



Integrated water resources management

Case study from mountainous Northwest Laos

From integrated Water/Food security project to Multiple Use water Service approach

Despite recent development efforts, Laos remains one of the poorest countries in the region (138/187, UNDP 2012). 34% of its population lives below the poverty line, mostly in rural areas. This figure can reach 43% in mountainous areas. Poverty is exacerbated by the lack of land access and of irrigation infrastructures, diseases affecting cattle and poor health declining productivity of the population. It is also aggravated by climate change creating weather disturbances and changing rainfall patterns (rainfall period postponement, short period of drought during rainy season, especially after sowing) and therefore having an impact on agricultural production levels. Strong economic and social disparities reinforce the separation between urban and rural populations.

The French Red Cross (FRC) has been operating in the Lao PDR since 2002 after it has been invited by the Lao Red Cross (LRC). From this date, the two national societies have been able to implement programs jointly on health, first aid, disaster risk reduction, WASH, food security and recovery programs.

The 5 strengths of Multiple Use water Service² (MUS)

- “1. MUS leverages and supports water self-supply; self-supply is people's investment in water infrastructure creating the human, physical, technical, financial and institutional capital of local water development and management.
2. MUS follows people's priorities, so that services are owned and locally appropriate.
3. MUS generates multiple water uses and so multiple health and wealth benefits in people's multifaceted livelihoods.
4. MUS develops multipurpose infrastructure, which is more cost-effective as a rule; single-use infrastructure is the exception.
5. MUS efficiently considers the local water cycle and the use and re-use of its multiple sources.”

In mountainous Northwest Laos, the FRC and the LRC have been implementing health projects with a strong focus on drinking water activities. From 2010, and with the support of the European Union, the FRC and the LRC have been focusing on Food Security actions (via 2 projects) partly consisting in building simple water infrastructures for the development of collective areas dedicated to gardening. A large majority of those infrastructures are Gravity Fed Systems (GFS).

This case study is intended to cover the various impacts of projects, to deal with the lessons learnt by the Red Cross staff and to develop Multi Usage water Service approach which is a particularly relevant one in the rural context of Northwest Laos.

¹ International Fund for Agriculture Development (IFAD)

² Van Koppen, B., Smits, S., Rumbaitis del Rio, C. and Thomas, J.B. (2014) *Scaling up Multiple Use Water Services: Accountability in the Water Sector.*

Project Impacts

The first project improved the quality of nutrition and the level of food security for more than 500 families. A small scale irrigation system infrastructure was used as a new method of growing agricultural products to support the dietary needs of families with home gardens.

The 'Food Technology Project' – compared to the previous project on the same theme – additionally focused on commercialised vegetables, fish ponds and animal raising production capacity to support the sales of products while also supporting the nutritional needs of the beneficiaries. Farmers groups were formed to support the activities, and at the village level, self-determination was encouraged and farmers had to decide what amount of products was to be consumed and to be sold. The FRC and its partners supported the farmers groups with training and capacity building sessions as many farmers were accustomed to subsistence farming and had no experience in selling products. Different levels of improvement have been observed in villages. More positive results are expected after the end of the project. The farmers will continue to adapt to the newly installed water infrastructure and to learn how to manage technical problems within their groups. The farmers' ability as groups to solve technical problems regarding water and production at this stage were encouraging.



More than
500 families

have improved
their living conditions

More than
50.000 sqm
of irrigated
garden

25
Gravity
fed systems



Kiewsala village Hongsa District

«We didn't join Red Cross project at the beginning, we first wanted to see how it works. Then we joined community garden and we are now happy about it. We eat more vegetables and we earn money to buy meat.»

Beneficiary family



"Since I started cultivating my garden, I stopped buying vegetables. I used to sell around a third of my crop. This garden is a success! We have started with 10 families, 25 other families have since joined us."

Mr Khamphak – Head of
community garden

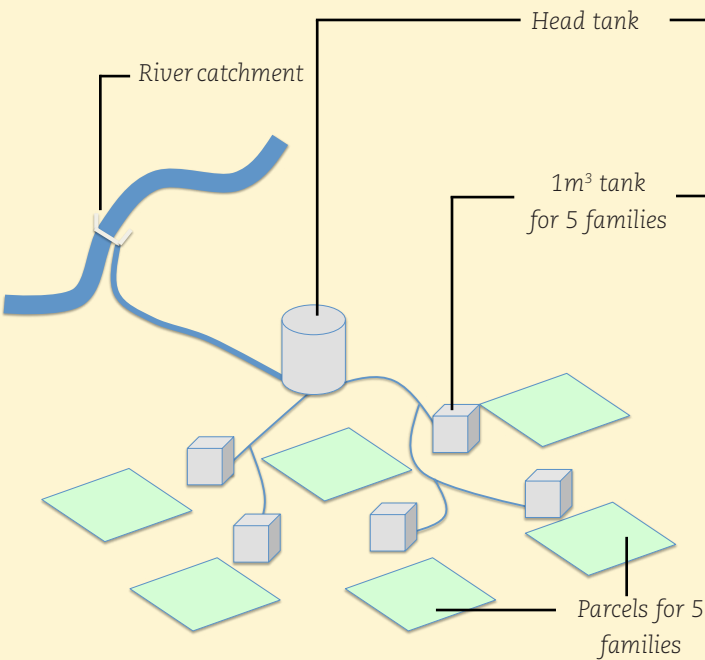
Houameuang village, Xienghone District

"I used to travel more than 100 km to buy vegetables. Today, I don't buy it anymore and i can sell vegetables for 3\$ a day"

Mme Dong - Head of
community garden

Houayong village, Hongsa District





The various steps of the project:

Steps	Activities
#1	Village selection
	Village mapping
	Demographic data collection
#2	Beneficiaries and available lands identification
	Existing and potential water resources Identification
	Technical proposals design
#3	Former community gardens visit to convince new motivated villagers
	Choice of land and water source for community garden irrigation after discussion of technical proposals with all key stakeholders
	Community garden group setup
#4	Validation and signature of community garden MoU
	Preparation and delivery of construction materials
	River catchment construction
#5	Connection to head tank
	Construction of head tank and other small tanks
	Connection from head tank to other small tanks
#6	Training: new agricultural practices, water management
	Hardware support for garden: seeds and tools
	Hand over ceremony

Community garden irrigated by small-scale gravity fed system
(Laosano village, Xienghone District)

**From the river to the market...
a diversity of skills to be coordinated**

From the river catchment many miles away from the village to the sale of vegetables on local markets, many technical skilled were called into play including ones in irrigation infrastructures setup, in new agricultural practices training for villagers and in water management. The combination of all of these skills falls within the area of expertise of the Red Cross. Moreover, particularly strong efforts are made here to coordinate those skills within the same project.

The main lesson learnt working on this project is that coordination between actors is more than essential:

- An efficient coordination is necessary in order to conduct a proper analysis of the context. A coordinated and shared analysis of information between the team in charge of water related activities and food security staff is a necessary requirement to ensure the consistency of the project.
- Meetings at village level to collect key information (about water resources, demography, design of technical proposals...) must be carried out in a coordinated manner and involve technical teams. This is especially important to find the appropriate balance between water resources availability and villagers' water needs.
- When implementing the different activities, a communication effort is necessary in order to understand the specific constraints teams will have to deal with on the field (period of low water flow to accurately measure yield, agricultural calendar, priorities of the villagers).
- The project should be conducted in a transparent and inclusive manner with villagers to improve the accountability of all stakeholders and avoid further water usages competition. An information board that explains how water gravity fed systems and community gardens work could be installed for this purpose.

The culmination of an internal review resulted in the Red Cross teams designing a sequence of activities as presented in the table:

**Indirect
positive impact**

River water is considered as non-drinking water and it was initially supplied to the village only for agriculture purpose. But villagers thought it could also be used for domestic usages (shower, laundry, toilet...). In the case where villages do not have enough drinking water supply to cover domestic water needs, the river water provision implemented by the Red Cross project has proven to be an interesting way to decrease drinking water demand.

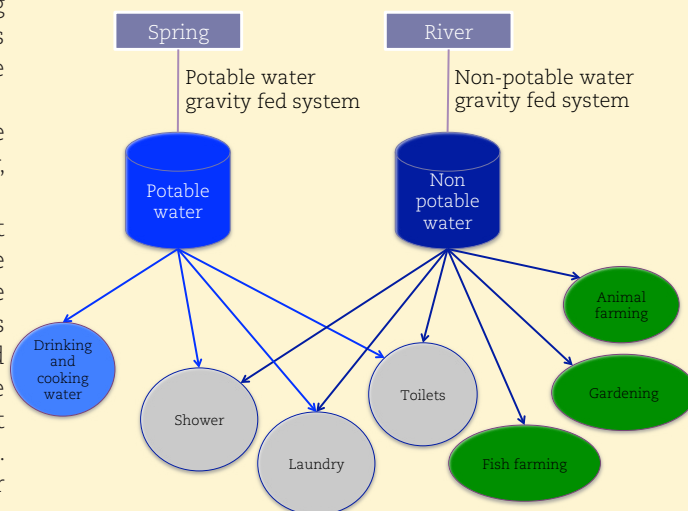
Changes in villagers' practices around water resources

The implementation of this irrigation project supporting vegetables gardening activity resulted in behavioural changes that can occur when a new water resource become available in a village.

The project often aroused the villagers' interest in using the resources for other purposes like domestic usages (shower, laundry, toilet...).

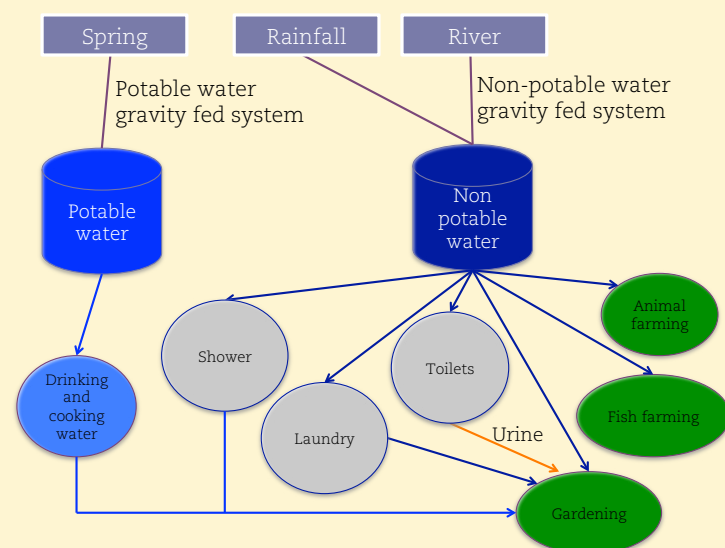
Moreover, this same water has been used for 2 different agricultural activities: for irrigation and for fish farming. The water users had some difficulties to agree on how to share and to manage this scarce resource in an effective way. It is worth noting that a village getting access to drinking and non-drinking water can be considered as more attractive. One of possible consequences can be a significant population increase due to migration from villages around. In this situation, pressures on water resource could further exacerbate tensions between different users.

The irrigation infrastructures have been designed to allow villagers to cope with further needs. Furthermore regulation of water usages seems to be a key point to pay attention to.



Potable and non-potable water current usages for villagers

Towards an integrated water resources management at the village scale



Example of water usages by considering an integrated water resources management at the village level

The distinction between drinking and non-drinking water is an important point of the integrated approach conducted in Laos. It could be useful to raise awareness among the villagers about water potability and to promote initiatives taken to protect water resources.

Finally, the integration of activities allows the Red Cross to get villagers involve easily, so that they are encouraged to pool financial and human resources for a better and more durable impact of the project.

A multiple-use approach applied to the setup of small gravity fed system using non-potable water constitutes a genuine integrated solution to develop agricultural potential of villages in the mountains while safeguarding existing water resources.

This approach can have an impact on villagers' health by considering sanitation and hygiene at the very beginning of the project. For instance, this could be conducted by taking into account villagers' water domestic needs (shower, laundry, toilet...) by proposing sanitation infrastructures to reduce waterborne diseases and by recycling grey water.

The multiple-use approach could be seen as an opportunity to introduce new practices, which contribute to a more rational management of water resources (rainfall harvesting, urine as fertiliser, treatment and reuse of grey water).

Improved villagers' resilience

In the case where villagers take ownership of this approach, it ensures them a better resilience to cope with further developments. These could be the decrease of drinking water availability, rainfall deficiency, village demographic variations but also issues related to bacteriologic and chemical water contamination (cattle, pesticide, herbicide...).

Key lessons learned & recommendations

- **To acquire in-depth understanding of project beneficiaries**

Within the context of mountainous Northwest Laos as in many other countries, the cultural diversity – due to the presence of numerous ethnic minorities – must be taken into account. Indeed, in each community, it is essential to understand how and what for water is used, which usage has priority and how to resolve a conflict around this resource if one occurs. An in-depth knowledge of local cultures can also help to understand motivation triggers that can be used to get villagers involved in the project so that it can be even more sustainable. A marketing study could be carried out to capture information (capacity to pay/ willingness to pay) and in the end to design more adapted infrastructures which could be easy to maintain and replicate.

- **To adopt an overarching view on water usages**

To implement an irrigation project where drinking water access is already an issue will have a significant impact on water usages and will probably be a source of conflict among users. To have a global vision of the situation on the field is of primary importance. In this case, it should include the identification, at the beginning of the project, of available drinking and non-drinking water source as well as the diverse water usages. In certain cases, it is important to consider the project's impacts on the neighbouring villages. A rapid increase in the village population due to migration could jeopardize water infrastructures.

- **To think of creative solutions to preserve water resources**

By developing an integrated approach, there is an opportunity to set up other activities which could contribute to preserve water resources (protection perimeter, infrastructure construction quality avoiding contamination, use of biological fertilizers). Besides, additional activities could contribute to increase and to optimise the existing water resource (rainwater harvesting, treatment and reuse of grey water).

- **To improve coordination between the sectors**

An integrated approach means the mobilisation of different skills and effective coordination. To ensure the success of this kind of approach, a significant effort on training and communication has become necessary for the Red Cross as well as for NGOs, the different departments of local authorities, the private sector or villagers. This could be considered as an important challenge both internally and externally.

- **To build local actors' capacities to support villagers' initiatives**

The sustainability of the project is not determined solely by villagers' capacities. Indeed, an environment favourable to the development and sustainability of activities has to be created. This environment usually comprises logistical, economical, technical, political and cultural aspects. It is also constituted of the local authorities and the private sector. It could be the supply chain for construction materials or the marketing chain of vegetables supported by the Red Cross. It is worth involving and training these stakeholders to ensure they will be able to support the villagers' initiatives.

- **To target the most motivated beneficiaries at the beginning of the project**

It is often efficient to identify the most motivated beneficiaries. Better than many words, concrete goals achieved by the first beneficiaries will often motivate other villagers to get involved. It could be very interesting to take into consideration this knock-on effect by organising field visits of former projects. This could also be a way to provide social recognition to the first beneficiaries.

- **To promote accountability and empowerment in order to contribute to the resilience of villagers**

Finally, the implementation of this kind of project must also include regular communication and consultation with villagers. At the end of the project, they should have the capacities to maintain the infrastructures in place but also to adapt it to fit in future situations.



Child spraying community garden
(Houameuang village, Xienghone district)

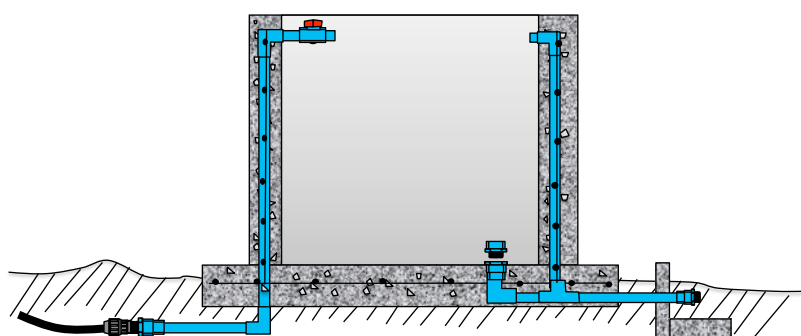
Training to build local capacities and promote irrigation systems based on the small-scale gravity fed system.

The French Red Cross, with nearly 10 years of experience in Hongsa et Xienghone district (Sayaboury Province) has developed in collaboration with the Lao Red Cross the training curriculum presented below.

This training is intended to reach technicians working for local authorities as well as local or international non-governmental organisations. The main objective is to build local capabilities needed to put in place replicable and sustainable infrastructures based on small gravity fed system. This will allow villagers to grow vegetables in garden in the specific geographical context of mountainous areas.

Decision makers would be involved during the first day. The 2 first days could include the private sector and villagers. Finally, the last two days would be dedicated to the construction aspect of the irrigation system and would be designed to brief engineers and technical staff.

Day 1	Day 2	Day 3 & 4
<ul style="list-style-type: none"> Detailed presentation of the 4 day training Multiple Use water Service management: villages situation and presentation of the integrated approach Irrigation system based on small scale gravity feeding system as a relevant option for mountainous villages 	<ul style="list-style-type: none"> Implementation methodology: making the water resources match with villagers' demand Design and operation of irrigation system (garden part) Presentation of quality control tools Integrated water resources management: to identify water usages, to share resources and to discuss about stakeholders responsibilities 	<ul style="list-style-type: none"> Identification and quantification of water resources Pressure loss calculation and design of water pipes Field visit: visit of river catchment, topography survey, discussions about main problems encountered Standard design on river catchment infrastructure Calculation of tank filling Field visit: installation of the head tank, set up of water pipe garden network and construction and maintenance of the 1 m³ tank



1 m³ tank schematic drawing



Field visit (Houay Lay village, Hongsa district)



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