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Lao PDR Sector Memorandum Priorities for Rural Infrastructure Development

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CURRENCY EQUIVALENTS

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WEIGHTS AND MEASURES

Metric System

ha - hectare

km - kilometer

Ton - metric ton (1000 kg)

kg - kilogram

FISCAL YEAR

Government: October 1 - September 30

IDA: July 1- June 30

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
APB	Agricultural Promotion Bank
CDRI	Communication and Design Research Institute
CPC	Committee for Planning and Cooperation (replaced in 1996 by State Planning Committee & Committee for Investment and International Economic Cooperation)
CTC	Communications Training Center
CTPC	Communication, Transport, Posts and Construction Office
GDP	Gross Domestic Product
DOI	Department of Irrigation
GOL	Government of Lao PDR
GTZ	Deutsche Gesellschaft Fuer Technische Zusammenarbeit
HYVs	High Yielding Rice Varieties
IDA	International Development Association (part of World Bank)
ILO	International Labor Organization
IRAP	Integrated Rural Accessibility Planning
IRR	Internal Rate of Return
IRRI	International Rice Research Institute
JICA	Japanese International Cooperation Agency

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LECS	Lao Expenditure and Consumption Survey
LNPDP	Luang Namtha Provincial Development Project
LWU	Lao Women Union
MAF	Ministry of Agriculture and Forestry
MCTCP	Ministry of Communication, Transport, Post and Construction
M&E	Monitoring and Evaluation
NGOs	Non-Government Organizations
O&M	Operation and Maintenance
PCTPC	Provincial Communication, Transport, Post and Construction Office
PDR	Peoples Democratic Republic
PIP	Public Investment Program
RDC	Rural Development Committee
RMI	Road Maintenance Initiative
SCML	Survey and Construction Material Laboratory
SIDA	Swedish International Development Agency
SIRAP	Sustainable Irrigated Agriculture Project
SOE	State-Owned Enterprises
SSATP	Sub-Saharan Africa Transport Program
SESCML	State Enterprise Survey and Construction Material Laboratory
SIPs	Sector Investment Programs
STENO	Science, Technology and Environment Organization
TA	Technical Assistance
QSL	Quaker Service Laos
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Program
USAID	United States Agency for International Development
UNICEF	The United Nations Children's Fund
WUOs	Water User Organizations

LAO PDR
PRIORITIES FOR RURAL INFRASTRUCTURE DEVELOPMENT

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The report is based on a mission to Lao PDR in April/May, 1996, which included an informal workshop that was attended by technical staff from the central and provincial governments, and representatives of donors including NGOs. The mission and the task team included Frank Byamugisha (Task Manager), Wael Zakout (Civil Engineer), Mary Judd (Anthropologist), Israel Naor (Irrigation Engineer; Consultant), Steve Carapetis (Rural Roads and Human Resources Specialist; Consultant), and Malcolm Mayfield (Economist; Consultant). Ms. Linda Schneider, World Bank Liaison Officer in Lao PDR, worked full-time with the mission. Mr. Jeffrey Gutman, the Division Chief (EA1AE) under whom the Team worked, provided useful comments on the draft report. The peer reviewers were Ms. Frannie Humplick (PRDIE) and Mr. Thampil Pankaj (SA1IN) who also provided useful comments. Ms. Sarian Wilkinson provided secretarial assistance. The Lead Economist who guided the study was Mr. William McCleary (EA1DR) and the Director was Mr. Javad Khalilzadeh Shirazi (EA1DR). The main findings of the report were discussed with representatives of the Government of Lao PDR, donors and NGOs in a workshop in Vientiane in November 1996; thereafter, a draft of the report was discussed with the Government whose comments are reflected in this final draft.

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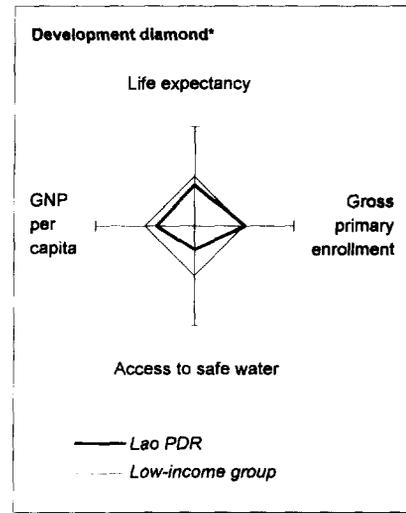
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Lao PDR at a glance

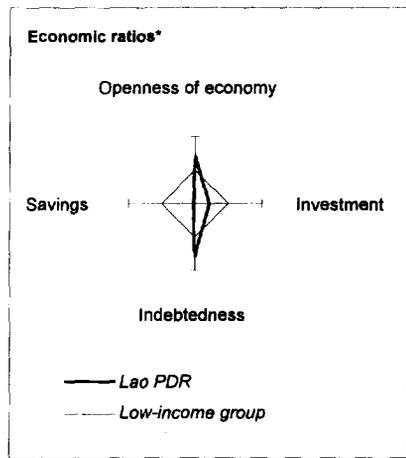
POVERTY and SOCIAL

	Lao PDR	East Asia	Low-income
Population mid-1995 (millions)	4.9	1,709	3,188
GNP per capita 1995 (US\$)	350	830	460
GNP 1995 (billions US\$)	1.7	1,418	1,466
Average annual growth, 1990-95			
Population (%)	3.0	1.3	1.8
Labor force (%)	2.6	1.4	1.9
Most recent estimate (latest year available since 1989)			
Poverty: headcount index (% of population)	46
Urban population (% of total population)	22	31	29
Life expectancy at birth (years)	52	68	63
Infant mortality (per 1,000 live births)	90	36	58
Child malnutrition (% of children under 5)	40	17	38
Access to safe water (% of population)	36	77	75
Illiteracy (% of population age 15+)	43	17	34
Gross primary enrollment (% of school-age population)	107	117	105
Male	123	120	112
Female	92	116	98



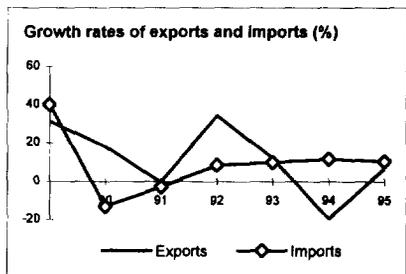
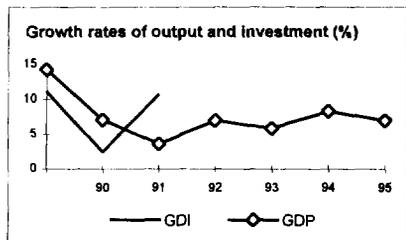
KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1975	1985	1994	1995	
GDP (billions US\$)	..	2.4	1.5	1.7	
Gross domestic investment/GDP	..	7.0	14.8	13.0	
Exports of goods and non-factor services/GDP	..	4.1	22.7	23.0	
Gross domestic savings/GDP	..	1.3	3.2	1.5	
Gross national savings/GDP	..	0.6	4.0	2.0	
Current account balance/GDP	..	-4.1	-15.0	-11.7	
Interest payments/GDP	..	0.0	0.0	0.0	
Total debt/GDP	..	26.1	128.2	121.0	
Total debt service/exports	..	12.2	7.7	8.9	
Present value of debt/GDP	44.3	..	
Present value of debt/exports	262.5	..	
(average annual growth)					
	1975-84	1985-95	1994	1995	1996-04
GDP	..	5.6	8.3	7.0	6.3
GNP per capita	..	2.5	5.0	4.6	3.4
Exports of goods and nfs	..	9.8	-19.3	6.7	7.6



STRUCTURE of the ECONOMY

	1975	1985	1994	1995
(% of GDP)				
Agriculture	56.4	54.3
Industry	17.8	18.8
Manufacturing	12.7	12.5
Services	25.8	26.9
Private consumption	..	89.9	86.0	88.6
General government consumption	..	8.8	10.8	9.9
Imports of goods and non-factor services	..	9.7	34.2	34.4
(average annual growth)				
	1975-84	1985-95	1994	1995
Agriculture	..	3.5	8.3	4.9
Industry	..	10.8	10.7	11.4
Manufacturing	..	13.3	7.0	11.7
Services	..	5.5	5.5	8.5
Private consumption	..	6.6
General government consumption	..	-7.2
Gross domestic investment	..	-0.2
Imports of goods and non-factor services	..	5.8	11.7	10.5
Gross national product	..	5.8	8.3	..

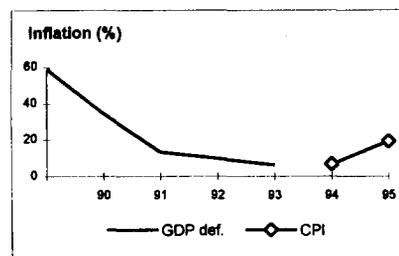


Note: 1995 data are preliminary estimates. Figures in italics are for years other than those specified.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

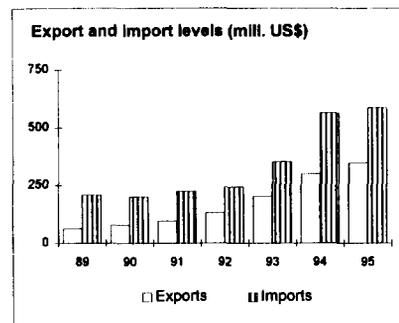
PRICES and GOVERNMENT FINANCE

	1975	1985	1994	1995
Domestic prices				
<i>(% change)</i>				
Consumer prices	6.8	19.4
Implicit GDP deflator
Government finance				
<i>(% of GDP)</i>				
Current revenue	..	9.7	12.5	12.6
Current budget balance	..	-0.2	1.7	2.3
Overall surplus/deficit	..	-6.7	-9.7	-9.2



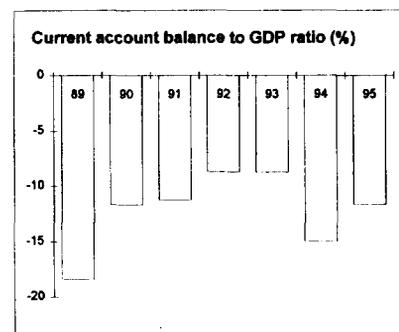
TRADE

	1975	1985	1994	1995
<i>(millions US\$)</i>				
Total exports (fob)	300	348
Timber	96	88
Electricity	25	24
Manufactures	95	155
Total imports (cif)	564	587
Food	105	116
Fuel and energy	21	31
Capital goods	146	189
Export price index (1987=100)
Import price index (1987=100)
Terms of trade (1987=100)



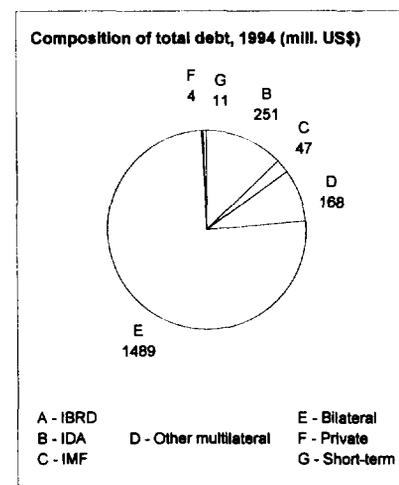
BALANCE of PAYMENTS

	1975	1985	1994	1995
<i>(millions US\$)</i>				
Exports of goods and non-factor services	..	58	386	445
Imports of goods and non-factor services	..	138	625	661
Resource balance	..	-80	-239	-217
Net factor income	..	-18	-2	-6
Net current transfers	..	0	10	22
Current account balance, before official transfers	..	-98	-231	-200
Financing items (net)	..	118	219	215
Changes in net reserves	7	-21	13	-14
Memo:				
Reserves including gold (mill. US\$)	..	25	158	191
Conversion rate (local/US\$)	0.4	45.0	728.5	821.1



EXTERNAL DEBT and RESOURCE FLOWS

	1975	1985	1994	1995
<i>(millions US\$)</i>				
Total debt outstanding and disbursed	44	619	1,970	2,069
IBRD	0	0	0	0
IDA	0	27	251	285
Total debt service	6	7	13	16
IBRD	0	0	0	0
IDA	0	0	2	3
Composition of net resource flows				
Official grants	16	15	125	109
Official creditors	5	37	56	91
Private creditors	1	0	0	0
Foreign direct investment	0	0	42	77
Portfolio equity	0	0	0	0
World Bank program				
Commitments	0	0	48	19
Disbursements	0	6	45	28
Principal repayments	0	0	1	1
Net flows	0	6	44	27
Interest payments	0	0	1	2
Net transfers	0	6	43	25



LAO PDR

PRIORITIES FOR RURAL INFRASTRUCTURE DEVELOPMENT

SUMMARY AND CONCLUSIONS

Rationale for the Study

1. This review of rural infrastructure is the first to be done for Lao People's Democratic Republic (PDR). Its primary beneficiary is the Government of Lao PDR (GOL) that should find it a useful input into the formulation of its own strategy for guiding investments in rural infrastructure. This study has been confined to three sectors of rural infrastructure, namely, rural roads, irrigation and water supply and sanitation, because their development and sustainability would benefit from taking an integrated approach to addressing the common critical elements of community participation and decentralization.
2. The development of rural infrastructure is central to improving rural incomes and basic services, and to reducing poverty. For example, rural roads and irrigation development contribute directly and indirectly to increasing rural economic growth and incomes while development of water supply and sanitation is essential to building human resource capacities through improvements in health standards and savings made in human energy that is otherwise spent in collecting water from long distances. In addition to facilitating rural economic growth, rural roads play an important role in raising access to health, education and administrative services.
3. In the past, little attention was paid to the development of rural infrastructure as priority was given to developing large scale infrastructure such as national roads, urban water supply systems and government-sponsored large scale irrigation schemes. Consequently, rural infrastructure has remained largely underdeveloped. For example, many of the country's villages and some districts lack access to the main road network; only less than 50 percent of the population have access to safe drinking water; and only about 13,000 ha of land is irrigated annually during the dry season. Support for rural infrastructure development is therefore necessary to reduce this backlog. In addition, as there is a strong link between rural infrastructure and rural development, the development of rural infrastructure is urgently required to address the development needs of the 80 percent of the population who reside in the rural areas, 53 percent of whom live below the poverty line.

Need to Rethink Strategy for Developing Rural Infrastructure

4. It is important to recognize that development of rural infrastructure is more costly and complex than what is generally assumed. It is deceptively low cost, in terms of per unit construction costs, but is expensive to develop because of the high costs related to mobilization and participation of beneficiaries, and high maintenance requirements. Because it is in small, dispersed and localized units, its development is also institutionally demanding during both the investment and operational phases. As Lao PDR shifts gear from the development of the larger national, urban-oriented infrastructure to rural infrastructure, local institutions must be developed to handle the small, localized and dispersed investments. The institutional complexities and the often changing needs of beneficiaries also require that rural infrastructure be planned differently from the larger national infrastructure. Unlike the latter whose development often starts with preparation of masterplans, the development of rural infrastructure relies on articulation of

processes, leaving the identification of investment activities to be undertaken over time based on the evolving needs of the beneficiaries.

5. This report was prepared by a broad-based team after it visited representative areas of the country where it met and held discussions with provincial and district staff and the local people. During the mission, the team also conducted a workshop in Vientiane, bringing together the people who deal with rural development, including government officials from the central government and provinces, donors and Non-Government Organizations (NGOs). Broad consultation and participation were necessary to share knowledge, and build a widely shared understanding of the key challenges and approaches to development as opposed to coming up with a master plan, prepared by experts. The team then returned to Washington and spent sometime reviewing international experiences and drawing relevant lessons for Lao PDR, and putting together the report. The result of that process is an articulation of the broad direction and scope of the required changes in policies, institutions and investments to support the development of rural infrastructure. Central to these changes are four critical elements: (i) increased public investments; (ii) beneficiary participation underpinned by effective decentralization; (iii) increased involvement and promotion of the private sector; and (iv) improved policies for cost recovery and operations and maintenance (O&M).

Development Needs and Funding Requirements

6. The needs for rural infrastructure development are enormous and varied. In the rural roads sector, the needs are not just for development of village and district roads, but also of provincial roads. In provinces like Phongsaly and Huaphanh, the most immediate need is to build roads required to connect the isolated provinces to the main road network. As the network of non-trunk roads (some provincial, and all district and village roads) is small and in an unmaintainable state, the needs also include reconstruction of roads to a maintainable state and new construction to extend the network to reach isolated districts and major villages particularly in the northern mountainous provinces. In the irrigation sector, the needs are also two-pronged: to reconstruct government-owned and managed irrigation schemes and transfer them to water user organizations (WUOs); and to provide technical and investment support required for the construction of new farmer-managed irrigation schemes. In the water supply and sanitation sector, the needs relate to the provision of technical and investment support required to lift the national coverage of safe drinking water in rural areas from currently less than 50 percent of the population to GOL's target of 80 percent by the Year 2000, and extending the coverage to the poorer ethnic minorities in the harder to reach highlands.

7. In the rural roads sector, the requirements for reconstruction (or rehabilitation) and new construction are much in excess of GOL's public investment program (PIP) for feeder roads for 1996-2000. Funding requirements for reconstruction alone are estimated at US\$107 million while those for new construction are even higher. This is in contrast to the PIP allocation of US\$102 million for 1996-2000. While inadequate to meet the requirements, the PIP allocation for feeder roads in 1996-2000 represents a large increase as a share in the total PIP for the road sector, from less than 5 percent in 1994/95 to about one third in the year 2000. The additional resources for rural roads will be generated through relative reductions in the PIP allocations for national and provincial roads which were until recently absorbing virtually all public investments in the road sector. This shift in PIP funding by GOL makes a lot of economic sense as access roads for agricultural and rural development are necessary to increase the economic returns from the

investments that have been made in trunk roads. If these resources were to be used for reconstruction (US\$107 million) alone, nearly all the backlog in reconstruction, equivalent to one half of the provincial roads (5,800 Km) and all the district and village roads (4,900 Km), would be completed (at a cost of US\$20,000 per km of provincial roads and US\$ 10,000 per Km of district and village roads). Alternatively, these resources could finance 3,400 km of new rural roads at an average cost of US\$30,000 per km. As the resources are not enough to meet the needs for both reconstruction and new construction, it is necessary to work out a road development program that reflects a mix of new construction and reconstruction that can generate the highest economic returns for the country.

8. In the irrigation sector, funding requirements for reconstruction, estimated to be US\$20 million, can be easily met from the irrigation PIP of US\$69 million for 1996-2000; funding of reconstruction would leave a balance of US\$49 million to fund capital costs of new irrigation schemes. GOL's PIP allocation for irrigation as a share of total PIP for agriculture has been declining gradually from a high of about two thirds during the second half of the 1980s to nearly 29 percent planned for 1996-2000. Given that, unlike earlier years, future irrigation development must be associated with the complex task of organizing beneficiaries into WUOs, the planned PIP for irrigation appears to be more than can be absorbed by the irrigation sector.

9. Due to lack of data, estimates of planned public investment in water supply and sanitation are unavailable. However, to achieve GOL targets of providing safe drinking water to 80% of the rural population by the year 2000, annual public investment would have to be much in excess of US\$ 2.7 million that was spent in 1995, probably by a factor of two; about US\$27 million would be required over the five years to the year 2000. As donor interest in water supply and sanitation has increased considerably, the likelihood is that the increased financing requirements for water supply and sanitation will be met as far as public funding is concerned.

10. A review of road densities in terms of kms of roads relative to the population and to land indicates that the northern provinces of Phongsaly, Luang Namtha, Bokeo, Luang Prabang, Huaphanh and Xayabury have the lowest road densities in the country. They also happen to have the lowest per capita income as well as the heaviest concentrations of ethnic minorities, slash and burn practices and, together with Sekong province in the south, food insecurity. This would mean that, for GOL to achieve its priority programs of reducing slash and burn, enhancing food security and developing ethnic minorities, it has to shift resources for rural roads, irrigation and water supply and sanitation toward these mountainous provinces. But public investment in rural roads and irrigation has to meet the minimum economic criteria in terms of internal rates of return. In addition, the funding of irrigation and water supply and sanitation has to be demand-driven; that is, beneficiaries have to demonstrate effective interest by organizing themselves into user groups and contributing toward meeting part of the capital costs, during and after the investment phase, and all the costs of O&M. There is a strong case, however, for GOL to subsidize the provision of this infrastructure (see paras. 36 and 37).

Decentralization and Beneficiary Participation

11. Need to Fine-tune Decentralization. From the above analysis of infrastructure funding, it is clear that the amount of investment which can be productively absorbed depends on the commitment by beneficiaries to participate in an investment that meets their priority needs and the responsiveness of infrastructure providers to such needs. This underlines the importance of decentralization and beneficiary participation which, from international and local experience, have

been found beneficial to the development of rural infrastructure. The process of decentralization in Lao PDR has been adequate in terms of depth but there has been an imbalance in terms of fiscal, institutional and political decentralization in the three sectors of rural infrastructure. For example, while responsibility for rural roads development has been passed on to the provinces and districts, it is clear that the latter do not have taxation authority to raise funds for road maintenance; and their authority over the allocation of budgetary funds for road maintenance seems to be limited. There seems to be a need for reviewing the scope of local government authority over the allocation of budgetary resources especially for rural roads maintenance and to increase it to the level that is consistent with their responsibilities for rural roads development. As far as irrigation and water supply and sanitation sectors are concerned, the current decentralization is adequate.

12. Need to Strengthen Institutional and Human Resource Capacity. The benefits of decentralization have not yet been fully realized partly because of lack of human resource capacities at all levels, especially in the northern mountainous provinces with high concentrations of ethnic minorities. As the role of the central government agencies has evolved from that of a provider to a facilitator of rural infrastructure, so have the demands of central agencies for professionals that can provide technical support and monitoring. At lower levels of government, the demand for personnel is for those that can undertake community mobilization and support project implementation. As current capacity building efforts (mainly through training) are continued into the future and strengthened, there is a concurrent need for greater involvement and promotion of the private construction industry (currently very weak), and for better utilization of NGOs and TA in order to ease the human resource constraint on implementation capacity. In the past, much of TA has been ineffective in transferring skills and know-how partly due to language difficulties, lack of suitable counterparts and inability to attract high quality experts to work in rural areas. To improve the effectiveness of TA, it is important to carefully plan the hiring and implementation of TA, including hiring the right expertise with some knowledge of the local language or with adequate arrangements for language training, prepare clear and adequate terms of reference and appoint suitable counterparts to work with it.

13. Need to Promote and Strengthen Private Construction Industry. To promote the local construction industry, at least three measures need to be taken. First, privatization of state-owned enterprises should be accelerated to provide a level playing field to all construction companies. Second, the procurement decree (No. 95/PM of December 1995), which opens up access of private companies to government contracts, should be implemented as a priority to increase opportunities of private companies to bid on government contracts. And third, on-the-job training should be provided to local private companies to upgrade their skills, particularly in contract bidding and execution; the training should be accompanied by a strategy to increase access of small contractors to bigger and better equipment and credit.

14. Need to Strengthen Planning and Coordination at Central Level. A realization of the benefits of decentralization requires also improvements in planning and technical coordination within and across sectors to avoid inconsistent application of policies and technologies; the need for coordination is even more urgent in the rural roads sector where there is a multiplicity of agencies building roads. While there is no single best coordination mechanism to recommend, it is worth considering the use of the existing State Planning Committee to coordinate the overall planning and monitoring at central level; coordination at provincial and district levels could be undertaken by the respective Planning Departments and Sections. In addition, the problems in the

rural roads sector warrant establishment of a unit in the Ministry of Communication, Transport, Posts and Construction to coordinate and facilitate the development of non-trunk roads.

15. Need to Improve Infrastructure Design. Apart from coordination, there is also a need for improvement in the area of infrastructure design. Design standards -- a responsibility of central government agencies -- are too high in the case of rural roads and are improperly applied in the irrigation sector due to lack of experience and design data. While the design problems in the irrigation sector can be addressed through capacity building, more emphasis on data collection and increased use of the private sector, a solution to those in the rural roads sector requires real changes in design particularly to increase the content of local materials and labor. Results from pilot projects in Lao PDR indicate that labor-intensive methods of rural road construction may be technically adequate, cost-effective and adaptable to specific areas. Road Design Manuals need to be revised to accommodate the option of using labor-intensive methods of road construction and maintenance in specific areas and situations where they are appropriate.

16. Need to Develop and Strengthen Beneficiary Organizations. But are beneficiaries ready to get involved in determining their needs, and in allocating and managing resources to meet them? The answer is yes and no: they are starting to get ready in the irrigation and water supply and sanitation sectors while they are far from it in the rural roads sector. For them to be adequately involved, beneficiaries must be organized into strong beneficiary organizations, and must be willing to participate in the planning, construction, operation and maintenance of infrastructure. In the irrigation sector, a good start has been made since 1991 in organizing WUOs but they are weak and limited in number, and they lack legal recognition. In the water supply and sanitation sector, beneficiary participation is through village-based groups which are neither formal nor legally recognized. In the rural roads sector, there are no beneficiary organizations or any other form of user group representation. It might be worthwhile to study ways of establishing some group representation of users such as farmers, transport operators and other interest groups in order to ensure that their interests are promoted and protected.

17. An important point to note is that, while beneficiary organizations are lacking or at an infant stage of development in all the sectors of rural infrastructure, they are so critical to the sustainability of infrastructure that its providers must use them as a basis for designing infrastructure programs and include organizational strengthening as a key component of those programs. To develop and strengthen beneficiary organizations, there is a need to: formalize and legalize them; and give them technical support primarily through training. It is important to note that maintenance problems in rural infrastructure are concentrated in those investments in which beneficiaries are not involved, namely, rural roads and government-owned irrigation schemes.

18. It is clear from the above analysis that the degree of participation by beneficiaries in expressing consumer preferences and their willingness to invest varies among sectors, projects and donors. This lack of consistency has the harmful effect of creating distortions in the investment choices of beneficiaries. For them to express their preferences, beneficiaries must be offered a choice. Yet many projects supported by donors often deliver to identified communities only one infrastructure activity: either rural roads, irrigation or water supply and sanitation. As the choice options available to beneficiaries are either to take what is given or do with nothing, they often take what is offered them. The lack of choice is clearly a design problem related to donors opting to provide their assistance in the form of single-sector projects. There is a need to

re-examine the way donors design their programs with a view to improving their design so as to make them responsive to the needs of beneficiaries (see para. 38).

Operation, Maintenance and Sustainability

19. While the above issues related to planning, design, public financing and construction are clearly important, the one issue that has undermined and remains a threat to the development of rural infrastructure is lack of maintenance. In the rural roads sector, lack of maintenance has resulted in most of the provincial roads and virtually all the district and village roads not being accessible in the rainy season, as drainage is inadequate, many bridges are missing or in poor condition and road shoulders are not stable. In the irrigation sector, the lack of maintenance has led to a situation where many of the irrigation schemes which were sponsored by the government during the 1980s are now in an unmaintainable state. While the lack of maintenance in the water supply and sanitation sector is not alarming in terms of immediate needs as many facilities are still new, an evaluation of the UNICEF program in 1996 indicated that maintenance problems are rising.

20. Lack of maintenance seems to be related to two main problems: (i) lack of financing; and (ii) lack of management. In rural roads where both funding and management are done by the state, the government would stand to blame for the lack of maintenance. In the other two sectors, the blame for poor maintenance goes to the beneficiaries for they are responsible for funding and management of operation and maintenance.

21. Rural Roads. Ironically, requirements for routine maintenance of rural roads are presently negligible as many of the existing rural roads are not in a maintainable state: they must be reconstructed before they are maintained. In fact, much of the investment in these areas has in the past gone into reconstruction. It is estimated that reconstruction would absorb US\$107 million (see para. 7). Upon completion of reconstruction, the required annual budget for routine maintenance of the current stock of provincial, district and village roads is estimated at US\$1-2 million, assuming a maintenance cost of US\$100-200 per km per year. The point to note here is that, in terms of budgetary support, maintenance of rural infrastructure is inexpensive compared to the cost of reconstructing (US\$10,000 - 20,000/km) or constructing a new road (US\$30,000/km). However, the reality is that maintenance receives a low political priority in Lao PDR and world-wide, when central government budgets are allocated. Even where adequate funds are allocated for maintenance, the allocated funds are either not directed to their original purpose or are applied inefficiently.

22. Thus, there is no easy solution to the problem of maintenance: what is needed is establishing accountability and making a fundamental change in the attitudes, political incentives and funding mechanisms for maintenance. First, whichever entity is given responsibility for rural road maintenance should also be given the necessary resources and authority to use them; but it must be held accountable to the road users. As responsibility for road maintenance now lies with local authorities (provinces and districts), they should be given the necessary budget and a mechanism worked out to hold them accountable to road users. Second, the transfer of road maintenance funds from the central government to the local authorities should carry with it an incentive for road maintenance: more funds should be given to local authorities that have a record of or a demonstrated potential for good road maintenance. Similarly, fund allocation for construction of new roads should be based on a good record of road maintenance or a potential

capacity for good road maintenance. And third, policy makers and their advisors should be made more aware of the benefits of good road maintenance through overseas study tours and seminars.

23. Irrigation Sector. With the exception of the government-owned irrigation schemes, the issue of operation and maintenance in irrigation is much different from the one in rural roads because both financing and management are in the hands of beneficiaries; thus, the quality of maintenance varies among WUOs depending on the strength of each WUO. On the whole, farmer-managed irrigation schemes have been taking care of their O&M reasonably well. With regard to government-owned irrigation schemes, the great majority that have not been reconstructed and handed over to WUOs are still in an unmaintainable condition. It is estimated that US\$20 million will be required to rehabilitate them before they can be handed over to the beneficiaries for management and, ultimately, for ownership (see para. 8). About 10 irrigation schemes have been rehabilitated and handed over to WUOs under GOL's irrigation management transfer program which was initiated in 1991.

24. O&M in the irrigation sector is faced with two problems of increasing importance: (i) water user rates which were set by the government in 1993 have been overtaken by the rising O&M costs; they need to be increased in order to provide WUOs with enough funds to meet O&M costs; and (ii) WUOs do not have enough capacity to manage the O&M of the more technically complex headworks and main canals of medium and large scale irrigation schemes. To address these problems, there is a need to quadruple the water user fees in the gravity-fed irrigation schemes and to double the water user rates for electric-based pump-lift irrigation schemes if and when the current electricity subsidy is removed (see para. 30). There is also a need for GOL to encourage private companies or the formation by WUOs of a subsidiary joint company to manage O&M in the larger irrigation schemes.

25. Water Supply and Sanitation. While the lack of maintenance at present is not alarming, maintenance needs are slowly building up, and the build-up will accelerate with the aging of the facilities. There are three issues to address. First, there is lack of clarity in the roles and responsibilities between GOL and the beneficiaries for O&M. Second, there are no guidelines or mechanisms for collection of funds for O&M and, at present, the user fees being collected are negligible. And third, there is no incentive for the two village-appointed water caretakers to do their work as they are not paid. Three sets of actions are needed. First, to cover fully the costs of O&M for water supply and sanitation, a clear cost recovery policy and guidelines need to be developed and issued. The policy should confirm that beneficiaries must bear at least full responsibility for O&M while the guidelines should indicate the structure of user charges and a mechanism to collect and administer them. Second, the water caretakers should be trained and paid for their services in order to motivate them and improve their performance. And third, water user groups should be formalized and given a legal status.

26. Environmental and Social Sustainability. While good O&M is essential for sustainability of physical facilities, long term sustainability of rural infrastructure significantly depends on the amount of attention paid to its impact on sustainable management of natural resources; it depends also on the attention paid to addressing its social impact. Planning of irrigation and water supply and sanitation should take an integrated approach to water resource management, with full consideration of all competing uses for water and the impact on public health. Similarly rural roads development has to take into account the potential impacts on the quality of water resources, particularly through soil erosion and siltation, as well as on deforestation. There is

therefore a need to strengthen the Science, Technology and Environment Organization that is responsible for environmental coordination, and the line agencies that have responsibilities for environmental planning and implementation. With respect to addressing the social impact of rural infrastructure development, the main concern is on resettlement arising out of rural infrastructure projects. Consideration should be given to assigning STENO the responsibilities for coordinating and overseeing project-related resettlement, particularly the acquisition of land (for rural infrastructure projects) and compensation of the affected people.

Beneficiary Financing and the Need for Improved Cost Recovery

27. Beneficiary financing of rural infrastructure significantly depends on the cost recovery policies and guidelines set by the government. GOL's cost recovery policies have two elements to it. First, the policies determine the contributions from beneficiaries for funding capital costs, during and after the investment phase, and O&M. Second, the policies also determine the amount of subsidies that GOL pays toward capital costs and O&M.

28. Cost Recovery Policies and Practices. In the case of rural roads, the government has no cost recovery policy for it does not directly involve beneficiaries in the financing of rural roads. Indirectly, GOL charges users of all roads through three taxes: fuel tax; import taxes on vehicles; and annual vehicle license fees. The three taxes raised revenue estimated at US\$15-18 million in 1994/95 compared to annual maintenance costs for rural roads estimated at US\$1-2 million. The tax revenue is not earmarked to road development; rather it is available to supporting the general budget.

29. In the irrigation sector, there was no cost recovery policy until about 1991 when GOL decided to involve beneficiaries in the development of irrigation infrastructure. A cost recovery policy was then introduced requiring beneficiaries to be fully responsible for the financing and management of O&M, in addition to contributing toward capital funding during the investment phase. Implementation guidelines were issued in 1993 by the Minister of Agriculture (regulation No. 593/MAF). They require beneficiaries of small scale irrigation schemes to contribute up to 70 percent, in terms of labor, local materials and cash, toward meeting capital costs during the investment phase, with the balance to be funded by GOL (or through bank loans) and to be recovered from beneficiaries through water user fees. For the medium and large scale irrigation schemes, the regulation requires beneficiary contributions of land, labor, local construction materials and some financial contribution but does not specify the amount of that financial contribution.

30. The extent to which this regulation has been complied with is unclear as there is no firm data to assess the experience. However, in regard to beneficiary funding of capital costs during the investment phase, results from a UNCDF-supported Small Scale Irrigation Project in Luang Namtha indicated that beneficiaries contributed between 2 and 46 percent of the project's construction costs during the investment phase. With respect to funding capital costs after the investment phase, it is clear that no mechanism or guidelines have been established to recover funds from beneficiaries; consequently, beneficiaries have not been paying. With respect to beneficiary funding of O&M, the regulation contains a structure for irrigation water fees: beneficiaries in the gravity irrigation schemes are required to pay 3,500-10,000 kip/ha/season; for electric pump-lift schemes, the fees are 12,000-20,000 kip/ha/season; and for diesel pump-lift schemes, the fees are 25,000-50,000 kip/ha/season. As O&M costs are estimated to be about US\$20/ha/season for gravity-fed irrigation schemes and about US\$30-50/ha/season for diesel and

electricity pump schemes (without an electricity subsidy of 27 kip/kwh), it is clear that the water fees for gravity schemes and for electric pump schemes need to be increased by about a factor of 2-4 and 2, respectively. The water fees set for diesel pump irrigation schemes seem to be consistent with the costs of O&M.

31. In the water supply and sanitation sector, GOL has no stated policy on cost recovery. In practice, cost recovery practices vary from project to project and from donor to donor. What seem to be common features are: (i) beneficiaries are required to contribute at least some labor and local materials during the investment phase; (ii) after the investment phase, beneficiaries are not required to contribute toward recovery of capital costs; and (iii) except for the repair tools which are given to beneficiaries upon completion of the water supply facilities, beneficiaries are left on their own to finance and manage O&M. The main emphasis seems to be on upfront contributions by beneficiaries toward the funding of capital costs. UNICEF requires beneficiaries to contribute about 30 percent of the total project expenditures during the investment phase while most of the other donors require less than that.

32. Principles to Guide Improvements in Cost Recovery. There are four principles that determine adequate cost recovery. First, beneficiaries should be required, during the investment phase, to make some contribution to capital funding; the contribution should be high enough to give them a sense of ownership of the investment. By and large, this principle is being met in the irrigation and water supply and sanitation sectors. Second, beneficiary contributions to capital funding should vary depending on whether the infrastructure shares many features of a public good or a private good. If it is largely a private good, capital costs should be fully funded by beneficiaries through cost recovery. If it is largely a public good, capital costs should be funded by the public through the budget. If it contains a balance of both features, capital costs should be funded partly through the budget and partly by beneficiaries.

33. But how can one tell the difference between private and public goods? As opposed to a private good whose supply is reduced when one consumes it at the exclusion of others, a public good is available to the public and one's consumption of the good cannot reduce it or exclude others from consuming it. Much of rural infrastructure shares characteristics of both private and public goods. For example, small scale irrigation schemes, single-village roads, and tertiary canals of medium and large scale irrigation schemes are predominantly private goods while the headworks and main canals of medium and large scale irrigation schemes, and the larger rural roads are predominantly public goods. However, small scale irrigation schemes can have characteristics of a public good when they are used to produce rice in the mountainous upland areas where slash and burn and food shortages are prevalent; they benefit society at large because they check deforestation and increase food security. Similarly, while small facilities of water supply and sanitation share many characteristics of a private good, they also have some characteristics of a public good as they provide benefits to society through improvements in public health which serve to prevent epidemic diseases. Similarly, in as far as single-village roads cannot be closed off from use by other villages and the larger public, they also share some characteristics of public goods.

34. According to this second principle, capital costs of rural roads and of the head works and main canals of medium and large irrigation schemes should be funded by the public through general taxation. Current government policy and practice seem to be consistent with this principle. For small scale irrigation and the tertiary canals of the larger irrigation schemes, capital

costs should be funded by beneficiaries through appropriate cost recovery mechanisms; however, there is a case for a government subsidy for those irrigation schemes that contribute to the reduction of slash and burn and to improving food security. For water supply and sanitation that shares both characteristics of a private and public good, funding of capital costs should be shared between beneficiaries and the public (GOL budget); but the sharing mechanism should reflect the importance attached to public health in each situation. Capital costs for single-village roads should also be shared as these roads share some characteristics of public and private goods. In this context, the current practice where GOL provides tools and equipment to communities to build their own roads makes a lot of sense and should be encouraged further.

35. The third principle is that users should be fully responsible for O&M because experience has demonstrated that this leads to better use of and care for the infrastructure. Except for rural roads, current GOL policy is consistent with this principle although it is unstated in the case of water supply and sanitation, and user charges do not fully reflect the costs of O&M in irrigation. There is therefore a need to issue a cost recovery policy in the former and to increase irrigation fees in the latter (see paras. 25 and 30). In the case of rural roads, there is a need to study ways and means of making users involved at least in planning and, if possible, contribute to road maintenance.

36. The fourth principle is that low income and poor people who cannot afford to pay the capital costs of rural infrastructure should be assisted to participate and benefit from the infrastructure. But this should be done in the most efficient (non-distortionary) way, with minimal administrative costs.

37. GOL has no clear policy on assisting poor people to gain access to rural infrastructure, especially irrigation and water supply and sanitation. Given that there are many poor people especially the ethnic minorities, there is a strong case to be made for subsidizing their infrastructure. Subsidization of capital costs of irrigation and water supply and sanitation would seem to be an effective way to do so particularly by working out much longer periods of cost recovery or, in the case of the very poor, by outright write-off of the capital costs (except beneficiary contributions of labor and local materials). An electricity subsidy as currently provided to cover part of O&M costs of pump-lift irrigation schemes would be an undesirable mechanism of helping the poor because it distorts investment by making electric-based pump-lift irrigation appear financially attractive relative to the more economically superior forms of irrigation such as gravity irrigation; it is also ineffective in that it does not target the poor.

Donor Programs Need to be Responsive

38. While the recommendations in this report are for GOL, they have implications for the design of donor programs (see para. 18). First, donor programs should follow and consistently apply the key policies and principles in rural infrastructure, particularly decentralization, beneficiary participation and cost recovery if applicable. Second, to really be demand-driven and reflect the needs of and choices made by beneficiaries, donor interventions need to be made on the basis of broad multi-sector projects as opposed to the typical single-sector projects. Third, to overcome human resource weaknesses, donors need to economize on the use of scarce local professionals and technical assistance (TA) by sharing them and designing projects that are geographically focused to minimize costs and personnel resources required for supervision and administration. And fourth, unlike the narrowly defined projects that donors have been supporting, the proposed multi-sector program approach would require that selection and detailed

design of sub-projects be undertaken during project implementation on the basis of beneficiary preferences. Chances of success in applying these principles and policies and in improving donor coordination are enhanced if donors channel their assistance through multi-sector programs that support the three sectors of rural infrastructure. This broad approach to investment support by donors has been used so far in various countries including Zambia, Uganda, Pakistan, Tanzania and Benin (under the umbrella of Sector Investment Programs) where it has been found a useful instrument in ensuring consistency in policies, investments and interventions of the various actors in sector development.

Need to Measure and Monitor Performance

39. To ensure that GOL is well informed about the effectiveness of its support for rural infrastructure and that problems are identified early and corrective actions taken, it is important to track the performance of rural infrastructure through establishment of an agreed set of targeted outcomes and a sample of indicators to measure them. Initial monitoring could focus on at least four areas. The first area is the national coverage of infrastructure, in terms of quantity, quality and geographical distribution which could be surveyed and updated once a year. The second area is institutional development which could be tracked through such variables as depth of decentralization, degree of beneficiary participation and human resource capacity (number of professionals). The third area is sustainability which could be tracked through the measurement and monitoring of variables such as budget allocation for road maintenance, level of cost recovery, and capacity utilization of infrastructure. And the fourth area is sector efficiency which can be tracked using sector performance indicators such as investment costs per beneficiary, net value of production in irrigation, the state of O&M and levels of budgetary allocations for road maintenance. Responsibility for performance monitoring would naturally lie with the central government agencies which need to be strengthened through training, technical assistance and the supply of necessary office equipment.

**LAO PDR
DEVELOPMENT PRIORITIES FOR RURAL INFRASTRUCTURE**

SUMMARY OF ISSUES AND PROPOSALS FOR ACTION

AREA	ISSUES	ACTIONS	TIMING ¹
A. Decentralization and Beneficiary Participation	Lack of accountability for road maintenance due to decentralization of responsibilities for rural road development without fiscal decentralization	Need to decentralize authority over the allocation of resources for at least rural road maintenance	Medium term
	Inadequate planning and coordination across sectors at center, between center and provinces, among donors, between donors and government at various levels, and between providers and beneficiaries	1. Develop mechanisms for integrated multisector planning and coordination using Planning Departments as a key coordinating entity particularly for planning; and 2. Clarify roles and responsibilities between different levels of government and between providers and users	Medium term
	Lack of sharing information between central and local levels of government	Develop mechanisms for information exchange through the Planning Departments	Medium term
	Weak human resource capacity at all levels, but most severe in mountainous provinces with ethnic minorities	1. Systematic capacity building efforts including training and incentives;	Medium term

¹ Short term refers to a period of up to two years while medium term is a period greater than two years and up to five years.

		2. Greater involvement and promotion of the private construction industry; and	Short and medium term
		3. More effective use of NGOs and TA	Medium term
	Lack of encouragement of beneficiary participation in rural roads and inadequate participation in irrigation and water supply and sanitation sectors reflected in: minimal consultation in planning and design stages; options and choices seldom discussed; inadequate training of user groups; and no legal recognition of user groups	1. Develop and strengthen beneficiary communities through genuine consultation and participation, and formalizing and legalizing user groups; increase technical support; and provide adequate and appropriate training; and	Medium term
		2. Promote beneficiary participation in rural roads sector, particularly in routine maintenance	Medium term
B. Promoting Local Construction Industry	Local construction industry is weak, with limited skills, experience, capital, equipment and access to government contracts	1. Accelerate privatization of SOEs;	Short term
		2. Urgently implement procurement decree no. 95/PM;	Short term
		3. Provide on-the-job training; and	Medium term
		4. Promote joint ventures and the pooling of equipment for lease	Medium term
C. Planning and Design	Inadequate screening of investment projects	1. Institute simple planning tools based on sector indicators to guide project selection; and	Medium term
		2. Identification and design of sub-projects be based on demonstrated or	Short term

	potential demand from beneficiaries	
The costs and benefits involved in clearing the millions of tons of bombs, land mines and bomblets found in many provinces have in the past not been considered in rural infrastructure development	Costs and benefits of dealing with unexploded ordinances should be considered in project planning and funding	Short to medium term
Design standards are too high (capital intensive) in rural roads	Lower design standards for rural roads to include labor-intensive methods and local materials, based on experiences gained from labor-based pilot projects	Short term
Engineering design is not adequate in irrigation and water supply and sanitation due to: lack of human resources; and lack of data especially hydrological, soil and geological data	1. Contract out design to private contractors;	Short term
	2. Give priority to data collection; and	Medium term
	3. Use training and TA to develop a cadre of professionals that can manage the design, contracting and supervision of works	Medium term

D. Funding of Capital Costs	Guidelines for beneficiary contributions to capital funding during and after the investment phase are inadequate and inconsistently applied	1. In irrigation, need to revise Regulation 593/MAF to: specify cash contributions to capital funding during the investment phase by beneficiaries in the medium and large schemes; and make provisions for recovering of capital costs after the investment phase;	Short to medium term
		2. Need to enforce regulation no. 593/MAF more consistently in irrigation; and	Short to medium term
		3. In water supply and sanitation, need to develop a policy and issue guidelines specifying the required beneficiary contributions to capital funding, during and after the investment phase	Short to medium term
	Capital budget for rural roads has been inadequate but the 1996-2000 Public Investment Program (PIP) has enough allocations for feeder roads and irrigation	Annual budgets should include allocations for rural roads and irrigation as contained in the 1996-2000 PIP	Short to medium term
	There is a large backlog of reconstruction needs in rural roads and irrigation sectors	More resources from the capital budget should be allocated to rehabilitation	Short to medium term
Investment in rural roads and water supply and sanitation has been relatively low in the mountainous provinces with ethnic minorities	Increase allocations of capital budget and trained staff for the mountainous provinces particularly for rural roads and water supply and sanitation; however, the investments should meet the minimum economic or social criteria	Short to medium term	
There is no policy and	A policy and a mechanism	Short to	

	<p>mechanism to provide infrastructure for irrigation and safe drinking water to the beneficiaries that cannot afford to contribute to capital funding during and after the investment phase</p>	<p>should be developed for subsidizing poor groups of people that take into account considerations for efficiency, cost-effectiveness, affordability and technical appropriateness. One option is to establish generously long periods of recovering capital costs after the investment phase and to waive the requirement for cash contributions during the investment phase</p>	<p>medium term</p>
	<p>Private commercial investment has not been adequately promoted especially in the irrigation and water supply sectors</p>	<p>Study and implement ways of encouraging private investment in irrigation systems and related agriculture as well as in private drilling for water for sale</p>	<p>Short to medium term</p>
<p>E. Cost Recovery and O&M</p>	<p>Maintenance of rural roads has been neglected</p>	<ol style="list-style-type: none"> 1. Establish accountability for rural roads by decentralizing authority over resource allocation especially for maintenance after some study; 2. Increase awareness of decision makers and their advisors through overseas study tours and seminars 3. Introduce incentives for road maintenance by tying central budget allocations for construction of roads to demonstrated or potential capacity for road maintenance; and 4. Increase the allocation and reliability of funds for rural road maintenance from the central 	<p>Medium term</p> <p>Short to medium term</p> <p>Medium term</p> <p>Short to medium term</p>

budget

<p>Water user charges for gravity irrigation and electric pump-based irrigation are set too low</p>	<p>1. Revise regulation no. 593/MAF to quadruple water user fees for gravity irrigation to at least US\$20/ha , and to double water user fees to US\$40-50/ha for electric pump schemes; and</p>	<p>Short to medium term</p>	
<p>There is lack of a clear policy and guidelines for cost recovery and O&M management in water supply and sanitation</p>	<p>2. Remove the electricity subsidy for electric pump schemes.</p>	<p>Medium term</p>	
<p>There is lack of a clear policy and guidelines for cost recovery and O&M management in water supply and sanitation</p>	<p>Introduce a policy and guidelines requiring beneficiaries of water supply and sanitation to be fully responsible for O&M and setting out the charges, and mechanisms to collect and administer them</p>	<p>Short to medium term</p>	
<p>A large increase in water charges for medium and large schemes will be unaffordable on the basis of current farming practices focused on one crop of rice a year</p>	<p>Farmers should be encouraged to diversify from rice to high value crops and supported to intensify production by providing them with better and more agricultural support and marketing infrastructure services</p>	<p>Short to medium term</p>	
<p>O&M of headworks and main canals of medium and large scale irrigation schemes is technically too complex for the water user organizations (WUOs) to manage</p>	<p>GOL should encourage private companies or the formation by WUOs of a subsidiary joint company to undertake O&M in medium and large scale schemes</p>	<p>Short to medium term</p>	
<p>There is variation within and across sectors in the application of cost recovery policies</p>	<p>Reduce variations in cost recovery practices through better coordination of government and donor programs</p>	<p>Short to medium term</p>	
<p>F. Adjustments in Donor Programs</p>	<p>Many donor projects are largely supply-driven, with little involvement of beneficiaries and</p>	<p>Donor projects should be based on beneficiary participation, and should cover more than</p>	<p>Short to medium term</p>

	focused on one sector	one sector to give choice options to beneficiaries	
	Approved donor projects are often rigid blueprints which leave little or no room for beneficiaries to express their preferences	Donor projects should be approved on the basis of broad, flexible design so that identification and design of subprojects can be done during implementation with full participation of beneficiaries	Short to medium term
	With limited local professionals, donors tend to compete for them and to use TA ineffectively	Need to share TA and local professionals preferably through co-financing that permits sharing of local staff and TA	Short to medium term
	There tends to be variation among donor projects in terms of applying key policies and principles of rural infrastructure particularly cost recovery, beneficiary participation and decentralization	To minimize inconsistent application of policies and principles and to economize on use of TA and local professionals, donors should channel their assistance through broad multi-sector programs that are regionally focused in order to save administration and supervision costs	Short to medium term
G. Performance Monitoring	Due to lack of monitoring, it has been difficult to know the state of infrastructure development and the effectiveness of government and donor interventions	Initiate the measuring and monitoring of key performance indicators to track key infrastructure developments such as national coverage, institutional development (no. of skilled staff), sector efficiency and sustainability (cost recovery levels, maintenance budgets and capacity utilization)	Short to medium term
H. Environmental and Social Impacts	Inadequate attention is paid to sustainability of rural infrastructure	1. Rural roads and irrigation projects ought to include environmental impact reviews and mitigation measures; and	Medium term

	2. Development of irrigation and water supply and sanitation ought to take an integrated approach to water resource management	Medium term
Institutional arrangements and capacities for environmental and social planning and implementation are not adequate	1. Need to establish common frameworks to deal with social (resettlement and ethnic minorities) and environmental issues for all rural infrastructure projects;	Medium term
	2. Need to strengthen STENO to perform its responsibilities for environmental policy and coordination; and	Medium term
	3. Need to consider assigning also to STENO responsibilities of coordinating policies and implementation of project-related resettlement	Medium term

1. PERFORMANCE RECORD, CHALLENGES AND STRATEGIC CHOICES

1.1 The underdeveloped state of rural infrastructure in Lao PDR is a major constraint to boosting rural economic growth and alleviating poverty for the majority of the population who live in rural areas. It is therefore clear that rural infrastructure development is a must if rural poverty is to be addressed in any significant way. Yet the development of rural infrastructure is a complex and costly business, and poses a great challenge to development planners and decision makers. This chapter reviews the current state of rural infrastructure, and the major issues that underly the identification of priority actions for its development. While the scope of rural infrastructure normally includes economic infrastructure such as transport, communications, power and irrigation facilities as well as social infrastructure such as schools, health, water supply and sanitation facilities, the scope of this report is limited to rural roads, irrigation, water supply and sanitation sectors.¹ The study has been confined to the three sectors of rural infrastructure because their development and sustainability would benefit from taking an integrated approach to the common critical elements of community participation and decentralization of development efforts to the local level.

A. METHODOLOGY, REVIEW, DISSEMINATION AND USE OF THE STUDY

1.2 The preparation of this report has involved five activities. First, a preliminary and main mission were conducted to undertake field investigations and identify key issues and options to address them. Second, a tripartite informal workshop involving Lao technical staff from central and provincial governments, NGOs and donors was conducted during the main mission to screen and prioritize issues and options. Third, the task team undertook a desk review of international experience and how this could be brought to bear in addressing issues of infrastructure development in Lao PDR. Fourth, this draft report was then written and reviewed within the World Bank. Fifth, another tripartite workshop involving government officials, NGOs and donors was held in November 1996 to discuss the key findings and recommendations of the report; thereafter, a draft of the report was discussed with GOL whose comments are reflected in this final draft. Sixth, copies of the final report are to be distributed to GOL and representatives of donors, including NGOs, in Lao PDR. And seventh, the report will be presented at the next donors' round table meeting for Lao PDR in 1997. It should be noted that the mission faced a serious problem of lack of data, especially in the area of rural roads, and had to rely significantly on its own field assessments and discussions with people involved in the development of rural infrastructure.

1.3 This report highlights priority areas for action in the development of rural infrastructure. It is hoped that it will provide an important input into the Government's efforts to prepare its own strategy and programs for rural infrastructure development. Also the report should be helpful to donors in planning their support for rural infrastructure.

¹ "Rural Roads" are loosely defined in this report as those roads, that served primarily rural development purposes, including village including district roads in some provincial roads.

B. CURRENT STATE OF RURAL INFRASTRUCTURE

General Background

1.4 Lao PDR is a landlocked country bordered by China, Vietnam, Cambodia, Thailand and Myanmar. In 1995, the country had a population of 4.6 million inhabitants, with 85 percent living in the rural area and mainly dependent on subsistence agriculture and forest products; its per capita income was nearly US\$320. Life expectancy at birth is estimated at 50 years and the infant mortality rate is 113-125 per 1,000 live births. The country has a very sparse network of main roads. Many of the country's villages have no access to this network. Accordingly, access to markets, schools and health facilities is limited. As of 1995, less than 50 percent and about 20 percent of the rural population had access to safe drinking water and sanitation, respectively, according to UNICEF's estimates.

1.5 Lao PDR is a highly heterogeneous country with over 100 ethnic groups classified under four major ethnolinguistic superstocks of Tai-Kadai, Hmong-Mien, Austroasiatic and Sino-Tibetan. For convenience, the Government of Lao PDR (GOL) has used the terms related to the three main agroecosystems to refer to the numerous groups since 1975--the lowland *Lao Loum* group who cultivate wetland rice; the upland *Lao Thoeng* who cultivate dryland rice; and the mountain-dwelling *Lao Soung* who practice shifting agriculture. The lowland Lao from the Tai Kadai stock comprise about 30-35 percent of the population and make up the dominant groups. In this report, the term 'ethnic minority' will refer to those groups who are not part of the lowland Lao.

1.6 Data from the Lao Expenditure and Consumption Survey (LECS) of 1992/93 indicate that the vast majority (96%) of the rural population either have land use rights or free access to land. However, the availability of lowland (best suited for production of rice--the staple food) is limited while the upland has increasingly deteriorated in quality. About three quarters of the population have access to dry land only, 6 percent cultivate irrigated land, 13 percent cultivate dry and irrigated land while 6 percent are not involved in agriculture.

Current Status of Rural Roads

1.7 The total length of the road network is approximately 14,700 km, of which 4,063 km (28%) are classified as national roads, 5,800 km (39%) as provincial roads and about 4,900 km (33%) as local and district roads. Even though the Ministry of Communications, Transport, Posts and Construction (MCTPC) and its provincial offices (PCTPCs) keep accurate inventories of the national and provincial road network, there is no inventory for district and local roads. Approximately a quarter of the national roads network has been rebuilt or improved. Provincial roads connect district centers to provincial capitals. Only 400 km of provincial roads are paved and the rest are gravel or earth surfaced. District and feeder roads connect communities to district centers or to provincial or national roads. The characteristics of district and feeder roads are diverse and range from simple earth tracks with no drainage that are rarely graded to tracks across rocky terrain which are not maintained and often bumpy, to engineered unpaved roads that are graded and periodically regravelled. They are in a very poor condition; drainage is inadequate, many bridges are missing or in poor condition and shoulders are not stable. Most of the provincial roads and almost all of district and feeder roads are not passable in the rainy season. While the state of underdevelopment of rural roads is a country-wide problem, it is more severe in the mountainous northern provinces of Phongsaly, Oudomsay, Luang Prabang, Xayabury and

Huaphanh. These provinces have lower road densities (in terms of national and provincial road coverage per capita and per unit area) than the lowland provinces in the central and southern regions of the country.

Current Status of Irrigation

1.8 As of 1995, there were an estimated 23,193 irrigation schemes, with a capacity to service about 150,000 ha, or about 20 percent of the country's 800,000 ha of annually cultivated land. Only 13,420 ha (out of a serviceable capacity of 25,830 ha) of land was irrigated during the dry season in 1995. Except in areas close to urban centers where some fruits and vegetables are produced during the dry season, irrigation is largely used to produce rice through the provision of supplementary water during the wet season. About 25 percent of national rice output is produced in the uplands through shifting cultivation (or slash and burn). Rice yields are generally low, ranging from 2 to 3 tons per ha under irrigation, and about half of that in upland rice. High yielding varieties (HYVs) of rice and improved inputs are only used in commercial rice production during the dry season (the country uses less than 10,000 tons of fertilizer a year) in which rice yields can exceed 3 tons per ha. The rest of rice production in the lowland and upland in the wet season is largely for subsistence consumption.

1.9 Ninety one (91) percent of annually irrigated lands are irrigated during the wet season while nearly 9 percent are irrigated during the dry season. Only 27,000 ha or 17 percent are located in the lowlands. By international standards, the irrigation schemes are small: only 6 have a service capacity of 1,000 ha or more and the largest scheme services only 4,500 ha. If the 6 large irrigation schemes are excluded, the average service capacity of the remaining schemes is less than 500 ha. The most numerous schemes are small dams (21,436 in total located mostly in the uplands) making up 92 percent of the total schemes but only 32 percent (or 49,731 ha) of the service area (see Table 1.1). The majority of the small dams are probably village-based, traditional diversion weirs, made of temporary brush or rock, with crude waterways that service an average land area of 2 ha. They need to be repaired or replaced frequently even within a single season.

Table 1.1 Potential Irrigated Area by Type of Irrigation in 1995

	Direct Diversion	Storage Reservoir	Pump Lift	Small Dams 1/	Total
Number	1,526	133	98	21,436	23,19
Irrigated Area (Ha)	70,920	11,334	23,409	49,731	155,39
Area Share (%)	46	7	15	32	10

Note: 1/ Includes traditional schemes.

Source: Department of Irrigation

1.10 Because of low technical efficiency and labor demands for frequent repairs posed by traditional weirs, their replacement by permanent weirs is being supported by the Government, NGOs and donors. This may involve replacement of several temporary weirs (along one river) by a permanent structure serving more than one village (community). In addition to covering several villages, the direct diversion schemes are designed as technical schemes, equipped with water

control at headworks and in canals, or as semi-technical systems that have only gated headworks but few canal control structures. There are over 1,500 direct diversion schemes serving an area of 70,920 ha or 46 percent of total irrigated area and averaging 46 ha each. Usually NGOs support the simpler, low cost small schemes whose upgrading do not disrupt the make-up of existing village-based water user organizations while donors support the larger more expensive multi-village schemes that often require the establishment of new multi-village water user organizations. The support by donors for such farmer-supported and managed schemes was initiated during the 1990s while donor support during the 1970s and 1980s was exclusively concentrated on the government-sponsored and managed irrigation schemes. These donor-supported government schemes were typically capital intensive, large reservoirs for storing water for use during the dry season, and pump irrigation schemes for pumping water, mainly from the rivers in the lowlands, for use during the wet and dry seasons. Until the early 1990s, the bulk of the public investment expenditures in irrigation went to supporting these schemes. As of 1995, there were 133 storage reservoir schemes servicing 11,334 ha or 7 percent of total irrigated area, and 100 pump-lift schemes servicing 23,409 ha or 15 percent of total irrigated area. Water is mainly lifted from rivers in the lowlands. Since 1992, a donor-supported government program has been assisting the organization, training and strengthening of water user organizations with the aim of transferring the management and ownership of these irrigation schemes to farmers. As of July 1996, no more than 10 irrigation schemes had been transferred to farmers to manage while none had been transferred to farmers for their ownership.

1.11 Except for traditional small irrigation schemes constructed, operated and maintained by farmers, most schemes are operating well below capacity mainly because of design and construction deficiencies, inadequate operation and maintenance, and also because a good number of them have not been completed, lacking tertiary canals for conveying water to farms.

Current Status of Water Supply and Sanitation

1.12 While accurate data on the coverage of rural water supply and sanitation is difficult to find, data provided by United Nations Children's Fund (UNICEF) for 1995 show a national coverage in the rural areas for safe water supply of 49.4 percent and 20 percent for sanitary latrines. Discussions with the Ministry of Health suggest that these figures are overestimated, and that the correct figures are more likely to be two thirds of these. Inaccuracy of data notwithstanding, it is clear that Lao PDR still has a low rural water supply and sanitation coverage and that the country would not be able to reach its goal of 80 percent coverage by the Year 2000. Nevertheless, a significant expansion in rural water supply and sanitation services has taken place from a low base in 1990 when, according to World Bank, only 25 percent and 8 percent of the rural population had access to safe drinking water and sanitation, respectively.² UNICEF, the major implementing agency in the country in rural water supply and sanitation, reports that during 1992-95 its installation program has provided access to safe water to about 12 percent of the population and sanitary latrines to over 3 percent of the population³. In the same four year period, UNICEF's rehabilitation program has expanded its overall coverage of water supply to 20 percent of the population⁴.

² See World Bank, 1994. World Development Report: Infrastructure for Development.

³ See UNICEF's 1995 Annual Report.

⁴ See SIDA's draft Evaluation Report of May 1995.

1.13 The coverage of water supply and sanitation has not only been low but also unevenly distributed. Services have tended to focus on the more accessible lowland provinces, particularly Vientiane, Champassack and Savannakhet. The less accessible highland areas with high concentrations of poor ethnic minorities have seen little development in water supply and sanitation.

C. IMPORTANCE OF RURAL INFRASTRUCTURE TO DEVELOPMENT

Links to Economic Growth

1.14 Rural infrastructure has both direct and indirect links to rural economic growth and welfare. Direct benefits come in various forms. First, there are employment opportunities created from road or irrigation construction and maintenance, particularly when labor-intensive methods are used. Second, by reducing transport costs, improvements in rural roads benefit villagers directly by lowering the costs of obtaining goods produced outside of the village. Similarly, such improvements open access to markets and lower the costs of marketing village-produced goods thereby increasing the returns from these goods. Third, irrigation has a direct effect on agricultural output and income by raising yields and allowing double cropping. For villages closer to towns and cities, dry season irrigation can offer opportunities to greatly boost incomes by growing high-value crops—primarily fruits and vegetables—for urban consumers. In addition, irrigation ponds are frequently used to raise fish and to water livestock in the dry season. And fourth, improved access to water supply provides opportunities for developing cottage industries and small scale food processing activities that require water.

1.15 Then there are the indirect benefits which often outweigh the direct ones. A reduction in transaction costs due to new or improved rural roads promotes a wide range of critically important supporting infrastructure and services—local markets for agricultural inputs and outputs, rural credit, agro-processing facilities (e.g., rice mills), education, and extension and health services. Together, these indirect benefits have a significant positive effect on agricultural output. In a frequently cited study of Indian districts by Binswanger, et. al,⁵ the elasticity of aggregate crop output with respect to changes in road density was estimated to be 0.2--nearly twice the short-run price elasticity. As for irrigation, the provision of reliable, controlled supplies of water, is a key factor in promoting the adoption of high yielding rice varieties (HYVs) and associated technical packages. Periodically inadequate or excessive water supplies and diseases may reduce yields of HYVs below those of traditional varieties. Since the advantages of “modern” rice varieties depend on secure water supplies, the share of rice area planted to HYVs is generally higher where reliable irrigation is prevalent.

1.16 There are also important indirect economic benefits from water supply and sanitation. Village water systems and latrines, properly designed and constructed, can bring substantial health benefits. In addition to the direct benefits of reduced mortality and morbidity, such health improvements add to available human resources and increase labor productivity.

⁵ Binswanger, Hans P., Shahidur R. Khandker and Mark R. Rosenzweig, “How Infrastructure and Financial Institutions Affect Agricultural Output and Investment in India,” *Journal of Development Economics*, 41:337-366, 1993.

Links to Food Security, Poverty Reduction, and Social and Environmental Development

1.17 The indirect benefits of rural infrastructure investments go beyond the more easily quantifiable enhancement of human resources and increases in labor productivity. Economic linkages already mentioned include positive effects on food security, poverty reduction, and many aspects of social development. In Lao PDR's particular context, two other areas that are considerably impacted by rural infrastructure are slash and burn agricultural practices and development of ethnic minorities.

1.18 **Slash-and-Burn**. It is estimated that about 300,000 households in Lao PDR—nearly half of all farm households—rely on slash-and-burn production methods, growing mostly rain-fed rice for family consumption.⁶ There are, in addition, many farm households that practice some slash-and-burn to supplement their cash incomes or household food supplies. The economic viability and ecological sustainability of slash-and-burn cultivation is rapidly breaking down under population pressure. Fallow periods have fallen from 12 years in 1981-82, to 8 years in 1989, and to 5.5 in 1992.⁷ With this decline in fallow periods comes a decline in soil fertility and, even more important, an increase in the amount of weeding necessary to maintain yields: from an average of under two weedings per season for long (greater than 12 years) fallows to 3-4 weedings per season for short (less than 5 years) fallows.

1.19 There are basically three approaches to dealing with this problem, and all three are represented in the Government's development program and spending priorities. The first approach is to foster marginal improvements in the productivity and sustainability of upland agriculture. This includes increased research and extension efforts to identify and promote a series of modifications in traditional methods to increase crop and livestock yields and reduce soil erosion and weeding requirements. The second approach is to increase the land under irrigation particularly in the mountain floor valleys. The third approach is to promote the growth of both farm and non-farm income-earning opportunities (e.g., livestock, fruit trees and handicrafts) as supplements to rice production in general and as alternatives to slash-and-burn in particular. The three approaches depend significantly on improvements in rural roads and irrigation.

1.20 **Ethnic Stratification**. Attempts to integrate rural communities into the economic and social life of the country are complicated by the particular form of ethnic stratification found in the region, in which culturally distinct groups have traditionally occupied different elevations, from valley floors to the tops of mountains (see para. 1.5). Given that two of the explicit objectives of GOL are to improve the living standards of ethnic minorities and increase their participation in the broader social life of the country, the relative isolation of rural communities is effectively the paramount barrier to achieving these goals. To achieve these goals, the role of rural infrastructure is obviously critical.

⁶ Chazee, Laurent, "Shifting Cultivation Practices in Laos: Present systems and their future", in Van Gansberghe, D. and R. Pals, (eds.) 1994, *Shifting Cultivation Systems and Rural Development in the Lao PDR. Report of the Nabong Agriculture College, Lao PDR, July 14-15, 1993*, Nabong Agriculture College Project UNDP/DDSMS/LAO/92/017, Vientiane.

⁷ Ibid. Most of the papers in the report give estimates of 3 to 5 years for various project areas in the early 1990s.

1.21 **Food Security.** A key concern of low-income farm households everywhere is food security, for which rural infrastructure can have a decisively positive impact; and in Lao PDR, the food security benefits of rural roads and irrigation should be high, since isolated regions tend to suffer the most severe food deficits and over 95 percent of the cultivated area is dependent on rainfall.⁸ Regionally, food deficits are most frequent in the mountainous north and in the remote southern province of Sekong. These areas have the greatest share of ethnic minorities and are more dependent on shifting cultivation.

1.22 **Impact on Health Standards and Welfare of Women.**

In Lao PDR, as in many other developing countries, the burden of fetching water for family consumption usually falls on women (and children). Village water supply projects have the potential to bring comparatively large benefits to women, allowing them to devote more time to raising children and tend home gardens thereby increasing food production

Box 1.1: Government's Eight Priority Programs for the 1996-2000 Development Plan

1. Infrastructure Development
2. Rural Development
3. Increasing Food Production
4. Promoting Production of Commodities
5. Reduction of Slash and Burn
6. Human Resource Development
7. Promoting Foreign Economic Relations
8. Development of Services

or cash income. In addition, they have a potential to enhance human resource capacities through improving health standards made available through provision of safe drinking water. Similarly, improved roads would give women access to health centers for services like child delivery and access to schools for girls.

Consistency of Rural Infrastructure Development with Development Policy

1.23 The development of rural infrastructure, as elaborated above, is consistent with and supports at least seven of the eight priority development programs of GOL which underpin the country's Socio-Economic Development Plan (1996-2000), namely: (i) increasing food production; (ii) promoting commodities production (commercial crops and livestock); (iii) reducing slash-and-burn reduction, (iv) promoting rural development; (v) infrastructure development; (vi) human resource development; and (vii) development of services (see Box 1.1).

Infrastructure Development Challenges

1.24 **Irrigation.** To achieve its rural development objectives, the Government has set ambitious targets for the expansion of irrigated wet season land from 150,000 ha in 1995 to 200,000 ha in 2000, and the increase of irrigated dry season land (design capacity) from 31,420 ha in 1995 to 50,000 ha by 2000. Achievement of these targets poses at least two major challenges. **First**, unlike in the past when much of the irrigation investment went into supporting government irrigation schemes that were supply-driven requiring just the provision of physical infrastructure, current government policy advocates development of farmer-managed irrigation schemes which are more complex to undertake as they require the organization of farmers into water user groups and recovering costs from beneficiaries. **Second**, while future irrigation development will involve

⁸ Lao/International Rice Research Institute (IRRI) Project, Annual Technical Report, 1994 (Vientiane, 1995).

schemes which are more complex to undertake as they require the organization of farmers into water user groups and recovering costs from beneficiaries. Second, while future irrigation development will involve expansion of irrigation capacity, improvement in capacity utilization will require significant resources to support the completion and rehabilitation of existing government-sponsored irrigation schemes and the transfer of their management and ownership to farmers. Third, the overall improvement in O&M of irrigation schemes will also take a substantial part of development effort.

1.25 **Rural Roads.** Unlike in the past when the program to develop infrastructure has focused on the development of hydropower and national highways, the Government has started to shift its priorities toward rural roads—in effect—provincial, district and village roads—in order to support its rural development program. Donors too have started to change their future assistance programs toward rural roads. In future, a major challenge would seem to be: (i) rehabilitation of the majority of rural roads that are in an unmaintainable condition; (ii) expansion of the rural roads network; and (iii) ensuring that the rehabilitated and new roads are maintained.

1.26 **Water Supply and Sanitation.** Water supply and sanitation are an important element of the rural development program, and the Government has ambitious plans to expand coverage of water supply to 80 percent by 2000. While significant achievements have been made in expanding coverage in the last five years (refer to para. 1.12), the challenge in the future will be developing and implementing a strategy that would improve funding and coordination in the establishment of water supply and sanitation facilities and would ensure effective O&M and environmental safeguards.

1.27 **Unexploded Ordinances (UXOs).** The presence and disposal of UXOs pose a significant cost and challenge to rural infrastructure development (see Box 1.2). The costs and benefits involved in clearing them must be considered in project planning and funding.

Box 1.2: Unexploded Ordinances: A Challenge to Infrastructure Development

From 1964 to 1973, over two (2) million tonnes of bombs and millions of anti-personnel bomblets were dropped on Lao PDR in all provinces except Vientiane Prefecture, Xayabury and Bokeo. The majority of these bombs and bomblets remain unexploded. These bombs have got an adverse impact on rural infrastructure development in at least two ways. First, they have made large areas of agricultural potential unexploited thereby reducing the potential benefits from the development of rural infrastructure, especially rural roads and irrigation. Second, the cost of removing and exploding them increases the overall cost of rural infrastructure development. It is therefore important that any strategy for the development of rural infrastructure takes into account the challenge posed by unexploded ordinances (UXOs) and the opportunities related to removing and exploding them. Responsibilities for UXOs are vested in the Ministry of Labor and Social Welfare. A National UXO Program was established and given financial autonomy; and a Steering Committee was established as well to manage a related Trust Fund, all under Decree No. 49/PM which was issued in February 1996 by the Prime Minister. A nation-wide socio-economic impact survey of UXOs was initiated in July 1996 and is expected to be completed and released by June 1997. The survey is expected to generate more accurate data on UXOs and their implications for development.

D. KEY ISSUES FOR RURAL INFRASTRUCTURE DEVELOPMENT

1.28 Given GOL objectives to develop rural infrastructure and the enormous needs and challenges to meet, this report will focus on addressing key issues and identifying priority areas for action in the development of rural infrastructure. The issues and priority actions will be built around four broad questions, namely: (i) are institutional arrangements, particularly decentralization and community participation, adequate?; (ii) is there adequate funding to meet the needs and is it demand-driven?; (iii) do beneficiaries have enough stake in infrastructure capital to give them a sense of commitment to its sustainability?; and (iv) are cost recovery policies and political incentives adequate to support good O&M?

2. INSTITUTIONAL ARRANGEMENTS FOR RURAL INFRASTRUCTURE PROVISION

2.1 Determining the correct institutional arrangements and obtaining quality performance from them are central to the development of rural infrastructure. Institutional arrangements range from competitive private markets on one end of the spectrum to the public sector on the other. The former are regarded as the most efficient while the latter is critical in ensuring that non-efficiency goals of society, such as the provision of rural infrastructure to the poor and other hard to reach groups including ethnic minorities, and preserving the environment, are met. Competitive markets give best solutions when one is dealing with goods of a private nature. When dealing with goods of a public nature, public sector arrangements increasingly become important. As rural infrastructure is a mix of public and private goods and since many societies would wish to pursue other goals over and above efficiency, the public sector must join hands with markets to deliver infrastructure that best serves society's goals.⁹

2.2 While the proposition that the public sector has a role to play in rural infrastructure provision is generally accepted, experience has demonstrated that central governments and their agencies are not well placed to play that role efficiently or effectively primarily because of its localized nature. Increasingly, decentralization has been tried and found to be successful in the provision of rural infrastructure in that it has provided a mechanism through which local governments and communities can determine their needs and take responsibility for allocating their resources accordingly. This chapter will review the scope and depth of decentralization which has been underway in Lao PDR, the changing roles of the various levels of government and their agencies, and their capacities to deliver rural infrastructure. In addition, it will review ways of enhancing synergy between public and non-public institutions in the provision of rural infrastructure.

A. DECENTRALIZATION AND THE EFFECTIVENESS OF THE PUBLIC SECTOR

2.3 In reviewing decentralization in the context of rural infrastructure provision, there are two key issues of interest. The first issue relates to the balance between fiscal (authority to raise and spend public resources), institutional (organizations and rules that govern them) and political decentralization. It is increasingly being recognized that successful decentralization hinges on striking the correct balance between these three. The second issue relates to the depth of decentralization and whether it is appropriately suited to each type of rural infrastructure. These issues will be reviewed in the context of each of the sectors of rural infrastructure. But before going into the sectors, a brief description of the administrative set up is necessary.

2.4 The People's Democratic Party is the supreme political organization while the national assembly is the supreme legislative organization that enacts laws and approves development plans and annual budgets, including taxes and other sources of government revenue. In addition to

⁹ Private goods can be identified from public goods by two characteristics: (i) consumption by one user reduces their availability to other users; and (ii) a user can be excluded from consuming them. Public goods on the other hand share the opposite characteristics: (i) consumption by one user does not reduce the availability to other users; and (ii) no user can be excluded from consuming them. According to this definition, small scale irrigation, water supply and sanitation, and minor rural roads contain more characteristics of private goods while large irrigation schemes and major rural roads share more characteristics of public goods.

these two central level organizations, there is the administrative arm of government—the central government—with central ministries and agencies which are charged with the responsibility of bringing about the economic and social development of the country. The country is organized into 16 provinces, one Special Zone and the Vientiane Municipality (the capital). Below the provinces are 133 districts, and below the districts are 11,640 villages, as of 1995. The central government is administered by a Prime Minister whose office is assisted by a Cabinet of ministers. Each minister heads a ministry which is represented by a Department at the provinces and a section at the districts. Provincial and district staff are administratively answerable to their respective governors but, on technical matters, they report to their respective ministries. Provincial governors whose political status is equivalent to that of cabinet ministers report directly to the prime minister who is responsible for hiring and firing them. Villages are administered by village chiefs who are assisted by various committees whose responsibilities include dealing with economic and social issues. It is important to appreciate that villages are administrative units but with no government-paid staff. Nevertheless, the villages are organizationally geared to undertaking additional functions including economic and social development.

Decentralization in the Irrigation Sector

2.5 Decisions concerning planning and financing of irrigation are made from the central government level while implementation takes place at the local level, mainly at the district level for projects confined within one district, or at provincial level for projects which cover more than one district. Traditional irrigation systems are carried out in their entirety at the village level, by the concerned community. The setting of technical standards and quality control are exercised from the central level by the Department of Irrigation (of the Ministry of Agriculture and Forestry) which also provides technical support and training. The Department of Irrigation (DOI) and many of its provincial offices have Survey and Design Units which are in the process of privatization. The provincial offices also have irrigation construction companies which are also in the process of privatization. Community organization and support are important responsibilities of provincial and district irrigation offices and are crucial to farmer participation, in irrigation development, through water user organizations (WUOs) that were initiated in 1991. WUOs, which are relatively young and in need of strengthening, have responsibilities for generating project requests, contributing to the funding of construction and operation and maintenance (O&M) of irrigation schemes.

2.6 Within the irrigation sector, there seems to be a correct balance between fiscal, institutional and political decentralization; in addition, the depth of decentralization is adequate to support irrigation development. There is a bottom-up approach to planning, and a requirement that funding approvals for new irrigation schemes be subjected to a commitment by beneficiaries to the participation in the construction, operation and maintenance of the schemes. The organizational set-up, the decision making process and the funding mechanisms permit beneficiary communities to participate in the planning and funding of construction and in the funding and management O&M of irrigation schemes. A constraint to the success of decentralization is a lack of institutional and human resource capacity, including shortages of professional staff and skills, particularly in the mountainous provinces with ethnic minorities.

Decentralization in the Water Supply and Sanitation Sector

2.7 Like in the irrigation sector, the decentralization process in the water supply and sanitation sector has passed on responsibilities for design and implementation to the local levels of

government (provinces and districts), while decisions concerning planning, financing, technical standards and quality control are taken at central government level. The center and, to some limited extent, the province provide the required technical support and training. The villages are responsible for generating and forwarding service requests as well as contributing toward construction funding of the facilities and their full O&M. At the center, the National Water Supply and Environmental Health Program or Nam Saat, part of the National Institute of Hygiene and Epidemiology of the Ministry of Health, has the lead responsibility for water supply, sanitation and environmental health activities in the rural areas. At the provincial level, there are Nam Saat sections, and nearly all districts have only one technician each who is often responsible for other activities besides water supply and sanitation. There are no government staff at the village level; there are only unpaid village volunteers.

2.8 The depth and scope of decentralization are adequate to support the provision of water supply and sanitation infrastructure. Like irrigation, the constraint to successful decentralization is a lack of professional staff and skills required to support the delivery of services. The lack of human resource capacity is most severe in the mountainous provinces. A related constraint is lack of formal community organizations to represent water users. What exists are informal unregistered water user groups structured within the village organization. Establishment and strengthening of formal water user organizations would require strengthening the capacity of districts and provinces to provide the required support in terms of user mobilization and training.

Decentralization in the Rural Roads Sector

2.9 Within the rural roads sector, decentralization is limited in terms of scope and depth compared to the other two sectors. This is justified from two points of view. First, as rural roads, particularly the provincial and district roads, serve many people, decentralization to the village level could be irrelevant and unnecessarily costly. Second, securing the commitment of users to the maintenance and sustainability of rural roads is not as critical as it is for the other two sectors since rural roads are largely a public good. However, lack of decentralization, particularly fiscal decentralization, is a source of concern especially in the context of getting a solution for the poor road maintenance (see para. 2.11 below).

2.10 At central government level, there is no agency with specific responsibility for non-national roads, that is, provincial, district and village roads (non-trunk roads). The Ministry of Communications, Transport, Posts and Construction (MCTPC) has responsibility for the construction and maintenance of only national roads. The responsibility for rural roads has been with the provinces and districts. Provincial Departments of Communication, Transport, Posts and Construction Office (CTPC) are responsible for the construction, repair, rehabilitation and maintenance of those roads within their provinces while district CTPC offices are responsible for district roads. However, as the districts do not possess the required capacity to carry out analytical, administrative and operational functions, they rely on technical support from the provinces.

2.11 A key issue is that, while responsibilities for rural roads are decentralized to the provinces and districts, decisions on budget allocation are not: budget allocations for construction and maintenance are made from the center on the basis of requests made by provinces. The budget allocations are not linked to any local effort. As funding is neither linked to local demand nor to the capacity of local governments to maintain roads, the non-trunk roads that were built have neither been maintained nor sustained. Often, the funds allocated by the central government to

maintain non-trunk roads are diverted to supporting the extension of the local road network. Clearly, there is a need to revisit the allocation of responsibilities and funding for rural roads to ensure clear accountability for and a stake in the development of roads. Provincial and district authorities would need authority to allocate public expenditures for rural roads, especially for maintenance; in return, a mechanism would need to be developed to hold them accountable. There is, however, need for further study before action is taken as there is lack of clarity on the scope of fiscal authority currently enjoyed by local authorities.

2.12 Apart from provincial CTPCs, there are other government line agencies involved in the planning, financing and implementation of rural roads where development projects in their sectors require such investments. For example, MAF, particularly its irrigation and forestry departments, administers investment programs that frequently include building or improving roads. These non-road line agencies are not staffed or equipped to undertake the necessary work, and often contract implementation through provincial CTPCs. Once construction is complete, responsibility for maintenance is usually transferred to the relevant provincial CTPCs or districts. There are two problems related to the sustainability of the roads sponsored by non-road line agencies. First, as the provincial CTPCs are not involved in the planning, design or financing of these roads, they lack incentives to maintain them. Second, the planning and construction of these roads are not coordinated with those for other roads that fall under the responsibility of the provincial and district authorities. There is therefore a need for developing a central level unit, preferably in MCTPC, to coordinate the development efforts of various agencies that deal with non-trunk roads.

Need for Coordination Within and Across Sectors

2.13 Within the rural roads sector, the need for coordination among agencies dealing with roads has already been highlighted. Within other sectors, horizontal coordination or linkage is not only necessary but inevitable. For example, unless the various WUOs in the irrigation sector associate to form a larger organization or collectively contract a private company to carry out maintenance of headworks and primary canals, they cannot maintain them individually as they cannot manage the technical complexity of those works. Across sectors, horizontal coordination and/or linking is also necessary, at least during planning. For example, the development of irrigation schemes often includes the development of feeder roads as part of the package. There is therefore a need for coordination across sectors. However, institutional arrangements suited to each situation need to be developed as there is no single institutional arrangement that can fit all situations. Nevertheless, within the existing organizational set-up, the State Planning Committee at the Center and its Planning Departments and Sections in the provinces and districts, respectively, would seem to be best suited to play a coordinating role in rural infrastructure development, at least in planning. But they would need to be significantly strengthened in order to play such a role.

Need to Build Capacity

2.14 In the above review, institutional and human resource weaknesses have been found to be a constraint to public sector performance in the development of rural infrastructure. A key institutional weakness has been a lack of coordination; this has been addressed in the previous paragraph. In the area of human resources, the key problems are: (i) inadequate professional staff especially in districts and provinces with ethnic minorities; and (ii) lack of necessary skills, knowledge, experience and incentives to support development of rural infrastructure. A four-

pronged approach should be considered to overcome human resource weaknesses, namely: (i) selected increases in staff numbers and upgrading of skills; (ii) providing appropriate incentives and a conducive environment for staff performance; (iii) improving the quality and the range of training programs; and (iv) improving the effectiveness of technical assistance.

2.15 While there is a shortage of professional staff in all sectors and at different levels, decentralization has changed the patterns of demand for staff such that, at the center, there is demand for staff who can deal with policy and technical coordination while the provinces would need staff that can undertake project planning including the application of participatory and community-based approaches, design, procurement planning and contract management and supervision. The additional staff required at the districts would be those that: can work with villagers in mobilizing and assisting them to assess and prioritize their own infrastructure needs; are capable to work with ethnic minorities; and can address gender issues. Hence, there is a need for selected increases in professional staff in areas where they are critically needed, particularly in the mountainous provinces; there is also a need to provide appropriate incentives and language and cultural training to those staff assigned in the areas of ethnic minorities to enable them to perform effectively. An increase in staff in the mountainous areas would obviously mean a reduction of staff in the lowland areas as there is a national shortage of skilled staff. In addition to improving the use of local skilled staff, there is an urgent need to improve the performance of technical assistance (TA) which has been ineffective in transferring skills and know-how partly because of language communication difficulties, lack of suitable counterparts and difficulties in attracting high quality experts to work in rural areas. To improve the performance of TA, it is important that TA be planned for in advance, including hiring the right expertise, making adequate arrangements for language training, preparing clear terms of reference and appointing counterparts to work with the TA. It is also important for donors to share TA, instead of duplicating it. In addition to delivering specific outputs (like project implementation or completion of studies), TA should be specifically required to transfer technology and knowledge; this should be made an important part of TA performance criteria.

2.16 In addition to the short term measures proposed above, there is a need to upgrade skills and knowledge, and train in modern techniques and systems as well as in participatory and community-based approaches. Both the roads and irrigation sectors have reasonably good local training institutions (the Communications Training Center and Thad Thong Irrigation School, respectively) but their training programs need to be improved and expanded to meet the skill demands of the sectors. The required expansion and improvement of the training programs ought to be based on clearly articulated human resource development strategies that are based on estimates of demand and supply of human resources for rural infrastructure development. The strategies should consider what training requirements can be undertaken within the country and the balance that can best be provided from overseas.

Need for Appropriate Design Standards and their Application

2.17 In rural infrastructure, there are problems with infrastructure design: either the standards are too high (like in rural roads), there are no design standards (water supply and sanitation) or existing designs are often improperly applied either due to lack of design data and/or lack of experience (in the irrigation sector). In rural roads, the current standards contained in a Manual produced by MCTPC in 1993 -- Road Design Manuals and Technical Standards, 1993 -- are too high and need to be lowered. An International Labor Organization/Deutsche Gesellschaft fuer

Technische Zusammenarbeit (ILO/GTZ) labor-based pilot project in Oudomsay and Savannakhet provinces has demonstrated that reduced technical standards may be technically adequate, cost-effective and adaptable to specific area needs. The conclusion reached is that, in many or most of the rural areas in the country, a reasonable number of local labor can be recruited during the non-agricultural season to construct and maintain rural roads by increasing the mix of labor to 50 percent. In addition to being an efficient approach to road construction, the use of labor intensive technologies would be important in providing employment income to people who would otherwise be unemployed during the non-agricultural season. There is therefore a strong case in support of reducing standards of road design to accommodate labor-intensive technologies. As for the design problems in the irrigation sector, they are best addressed through capacity building efforts (see the previous section).

B. THE ROLE OF NON-PUBLIC ORGANIZATIONS IN INFRASTRUCTURE PROVISION

2.18 While considering various institutional arrangements for delivering rural infrastructure, it is critical to look beyond the public sector for two reasons. First, in as far as competitive markets are feasible or can be simulated, non-public organizations should be the first choice in the delivery of rural infrastructure as they represent the most efficient mechanism (see para. 2.1 above). There is unexplored potential for irrigation and water supply development through direct private investment. Second, the review of decentralization has shown that there is weak institutional and human resource capacity at central and local levels of government. While efforts at capacity building including training and technical assistance can alleviate the problem in the long run, in the short term a way to alleviate the problem is to maximize the use of Non-Government Organizations and the private sector.

Increasing the Role of Non-Government Organizations in Infrastructure Provision

2.19 Non-Government Organizations (NGOs) have already proven their effectiveness in the development of rural infrastructure in Lao PDR. In irrigation, water supply and sanitation sectors in particular, there are at least 25 NGOs involved in sector development, through provision of financing and/or technical assistance. There is a need to coordinate their activities with those supported by other donors and GOL so as to further increase their effectiveness and to also ensure consistency in approach among all the providers of infrastructure. There is also a need to tap more into the resources of NGOs, particularly the strong organizational representation at grass root level, so as to support development of beneficiary organizations and implementation of projects. A notable NGO with a strong grass-root presence is the Lao Women's Union (LWU). While it is already involved significantly, particularly in the water supply and sanitation sectors, it could be made to play even a greater role particularly in the organization and strengthening of beneficiary communities not only in the water supply and sanitation sectors but increasingly in the irrigation and rural roads sectors. Other local NGOs, including churches, should be identified, encouraged and supported to play a greater role in the development of rural infrastructure.

Increasing the Role of and Promoting the Private Construction Industry

2.20 The private sector is already playing a role in the development of rural infrastructure particularly in the construction of water supply and sanitation facilities, rural roads and small irrigation schemes. But on the whole, the private sector is small, very weak and in need of promotion. The local construction industry is still dominated by ex-state-owned or province-owned construction companies which are at various stages of privatization. The weak financial

base of these companies jeopardizes their survival in an environment of delayed payments, which are very common in contracts with government that provide them with most of the jobs. The companies are also unable to recruit suitable staff (if available) as their conditions of employment are required to follow civil service regulations. Clearly, the process of privatization should be accelerated in order to increase the competitive potential of these companies while also opening the way for private local companies to enter the market.

2.21 In addition to the state-owned companies, there are a few local private companies in many but not all provinces which, while they do small works in roads, are mainly engaged in construction of buildings. A recent study completed by the Asian Development Bank (ADB) in the roads sector concluded that the contracting capacity is small and weak. Local engineering organizations suffer from a shortage of skilled personnel required to draw up technical specifications and supervise their enforcement, prepare cost estimates and bids, and manage the contracts. The construction industry also suffers from a shortage of capital and, consequently, it is forced to use old equipment and sub-standard materials, and to hire uncompetitive technicians and managers. The local construction industry in irrigation is in a similar state. As for water supply and sanitation, the local construction industry is even much smaller, as the sector is in its infant stage and currently civil works are being largely implemented by force account.

2.22 Clearly, the local construction industry is in need of upgrading, and GOL must provide assistance in this activity. GOL has already adopted two policies which, if implemented, would assist the industry. The first policy is the privatization of state enterprises which is on-going. According to a recent review by the World Bank, there would be efficiency benefits to reap from extending the privatization program to cover all the state enterprises (except the strategic ones), including those in the construction industry¹⁰; privatization of the latter should be accelerated in order to permit them to compete freely while also enabling private companies to compete on an equal basis. In addition, the Decree on Government Procurement of Goods, Construction, Repairs and Services (Decree No. 95/PM of December 5, 1995) should be implemented as a priority to ensure that major public works are procured by contracts (not by force account). This would increase business opportunities for the local private industry and eliminate discrimination against non-state companies. In addition to these two measures, GOL with donor support, should provide to private contractors and to privatized state-owned companies training in essential skills. The training should focus on cost estimates, state of the art-construction techniques, contract administration, construction specifications and standards, quantity and quality control and accounting. It should be combined with a strategy of increasing access of the small contractors to bigger and better equipment and credit which at present are major constraints to their performance. Such a strategy could include the formation of equipment pools for lease by contractors and/or encouragement of formation of joint ventures with foreign firms.

¹⁰ See World Bank, August 1996. Lao PDR: Public Expenditure Review, draft economic report. Volume 2, chapter 14.

3. PLANNING AND FINANCING OF RURAL INFRASTRUCTURE

3.1 Past experience in Lao PDR and elsewhere indicates that, for development of rural infrastructure to be successful, it is necessary that: beneficiaries be involved in its planning, design and implementation, and have a real stake in it; provision of infrastructure is demand-driven; and there is adequate funding to meet high demands for investment, operation and maintenance. This chapter reviews the challenges the country faces in meeting these principles and the opportunities that can be seized to meet them.

A. PARTICIPATION OF BENEFICIARIES AND LOCAL COMMUNITIES

3.2 The participation of beneficiaries is central to the effective delivery of rural infrastructure. Reviews of past projects in agriculture and rural development funded by the World Bank and United States Agency for International Development (USAID) during the 1970s and 1980s found that participation by beneficiaries and grass-roots institutions was a key factor in those projects' long term success, particularly in the maintenance of facilities.¹¹ For participation to be successful, beneficiaries must be involved in decision making related to planning, design, implementation, operation and maintenance of rural infrastructure. They must also contribute in kind or cash at such a scale as to gain a sense of ownership of the infrastructure and a commitment to operating and maintaining it.

3.3 Experience in beneficiary and community participation in Lao PDR's rural infrastructure has shown mixed results: in the irrigation and water supply and sanitation sectors, it is now the basis for developing new projects although the policy was initiated only in the 1990s. In the rural roads sector, participation is the exception rather than the rule. Below is a record for each sector in beneficiary participation.

Community Organization for Participation

3.4 **The Irrigation Sector.** Promotion of beneficiary participation in irrigation development did not become policy until the 1990s. This is in spite of the fact that, for centuries, many farmers had always worked together in informal water user organizations (WUOs), to construct, operate and maintain traditional diversion weirs without any assistance from anybody (Box 3.1). In 1991, GOL changed its irrigation policy from supporting government-owned and managed irrigation schemes to promoting those schemes that are farmer-owned and managed. In 1992, programs supported by the Mekong River Commission and the Japanese International Cooperation Agency (JICA) were launched to organize, train and enable farmers to take over the management and, ultimately, the ownership of the irrigation schemes that GOL had previously sponsored. To facilitate the formation of WUOs, the Minister of Agriculture and Forestry (MAF) issued in 1993 a regulation (No. 593 of July 25, 1993) providing for beneficiary participation in decision making and in financing of construction and maintenance of irrigation schemes. Accordingly, MAF established at national and local levels organizational units to organize farmers into WUOs and provide them with the required training. While information is unavailable on how many formal WUOs have been formed, indications are that new irrigation schemes that have been initiated in

¹¹ World Bank, 1994. Op. cit.

the 1990s involve the formation of WUOs to manage and own them; furthermore, GOL's program of transferring irrigation schemes to water user organizations had transferred at least 9 irrigation schemes as of July 1996. Most of these WUOs are concentrated in the lowland provinces.

Box 3.1: Traditional Farmer-Built Irrigation Schemes: Full Participation

More than 20,000 of the 23,193 irrigation schemes in Lao PDR are small, covering an average service area as low as 0.3 ha (in Saravanne province) and as high as 57 ha (in Sekong province). The bulk of these schemes were built entirely by farmers who have operated and maintained them without any assistance from outside the community. The great advantage of these schemes is that, being built, operated and maintained by farmers themselves, they are sustainable; the tradition has been in existence for centuries. However, there are at least two problems. The first is that the diversion weirs are actually temporary structures that are frequently damaged or totally washed away by recurring floods; some communities reportedly have to replace the weirs and headworks as often as 10-15 times during a single rainy season, and hence they are time consuming. The second problem is that the streams from which water is diverted in the uplands have mostly small catchments at the point of diversion and, as a result, have small water discharges during the dry season. Without water storage facilities, the potential for increasing agricultural production is limited to the wet season. Because of these problems, programs supported by donors, NGOs and the Government have been underway to upgrade them.

3.5 There are two key issues related to community organization in the irrigation sector. First, there has been no legislative action to legalize existing or new water user organizations; current WUOs have been established on the basis of a Memorandum of Understanding and by-laws approved by village, district and provincial authorities and DOI but are not legally recognized. As such, they cannot enter into contracts. This causes problems particularly with respect to borrowing funds from banks (except under the joint liability group-lending scheme) and entering into ownership arrangements with GOL for those irrigation schemes that are intended to be handed over to farmers. As there is a water law being considered, provisions should be built into it to give the required legal framework for establishing and strengthening WUOs. Second, there is inadequate support from MAF to organize and train WUOs so as to make them efficient and effective managers of irrigation schemes. There is a need for adequate staffing of the relevant MAF units (at central and local level) and providing them with resources to enable them fulfill their functions.

3.6 **The Water Supply and Sanitation Sector**. There are no formal organizations of beneficiaries in the water supply and sanitation sector. However, the village which is an administrative but multi-purpose organization, is often used as a basis to organize WUOs which are required to be in place before GOL and donors provide support for construction of water supply and sanitation facilities. In addition, the Lao Women Union which is a nation-wide mass organization representing women, plays an important role, as an advocacy group, in bringing together providers of water supply and sanitation facilities and potential beneficiaries. The WUOs are required to appoint two of its members as volunteer water caretakers who are made responsible to fix the water facilities or arrange for maintenance when they fail to operate. One drawback is that these WUOs, like those in the irrigation sector, are neither registered nor do they

carry legal recognition as owners and managers of water supply and sanitation facilities. They also lack adequate support in terms of training.

3.7 The Rural Roads Sector There are no specialized community organizations representing beneficiaries in the rural roads sector. However, villages have at times acted as beneficiary representatives in some instances. For example, there are reported cases where villages have received from GOL tools and equipment as well as technical support to build minor village roads using their own labor and local materials. Similarly, under an ILO/GTZ Pilot Project in Oudomsay and Savannakhet provinces, villages have been contracted to maintain roads for a fee, under the so-called lengthman system. However, these cases of community participation in rural roads development are few and apart. The common approach of planning, construction and maintenance of rural roads is to use the government road organizational agencies at provincial and district levels, and not the communities: it is a largely supply-driven approach. Institutional mechanisms of involving communities in rural roads development are still elusive.

B. DEVELOPMENT NEEDS AND FUNDING REQUIREMENTS

3.8 The Rural Roads Sector Clearly, the needs for rural roads development and the financing requirements to meet them are enormous and varied. While the status of underdevelopment of rural roads is a country-wide problem, it is more severe in the mountainous northern provinces of Phongsaly, Oudomsay, Luang Prabang, Xayabury and Huaphanh as these provinces have lower road densities compared to the lowland provinces in the central and southern regions of the country (see para. 1.7). The needs range from the development of provincial roads to the development of village and district roads. In provinces like Phongsaly and Huaphanh, the most immediate need is the building of roads to connect the isolated provinces to the main road network. As the network of non-trunk roads (some provincial, and all district and village roads) in the country is small and in an unmaintainable state, the needs also include reconstruction of roads to a maintainable state and extension of the network to reach isolated districts and major villages.

3.9 The funding requirements for reconstruction alone amount to US\$107 million (see para. 4.3); the requirements for new construction is a much higher multiple of that. To meet funding requirements, GOL has included in its PIP US\$102 million for feeder roads for 1996-2000, or an average of about US\$20 million per year compared US\$2.0 million provided for feeder roads in 1994/95 (see Table 3.2). There are at least two problems related to financing and implementation of the rural roads program. First, the PIP allocated for rural roads for the next five years is only just about enough to complete the backlog of rehabilitation requirements (see para. 4.3), leaving no resources to support expansion of the network. As public funding is inadequate to meet all requirements for reconstruction and new construction, it is necessary to work out a road development program that reflects a mix of reconstruction and new construction that can generate the highest internal rate of return for the country. Second, the annual increase in the PIP for rural roads represents a 10 fold increase in the next five years compared to 1994/95, posing a challenge to the implementation capacity. It also represents a large increase in public funding for rural roads made possible by reducing the share of national and provincial roads in the total PIP for roads from 95% in 1994/95 to about two thirds in the year 2,000. The increased share of investments in access roads is necessary to increase the economic returns from the existing stock of trunk roads. The challenge to implementation capacity becomes clearer if one looks more closely at the volume of roads to be built. Assuming a km of a rural road costs US\$30,000 to construct (based on the experience in the region), the planned US\$102 million would be enough to construct 3,400 km of rural roads over five years, or an average of 680 km of roads per year compared to less than 100 km built in 1994/95. As rehabilitation costs are lower than the costs of new construction, the volume of roads that can be undertaken with the US\$102 million PIP would be even significantly higher (see para. 4.3). It is therefore clear that implementation capacity must be boosted if the rural roads investment program is to be completed.

Table 3.1. Public Investment Expenditures, 1991-95

Fiscal Year Ending:	1991	1992	1993	1994	1995
	(million \$US: avg. exchange rates)				
Total Investment	89.3	121.7	143.5	164.0	230.7
Roads	37.0	41.3	47.3	55.7	68.3
National	30.5	38.4	43.7	46.7	50.1
Provincial	5.4	2.7	3.4	8.6	17.9
Irrigation	5.9	8.8	25.0	12.1	5.7

Sources: MCTPC, MAF and CPC.

3.10 **The Irrigation Sector.** Given the underdeveloped nature of irrigation and the available irrigation potential, the development needs for irrigation are great (see paras. 1.8-1.11). There is a need to rehabilitate many state-sponsored irrigation schemes which are now in an unmaintainable state. In addition, there is significant unmet irrigation potential in the lowlands of Lao PDR as well as significant scope in expanding small scale irrigation in the mountain valleys of the highland provinces. However, given the complexity of organizing and strengthening water user organizations that must precede major investments in irrigation, the development of irrigation must necessarily take time.

Table 3.2. Public Investment Expenditures, 1996-2000

Fiscal Year Ending:	1996	1997	1998	1999	2000
	(million \$US: 1 \$US = 920 kip)				
Total Investment *	180.3	210.1	240.6	270.8	291.3
Total Roads	60.2	66.0	75.7	92.5	93.5
Feed roads	9.0	14.0	20.0	27.0	32.0
Road maintenance **	3.2	4.0	5.2	6.5	6.5
Irrigation	10.0	13.4	15.2	15.0	15.0

Sources: CPC, PIP for 1994-2000.

* Excluding hydropower.

** This is for national and provincial roads and bridges.

3.11 Funding requirements for reconstruction is estimated to be US\$20 million (see para. 4.5). This can be easily met from the PIP of US\$69 million for 1996-2000, leaving US\$49 million

to support development of new irrigation schemes. GOL's PIP allocation for irrigation as a share of total PIP for agriculture has been declining gradually from a high of about two thirds during the second half of the 1980s to nearly 29 percent planned for 1996-2000. Nevertheless, the PIP allocation for irrigation during 1996-2000 represents a 20 percent increase over the PIP for 1991-95 (see tables 3.1 and 3.2). Given the difficulties of organizing WUOs which, unlike before 1991, must constitute the basis for irrigation development, absorption of the planned PIP for irrigation poses a challenge in terms of absorption capacity.

3.12 **The Water Supply and Sanitation Sector**. Development needs for the water supply and sanitation are also great if the country is to attain its goal of expanding national coverage of safe drinking water from less than 50 percent in 1995 to 80 percent by 2,000. Investments in the sector must redress the uneven distribution of services which have tended to be focused in the accessible lowland provinces, particularly Vientiane, Champassack and Savannakhet. The greater development needs are in the less accessible highland areas which also have high concentrations of poor ethnic minorities.

Table 3.3. Contributions for Rural Water Supply and Sanitation Projects in 1995

Source of Contribution	Contribution (US\$)1/	Contribution (%)
Community	231,943	8
Government Budget	18,897	1
External Support	2,688,931	91

Note: 1/ The exchange rate used in currency conversion is US\$1 to Kip 920.

Source: Report of the Water Supply and Environmental Health Program for 1994-1995, Nam Saat, November 1995.

3.13 Due to lack of data, estimates of public investments in water supply and sanitation are unavailable. However, to achieve GOL targets of providing safe drinking water to 80 percent of the rural population by the year 2,000, annual public investment would have to be much in excess of US\$2.7 million that was spent in 1995 (table 3.3). We estimate that a doubling of annual public investment to US\$ 5.4 million would be required; this would amount to a PIP of US\$27.0 million during 1996-2000.

C. BENEFICIARY FINANCING AND COST RECOVERY POLICIES AND PRACTICES

3.14 **The Irrigation Sector.** Until 1991, the record of beneficiary participation and cost recovery in the Lao PDR's irrigation sector was poor; but it has been improving since then. While there is a long tradition of farmers engaging independently in irrigation development and meeting the full cost of construction and maintenance of traditional diversion weirs (see Box 3.1), all government-sponsored and donor-funded irrigation projects before 1991 did not involve farmers nor did they require any contributions from beneficiaries (see para. 3.4). In 1991 GOL initiated a policy, requiring new investments in irrigation to go into farmer-managed and owned irrigation schemes. Under the policy, the government supports construction while water user groups take full responsibility for O&M and partial responsibility for funding of capital costs, primarily through contributions of free labor and local materials. In July 1993, a regulation (No. 593/MAF) was issued by the Minister of Agriculture and Forestry laying out detailed guidelines for beneficiary contributions and cost recovery consistent with this policy.

3.15 According to the regulation, beneficiary communities of a small scale irrigation project are required to meet all the capital costs in terms of land (for construction of headworks and canals), local construction materials and cash of not less than 70 percent project expenditures; the balance -- up to 30 percent -- is supposed to be funded by GOL or through bank loans and recovered from beneficiaries through user fees.¹² For irrigation schemes that are larger than small scale, the regulation provides for beneficiary contributions of land, labor, local construction materials and some financial support but does not specify the amount of that financial support. While these guidelines provide a mechanism to guide beneficiary contributions before and during the investment phase, there are neither guidelines nor mechanisms in place to support the recovery of capital costs from beneficiaries after the investment phase.

3.16 The regulation contains also guidelines for WUOs to follow in setting water user fees (see Box 3.2) required to finance operation and maintenance costs.

3.17 How have the guidelines for beneficiary contributions and water user fees been applied and how adequate are they? Let us start with the guidelines for beneficiary contributions. The extent to which the guidelines have been complied with is unclear as there is no firm data

Box 3.2: Irrigation Water Fees (Kip)

Reservoir	0.43-0.45/m ³ or 5,000-10,000/ha/season
Weir (dam)	0.35-0.40/m ³ or 3,500-5000/ha/season
Electric pumps	1.01/m ³ or 12,000-20,000/ha/season
Diesel pumps	1.5-2.5/m ³ or 25,000-50,000/ha/season

Source: MAF Regulation No. 593 of July 25, 1993.

to assess the experience so far. However, results from a Small Scale Irrigation Project in Luang Namtha which was supported by the United Nations Capital Development Fund (UNCDF) and completed in 1995 indicate that beneficiary contributions to 8 irrigation schemes ranged from 2 percent to 46 percent of the project's construction costs, including labor and materials (see Table

¹² The regulation defines a small scale irrigation scheme as having irrigated areas of 30-100 ha and construction budgets of 30-100 million kips; a scheme with less than 30 ha and construction budgets of less than 30 million kips is a people's or family irrigation system; a medium scale irrigation scheme is one having 100-1,000 ha of irrigation area and construction budgets of 100-500 million kips while any scheme with a larger irrigation area and higher construction budgets than these is defined as a large scale irrigation scheme.

3.4). Clearly, this was a significant effort from beneficiaries when compared to the period before 1991 but falls short of the high levels of contributions that are required by the regulation. It is important to note, however, that beneficiaries have not been paying capital costs through user fees since they have been set at a level that is aimed at covering only the costs of O&M (see paras. 3.18 and 3.19).

Table 3.4. Unit Costs and Farmer Contributions to Construction of Irrigation Schemes in Luang Namtha Province Supported by UNCDF and Completed in 1995

Name	Type of Work	Unit Cost (\$/Ha)	Farmers' Contribution (%) ^{1/}
Nam Tiu	Reinf. conc. weir	2,444	2
Nam Tiu 1	Gabion weir	101	34
Nam Tiu 2	Gabion weir	314	46
H. Makwa	Gabion weir	153	43
H. Dame	Gabion weir	184	32
Nam Lee	Gabion weir	117	20
Nam Yajung	Gabion weir	268	28
H. Hiem	Gabion weir	302	29

Notes: 1/ Farmers' contribution was mainly in kind (labor) at \$1/day

Source: Inventory of UNCDF Small Scale Irrigation Projects in Oudomsay and Luang Namtha Provinces, June 14, 1995.

3.18 Let us now review how the guidelines for water user fees have been applied and how adequate they have been. For small scale irrigation schemes that are largely of the gravity type, the common practice in terms of contributions to O&M is providing 25 kg of paddy per ha per year for the wet season crop -- about 3,000 kip-- (or 30 kg of paddy -- about 3,600 kip -- for the dry season crop) plus labor and local materials. For well built and maintained schemes, the contribution could be adequate to cover all the costs of O&M. For the more costly schemes however, the contribution would be inadequate. For example, experience under the IDA-supported Upland Agricultural Development Project would indicate that O&M costs are in the range of US\$20 equivalent for the gravity-type small irrigation schemes. To cover these costs, the water user fees, set in the 1993 regulation, would need to be increased by about four times (assuming they include the cost of labor and materials), in order to fully cover the costs of O&M.

3.19 For the medium and large scale irrigation schemes, experience with cost recovery and O&M relates only to the government-owned irrigation schemes which were initiated or completed before 1991. All of them are pump-lift irrigation schemes, powered by electricity or diesel. Under an on-going donor-supported program, these schemes are being rehabilitated and handed over to WUOs to manage (and ultimately take over). As of July 1996, 10 irrigation schemes had been handed over to WUOs who were paying the costs of O&M. During a review of the Sustainable Irrigated Agriculture Project (SIRAP) program in July 1996, it was reported that WUOs have been meeting the routine O&M costs through payment of a flat service fee of 18,750 kip/ha/year (about US\$ 21.50) which has been adequate to cover O&M costs estimated to average US\$20.8/ha/year. But as electricity is subsidized by GOL for the irrigation sector, these costs are based on a subsidized price of electricity of 8 kip/kwh instead of 35 kip/kwh charged to the commercial sector. If the electricity subsidy is removed, it is estimated that the cost of O&M would double, requiring a doubling of the water user fees (to US\$40-50/ha/year). If the capital

costs of the irrigation schemes were to be recovered from farmers over 25 years (the design life of an irrigation scheme) by an annualized charge added to the annual water fees, this would further escalate the annual water fees collected by WUOs from beneficiaries (see para. 3.20).

3.20 A relevant question to address is whether farmers can afford to pay. The current level of water user fees (US\$21.50) charged in the pump-lift irrigation schemes represents about 20 percent of farmers' gross income from rice production which is regarded as manageable.¹³ If the electricity subsidy is removed resulting in a doubling of water fees, the latter would amount to about 40 percent of the farmers' gross income; this would cause a lot of financial stress to the farmers. A further increase beyond this level to recover capital costs (full cost recovery) would make it even more unbearable for the farmers. Another assessment, based on gross margin analysis, indicates that with current water charges, farmers' would receive a return to labor of US\$3.4-9.7 per day (more than double the current wage rate in the central region of Lao PDR) while a doubling of the water fees would reduce the return to labor only marginally to US\$3.2-9.5 per day (Table 3.5). This analysis is based on the assumption that farmers would change farming practices from one crop a year to two crops, including a dry season crop produced with improved inputs. A key message then is that farmers must go into crop intensification and diversification from rice to high value crops (vegetables and fruits) in order to cover the full cost of O&M, without resort to subsidies, and to start contributing toward recovery of capital costs.

¹³ Based on the Reports presented during the July 1996 Workshop on Irrigation Management Transfer in Vientiane, Lao PDR.

Table 3.5(a): Summary of Gross Margin Analysis, Assuming Water Fees at Kip 5,000/ha

Crop	Methods	Returns to Labor (kip per day)	Returns to Land (kip per ha)
Lowland rice	Traditional	2,424	242,400
Lowland rice	High Input (HI)	3,186	395,038
Non-glutinous rice	HI, Dry Season Irrigated	3,501	469,113
Soy bean	HI, Dry Season Irrigated	6,885	585,258
Mung bean	HI, Dry Season Irrigated	9,109	801,555
Watermelon	HI, Dry Season Irrigated	9,818	1,570,880

(b): Summary of Gross Margin Analysis, Assuming Water Fees at Kip 50,000/ha

Crop	Methods	Returns to Labor (kip per day)	Returns to Land (kip per ha)
Lowland rice	Traditional	2,424	242,400
Lowland rice	High Input (HI)	3,186	395,038
Non-glutinous rice	HI, Dry Season Irrigated	3,165	424,133
Soy bean	HI, Dry Season Irrigated	6,356	540,258
Mung bean	HI, Dry Season Irrigated	8,597	756,555
Watermelon	HI, Dry Season Irrigated	9,537	1,525,880

(c) Summary of Gross Margin Analysis, Assuming Water Fees at Kip 20,000/ha

Crop	Methods	Returns to Labor (kip per day)	Returns to Land (kip per ha)
Lowland rice	Traditional	2,424	242,400
Lowland rice	High Input (HI)	3,186	395,038
Non-glutinous rice	HI, Dry Season Irrigated	3,389	454,133
Soy bean	HI, Dry Season Irrigated	6,709	570,258
Mung bean	HI, Dry Season Irrigated	8,938	786,555
Watermelon	HI, Dry Season Irrigated	9,724	1,555,880

- Memo Items: 1. Lowland (glutinous) rice is assumed to be produced in the west season with supplementary irrigation at no charge.
2. Agricultural wage rate (Kip/day): In the north it is about 750; in the south and central regions, is about 1,000 to 2,000.

Source: World Bank mission estimates.

3.21 **The Water Supply and Sanitation Sector**. In the water supply and sanitation sector, beneficiary contributions toward meeting capital costs are not governed by any policy, law or regulation, and therefore vary from project to project, depending on the requirements of the donor in question. The United Nations Children Fund (UNICEF) which, together with the

Swedish International Development Agency (SIDA) and JICA, is the major donor in the sector requires beneficiary communities to contribute, on average, 30 percent of the capital costs.¹⁴ In 1995, contributions from beneficiary communities to cover Nam Saat's annual program budget (including salaries and operational costs) for water supply and sanitation amounted to 8 percent as compared to 1 percent from GOL and 91 percent from donors (see table 3.3). Clearly, this is at variance with the 30 percent contribution required by UNICEF; moreover, there is no mechanism in place to recover the capital costs from the beneficiaries through user charges.

3.22 How about policies and practices for O&M? While unstated and unclear, the policy of GOL on O&M in the water supply and sanitation sector seems to be that users are fully responsible for O&M. Once water supply and sanitation facilities have been constructed and handed over to community beneficiaries, two unpaid village care takers are appointed and a set of repair tools are provided to them. These two caretakers are assigned the responsibility of fixing any problem of O&M that arises. As many of the facilities are new and have not yet required major expenditures on O&M, the policy is not yet fully tested. However, it is clear that users are not systematically collecting money that could be put aside to take care of O&M. There are indications that this system of O&M will not serve the users well in future. First, the care takers currently in use are volunteers; it will be necessary to pay them a fee or an allowance as an incentive to offer quality services. Second, some of the schemes, like water pumps, need to be serviced by trained technicians who must be hired; alternatively, training would have to be provided to the existing care takers to become technicians. And third, spare parts would need to be purchased. All these demands require that money be collected and set aside for use if and when needed. It is therefore necessary for the Government to issue a regulation that provides guidelines for financial contributions toward O&M and urges users of water supply and sanitation to make those contributions. The regulation should be preceded by a study on O&M funding levels and management, based on experiences of similar countries in the region. The water charges for O&M should be high enough to cover: allowances for two water caretakers (currently unpaid); costs of regular maintenance by trained technicians; and costs of spare parts. Consideration should be given to whether beneficiary communities should contribute additional funds (over the long term) toward the recovery of capital costs.

3.23 **The Rural Roads Sector** In the rural roads sector, the government has no cost recovery policy for it does not directly involve beneficiaries in the financing and/or maintenance of rural roads. Consequently, beneficiary contributions to construction or maintenance of rural roads have been negligible. In a few isolated cases involving minor village roads, beneficiary communities have contributed their own labor and local construction materials while GOL has contributed tools, equipment and technical support. There are no laws or regulations that require beneficiary communities to contribute to capital funding or the funding of maintenance.

3.24 What GOL has got is a cost recovery policy for road transport in general, and not specifically for rural roads. It has the following user taxes: taxes on fuel used on roads; import taxes on vehicles; and annual vehicle license fees. For 1994/95, these taxes raised revenue estimated at US\$15-19 million as opposed to road maintenance costs now estimated at US\$5.8

¹⁴ The required contributions from beneficiary communities for various types of water supply and sanitation amount to: 20-30% for boreholes with handpumps; about 15% for the more costly gravity-fed systems; about 30% for rainwater jars; and about 40% for the less costly pour flush latrines.

million per year.¹⁵ But these revenues enter the general revenue account of GOL and are not earmarked for road maintenance. There is no guarantee these funds are spent on road maintenance. In fact, road maintenance has been and is currently under funded even when the user fees collected exceed the funds required to maintain the roads.

D. PRINCIPLES TO GUIDE IMPROVEMENTS IN COST RECOVERY

3.25 There are four principles that determine adequate cost recovery. First, beneficiaries should be required, during the investment phase, to make some contribution to capital funding; the contribution should be high enough to give them a sense of ownership of the investment. By and large, this principle is being met in the irrigation and water supply and sanitation sectors. Second, beneficiary contributions to capital funding should vary depending on whether the infrastructure shares many features of a public or a private good. If it is largely a private good, capital costs should be fully funded by beneficiaries through cost recovery. If it is largely a public good, capital costs should be funded by the public through the budget. If it contains a balance of both features, capital costs should be funded partly through the budget and partly by beneficiaries.

3.26 But how can one tell the difference between private and public goods? As opposed to a private good whose supply is reduced when one consumes it at the exclusion of others, a public good is available to the public and one's consumption of the good cannot reduce it or exclude others from consuming it. Much of rural infrastructure shares characteristics of both private and public goods. For example, small scale irrigation schemes, single-village roads, and tertiary canals of medium and large scale irrigation schemes are predominantly private goods while the headworks and main canals of medium and large scale irrigation schemes, and the larger rural roads are predominantly public goods. However, small scale irrigation schemes can have characteristics of a public good when they are used to produce rice in the mountainous upland areas where slash and burn and food shortages are prevalent; they benefit society at large because they check deforestation and increase food security. Similarly, while small facilities of water supply and sanitation share many characteristics of a private good, they also have some characteristics of a public good as they provide benefits to society through improvements in public health which serve to prevent epidemic diseases. Similarly, in as far as single-village roads cannot be closed off from use by other villages and the larger public, they also share some characteristics of public goods.

3.27 According to this second principle, capital costs of rural roads and of the head works and main canals of medium and large irrigation schemes should be funded by the public through general taxation. Current government policy and practice seem to be consistent with this principle. For small scale irrigation and the tertiary canals of the larger irrigation schemes, capital costs should be funded by beneficiaries through appropriate cost recovery mechanisms; however, there is a case for a government subsidy for those irrigation schemes that contribute to the reduction of slash and burn and to improving food security. For water supply and sanitation that shares both characteristics of a private and public good, funding of capital costs should be shared between beneficiaries and the public (GOL budget); but the sharing mechanism should reflect the importance attached to public health in each situation. Capital costs for single-village roads should also be shared as these roads share some characteristics of public and private goods. In this

¹⁵ See World Bank, August 1996. Op. cit.

context, the current practice where GOL provides tools and equipment to communities to build their own roads makes a lot of sense and should be encouraged further.

3.28 The third principle is that users should be fully responsible for O&M because experience has demonstrated that this leads to better use of and care for the infrastructure. Except for rural roads, current GOL policy is consistent with this principle although it is unstated in the case of water supply and sanitation, and user charges do not fully reflect the costs of O&M in irrigation. There is therefore a need to issue a cost recovery policy in the former and to increase irrigation fees in the latter (see paras. 3.18 and 3.19 above). In the case of rural roads, there is a need to study ways and means of making users involved at least in planning and, if possible, contribute to road maintenance.

3.29 The fourth principle is that low income and poor people who cannot afford to pay the capital costs of rural infrastructure should be assisted to participate and benefit from the infrastructure. But this should be done in the most efficient (non-distortionary) way, with least administrative costs. GOL has no clear policy on assisting poor people to gain access to rural infrastructure, especially irrigation and water supply and sanitation. Given that there are many poor people especially the ethnic minorities, there is a strong case to be made for subsidizing their infrastructure. Subsidization of capital costs of irrigation and water supply and sanitation would seem to be an effective way to do so particularly by working out much longer periods of cost recovery or, in the case of the very poor, by outright write-off of the capital costs (except beneficiary contributions of labor and local materials). An electricity subsidy as currently provided to cover part of O&M costs of pump-lift irrigation schemes would be an undesirable mechanism of helping the poor because it distorts investment by making electric-based pump-lift irrigation appear financially attractive relative to the more economically superior forms of irrigation such as gravity irrigation; it is also ineffective in that it does not target the poor.

4. MAINTENANCE AND SUSTAINABILITY

4.1 The problem of lack of maintenance in rural infrastructure is almost reaching a crisis point and therefore calls for urgent solutions. For many years now, the road development program has been almost exclusively focused on reconstruction, a result of many years of neglecting maintenance. While not as bad, the problem of maintenance is also a serious one in the irrigation sector: since 1992, at least two donors have been supporting GOL in reconstructing old irrigation schemes to make them maintainable. In the water supply and sanitation sector, it is too early for maintenance problems to become alarming as much of the existing infrastructure has been built only recently (since about 1992). Nevertheless, there are signs of a backlog of maintenance requirements and yet no funding mechanism is in place for O&M. This chapter will assess the magnitude of the problem of maintenance and its root cause, and propose measures necessary to reconstruct the infrastructure to a maintainable condition and to undertake routine maintenance. In addition, it will review sustainability problems related to environmental conservation and development of ethnic minorities and other poor groups. It will also review the necessary changes in donor programs to respond to the key principles discussed in this Report. Finally, it will suggest key indicators to measure progress in infrastructure provision.

A. HOW BIG AND SERIOUS IS THE MAINTENANCE PROBLEM?

4.2 **The Rural Roads Sector** Ironically, the problem of maintenance in the rural roads sector is almost zero as the existing roads are not in a maintainable condition. Most of the provincial roads (estimated at 5,800 km) and virtually all the district and village roads (estimated at 4,900 km) are not accessible in the rainy season, as drainage is inadequate, many bridges are missing or in poor condition and road shoulders are not stable. It is necessary therefore to upgrade them to a maintainable condition before undertaking routine maintenance.

4.3 To get a sense of the financial burden involved in bringing the roads up to a maintainable condition, one can estimate the unit cost of upgrading a road and multiply that by the volume of roads that need to be upgraded. International experience would indicate that rural access roads can be upgraded at an average cost of US\$10,000 per km, using a spot improvement approach that includes drainage systems, replacing small missing bridges, and limited regravelling. The ILO/GTZ pilot project in Oudomsay and Savannakhet provinces of Lao PDR estimated the cost of upgrading at US\$8,000 per km. Assuming half of the provincial roads and all the district and village roads have to be upgraded (which is a realistic assumption) at a unit cost of US\$10,000 per km for district and village roads and US\$20,000 per km for provincial roads, it is estimated that it would cost US\$107 million. After the roads are put in a maintainable condition, it would be essential to provide maintenance routinely, for which an adequate allocation would range from US\$100 to US\$200 per km per year. The annual budget for routine maintenance for the current stock of provincial, district and village roads would range from US\$1.07 million to US\$2.14 million. To be able to accurately estimate future budgetary requirements for road maintenance and to plan the required revenue to finance them, it would be prudent for GOL to adopt a multi-year forward budgeting system as recommended in a recent public expenditure review that was undertaken by the World Bank¹⁶.

¹⁶ Ibid.

4.4 **The Irrigation Sector.** The problem of operation and maintenance in the irrigation sector mirrors that in the rural roads sector in that many irrigation schemes which were sponsored by the government (mainly the medium and large scale schemes initiated in the 1980s) are not in a maintainable condition. Some were not adequately completed (no tertiary canals built) and many are out of use due to lack of satisfactory O&M arrangements as beneficiaries were not involved in their planning and construction. There is a need for rehabilitation, WUOs to be established and trained, and management to be transferred to WUOs before routine O&M can be carried out by beneficiaries.

4.5 To get an approximate idea of the cost involved in the schemes' rehabilitation before they are handed over to WUOs for normal O&M, one would need to estimate the average rehabilitation cost for each scheme and multiply by the number of irrigation schemes involved. In terms of cost, experiences from the SIRAP project, which has been supporting rehabilitation and handover of irrigation schemes to WUOs, would indicate that it costs an average of US\$ 950/ha for rehabilitation and completion, and US\$ 335/ha for rehabilitation only.¹⁷ The work on the schemes under the SIRAP program involved cleaning or rehabilitating existing canals, and constructing new canals and other structures required to complete or expand the schemes. To estimate the number of irrigation schemes that are in need of rehabilitation and hand-over to WUOs, one would have to include all the pump-lift schemes (a total of 98 schemes -- or 23,409 ha -- minus about 9 schemes already rehabilitated) and all the storage reservoir schemes (a total of 133 schemes or 11,334 ha); this gives a total of 222 irrigation schemes.¹⁸ Multiplying the average unit costs of rehabilitation and completion by the number of irrigation schemes gives a total cost of US\$20 million, assuming half of the schemes will just be rehabilitated and another half rehabilitated and completed. This represents the financial burden on GOL to rehabilitate the irrigation schemes to a maintainable position before they are transferred to WUOs which would have to incur the full cost of O&M. Additional resources would be needed to train and support WUOs. The amount of money that WUOs would have to spend on O&M is estimated to be about US\$20/ha/year for the gravity irrigation schemes and US\$40-US\$50/ha/year for the pump-lift irrigation schemes (see paras. 3.18-3.19).

4.6 **The Water Supply and Sanitation Sector.** The lack of maintenance in the water supply and sanitation sector is not alarming in terms of immediate needs mainly because the facilities are relatively new. However, there is cause for concern since there is very little maintenance of the installed water supply and sanitation facilities (despite some need), there is lack of clarity in the roles and responsibilities between GOL and beneficiaries, and the collection of user fees for maintenance is negligible. It is even more alarming in that the need for proper O&M is not only for sustainability of the physical facilities but, more importantly, for improving the health of water users as many of the diseases in the country are water-borne. For example, diarrhea is a health problem in over 80 percent of the country's villages, and skin infections are common among the population. Improper O&M of installed systems and the problem of waste water could undermine the investment in the sector as well as cause the deterioration of health in the communities.

¹⁷ These unit costs do not include the cost of organizing and training WUOs. The rehabilitation cost is averaged over the wet season command area.

¹⁸ This is likely to underestimate the rehabilitation requirements as it does not include some direct diversion schemes that possibly fall in this category.

4.7 At the moment, there is not much information on O&M and the state of health associated with the existing systems. However, based on the observations of the mission in April/May 1996 and from SIDA's evaluation of UNICEF's program, there are some O&M problems despite many of the systems having been installed in the last five years and still being in use.¹⁹ Here are some of the elements of O&M problems that were found: many of the gravity systems were not well managed; in-takes were not monitored and cleaned; taps were of low quality and had to be replaced regularly; some taps were not replaced and water was allowed to flow freely; there were poor sanitary conditions around some wells; there were some leaky joints from bamboo and makeshift repairs; and there were incidences of poor drainage.

4.8 From the above analysis, the challenge to addressing the O&M problems in water supply and sanitation would seem to be the need for: (i) clarifying the role of GOL and beneficiaries in O&M and making clear that O&M is the full responsibility of beneficiaries; and (ii) training beneficiaries ahead of the investment and explaining to them their responsibilities with regard to contributing toward construction of facilities and paying the full cost of O&M.

B. WHAT SHOULD BE DONE TO ROUTE OUT MAINTENANCE PROBLEMS?

4.9 To address the chronic problem of lack of maintenance, two sets of measures are needed: (i) supporting the rehabilitation of infrastructure in sectors where this is required to precede maintenance; and (ii) implementing cost recovery measures and providing the necessary budgetary support to ensure routine O&M is carried out.

4.10 **The Rural Roads Sector**. As noted in para. 4.3 above, the required upgrading of half of the provincial roads and all districts and village roads would cost an estimated US\$107 million; reconstruction is required before routine maintenance can be done. Given that only US\$102 million has been planned for investment in feeder roads in the 1996-2000 PIP, future public investment in feeder roads must be concentrated on rehabilitation of existing roads. This makes a lot of economic sense as investment in rehabilitation of roads generally fetches high economic returns as it builds on sunk costs. Nevertheless, it is important for a four-year rehabilitation program to be worked out, with clear indication of priorities, so as to facilitate budgeting and to build up the required implementation capacity.

4.11 The routine maintenance of the current stock of provincial, district and village roads is estimated to cost US\$1 million to US\$2 million per year. Given that rural roads have strong characteristics of public goods, the maintenance funds have to come from GOL budget which is partly funded by US\$15 -19 million raised annually from road user taxes (see para. 3.24). While funding requirements for maintenance are little compared to the funds raised from road user taxes, this is no guarantee that revenue from road user taxes will be allocated for the maintenance of rural roads, or for that matter spent on them if at all allocated. In the past, maintenance of all roads has always been underbudgeted and/or funds allocated to it diverted to other use. As it will take some years before all roads are brought up to a maintainable position, it is important for GOL to establish a mechanism for taking stock of maintenance requirements and make forward estimates of future maintenance requirements so as to accurately budget for them.

¹⁹ SIDA, May 1996. Evaluation of UNICEF's Program, draft report.

4.12 To ensure that past practices are left behind and road maintenance is budgeted for and undertaken, some special measures need to be undertaken. First, decision makers need to be made aware, through seminars and overseas study tours, of the benefits to be gained from good road maintenance practices. Second, political incentives should be given to local authorities to give priority to road maintenance over construction of new roads. For example, central government funding of new roads in a province should be related to demonstrated or potential capacity to undertake routine maintenance. And third, as commitment to road maintenance is related to the amount of stake the beneficiaries have in the capital asset (the road itself), GOL should study ways of transferring responsibilities for funding and maintenance of rural roads to the provinces and districts. A review of forty two developing countries by a World Bank study found that, where road maintenance was decentralized, backlogs were lower and the condition of roads was better.²⁰

4.13 **The Irrigation Sector**. The cost of rehabilitating and/or completing existing government-sponsored and managed irrigation schemes has been estimated at US\$20 million (see para. 4.5). There is an additional cost of organizing and training WUOs to take over the management of these schemes. The funding of rehabilitation should not be a problem since the 1996-2000 PIP has ample resources for public investment in the irrigation sector -- US\$69 million. While investments in irrigation rehabilitation generally produce high economic returns, the economics of rehabilitation is more tricky in the context of Lao PDR where irrigation is used to produce rice that is a relatively low value crop: a review of the rehabilitation program being carried out under SIRAP indicates that the 9 rehabilitated schemes generate an IRR in the range of 4-8 percent if they produce rice alone. When they diversify into fruits and vegetables, the IRRs increase to more than 15 percent which is respectable.²¹ It is therefore necessary that every investment in rehabilitating the schemes be preceded by a financial and economic evaluation to establish the viability of each scheme. In addition, a four-year rehabilitation program needs to be worked out in order to facilitate planning and budgeting, and to build the necessary implementation capacity to execute it.

4.14 After accomplishing the rehabilitation and the transfer to WUOs of irrigation schemes, the O&M of the schemes becomes a responsibility of the beneficiaries. The challenge to GOL is ensuring that an appropriate cost recovery policy is in place (see paras. 3.18 and 3.19) and that the required farmer support services are provided to enhance the profitability of irrigation farming. To avoid creating maintenance problems similar to those in the past, GOL should avoid supporting new irrigation schemes that are not demand-driven and managed by beneficiaries.

4.15 There is an outstanding issue that needs to be addressed with respect to the management of O&M on medium and large scale irrigation schemes. The issue is that, while WUOs can undertake O&M on all systems of small irrigation schemes and on tertiary canals of the larger schemes, they are not capable of doing it on the main canals and headworks of the medium and large schemes as these are technically too complex for them to manage. There are no private companies to be hired to do the job either. It is therefore important and urgent that GOL takes a decision on the entity to carry out this work, including consideration for promoting a private

²⁰ World Bank, 1994. Op. cit.

²¹ Reported in a July 1996 Workshop Evaluating the SIRAP.

company (probably through a joint venture) or encouraging the WUOs to establish a subsidiary joint company to do it.

4.16 **The Water Supply and Sanitation Sector**. Unlike for the rural roads and irrigation sectors, the water supply and sanitation sector does not require rehabilitation to precede O&M. To ensure adequate O&M, three issues raised above have to be addressed. First, there is a need to clarify the role and responsibilities of beneficiaries and of GOL in the O&M of water supply and sanitation facilities. This could be done through the issuing of a regulation or decree which lays out clearly that beneficiaries must take full responsibility for O&M. Second, this regulation or decree should include guidelines for WUOs to follow in fixing O&M fees that they would charge their members. Consideration should be given to whether user fees should include an additional contribution toward recovery of capital costs. And third, the regulation or decree should indicate clearly the contributions beneficiaries are expected to make toward the construction of the facilities, and how these contributions should be used.

C. DEALING WITH ENVIRONMENTAL AND SOCIAL CONCERNS

Environmental Concerns

4.17 While good O&M is essential for sustainability of physical facilities, long term sustainability of rural infrastructure significantly depends also on sustainable management of natural resources, particularly those related to water, land and forests. Planning of irrigation, and water supply and sanitation should take an integrated approach to water resource management, with full consideration of all the competing uses for water and the impact on public health. Similarly, rural roads development has to take into account the potential impact on the quality of water resources, particularly through soil erosion and siltation, as well as on deforestation, through changes on the distribution of people that could lead to an increase in slash and burn and to unsustainable harvesting of forestry resources.

4.18 The mandate for environmental coordination and oversight lies with the Science, Technology and Environment Organization (STENO) which was established in 1995 to coordinate environmental work, following the adoption by the Government of a National Environmental Action Plan. STENO is responsible for providing policy and technical guidance as well as for coordination. It coordinates through an inter-Ministerial committee while its environmental Department acts as the secretariat. Responsibilities for implementation, including the preparation of impact assessments and mitigation measures, lies with the line agencies. For example, environmental responsibilities in the area of roads lies with MCTPC, while for irrigation, water supply and sanitation, responsibilities are vested with MAF and MOH, respectively. An environmental decree is being prepared to provide the required guidelines for environmental planning, implementation, monitoring and enforcement. While STENO has started off well in terms of working out modalities required for environmental planning, monitoring and coordination, progress is limited by lack of institutional and human resource capacities, partly related to the newness of the organization. Technical assistance is being received from a few donors to strengthen its capacity, with TA and training, but more is needed. Similarly, support is required to strengthen the capacity of the line Ministries and the State Planning Committee to carry out environmental planning (particularly impact assessments) and mitigation measures.

Social Concerns

4.19 Any development of rural infrastructure in Lao PDR has to take the ethnic minority issue as well as resettlement into serious consideration. A large portion of the ethnic minorities tend to fall into the poorest segment of the population. They live in remote and inaccessible areas practicing shifting cultivation and receiving minimal social services. The Government has a strong commitment to promote ethnic equality and to try to close the economic gap existing among the various groups through provision of initial capital and technology (see para. 1.20). It wants to solve the problem of shifting cultivation by focusing on the improvement of upland farming systems, expansion of upland irrigation and increasing farm and off-farm income earning opportunities. The reduction of slash and burn practice in agriculture is one of the eight development priorities for the country (see Box 1.1).

4.20 As the Government of Lao PDR builds on this report to develop a rural infrastructure strategy and program, this would provide an opportunity to address the above environmental and social issues in a more integrated way with adequate links to the overall economic and social development program of the country. Questions that such a rural infrastructure development strategy should address include: How can the Government achieve its objectives of decreasing the economic gap among the various ethnic groups while at the same time promoting and expanding the identity of all ethnic groups in terms of their culture, tradition and mores? Do hard to reach groups have to be resettled in order to receive basic services or can these services come to them? What can the Government do to encourage voluntary resettlement and yet provide services to those who choose not to relocate?

4.21 In addition, there are social issues more directly related to rural infrastructure development projects. The most important of these is resettlement of project-affected people including acquisition of land and the provision of compensation to project-affected people. An outstanding problem has been lack of an organization with the responsibility of managing and coordinating project-related resettlement. As STENO already handles environmental management and coordination and since this responsibility is closely related to resettlement associated with projects, consideration should be given to assigning it the responsibility for coordinating the planning and implementation of project-related resettlement.

D. RESPONSE OF DONOR PROGRAMS TO LESSONS FROM PAST EXPERIENCE AND TO KEY PRINCIPLES OF INFRASTRUCTURE PROVISION

4.22 Donor-supported projects in Lao PDR's rural infrastructure have generally performed unsatisfactorily but useful lessons have been learnt from experience, including the following: (i) rural infrastructure projects should be designed as stand alone projects; (ii) projects should be regionally focused, covering one or just a few provinces, and their management and implementation should be mainstreamed into the regular structures and activities of the provinces; (iii) community and beneficiary participation should be made an important element of project design and implementation; (iv) capacity building and training should be an important component of the projects; and (v) TA should be carefully designed and implemented (see Box 4.1). These lessons are consistent with the key principles of rural infrastructure provision, derived from the analysis in this report. The lessons and the principles together constitute a useful framework that could guide the design of future donor assistance for rural infrastructure.

Box 4.1: Lessons From IDA Support for Rural Infrastructure in Lao PDR

IDA has, since 1977, provided assistance to rural infrastructure (rural roads, irrigation and water supply and sanitation) through agricultural projects. These include: the First and Third Agricultural Rehabilitation and Development Projects; the Agricultural Production Support Project; and the Upland Agricultural Development Project. The only stand-alone project for rural infrastructure is the on-going Luang Namtha Provincial Development Project (LNPDP).

With the exception of the LNPDP, the projects have performed unsatisfactorily and the rural infrastructure that was built is largely in an unmaintainable condition. Failure can be attributed to at least five factors: (i) a multiple number of unrelated project components -- representing a mix of agriculture and rural infrastructure -- has complicated project implementation; (ii) weak implementation capacity; (iii) lack of beneficiary and community participation; (iv) projects were dispersed over large areas and a multiplicity of provinces, resulting in high costs of project supervision and administration; and (v) poor performance of technical assistance related to inability to attract good quality consultants, lack of counterpart staff and language problems. In recognition of past failures, the design of LNPDP which was approved in 1994 and is performing reasonably well, took into account the above failures: the project is confined to one province and to supporting only rural roads, water supply and institutional strengthening. In addition, UADP was restructured in 1995 to focus primarily on rural roads and irrigation at the cost of agricultural research, extension and water supply which were dropped; its performance has improved significantly.

The following lessons can be drawn from past experiences of IDA support for rural infrastructure in Lao PDR: (i) projects should be designed as stand alone rural infrastructure projects; (ii) projects should be regionally focused, covering one or just a few provinces, and their management and implementation should be mainstreamed into the regular structures and activities of the provinces; (iii) community and beneficiary participation should be made an important element of project design and implementation; (iv) capacity building and training should be an important component of the projects; and (v) TA should be carefully designed and implemented.

4.23 For donor assistance programs to be successful in delivering rural infrastructure, they have to comply with the key principles discussed in the report and take into account lessons from past experience. First, the programs should be consistent with the principles of decentralization and beneficiary participation. As many of the donor projects in the past have been initiated through central agencies and have tended to be supply-driven, future programs should involve beneficiaries right from the planning and design stage, and should be driven by the needs of beneficiaries. Second, to be genuinely demand-driven, donor assistance should offer beneficiaries a choice among the various types of rural infrastructure (roads, irrigation, water supply and sanitation). Third, donor projects should comply with GOL cost recovery policies which ought to be applied consistently across projects in order to avoid distortions in investment choices made by beneficiaries. Fourth, to permit beneficiaries make their true choices and be fully involved in the delivery of rural infrastructure, donor projects should be approved by their sponsors on the basis of a broad, flexible design, leaving details of sub-project identification and design to be done during project implementation. Fifth, as there are institutional and human resource weaknesses to be overcome, donor projects should attempt to economize on and improve the use of scarce local

professionals and TA by: sharing them; designing projects that are geographically focused to minimize costs and personnel resources required for supervision and administration; and designing and implementing TA more diligently.

4.24 Chances of success in applying these principles and lessons and in improving donor coordination are much enhanced if donors channel their assistance through multi-sector programs that support the three sectors of rural infrastructure. This broad approach to investment support by donors has been used in various countries including Zambia, Uganda, Pakistan, Tanzania and Benin (under the umbrella of Sector Investment Programs) where it has been found a useful instrument in ensuring consistency in policies, investments and interventions of the various actors in sector development (see Box 4.2).

Box 4.2: A Broad Sector Approach to Investment Lending: Key Features of Sector Investment Programs

Due to the need for ensuring consistency of policy and investments and of the interventions of the various actors, the World Bank and other donors have been involved in supporting Sector Investment Programs (SIPs) as a vehicle for donor support for investment. There are six distinguishing features of SIPs: (i) comprehensive sector coverage including relevant policies, programs and projects within a sector; (ii) a coherent sector policy framework; (iii) local stakeholders in charge of the sector program, with donors supporting and assisting; (iv) all major donors in the sector participate in the program, avoiding parallel donor-driven designs; (v) common implementation arrangements; and (vi) minimal long-term foreign technical assistance. SIPs that have been or are being implemented include: the First and Second Tanzania Integrated Roads Program; the Zambia Agricultural Sector Investment Program; the Zambia Health Project; the Pakistan Social Action Program Project; the Uganda District Health Project; and the Benin Population and Health Project.

Source: Peter Harrold and Associates, 1995. The Broad Sector Approach to Investment Lending: Sector Investment Programs, World Bank Discussion Papers, Africa Technical Department Series No. 302.

4.25 Another case in which a broad multi-sector approach has been used with some considerable success is in the design and implementation of a World Bank-supported Village Infrastructure Project in Java, Indonesia (see Box 4.3). While Lao PDR's conditions are different from the African countries, Pakistan and Indonesia where the broad multi-sector approach has been applied, design experiences gained from these multi-sector operations should be good indicators of what works and does not work.

Box 4.3: The Village Infrastructure Project in Java, Indonesia

To assist in addressing poverty in Indonesia, the Village Infrastructure Project for Java with a loan (Ln. 3888-IND) of US\$72.5 million, was approved by the World Bank Board of Executive Directors on May 23, 1995. It comprises a two-year program to assist some 1,200 poor rural villages in Java in carrying out public works of their choice, mainly in all weather access roads and drinking water. Engineering assistance is being provided at the village level to help with subproject design and to achieve good quality of works. The village allocations are being channeled through the local branch of a commercial bank, independent of the official budgetary cycle.

Project implementation is proceeding smoothly and on schedule with 100 percent of the first year program completed as of March, 1996. Reports from field engineers indicated that village community groups are performing their new responsibilities well with a high level of cost-effectiveness. Completion of works was expected around December 1996, while monitoring activities will continue into 1997.

Building on the implementation experience of this pilot project, a second village infrastructure project is under preparation. The objectives of the second project are to build small infrastructures in poor rural villages and increase decentralization and community participation. In order to reach the above objectives, the proposed project comprises a 2-year effort to assist some 2,600 poor rural villages on Java and to build public works such as access roads, bridges, water supply schemes, sanitation facilities, drainage, markets, piers or other small economic infrastructures. It would provide a grant (US\$50,000 equivalent) to each of the beneficiary villages for building local public infrastructures. The villagers decide what to build, from a menu of choices, and mostly build it themselves, the workers being paid by output. Much of the grant will be used to purchase materials. Villagers will be assisted by consultant field engineers to plan and implement village works with labor intensive methods. The project works would be supervised and audited, and project impact on beneficiaries would be monitored, on a sampling basis.

E. MEASURING PROGRESS IN INFRASTRUCTURE PROVISION

4.26 To be sure that government objectives for rural infrastructure are being pursued and to know the extent to which they have been achieved, it is important to develop a set of key indicators that can be used to track performance. Tracking performance is particularly important to ensure that performance problems are identified early enough and corrective action taken. It is suggested that well selected performance indicators be developed and maintained in order to track performance in the three sectors of rural infrastructure in at least four areas. First, coverage of rural infrastructure, particularly rural roads and water supply and sanitation, needs to be measured and monitored annually in such a way that the amount, distribution and quality of infrastructure can be known. Second, institutional development should be monitored through measurement of variables such as the depth of decentralization, the degree of participation (number of beneficiary organizations), and human resource capacity (number of professionals). Third, sustainability ought to be monitored closely through tracking down variables such as budget allocation for road maintenance, level of cost recovery achieved, and capacity utilization. And fourth, performance

monitoring must track also efficiency in each of the sectors using indicators such as investment costs per beneficiary, net value of production in irrigation, the state of O&M, and levels of budgetary allocation for maintenance. Performance monitoring should be made a responsibility of central government agencies which should be strengthened with training, technical assistance and the supply of necessary office equipment.



IMAGING

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