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Northern and Central Regions Water Supply and Sanitation Sector Project (Laos)

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Summary

In order to reduce the levels of poverty in Lao People's Democratic Republic, multi-faceted work is being carried out in the water and sanitation related aspects of the health sector. The daily water demand was generally met through energy and financial resources as well as time intensive methods. The absence of adequate plumbing facilities for safe distribution of potable water led to frequent and wide-spread occurrences of diseases such as diarrhoea and malaria which led to higher morbidity rate. The poor living conditions and facilities in the communities of Laos has hindered economic development and posed as barriers for expansion of public services to adjacent areas. The Northern and Central Regions Water Supply and Sanitation Sector Project funded by Asian Development Bank (ADB) aimed to tackle these challenges by improving the conditions of water and sanitation facilities in towns within the Northern and central regions. The key focus areas of the project includes increasing community involvement and ownership, reducing poverty while maximising its related health benefits and promotion of good health and hygiene practices. Under the project, water supply and sanitation facilities within 12 small towns in the Northern and central regions of the country were improved to provide reliable and sustainable source of water to the public, with minimum detrimental impacts on the environment. In order to achieve these goals, the project provided assistance in increasing the capacity of water production through new projects as well as development of existing facilities of sanitation, sewage, roads and bridges. Additionally, public awareness campaigns were conducted to enhance knowledge on good hygiene practices and public participation and advocacy of such activities, as well as increase sector planning, management, and regulation capacity.

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Acronyms and Abbreviations

ADB	Asian Development Bank
CHAP	Community Health and Awareness Programme
DHUP	Department of Housing and Urban Planning
EIRR	Economic Internal Rate of Return
IEE	Initial Environmental Examination
JWRC	Japan Water Research Center
LDC	Least Developed Country
MDG	Millennium Development Goal
MPWT	Ministry of Public Works and Transport
NGPES	National Growth and Poverty Eradication Strategy
NORAD	Norwegian Development Cooperation Agency
O&M	Operation and Maintenance
OFID	OPEC Fund for International Development
OPEC	The Organization of the Petroleum Producing Countries
PCU	Project Coordination Unit
PDR	People's Democratic Republic
PIU	Project Implementation Unit
PNP	Provincial Nam Papa (Provincial Water Supply Company)
UEI	Urban Environment Improvement
UN	United Nations
VEI	Village Environmental Improvement
WASA	Water Supply Authority
WASRO	Water Supply Regulation Office
WATSAN	Water and Sanitation Division
WSD	Water Supply Division

1 Introduction

Laos or Lao People's Democratic Republic (PDR) is a country bordering Myanmar, Cambodia, China, Thailand and Vietnam. The country is largely mountainous, and its most fertile lands can be found along the plains of the Mekong river which flows from north to south. In Laos the population is 6.5 million while 68% of the population live in rural areas. Urbanization is occurring at a rate of 4.9% each year in Laos. Although Laos is a Least Developed Country (LDC), over the past two decades it has made significant progress regarding poverty alleviation with poverty rate declining from 46% in 1992 to 23% in 2015. Moreover, Laos has already achieved the Millennium Development Goal (MDG) target of halving its poverty. Figure 1 shows the geographical map of Laos.

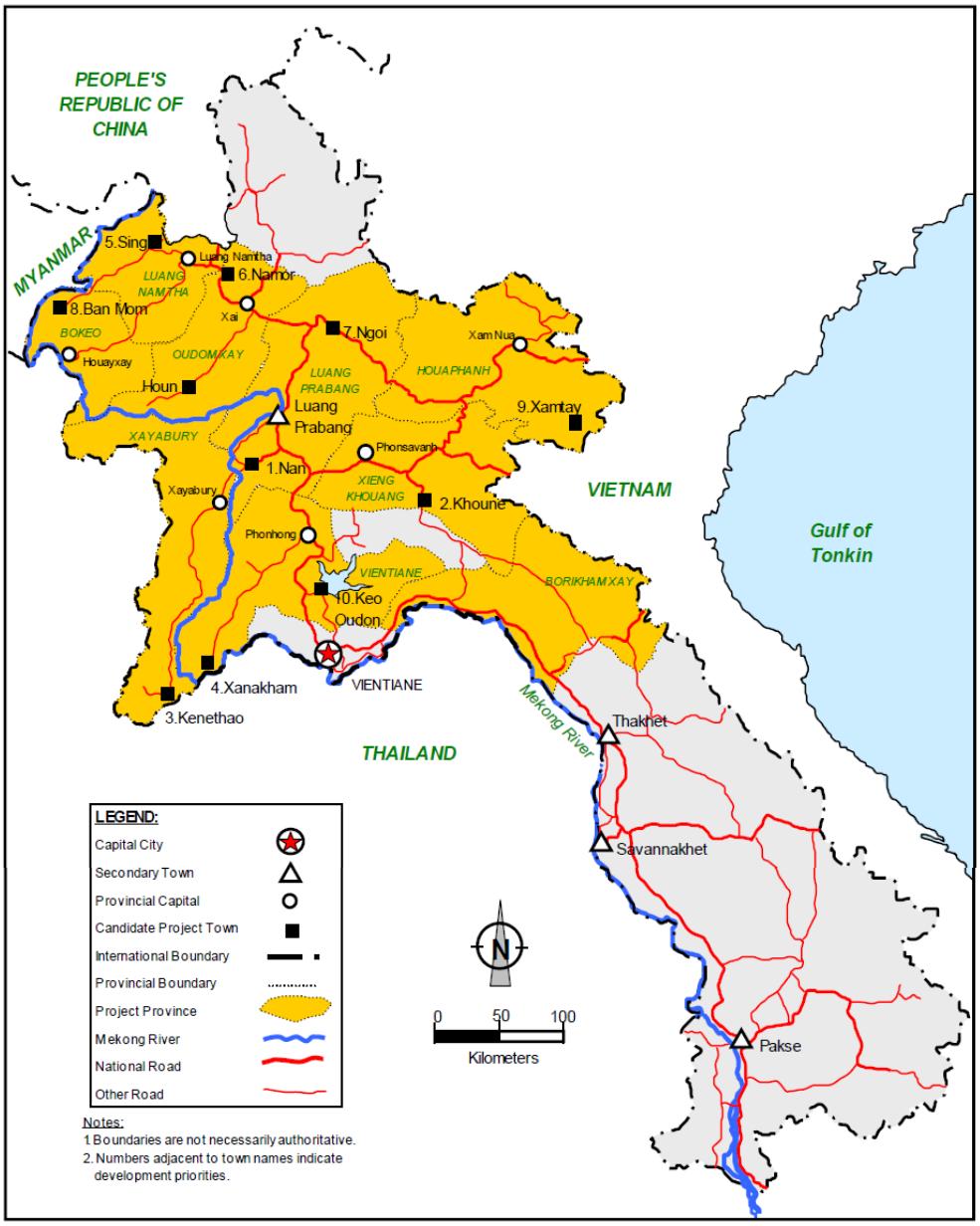


Figure 1. Geographical Map of Laos (ADB, 2009)

People in the small towns of the northern and central regions of Laos spend most of their time, money and energy on fulfilling their daily water requirement. For decades, the people in these rural and poor areas have undergone numerous difficulties to access clean and safe water. Fetching water is a tiring task in these areas because, they had to get up early in the morning and walk along uneven dirt paths to reach to a water source. Sometimes they had to carry 20 L at times or several number of times to fetch enough water for a day and it takes around 20 mins for each trip. Lack of safe and clean water and sanitation facilities have impacted them in number of ways. It has impacted their physical health, their ability to engage in occupations as well as their right to live with dignity. Since women and girls in the families were responsible for fetching water for the family, they were particularly hard hit as they had to deal with the daily task of fetching water and also due to health-related family problems. They spend most of their time for fetching water instead of working or socializing. Moreover, most of these families have never had the opportunity to use modern toilets. During the preparation of the project in 2005, there were only 17% houses fitted with water pipeline, while more than 50% did not have modern toilets in these small towns in Laos.

Figure 2. Children carrying containers to fetch water (UNDP, 2019)

In these small towns, the incidence of diarrhoea, malaria and morbidity are high due to inadequate pipeline for water supply, indigent quality environmental conditions and low awareness on hygiene. Such conditions in these towns have also led to impede the economic development and their capability to serve nearby rural areas. This project was implemented to uplift the quality of life of the residents in these small under-developed towns in the Laos and provide them an opportunity to make the town function as markets, services and manufacturing centers to support the nearby areas. As per the selection criteria agreed under the project, the proposed small towns in the Laos were selected. Since the project addressed the urban population in the Laos, it supported the government's National Growth and Poverty Eradication Strategy (NGPES 2004) which was targeted towards minimizing the poverty by achieving economic growth while focusing more on poorer districts. The project included two main objectives which were improvement of water supply and sanitation

facilities within 12 small towns in the Northern and central regions of the country to provide reliable and sustainable source of water to the public and the development of the urban and rural environment to enhance living standards of the residents of the targeted small towns.

The financial and technical aspects of water supply sector and other relevant urban factors in the small towns were covered by the project, going in line with the governments priority of improving the living conditions of these areas. The poor areas within the Northern region of the country was selected as the project locations to adhere to the requirements of ADB. To provide sustainable solutions, a large focus was given to increase the involvement of the community significantly for adequate reduction of poverty and to enhance knowledge on good hygiene practices. This was done to improve advocacy of such activities within the communities to further develop the local ownership of the project facilities and maximize the intended health benefits and poverty reduction impact. The project was implemented in 3 phases. Phase 1 covered three towns, phase 2 covered five towns, and phase 3 covered four towns. Due to the increase in cost during the implementation of phase 1 and phase 2 towns, additional grants were required to achieve the planned targets in the four towns under phase 3. The costs increased due to the revised project horizon, the higher-than-assumed population growth rate in those towns and also due to the increased per capita water demand.

Table 1: Overview of the Northern and Central Regions Water Supply and Sanitation Sector Project (ADB, 2005; ADB, 2014a)

Item		Description
Project name	:	Northern and Central Regions Water Supply and Sanitation Sector Project
Type	:	Water, transport, and other urban infrastructure and services
Sources of funding	:	• Asian Development Bank • OPEC Fund for International Development • Lao People's Democratic Republic • Norwegian Agency for Development Cooperation • UN-Habitat - United Nations Human Settlement Program • Beneficiaries
Geographical location	:	Ban Muang-Nan, Ban Namkeung-Kao, Louang Namtha, Muang Houn, Muang Kenthao, Muang Keo-Oudom, Muang Khoun, Muang Ngoy, Muang Sing, Nam O, Xamtay, Xanakham
Project objectives	:	1. Construction of the water supply system 2. Improvement of the roads, culverts and roadside drainages 3. Improvement of the village environment such as small access roads, footpaths, paved public areas, tertiary drains, drainage covers, and improved public and household sanitation
Total project fund	:	US$ 33.66 million
Project duration	:	April 2010 – May 2014 (Originally September 2012)

Rationale : The Lao People's Democratic Republic successfully reduced the poverty rate in the country from 45% in 1993 to 32% in 2003. However, due to unbalanced economic development, the level of poverty decreased only slightly in the Northern region, where the highest level of poverty is 52% and is home to 25 of the 47 poor areas of the country that are officially identified as development priorities. The government's national strategy for growth and poverty eradication aims to reduce poverty through significant economic growth and increased focus on the poorest areas.

The focus is on health, including water supply and sanitation, as one of the four priority sectors in the fight against poverty. Being forgotten in past investments, small cities with a population of 2,000 to 20,000 people remain underdeveloped, with total water supply coverage of only about 17% compared to 69% in Vientiane and the four largest secondary cities. More than 50% of households do not have watertight toilets, and less than 10% of primary schools have toilets. Roads have mostly gravel or mud pavements with low coverage of roadside drains.

Residents of small cities spend a lot of time, energy and financial resources to meet their daily water needs. Low coverage of safe plumbing, poor environmental conditions and poor hygiene in small towns have led to a high incidence of diarrhea, malaria and high morbidity. Such adverse conditions also hamper the economic development of small cities and limit their ability to serve nearby rural areas.

The project promotes water supply and improvement of urban conditions in small cities, which are the main priorities of the government in the development of small cities. Most project cities are in the poor Northern region, which is the geographic focus of the Asian Development Bank (ADB). The rest is in the Central region. The project includes active community participation, poverty reduction, health and hygiene promotion activities aimed at strengthening local ownership and maximizing expected health benefits and impact on poverty reduction.

2 Technical and Technological Brief

The key focus areas of the project includes increasing community involvement and ownership, reducing poverty while maximising its related health benefits and promotion of good health and hygiene practices. Under the project, water supply and sanitation facilities within 12 small towns in the Northern and central regions of the country were improved to provide reliable and sustainable source of water to the public, with minimum detrimental impacts on the environment. In order to achieve these goals, the project provided assistance in increasing the capacity of water production through new projects as well as development of existing facilities of sanitation, sewage, roads and bridges. Additionally, community based activities were also included targeting to enhance public awareness regarding hygiene practices and increase public participation in the development project order to provide sustainable solutions that can be led by residents within the communities themselves. Targets to strengthen the technical capacity of relevant stakeholders within the target geographical areas is also highlighted to enhance the ability to plan, manage and regulate public services. In order to properly manage the project, it was divided into 5 components; i) strengthening

guidelines and management of the water supply sector; (ii) development of water supply; (iii) improvement of the urban environment; (iv) community involvement, awareness and action; and (v) project assistance and capacity building.

2.1 Strengthening Regulations and Management of the Water Supply Sector

This component of the project involves identified major stakeholders within the water supply sector including the Water Supply Regulatory Office (WASRO) and the Water Supply Division (WSD) in the Department of Housing and Urban Planning (DHUP). Key activities were conducted within each stakeholder in order to strengthen the regulatory, planning and management aspects of the sector.

The main regulatory body WASRO underwent enhancement of its legal mandates within the sector, with the provision of technical assistance to increase its capacity to regulate and monitor sectoral activities. Further assistance was provided to enhance WASROs capacity to source finances for executing its functions for better reliability of services.

The Water Supply Division (WSD) in the Department of Housing and Urban Planning (DHUP) was provided with technical assistance in structuring sectoral planning and management works for the preparation of strategic documents that will assist in generating adequate technical and management regulations. DHUP and WASRO played a role in the revision of regulatory and policy initiatives and the standard documents required to enhance the participation of the private companies within the water supply sector.

2.2 Water Supply Development

The second component of the project was included to expand the water supply system within the targeted 12 towns with 115,000 people. Under this component, it was aimed to provide water supply services that are reliable in terms of safety and security as well as affordable for the target population. In order to achieve these targets, this component included all relevant facilities for collection, purification of raw water for distribution to individual households through a network with metered connections. Additionally, offices, workshops and equipment required for the operation and maintenance of the facilities are also to be provided within this component. Furthermore, in order to improve the participation of the private sector, this component also had to determine the most appropriate model to enhance private sector involvement in the works.

2.3 Urban Environmental Improvement

In order to provide sustainable and all-encompassing solutions to the issues in the water and sanitation sector of the country, this component of the project was targeted towards the improvement of urban infrastructure that is directly related to the sector of concern. The infrastructure that were covered under this component include public sanitary facilities, sewage systems, roads and bridges. Further, the equipment required to improve the capacity to operate and maintain the urban environment infrastructure at an adequate level was also provided. Investments for UEIs included in this section were given priority by local stakeholders and was restricted to a sum of about $ 22 per capita to ensure fair distribution of benefits across all project towns.

2.4 Participation, Awareness and Community Actions

This component of the project involves two main parts to it, which are (i) a community health and awareness program (CHAP) and (ii) an improvement in the rural environment. CHAP was

responsible for raising awareness about health, hygiene and sanitation among the public, encourage people to connect to the piped water network and upgrade the toilets, and help the people in planning, designing, operating and support the local urban services by cooperating with local agencies. The component also provided technical and financial support to improve the overall living standards of the towns through contributions to small infrastructure developments.

2.5 Project Implementation Assistance and Capacity Building

The fifth and final component of the project can be further divided into three parts, which were (i) aid the project coordination unit (PCU) and project implementation units (PIU) through consultancy services, (ii) enhance the capacity of existing stakeholders within the sector to enable provision of sustainable and reliable services and their management and (iii) offer technical assistance and training to PIU staff, non-government organisations or key community groups and WATSAN for higher capability to advocate community participation and management of operation and maintenance works. Moreover, workshops for resettlement training were held for the district officials. Furthermore, financial support was given to the PCU and PIUs for the establishment of an administrative workspace, procurement of desktop equipment and vehicles in addition to the provision of salaries to adequately carry out the project works.

3 Financial brief

The funding for the project was provided by contributions from different agencies. Out of the total of $ 33.66 million USD, ADB funded $ 10 million USD (about 40.1% of the overall project cost) as a grant from the Asian Development Fund. The funds from ADB were utilised by provincial governments for the construction of water supply systems, roads, sewage systems and improved sanitation; involvement in educational and public events; and project cooperation and capacity building.

The OPEC Fund for International Development (OFID) provided $ 9.0 million USD (36.1% of the overall project cost) as a grant. The OFID grant was intended to co-finance the water supply development portion and improve the urban environment in conjunction with the grant from ADB. A portion of the loan received from an OFID loan equivalent to 30% of the cost of each water supply scheme was provided to the relevant provincial water supply company in accordance with an additional loan agreement that was acceptable to ADB.

Part of the remaining amounts for the project was provided by a grant of $ 1.7 million USD from Norwegian Development Cooperation Agency (NORAD). The NORAD grant was to co-finance the establishment of the guidelines and management component of the water supply sector. After the grant was sanctioned, ADB UN-Habitat agreed to support assistance in execution of project and capacity building in the amount of around $ 580,000.

Contributions from the Government of the Lao People's Democratic Republic themselves further supported by the residents of the target project areas through in kind assitance amount to a total of $ 4.2 million USD (around 17.0% of the overall project cost).

The detailed cost breakdown in provided in Table 2.

Table 2: Project cost breakdown (ADB, 2014a)

	Item	Amount (USD million)
Base costs		
A	Land and compensation	0.61
B	Civil works	
	1. Water supply	18.21
	2. Roads, bridges, and public sanitation improvement	2.44
	3. Village environmental improvements	1.15
C	Vehicles and equipment	2.2
D	Community health and awareness program	0.67
E	Project implementation assistance and capacity building	3.81
F	Sector regulation and strengthening	1.96
G	Incremental administration	2.03
	Total base cost	33.08
Contingencies		0
Interest and other financing charges during construction		0.58
	Total project cost	33.66

4 Project Features

4.1 Technical and technological features

The execution and results of the five components of the project is detailed below.

4.1.1 Strengthening regulation and management of the water supply sector

Under this component operational support was provided to WASRO to homogenise their efforts in the water supply sector through the generation of standardised procedures and guidelines for regulatory works. Additionally, the works of the policy makers WSD were also standardised through strategic, technical and management guidelines. Furthermore, training was provided to DHUP provincial nam papas (water supply authorities) and WASRO covering the integration of information technology and other aspects. Capacity building for the strategizing of financial investments in the development of urban wastewater sector was also provided.

4.1.2 Water supply development

When evaluated, the project is expected to directly benefit approximately 89,000 inhabitants in 2010 and 115,000 in 2015 in the main villages of approximately 12 small towns, providing secure and dependable tap water and improving the urban environment, which has a direct effect on health and living conditions of urban settlements. However, currently the estimate number of residents that directly benefits from the project has increased to 90,000 in 2012 and 140,000 by 2027. This increase

in excepted outcome is related to the higher rates of population increase than previously estimated, as well as an expansion of the projects target coverage rates to 90% per area. Furthermore, an additional population of estimated value 98,000 residents living in the areas adjacent to the project locations indirectly benefit from the project through the upgradation and development of urban infrastructure that enable ease of access to urban markets and social services in cities. Water supply systems, which were implemented in 3 phases and covers 12 subproject cities in 8 provinces, are shown in Table 3.

Table 3: Water Supply system implementation (ADB, 2014a)

Subproject Towns Item	Province	Subproject Town	Direct Beneficiaries (2012)	Direct Beneficiaries (2027)	Coverage (2012) %
Phase 1					
1	Xayaboury	Kenethao	9,260	14,420	94
2	Luang Prabang	Nan	11,090	17,280	101
3	Oudomxay	Houn	11,930	18,590	105
Phase 2					
4	Vientiane	Xanakham	5,215	8,125	84
5	Vientiane	Keo-Oudom	10,140	15,800	83
6	Xieng Khouang	Khoun	3,690	5,750	92
7	Houaphan	Xamtay	6,020	9,370	96
8	Luang Namtha	Sing	8,130	12,660	107
Phase 3					
9	Oudomxay	Namor	3,740	5,820	91
10	Luang Prabang	Ngoi	5,290	8,240	86
11	Bokeo	Nam Keung	5,350	8,330	103
12	Luang Namtha	Old Namtha	10,280	16,020	100
Totals			**90,020**	**140,400**	**96**

In support of the free connection policy, water meters were purchased under supply and delivery contracts for 100% of consumers in each city. The meters were purchased in three packages to supply the cities of phases 1, 2 and 3. After delivery, the construction contractor assumed responsibility for the installation and connection to the reticulation network. To support ongoing operations, 1-ton flatbed trucks were purchased for some subproject cities in Phases 1 and 2 to ease the hard work required by their operation and maintenance responsibilities.

4.1.3 Improvement of the urban environment

Similar to water supply systems, the improvement of the urban environment was also carried out in 3 phases, covering 12 subproject cities in 8 provinces, and followed the results of the feasibility carried out for the project component. The works to be conducted under this component were

carried out following the completion of construction works of the water supply system. This was done to avoid the need disturbing new pavements constructed to allow for installation of water supply pipes which would have led to double works.

This component of the project was targeted towards the improvement of urban infrastructure that is directly related to the sector of concern. The infrastructure that were covered under this component include public sanitary facilities, sewage systems, roads and bridges. Further, the equipment required to improve the capacity to operate and maintain the urban environment infrastructure at an adequate level was also provided. Investments for UEIs included in this section were given priority by local stakeholders and was restricted to a sum of about $ 22 per capita to ensure fair distribution of benefits across all project towns.

Following the requirements of the funding agency and the grant agreement 0016, construction works to be done under phase 1 and 2 in 8 cities were completed and commissioned. The activities under phase 3 for grant 0205, construction works were completed and commission in 4 towns. Details are shown in Table 4.

Table 4: Urban Environmental Improvements achieved under grant 0205 activities (ADB, 2014a)

		Activities		
		Road		**Sanitation**
Province	**Subproject town**	**DBST road with lined drain (m)**	**Gravel road with lined drain (m)**	**Septage disposal pond (number)**
Phase 3				
Oudomxay	Namor		529	1
Luang Prabang	Ngoi	1,560		1
Bokeo	Nam Keung	1,208		1
Luang Namtha	Namtha	1,165		-
Total		3,933	529	3

4.1.4 Community participation, awareness and action

This component of the project involves two main parts to it, which are (i) a community health and awareness program (CHAP) and (ii) an improvement in the rural environment. These subsections were planned to ensure that a priority was given to the evaluation of poverty in the target areas and give a focus on social assessment of the project. Additionally, it was a strategic decision taken to compy with the needs expressed by the stakeholders within the project preparation phase.

CHAP was devised for creating educational toolkits to assist the PIUs, consultants and participating community action groups to create awareness about health, hygiene and sanitation among the public in addition to the components of the project and their implementation. A key element of the awareness sessions were that they were easily comprehensible by rural ethnic groups that participated in the activities to ensure equal participation and effectiveness of the programs.

Another key factor of CHAP was to create a platform to enable constant flow of information between village development committees and water and sanitation divisions (WATSAN). A total of 16,215 residents with 62% women from the target regions took part in the awareness sessions and their activities. Sanitary grants of $ 75 each for 751 poor households in 12 cities with sub-projects were also allocated under CHAP. This aided in increasing the project coverage area to about 96%, which is more than the initially anticipated target of 80% required for approval.

Under this component, the upgradation of the rural environment was planned to involve members of the community through volunteering initiatives with the cost of the works to be conducted provided and managed by the project. Through this method it was ensured that the community was allowed to make the decisions in the planning and prioritising of the work to be conducted within the rural areas under the project. However, the implementation phase of this subcomponent of the project proved that urbanised communities showed little interest in providing in-kind contributions or construction management.

Furthermore, works were carried out to identify low-income households through social surveys and poverty mapping to recognise those that needed the sanitary grants that were to be distributed. Although the provisions were procured in bulk under a single contract for each city, the actual labor work was carried out by labor within the communities themselves.
Construction of toilets in non-poor households was done individually. To create an interest in public for building toilets, public awareness campaign was started at the initiation of the project. However, the initial uptake was low, so the construction of latrines was a means of getting free water supply connections to houses. Consequently, coverage improved by about 50% and ranged from 85% to 100%.

4.1.5 Project assistance and capacity building

To ensure systematic implementation and effectiveness of capacity programs, three packages were created and provided under this section as follows:

- **Package A** : funded by the Norwegian Development Cooperation Agency (NORAD), supported Section 1 - Strengthening the regulation and management of water supply
- **Package B** : financed by an ADB grant, supported sections 2-5 and was coordinated with Section 1. The target activities were:
    - advise the PCU and PIU to adhere with ADB security requirements and grant agreement
    - advice and support to reform sectors such as tariffs, connectivity policies, legal and operational frameworks and corporate plans,
    - assistance in conducting feasibility studies for each subproject and for preparation of detailed projects, tender documents, bid evaluations and contractual documents,
    - assistance in contract management, construction supervision and final commissioning.
- **Package C** : funded by the United Nations Human Settlements Program (UN-Habitat) Grant, provided support to communities for capacity-building for components 4-5 on geographic information system, and O & M for water supply operation.

The assistance under package B was provided through direct services, on-the-job training, workshops, and distribution of information materials. Similar form of combination has been used for

delivery processes in all aspects of the project, including relocation in districts, accounting, and financial and operational issues.

In order to carry out the works that were planned under package C, independent consultants were hired by the funding agency for the package within the year 2007. The work of these consultants were managed and organised by the team leader identified in package B who was in turn answerable to the director of the project PCU. The design process of the project was aided by geographic information systems (GIS) to ensure sustainability of the water supply systems and through generation of effective operation and maintenance manuals and tailor-made training programs. This in turn assisted in the development of community efforts.

Additionally, under this component of the project, a headquarters for PCU and PIU staff was provided along with the required office supplies and electronics. Vehicles were procured for the PCU and project assistance, as well as in the PIU to support construction supervision.

4.2 Economic and financial features

The economic benefits of the Project will be due to safe, dependable and inexpensive water supply and environmental improvement of the cities. The economic analysis was carried out on the WSS component in each sample city of the subproject in accordance with the ADB Guidelines on Economic Analysis of Projects and the Guidelines to Economic Analysis of Water Supply Projects (1998).
The benefits from non-incremental water consumption along with improved water supply services will give quantifiable economic benefits, which can be measured as the average price of water supply from non-water sources; additional water consumption, estimated at the average price of demand; and other resource savings. The average economic internal rate of return (EIRR) for the three sample subprojects is estimated at 21.5%, with individual results ranging from 19.1% to 22.7%.

Project progressive tariffs were accepted under the Project. The progressive tariff structure proposed under the Project consists of three consumption units, namely: the "life line" unit (less than 40 l / s), the middle unit (between 40 and 85 l / s) and the unit above the average (more than 85 l / s). The target average tariff level is set to reimburse the full costs of operation and maintenance, plus 30% of capital costs with a debt service ratio of at least 1.2.
Progressive tariff structures are developed on the basis of following principles: (i) the tariff for the lifeline block is set to recover direct cash operating and maintenance expenses; (ii) the tariff for the middle block is set to recover cash O&M expenses, taxes, and debt service and to achieve a debt-service ratio of at least 1.2; and (iii) the tariff for the highest domestic block and all nondomestic consumption is set at 1.5 times the second block tariff.
The financial and affordability analyses for the three sample subprojects show that the tariffs proposed by the Project based on the above principles are affordable to all, including the poor households. With the projected tariffs, all PNPs are expected to have positive cash flows after the subprojects are put into operation in 2009—no additional subsidy is required during the operation period.

4.3 Social and environmental features

In accordance with the results of the project evaluation, there were no significant adverse impacts on the environment due to the project in the target locations. Although there were shot-term issues they were considered to be insignificant in nature due to the ease of their mitigation through the creation of adequate environmental management plans (EMP). These EMPs were carried out prior to the initiation of the project and the results of which were included in the contractual documents

signed between the contractors and project implementation bodies. The resulting water supply networks built through the project created potable water that adhered to World Health Organization standards, which is what the standards of the country is based on.

As a result of the project, 751 poor households of 12 cities directly benefited though the sanitary grants that provided free plumbing services and material for the installation of sanitation facilities within the households. Through this and other activities, the project provided the basic means to reduce levels of poverty and provide affordable safe drinking water. Additionally, the project enhanced the tariff scheme by the introduction of "lifeline" blocks within the tariff structure allowing low-income families to pay less than 4% of the household income and receive as much as 60 liters of potable water per person per day. Following the project, the coverage of water supply and sanitation services and facilities within the low-income households of the 12 target cities was 100%.

During the project, a high priority was given to avoid exclusion of ethnic groups through specialised awareness programs targeting their inclusion following the Ethnic Groups Development Framework created for the project. Further, 95% of the total number of 3,156 households of ethnic minority groups were provided with water supply connections, with targets to include the remaining 5% through PNP.

According to ADB's environmental assessment guidelines, this project has been classified as category B. A preliminary environmental impact assessment (IEE) was carried out and an environmental assessment structure approved by the Agency for Water Resources and Environment was developed during the preparation of project. In order to adhere to the requirements of ADB's Environmental Assessment Guidelines (2003), the Environmental Protection Law (1999) of the Government of Lao PDR and its Implementing Decree (2002) and Regulation on Environmental Assessment (2000), preliminary environmental impact assessments were carried out for each of the project towns Namkeung, Namor, Namtha, and Ngoi. The results of the IEEs conducted proved that the classification of the project as category B.

The impact of land acquisition and resettlement for each city of the subproject, should be category B or negligible in accordance with the eligibility criteria of the project. The framework for resettlement and the short resettlement plan for the Muong Houn, Muong Nan and Kenethao subprojects were prepared in accordance with the regulations of the Lao People's Democratic Republic and ADB's policy on involuntary resettlement.

46 ethnic groups, dividing into three broad groups: Lao Lum (most), Lao Teung and Lao Sun, calls The Lao People's Democratic Republic home. The population in the project area is about 78% of the Laotian laum, 9% of the Laotian theun, and 14% of the Laotian Sung. The project is expected to have minimal negative impact on Lao Teung and Lao Sung ethnic groups (category B). However, the ethnic development structure was prepared in accordance with government regulations and ADB's policies to help assess the potential impact on all ethnic groups during feasibility studies.

5 Project Benefits

Figure 3. Children enjoying a new water well at a primary school in Laos (Pinterest, 2019)

The lives of residents within 12 target small towns of the country were improved though the provision of a reliable source of safe drinking water and the development of the urban environment. By the year 2010 a total of 89,000 residents directly benefited from the activities of the project, and by the year 2015 an additional 100,000 residents were reached. These led to direct positive impacts on the overall health and living standards of the communities within the areas.

Health benefits will come from (i) safe and convenient water supplies; (ii) improving environmental sanitation through drainage and related work; (iii) increased use of household sanitation facilities due to increased awareness, appropriate sanitation models and improved water supply; (iv) increasing knowledge and awareness of health and hygiene issues; and (v) avoiding the hard work of collecting water.

Additional health benefits were provided through information dissemination on the importance of personal hygiene for enhancing good health conditions within the resident populations. The upgrade works carried out within the 100 main village environments including the construction of access roads, walkways, and improved drainage and sanitation in residential areas further improve the living conditions of populations. Due to the improvement in roads and bridges, providing better access to urban markets and social services, an estimated 98,000 rural dwellers in surrounding areas will also receive benefits.

Indirect benefits through improved sanitation facilities include the reduction in costs caused by health care and economic losses that comes with the inability to work. Additionally, it leads to an increase in productivity, allowing more useful utilisation of the time that was previously spent on collecting water. The enhanced urban environment will further contribute to higher efficiency of commute and ease the access for residents of the area as well as visitors.

It can be safely concluded that the project was successful in the achievement of all its objectives in a manner that was effective and sustainable. This can be reinforced through the fact that although a target of 84,000 people was set, by the end of the project in 2013, about 96,036 residents in 12 target cities gained access to safe tap water at a satisfactory. Furthermore, even though the projected reduction the utilisation of unsafe sources of potable water was 80% by 2015, an impressive total reduction value of 97% was achieved on commissioning of the project in 2013. The coverage area of sanitary facilities increased up to 99% of the population in selected cities by 2013, which is more than the projected value of 80% by the year 2015.

The water supply subprojects gave an economic internal rate of return (EIRR) from 19.42% to 44.53%, which is higher than the 14.20% to 26.80% estimated during the assessment and exceeded the base discount rate of 12%. The cost savings involved with the replacement of non-incremental water consumed, which was previously obtained from alternative sources, with incremental water consumed, which is provided by the new piped water supply systems, were the major quantifiable benefits. An analysis of the sensitivity to revaluation with a 10% reduction in benefits showed that the EIRR remained above the control level of 12%, thus assuming that the subprojects are robust.

The recalculated EIRR values of the urban improvement components were 15.65–41.79% compared with 13.30–37.60% estimated during the assessment. A reappraisal sensitivity analysis with 10% reduction in benefits indicated these EIRRs remained above the 12% benchmark similarly suggesting that the subprojects are robust.

The project provided round-the-clock supply of clean water in 12 cities in the northern and central regions of the country, to 18,173 households (96,036 people). This enabled, around 17,565 households to build modern toilets, while from these household, 751 poor households received grants to pay for the installation of toilets. The project also provided access to water to approximately 3,000 households from ethnic groups headed by women, groups that are vulnerable and sometimes ignored.

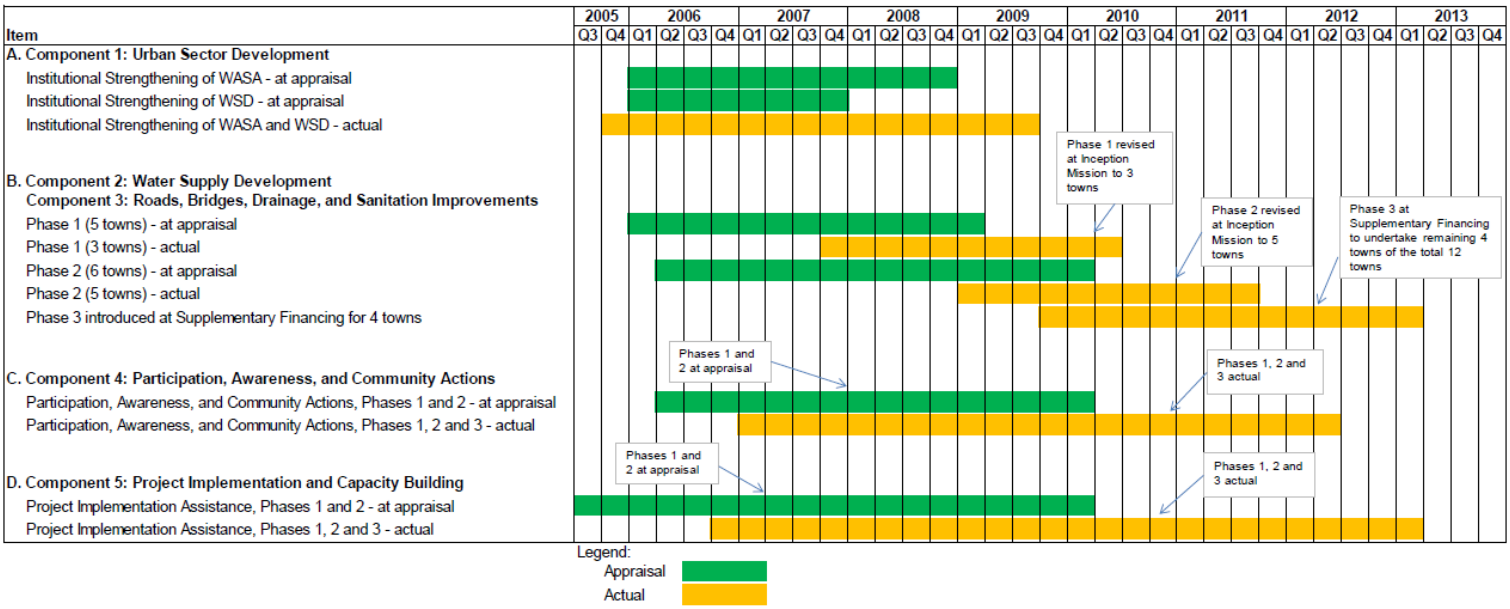
In addition to the installation of water distribution systems, a wastewater treatment plant was built as part of the project to maintain water quality. The focus of this project centered around helping women, by providing them with access to clean water and modern toilets for their homes. While, giving them training as water company employees, project management staff and community leaders. About a third of the civil servants in the project management units were women. While, women formed nearly half of the participants in the water supply and sanitation workshops organized by the project and almost a third of the training in operation and maintenance for water utility employees.

6 Implementation status of the project

The implementation arrangements were as envisaged at appraisal. The MPWT was the executing agency, with DHUP within MPWT working on MPWT's behalf. The responsibility for subproject implementation was assigned to provincial departments of public works and transport. A national project steering committee chaired by the vice minister of MPWT was established, and it included a wide range of stakeholders. A PCU in MPWT was able to successfully perform a routine coordination.

To deliver supervision of subproject activities, provincial project steering committees were formed in each participating province. These committees convened regularly to discuss key issues with respect to the subproject. The implementing agencies and their PIUs provided routine coordination between the various stakeholders at the subproject level. A PIU was established within each implementing agency. The implementation arrangements as designed at appraisal were assessed adequate to deliver the project's outputs and achieve its outcome.

Table 5: Status of the project (ADB, 2014a)



WASA = Water Supply Authority, WSD = Water Supply Division.
Source: Asian Development Bank.

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