covenanted financial indicators of the Project—working and debt-service ratios—have been fully met.