

Nam Ton Watershed Management Dialog

“Plan of Action – 2008”

“Maintaining Watershed Functions at Agreed Levels”.

“Watershed Management” is the process of people guiding and organizing water, land and forest resource use in a watershed in order to provide a range of economic and social “goods and services” without impacting on water, soil and vegetation resources beyond what the stakeholders consider to be acceptable levels.

It is a process that brings together, or coordinates, the strategies and actions of the various water related agencies working watershed and allows the communities and stakeholders to contribute more in the water related planning and management decisions of the watershed. It has been shown internationally that the more use that is made of local information and opinions, and the more direct involvement of the local level people (district and commune levels) in the watershed planning and management processes, then a more sustainable and balanced outcome is achieved.

Chapter A: Background to the Watershed Plan

The Nam Ton Watershed is located in central Laos and management of the lower watershed is under the administration of Sonthang District of Vientiane Province and the upper watershed by Hin Heup District of Vientiane Province (Figure 1 needs to be added in). Large parts of the watershed have been heavily deforested, otherwise however, development pressures such as large towns, manufacturing industries, and primary industries such as plantation forestry and irrigation are at an early stage of expansion. These development plans are a sign that a watershed management approach is required which protects and where possible improves the watershed's functions¹, and to avoid the lessons from many other places where management actions take place only after widespread problems, losses have taken place. A watershed plan is also required to minimise the degree that developments by one sector, or in one part of the watershed, affect other sectors or locations.

This first watershed plan for the whole Nam Ton watershed has undertaken a wide range of information collection and interviews and consultations with the Nam Ton community, the private sector and government staff. The results of these investigations found issues where an overall watershed management approach is required including; reduced soil productive potential and sedimentation in rivers due to erosion, reduced fisheries due to sedimentation and reduced flows, plans for increased irrigation may exceed the supply capacity without construction of storages which would further affect fisheries and be subject to sedimentation, and opportunities to better manage steep land to reduce erosion, reduce flash flooding and increase livelihoods .

The watershed management approach aims to maintain and where possible improve the functions of the watershed as these are the foundation of the watershed community's living conditions and livelihoods. The community also places much emphasis on having a good and clean natural environment both culturally and also so that it is a pleasant and pleasing place to live. Important functions include improving the condition of the land, water, and aquatic and terrestrial environment such as ensuring water flow and quality, providing erosion control, improving soil fertility, maintaining biodiversity, producing food and other primary products,

¹ The *watershed function* is the sustainable provision of natural and water related goods and services. This comprises biophysical and ecological (eg. water of sufficient quantity and quality), economic (eg. provision of natural resource products), social (eg. living conditions) and cultural (eg. religious places) goods and services.

supporting income generating opportunities and livelihoods, and providing a good quality of life and recreational activities. Globally watershed management offers the opportunity to reduce greenhouse gases.

Watershed management is important in the Nam Ton watershed because its assets are managed by different sectors and levels of government as well as administration of the upper and lower watershed being the responsibility of a different District and Provincial governments. This means that local problems which are evident in the lower watershed and are caused by upstream actions cannot be managed by the local administration. This necessitates a cooperative management system in the watershed.

The purpose of this watershed plan is management of the watershed's assets and values so that they are shared fairly between the basin's communities, the environment and indefinitely into the future. It also recognises that as a tributary of the Mekong river, it has some important functions such as a fishery hatchery area that need to be protected as well as ensuring that the watershed does not become a pollution source of the mainstream.

The Nam Ton Watershed Plan was developed after detailed consultation with the watershed's communities and government agency staff. A Watershed Profile was prepared using this information and the information led to the preparation of this plan. Meetings of government leaders and senior staff from each District and Province were held to discuss the findings of the Profile and this Plan.

This plan is 'the first' Nam Ton Watershed Plan and is the start of the journey to sustainable management of the watershed not the end. The plan will need to be regularly updated as better information becomes available and also to better address the priorities and needs of the local community. This updating should take place every 1-2 years for the next period of time because there is a much new data and studies underway and required. The community and government agencies also need to better understand and have on-going input into making a better watershed plan.

Chapter B: The Watershed Community

Stakeholders in a watershed and maintenance of its functions include the watershed community but also come from outside a local community, such as the national and provincial agencies, project developers and investors, downstream communities, etc. In this context the watershed community includes District government leaders as well as agency staff.

Understanding the characteristics of the watershed community is an important basis for deciding strategies for sustainable watershed development.

The Watershed Community

The population of the Nam Ton Watershed Project Area increased from approximately 31,000 to 32,382 people, from 2004 until 2007 at an annual growth rate of 2.6%. This population is organized into 6,079 households, up from 5,550 in 2004 (an increase of 9.5%). The population tends to be concentrated along the Nam Ton and Mekong Rivers and at a population density of 40.25 people/km², is significantly above the national average (20.5 people/km²) which places extra pressures on the watershed's scarce natural resources. The watershed community sees that this increasing population is causing overexploitation of the natural resources and decreases in available water resources. This is seen as critically important in the Huaykham village area, where population density is well over 100 people/Km².

Families of higher income levels tend to have larger household sizes (ave 6.4 persons) relative to poorer families (ave. 5.0). This could be because of larger families or because they include a larger number of relatives. Males slightly outnumber females (52% and 48%, respectively). Approximately 50% of the population is aged between 15 and 60 years of age.

Ethnically, the watershed population is largely ethnic Lao, followed by minorities of Kh'hmu, Tai, and Hmong (Table B1). Lowland settlements are comprised generally of Lao groups and minority groups largely inhabit the upper reaches of the watershed. An exception to this is Ban Huaykham, which is in the lower stream reaches, into which many minorities have been resettled. Whilst Kh'hmu people are the minority in the overall watershed, in Hinheup District they form the majority which may have important implications for watershed decision making and participation.

Table B1. Ethnic distribution by District

District	Lao	Kh'hmu	Hmong
Sangthong	91.23%	8.74%	0.63%

Hinheup	42.55%	51.02%	6.48%
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In Sangthong District, most minority families have arrived in the last ten years, typically settling small housing clusters on the outskirts of larger, lowland Lao villages.

Immigration and resettlement is a serious issue of the natural resources of the watershed. Generally, recent new settlement of the watershed has taken place in two ways. The majority has been villager-driven by families from northern areas of Laos who have moved in the past 7-8 years in search of land (typically upland areas) for agricultural production, and access to health and educational services. The second broad type of resettlement has been government-sponsored. Additionally there has been internal watershed migration and immigration through non formal channels.

Much of this resettlement and immigration has implications for sustainable use of natural resources and for local conflict issues. Mostly low-income, comparatively disadvantaged upland immigrant families are more likely to follow swidden agriculture and place further pressure on natural resources due to greater exploitation of sensitive, degraded forest areas in the search for the productive land. There are also issues of access to clean water and sanitation and community health for these new communities.

Stakeholders in Natural Resources Management of the Nam Ton Watershed

Government and non government stakeholders in the Nam Ton watershed’s natural resources and their involvement in the Watershed Management Dialog are shown in Tables B-2 and B-3.

Community involvement is particularly important and achieved, primarily at a village level as this level can respond directly to local watershed issues and conservation or improvement of its functions. The village cluster (Kum Ban) system is being developed as a mechanism for more efficiently involving villages in government decision making and management. The Sangthong District has about 22 villages organised as 6 Kum Bans in the watershed and Hinheup District has about 9 villages organised as 3 Kum Bans there is one extension officer allocated to each Kum Ban.

Table B-2: Directly Involved Government Stakeholders in Nam Ton Watershed Management

Level	Institution or Group	Responsibility in the NTWSA	Involvement in NT WSMP
National	Ministry of Agriculture and Forestry (MAF)	Responsible for: <ul style="list-style-type: none"> • Forests and agricultural lands • Survey and land use planning of watershed areas • Forest conservation 	Represented on the WSMP working group oversees conduct of MAF project activities.
National	Water Resource and Environment Agency (WREA)	<ul style="list-style-type: none"> • Policies and oversight of all activities related to the natural environment and water, including EIA, • Monitoring meteorological and water resource conditions • Research into water resources and environment 	
National	National Land Management Agency (NLMA)	Responsible for LA/LUP, as well as all policies related to the land management	
National	Lao National Mekong Committee Secretariat (LNMCS)	A section of WREA. Oversight of project activities related to the Mekong and her tributaries	Official involvement at the national level, holds responsibility for NTWS project activity.
National	Ministry of Public Works and Transport	<ul style="list-style-type: none"> • Urban water supply • waste-water treatment 	
National	Ministry of Health	<ul style="list-style-type: none"> • Rural water supply • Groundwater management for rural water supply • Water quality monitoring for drinking water 	
Provincial	Governor's Office	Oversight of all activities occurring within the Province or Municipality	Receives reports from district authorities regarding project activities
Provincial	Provincial Agriculture and Forestry Office	Responsible for forestry and agricultural activities within the NTPA	Receives DAFEEO reports for each district
Provincial	Water Resources and Environment Office	Unit of the Governor's Office, responsible for activities relating to water and environment	Receives reports from district offices

Level	Institution or Group	Responsibility in the NTWSA	Involvement in NT WSMP
District	District Agriculture and Forestry Extension Office	Involved with LUP/LA at the district level. Responsible for: <ul style="list-style-type: none"> • Agricultural development including land use and irrigation • Fisheries resources • Plantations, Forestry, Non-timber forest products related issues 	Represented on District Watershed Management Dialog (WMC)
District	Department of Environment	Monitoring of activities which impact upon natural environment Conservation and Protection Forests	Represented on District WMC
District	District Land Office	Involved with LUP/LA at the district level, and has oversight over land use activities within the NTPA	Represented on District WMC
District	Department of Commerce	Commercial development within respective district, such as marketing of NTFPs, rice product, etc.	Represented on District WMC
District	Police	Implementation and enforcement of laws	Interests represented by proxy through the District governor's office
District	Military	<ul style="list-style-type: none"> • Primary responsibility for the Phou Panang NPA, border posts between districts and along the Mekong • Resource use by personnel within the NTPA² 	Interests not represented
Village	Village Head & Committee	Broadly responsible for all activities within the village territory	Represented on District WMC
Village	PRORICE contracted farmers	Organic paddy rice producers with lands along the mid Nam Ton River	Represented by Village heads on WMC.
Village	UNIFEM silk producers	5 hectares of mulberry plantations along the mid Nam Ton, minimal amount of water also used for silk processing	Represented by Village heads on WMC.
Village	Farmers	Benefit and impact watershed functions in diverse ways through agriculture and forestry, and use of water.	Represented by Village heads on WMC.

² This is of particular importance in relation to the use of natural resources within the NTPA. Military personnel are not obligated to abide by village management decisions related to fisheries or water resources

Table B-2: Non government Stakeholders³

Level	Institution or Group	Responsibility in the NTWSA	Involvement in NT WSMP
District	Sangthong Community Development Project (of MCC)	Development activities throughout the lower WS in the following sectors upland rice, farmer-managed plantation, livestock, fisheries conservation, well and latrine construction, health outreach activities, educational activities	Interests not currently represented. In part, SCDPs interests are represented through partnering line agencies (DAFEO and DoE).
District	Canadian University Service	Rice-based development activities, particular organic rice production in the middle reach of the Nam Ton river	Interests not represented
District	PRORICE	Marketing of organic rice with contracted farmers	Interests not represented
District	Forestry Plantation Companies	Plantation and development throughout the NTPA	Interests not represented
District	Cash-Crop Plantation companies	Cash-crop plantation in the WS, particularly in the lower Nam Ton river, and along the Mekong catchment area	Interests not represented
District	Mining Companies	Mining activities which can deplete and pollute the water resource	Interests not represented

³ The stakeholder analysis has included major outside organizations operating within the NTPA which are likely to have a direct impact upon watershed function. The analysis does not include small organizations or organizations whose activities are peripheral to the watershed.

Chapter C: The Nam Ton Watershed

The Nam Ton Watershed is a small watershed in Lao PDR (**FIGURE1**) and is a direct tributary of the Mekong River. The watershed has an area of 80,500 ha and is approximately 62 km long in a north south direction and is 5 - 20 km wide in an east-west direction. The Nam Ton River is about 82 km long.

The watershed plan area comprises the entire Nam Ton watershed and the sub-catchments of some neighbouring small streams, which drain directly into the Mekong. In the west the eastern part of Nam Sang watershed is included. The Nam Ton River comprises four main tributaries: Huai Kam, Huai Pan, Huai Snot, Huai Ki. Elevations range from 760 m to 180 m asl and the northern and western parts are hilly with moderate to steep slopes and in the south more gently sloping or flat. The western area is comparatively less forested and more developed for irrigation. The Phou Panang National Protected Area forms the eastern part of the watershed includes the eastern border.

Climate

There is no weather station in the watershed. The nearest is Vientiane and its meteorological data is summarised in Table 1. It is likely that temperatures and evaporation in the watershed are significantly lower than this due to higher elevations. Rainfall is expected to be higher than in Vientiane due to elevations but also from regional rainfall information.

Table 1: Meteorological data for Vientiane

Climate Data	Maximum	Minimum	Average
Temperature (°C)	28.9	22.6	26.3
Humidity (%)	83.1	65.3	74.1
Precipitation (mm/mo)	3309	81	1421
Evaporation (mm/mo)	1674	122	1374
Sunlight (hours)	2574	1353	2009

Source: Department of Meteorology, Vientiane. 2007

River Flow and Water Levels

The water flow of Nam Ton and Nam Sang is characterized by low-level flow in the dry season (October to May) and overflow in the rainy season (June to September) when 95% of rainfall occurs. There is limited information on river flow in the project area however there is information showing declining dry season flow in some tributaries. Additionally, village interviews found a widespread view that pools along rivers are now no longer connected during the dry season. Any trend of declining flow will be exacerbated by increasing diversions of water for irrigation and other consumptive uses.

Stream Water Quality

Generally water quality is not a serious problem. However, there is very limited information on water quality and stream conditions in the watershed including seasonal responses. An initial assessment of stream conditions using field measurement and villager survey techniques found:

- increased turbidity from upstream to downstream in the dry season
- increased sedimentation of the stream bed
- higher water temperatures and decreased oxygen caused by low shading of the stream,
- local water fouling from wandering stock,
- water acidity (pH), electrical conductivity and nutrient loadings were generally well within critical levels although there are exceptions in isolated pools during the dry season
- findings of increased water turbidity and temperature was supported from villager surveys

The overall consequence of these conditions is that the value of the streams to native fish and aquatic organisms is reduced and would at least partly explain reported drops in fish catches. Water quality for human consumption is also reduced.

Stream Conditions and Fisheries

Rivers and their condition are a measure of the health and management of the watershed. Rivers are important for water supply, fisheries and other aquatic animals, vegetation, recreation and natural beauty. Rivers are also very important to local people's beliefs and value systems.

Village interviews and field investigations revealed that, in past years, erosion has increased and more sand and mud is found in the river bed reducing the number and depth of deep pools. These pools are important for fish and aquatic life particularly in the dry season. Increased water temperature, which would result from reduced shading, was also reported by villagers. In addition stream banks were found to have low plant cover in places which

increases bank erosion. Sangthong District already has a policy for management of the riparian strip 25 to 150 m on either side of river and waterways

Assessment of fish species is based on villager reports who have reported declining fish stocks. Eighteen species are common and important for protein, 4 fish species which were important are now found infrequently, and 2 formerly important species are now not found. Two introduced species have become common.

Village discussions indicate a major fishery hotspot for catfish formerly existed at the confluence of the Nam Ton and Mekong rivers and that this has been substantially reduced due to unsustainable fishing techniques, lack of management and possibly reduced flow from the Nam Ton.

Groundwater and Water Supply

Groundwater is the most important water source for the domestic water supply in the project area. There is limited information on the extent, condition, usage and trends in water levels and water quality.

There are 537 shallow hand dug wells (typically serving up to 10 families), though most of these (about 65%) are dry by April. During the rainy season, some shallow wells in lowland areas are contaminated by flood waters. Most of the shallow wells are privately owned (61%), with the remainder belonging to the village. There are 381 deeper constructed tubewells (30% privately owned) and typically capable of servicing 15 families. Surveys (2004) have found that nearly half of these are non functioning. Villager surveys have reported declining groundwater levels. There is an indication that groundwater will be increasingly used for irrigation in the future.

During the dry season, when water supply is limited, well use is usually restricted to domestic consumption and streams and rivers are used for bathing and washing clothes. When water is in short supply, villagers rely on the collection of rainwater or river water which is either boiled or, in some cases, left untreated.

There are two piped water supply systems; one in Phialat and the other in Sangthong District Centre. Drinking water supply is generally adequate in the project area although there are some communities which lack drinking water resources such as Ban Huaykham, Ban Gua, and the resettled enclave on the outskirts of Ban Xo.

Water quality of groundwater is not yet recognised as a problem, however there are some obvious risks because village latrine systems overly groundwater reservoirs which are used for water supply. This is a potential a risk to human health.

Waste Water Disposal

Currently disposal of urban and domestic waste water is to the environment (eg. land and rivers) or via pits and latrines. With time and as populations increase this will increasingly become a source of pollution causing surface and groundwater water quality decrease and health problems unless it is well managed. The Sangthong Community Development Program supports latrine construction.

There is generally good latrine coverage throughout the project area, although an enclave on the outskirts of Ban Xo lacks latrines and clean water supply and, during the first months of 2008, suffered a severe diarrhea outbreak.

Forests

There are 3 main forest types in the project area: (i) mixed deciduous forests, where deciduous species are more than 50% of the stand, is the main forest type in the area. (ii) Small areas of lower dry evergreen forests which have 50-80% of evergreen species, and all occur below 200 asl, and (iii) bamboo forests, with less than 5% tree cover, occur in the hilly and mountainous areas of the project area.

Forest cover is currently at 43%, and decreasing by nearly 2% of the remaining area per year. This causes increased land degradation and sedimentation as well as biodiversity loss. In addition, forests are fragmented to small areas which are not connected to large areas which reduce their biodiversity value.

Dense forests make up only 18% of the NTPA. Other impacts of forest loss include lower dry season flows, higher wet season flows and more frequent occurrence of flash floods.

Village protection and conservation forests and, especially, Phou Panang National Protected Area cover, approximately 26% of the total land area of the NTPA, and are the vast majority of dense forestland throughout the area. However, these areas continue to be encroached for agricultural purposes and timber utilization due to lack of enforcement resources and local community knowledge of the importance of conservation and the relevant laws and policies.

Wildlife

Information on wildlife in the project area is limited and relies on information from a 1996 study. There are 3 globally threatened mammals (gibbon, asian golden cat and asian elephant)

and 6 regionally at risk mammals (pig-tailed macaque, rhesus macaque, landgu, leopard cat, variable squirrel and the inornate squirrel). There are many (hundreds) bird species in the project area. Seven are globally threatened, 8 regionally at risk and 1 nationally at risk

Land Use and Management of Degraded Land

Land suitability mapping has taken place throughout the watershed. However most of the land used for agriculture has been classified as not being suitable for most crops. There also appears to be internal inconsistencies into the land suitability classifications and because of this they do not form a good basis for confident land use decision making.

Thirty-nine percent (up from 35% in 1998) of the project area is considered degraded or unproductive based on satellite imagery. This forces farmers to encroach onto neighbouring lands, thereby perpetuating the degradation of land cycle. This degraded land is a source of erosion and sediment in the watershed.

The development of forestry plantations presents an important opportunity for the successful management of the Nam Ton watershed, particularly as an alternative to upland rice production on sloping lands and to rehabilitate degraded land. This should involve a planned mix of forest and plantations decided through rigorous land use planning and regulation practices. Successful intercropping mosaic systems will provide livelihood alternatives for villagers in the short and medium terms.

Large scale timber plantations are likely to have negative impacts on watershed values and functions relative to small-scale mosaic plantations. There are also serious social issues related to labour supply associated with large scale plantations. These issues will need to be carefully managed and planned.

Immigrant Population Pressures

Immigration of minorities and other external immigrants are seen by the community to be placing pressure on the natural resource base and causing declining fish stocks, reduced water resources and deforestation. The majority of established families did not believe that land should be allocated to new families, and that existing forestlands should be conserved rather than converted to agriculture. Resolution of this difficult issue will need to be managed carefully as the immigrant communities tend to be resource-poor and consequently dependent upon 'common' resources such as village lands, NTFPs and fish.

Economic Development- Irrigation:

Irrigation is an important means for raising agricultural productivity, household cash income and living standards of the involved land holders. However whilst irrigation activities offer these important benefits, projects need to be planned and implemented carefully.

Current plans for irrigation appear to be for Sangthong District: increase rice paddy from 6,712 ha to 7,980 ha, increase irrigation area from 310 ha to 328 ha; and Hinherb District: increase irrigation area from 100 ha to 115 ha.

Increases in irrigation need to be carefully planned and considered for their environmental and downstream impacts and how they can be managed including:

- dry season water availability and impacts on downstream water users
- weirs across rivers will often restrict fish passage in the migratory season
- impacts from intensification of production (e.g. fertilisers, pesticides, herbicides)

Economic Development- Mining:

Mining requires access to water and will affect water quality. Gold and other metal mining, particularly where there is on-site processing which uses dangerous chemicals, has the potential to seriously affect water quality, kill fish and cause serious human illness.

There are 13 active mining companies in Sangthong district: gold 4 companies; calcium 1 company; and gravel 8 companies. There is 1 copper mining company in Hinherb District.

Economic Development- Industrial Zone Development:

Industrial development zones have been mentioned by both Districts and are potentially important for local economic development and social development. At this stage plan details are limited and at a more conceptual stage of planning. Depending upon the type and intensity of industries involved, there are potentially negative impacts on watershed values and functions. These need to be carefully considered at an early stage and managed appropriately.

Economic Development- Hydropower:

There are no hydropower projects planned for the Nam Ton watershed.

Chapter D: Policies, Strategies and Socio-economic Planning

Legislation Relevant to Watershed Management⁴

WSM legislation is contained in several national laws, most prominently in the Water and Water Resource Law 1996, the Environmental Protection Law 1999, the Land Law 2003, the Forest Law 1996 and the Agriculture Law. Most of these laws follow a comprehensive approach, taking into account many issues relevant for WSM. They are supported by a range of implementing decrees.

The following legislations and supporting decrees are of major importance to watershed management in Lao PDR⁵:

Table D-1: Important Laws, Decrees and Regulations Relevant to Watershed Management

Law's
The Forestry Law (1996, amended version 2006)
The Water and Water Resource Law (1996)
The Land Law (1997)
Decrees and Regulation's
MAF Order 54 (1996): Customary Rights and Use of Forest Resources
MAF Instruction 822 (1998): Land Forest Allocation for Management and Use
MAF Regulation 196 (2000): Development and Promotion of Sustainable Tree Planting
MAF Regulation 221 (2000): Timber and Non Timber Forest Product Management and Extraction
MAF Regulation 535 (2001): Management of Village Forests
MAF Regulation 524 (2001): Management of NBCAs, Wildlife and Aquatic Animals
PM Decree 59 (2002): Sustainable Forest Management of Production Forest Areas
PM Decree 96 (2003): Commercial Tree Plantation and Environment Protection
PM Decree 38 (2005): Forestry and Forest Resource Development Fund

Table D-2 shows the linkages between the main relevant laws and thematic aspects of watershed management in Laos.

⁴ MRC-GTZ Cooperation Programme Watershed Management Project in the Lower Mekong Basin (May 2007) Review and Analysis of Policies, Laws And Regulations on Watershed Management n Lao PDR - A Consolidation. The Committee for Consolidation and Review of Policies, Laws, and Regulations on Watershed Management

⁵ GFA Consulting Group (2007) Nam Ton Sustainable Watershed Management Project, Lao PDR Annex 7: Natural Resource Management and Forestry. Report to KfW.

The following policies are of major importance to NRM⁶:

- The National Growth and Poverty Eradication Strategy (PMO, 2003)
- The Socio-economic Development Strategy (2001-10) and the Sixth National Socio-economic Development Plan (2006-10)
- The Strategic Vision for Integrated Watershed Management (MAF, 2002)
- The National Biodiversity Strategy to 2020 and Action Plan to 2010 (STEA/ PMO, 2004)
- The Forestry Strategy to the Year 2020 (MAF, 2005)

The relevant government agency at Provincial and District levels is responsible for interpreting and applying these laws and any relevant implementing decrees in preparing and implementing watershed management.

⁶ Ibid

Table D-2: Relationship between Legal Instruments and Thematic Aspects of Watershed Management⁷

		LAO LEGAL INSTRUMENTS IN WATERSHED MANAGEMENT												
		Soil erosion/ soil fertility	Siltation	Flooding	Water quality/ pollution	Sustainable use	Irrigation	Water sources/ water quantity	Surface runoff	Groundwater recharge	Conservation of biodiversity and environmental equilibrium	Planning	Public participation	Mo
Legal Instrument														
1	Land Law 2003													
2	Forestry Law 1996													
3	Agriculture law 1998													
4	Environment Protection Law 1999													
5	Electricity Law (1997)													
6	Water and Water Resource Law 1996													
7	Code of Practice for Forest Harvesting, No. 2157/Uaj.2006, date: 06 Nov 2006													
8	Ministrial Resolution on Environmental Standard, No. 575/MIH, date: 01/10/2001													
9	Priminister's Decree on the Establishment of NBCA (1994)													

	Green means that the legal instrument explicitly enables management of the issue
	Orange means that the legal instrument implicitly covers the issue
	White means that the legal instrument does not deal with the issue

District Development Plans

District Development Plans aim to increase family, economy and commercial production in order to improve the living condition by 1) completely ceasing shifting cultivations, 2) establishing permanent cultivations and pilot commercial production groups, 3) raising the basic standard of living, and 4) providing secondary school at all village clusters with clean water, electricity and all season access road.

The natural resources in Nam Ton Watershed are still in good conditions which enable the local residents to use and to produce foods. Furthermore, its location which is close to the Vientiane, is suitable for weekend ecotourism or outdoor activities and that it is on the main road networks to Vientiane that goes through Sangthong and Hinheup District. Sangthong

⁷ MRC-GTZ Cooperation Programme Watershed Management Project in the Lower Mekong Basin (May 2007)

District has identified its 8 natural advantages as 1) large land area, 2) rich in minerals, 3) rich natural resources, 4) many rivers, 5) good basic infrastructure and communication, 6) cross linking districts, 7) villagers embracing and energized to improve their living standards, and 8) reasonably senior persons and strong security system for peaceful development.

Some measures have been made to achieve these goals by implementing LU/LA, designing settlement areas according to laws, continuing location of staff to village clusters, increasing the number of irrigation schemes and extending rice paddy area, establishing markets, establishing ecotourism and historical places, implementing land-forest-natural resource degrees, implementing green peace school.

Selected future activities from district plans and activities (2007/2008) from Hinheup and Sangthong Districts are as follow.

Sangthong District:

- continue to register all family members of the district, estimated at about 2,000 people (immigrated brides and grooms)
- focus on LUP/LA
- increase rice paddy from 6,712 ha to 7,980 ha
- increase irrigation area from 310 ha to 328 ha
- reducing the number of shifting cultivation families from the current 1,141
- develop eco-tourism and historical places in 2 to 3 locations
- develop live stock grass land of 2,572 ha
- develop cassava plantation in 1,416 ha
- develop rubber plantation in 1,689 ha
- develop "Mak Deay" plantation in 185 ha

Hinheup District:

- establish framework for complete circle production of agricultural and forestry products
- M&E of LUP/LA and register poor families including families without lands
- cooperate with other concerned sectors to investigate the potential mining area such as coal, saltpeter, sand and gravel etc.
- develop human capacity
- increase irrigation area from 100 ha to 115 ha (15%)

- develop tree plantation in 1,330 ha
- develop eco-tourism and historical places in 3 or 4 locations (Pha Bong, Tham Farn, Keng Ka Chang, Houay Sa Mone Waterfall)
- establish village information group and disseminate best work of sample farmer and staff

Chapter E: Key Watershed Issues, Functions and their Management

Introduction

The watershed profile reports the results of a detailed assessment of the condition and issues in the watershed and these were summarised in Chapter C. Based on this assessment, issues papers were developed describing some of the key issues and these are presented at Annex 1. These have been analysed further and further information collected. This Chapter takes this information and considers possible responses which would attempt to remedy the issue (Table E-1 Table E-2). The two Districts in the watershed have considered and prioritised the issues in their respective administrative issues (Table E-3). This information is then further analysed and developed into the Watershed Plan of Action which is described in the following Chapter.

Watershed Issues and Possible Responses

Figure E-1 identifies the major issues that have been identified and possible responses that could be taken to alleviate the issue and its impacts.

Table E-2: Watershed Issues and Possible Responses

ISSUE	POSSIBLE RESPONSES
Current Watershed Issues	
<p>1. Water resources are threatened: There is a water shortage in some parts of the watershed in the dry season. This will worsen as water uses increase and further reduce fisheries and the environment unless corrective action is taken</p>	<p>1. <u>Prepare a Water Resources Inventory of the Watershed</u></p> <ul style="list-style-type: none"> • Undertake an investigation of existing seasonal, urban and rural surface water uses in the watershed and compile a water users register • Develop a long term and low cost rainfall, flow and level monitoring and / assessment program recognising that the cost and maintenance of more formal monitoring approaches is problematic • Assess the environmental flow needs along the rivers at key times of the year including minimum dry season flows, flows at fish migratory times, flows required to prevent sedimentation of deep river pools • Assess future (10 years) water demand by new developments • Assign seasonal water rights to existing users and uses • Assign water, as available for new uses • Improve irrigation system efficiencies and where possible reduce water rights for re-allocation to other uses including new irrigation and the environment <p>Depending upon the level of water shortage a more formal water allocation plan (WAP) and</p>

ISSUE	POSSIBLE RESPONSES
	<p>permitting approach may be needed.</p>
<p>2. Rivers and fisheries in the watershed are degrading and will continue to do so if there is no corrective action.</p>	<p><u>1. Extend Riparian Buffer Strips throughout the Watershed</u> Extended buffer strips throughout the watershed consistent with the approach used in Songthan District. This should be included in the watershed LUP project.</p> <p><u>2. Reduce watershed erosion and sedimentation in the watershed</u></p> <p><u>3. Undertake Basic Water Quality Monitoring to improve the understanding of water quality issues in the watershed</u></p> <p><u>4. Assess Basic River Health in the Watershed</u></p> <ul style="list-style-type: none"> • Continue monitoring of river health in the watershed • Extend approach sop that it can be implemented via village communities with the assistance of District staff. <p><u>5. Watershed Fisheries Management Plan</u></p> <ul style="list-style-type: none"> • Prepare a FMP for fish conservation and to build fish stocks in the watershed • Build awareness of the community concerning sustainable fishing techniques and management • Promote sustainable aquaculture, provide trainings on sustainable techniques <p><u>6. Include environmental flows in the Watershed Water Resources Inventory</u> The issue should be addressed in preparation and implementation of a water sharing plan</p> <p><u>7. Community Participation</u> Build the awareness of the community and directly involve the community in planning and management of the watersheds rivers and fisheries</p>
<p>3. Erosion is reducing land productivity, increasing sedimentation in streams and degrading the stream environment</p>	<p>A plan for reducing watershed erosion should be developed and implemented. This should include:</p> <p><i>(a) Land Use Planning (LUP) and Land Allocation (LA)</i></p> <p><i>(b) Riparian buffers-</i> A consistent policy and its implementation for buffer strips throughout the watershed, including communal usage of these areas, should be developed. This may require support or other incentive/ compensation for local communities who rely on flood-zone areas and stream banks for dry-season vegetable production (eg. alternative livelihood options, in the form of riparian NTFP for those affected) and assistance supporting revegetation of these critical areas and for stock watering points.</p> <p><i>(c) Community Awareness and Participation</i> Build the awareness of the community and directly involve the community in planning and management of the resource</p>
<p>4. Underutilised and unproductive lands should be managed to improve productivity, increase dry season river flows, reduce flash floods and improve</p>	<p><u>1. Land Use Planning (LUP) and Land Allocation (LA)-</u> Land Use Planning, with special reference to the conservation of sensitive habitats and landscapes, is a necessary precondition for sustainable resource management within the watershed. The allocation of land and the issuance of permanent land titles is a necessary component to sustainable land management. LUP/LA has not been carried out throughout</p>

ISSUE	POSSIBLE RESPONSES
<p>environmental conditions</p>	<p>large areas inside the watershed and land titling has not been completed.</p> <p>LUP/LA policy, procedures and systems need to be clarified, and stakeholders involved. Reasonable resources need to be accessed for a comprehensive planning. Furthermore, the roles and responsibilities between line agencies (eg. involvement of WREA) need to be improved.</p> <p><u>2. Development of Forestry and Plantations Development Plan-</u></p> <ul style="list-style-type: none"> • Develop new forestry and plantations plan once the LUP and LA plans are completed. Draft guidelines for concessions and promote sustainable techniques and plantation types. • Support and promote short and long term plantation intercropping systems, provide technical support and assist in building technical expertise of villagers. • Consider development and environmental impact of needed infrastructure for caring and harvesting plantations and draft a plan for sustainable development. <p><u>3. Improvement of pasture land -</u></p> <ul style="list-style-type: none"> • Promote soil improving forage crops as well as cut and carry systems for livestock raising <p><u>4. Awareness Raising</u></p> <p>Build the awareness of the community and directly involve the community in planning and management of the resource</p>
<p>5. Protected and unprotected forests are being reduced in extent, degrading and need to be more actively managed to improve ecological conditions and livelihoods</p>	<p><u>1. Vegetation Management Plan</u></p> <ul style="list-style-type: none"> • A Watershed Vegetation Management Plan, linked to LUP, should be developed which both improves the protection of protected forests and which builds on them as a nucleus for conserving and linking important remnant vegetation areas outside of the protected areas. This should lead to building biodiversity as well as the resource base for NTFP. • Residents must be actively involved in the development and implementation of conservation policies, and provided with livelihood alternatives. <p><u>2. Non-Timber Forest Products development-</u></p> <ul style="list-style-type: none"> • Develop sustainable NTFP management plans, improve knowledge about NTFP and provide access to markets. <p><u>3. Awareness Raising</u></p> <p>Build the awareness of the community and directly involve the community in planning and management of the resource</p>
<p>6. Groundwater levels may be falling and there is a risk to groundwater quality</p>	<p><u>1. Undertake a Groundwater Monitoring Program</u></p> <ul style="list-style-type: none"> • Monitor groundwater levels on a 1-3 month time scale in areas where groundwater is being used throughout the watershed (include irrigation areas if groundwater is being used) • Measure groundwater quality (including bacteriological) on a number bores which are thought to be at risk. • Depending upon results a groundwater management plan may be needed

ISSUE	POSSIBLE RESPONSES
Future Threats on Future Resource Condition	
<p>7. Immigration into the watershed is causing ecological damage and social instability.</p>	<p><u>1. Manage immigration and re-settlement carefully:</u></p> <ul style="list-style-type: none"> • Implement Province – District consultative arrangements to coordinate management of the issues and ensure that minorities are included in the decision making process in regard to management of the watershed's resources. • Facilitate participation of concerned villages on settlement of immigrants to avoid disputes about natural resources use and excessive pressures on the resource base. • Ensure that resettlement and land allocation strictly follows the LUP and LA process <p><u>2. Awareness Raising</u></p> <p>Build the awareness of the community, including immigrants and minorities on watershed issues and functions and management needs</p>
<p>8. Increased irrigation development is likely to reduce water availability for existing users and to further negatively impact on fisheries and the environment.</p>	<p><u>1. Manage water use carefully and secure minimum water flow in streams:</u></p> <ul style="list-style-type: none"> • Follow the findings of the watershed inventory on water availability before committing to new irrigation developments • Prepare a prioritised plan for the development and rehabilitation of irrigation in the watershed and ensure that new irrigation developments have a water allocation which will not reduce the water available to existing water using developments and that environmental impacts (water quality in particular) will be managed. Assessment criteria should include economic justification and minimal environmental impacts. • Rehabilitate existing irrigation systems, including WUGs so that water is used more efficiently and water taken from streams is reduced. This water then becomes available for other users or the environment. • Construct new irrigation schemes once a water permit or allowance is obtained and water user group arrangements are in place. Clarify and apply national policies regarding cost recovery. • Support irrigation with PAFO and DAFO extension to improve productivity and minimize off site impacts • Beware of and assess the impacts of water storages on fisheries and sedimentation.
<p>9. Development of a new industrial area may reduce water quality and environmental conditions.</p>	<p><u>1. Undertake a Feasibility and Impact Assessment of Industrial Zone Development</u></p> <ul style="list-style-type: none"> • Assess the attractiveness of alternative industrial zones. Relevant issues would include costs of development, types of industry, availability of labour, supply chains, access to markets, transport costs, environmental impacts, etc. • Draft an industrial zone development plan including evaluation of water needs and availability, and water quality and other environmental impacts. • Develop and implement an environmental management plan which protects water quality and which improves local environmental conditions. The plan should include a water resources monitoring plan to detect water quality and water quantity impacts.
<p>10. Mining: Sand & gravel mining in streams degrades water quality and aquatic life. Mining of minerals and storage of waste is a very serious risk to</p>	<p><u>1. Carry out Social and Environmental Impact Assessment of increased mining activities</u></p> <ul style="list-style-type: none"> • Prepare a register (including location, size, minerals mined, processing and waste storage) of existing and planned mines/processing sites and ensure that all have environmental management plans (EMPs) with satisfactory environmental and social safeguards • Assess EMPs and monitor performance compliance and ensure all mines have and implement

ISSUE	POSSIBLE RESPONSES
water quality, human health and the environment	approached environmental management plans

District Prioritisation of Watershed Issues

Discussions were held with Districts on the watershed issues and each District prepared a prioritised list of the issues using the following criteria (Table E-2).

Table E-2: Criteria used to Prioritise Issues

Criteria	Sangthong District	Hin Heup District
1	Dangerous Level or Risk Level	Dangerous Level or Risk Level
2	Urgency based on people subsidizing or living activities	Urgency based on people subsidizing or living activities
3	Forest as basic resource	Staff are available
4	Forest decrease every year	Villagers are ready
5	8-Potentials of the district	Places or lands are available for development
6	Poverty alleviation and Eliminate Shifting Cultivation	

Table E-3 presents the prioritised list issues for each District.

Table E-3: Prioritised ranking of Issues in the Districts

PRIORITY	SANGTHONG DISTRICT:	HIN HEUP DISTRICT:
1.	Forest cover is currently at 43%, and decreasing by nearly 2% per year	Forest cover is currently at 43%, and decreasing by nearly 2% per year
2.	Plans to develop an industrial area which has implications for water quality and possibly water supply unless carefully managed	Water resources are threatened by a variety of factors including dwindling water levels and increasing sedimentation of the mainstream
3.	Degraded and unproductive land has increased to cover approximately 39% of the land area of the NTPA	Plans to increase the area of irrigation which will place additional demands on an already limited water supply. This may reduce the availability of water for existing water users
4.	Non-timber forest products (NTFPs) are harvested at unsustainable rates in the absence of sustainable management plans	Plans to develop an industrial zone which has implications for water quality and possibly water supply unless carefully managed
5.	There are several areas of concern regarding actual or potential natural resource conflict within the NTPA	Degraded and unproductive land has increased to cover approximately 39% of the land area of the NTPA
6.	Water resources are threatened by a variety of factors including dwindling water levels and increasing sedimentation of the mainstream	There are several areas of concern regarding actual or potential natural resource conflict within the NTPA
7.	Villagers across the region report a categorical decline in fish stocks	Non-timber forest products (NTFPs) are harvested at unsustainable rates in the absence of sustainable management plans
8.	Plans to increase the area of irrigation which will place additional demands on an already limited water supply. This may reduce the availability of water for existing water users	Villagers across the region report a categorical decline in fish stocks
9.	Flood management in critical zones along the Mekong (this is not considered further at this stage as it is considered a Mekong river management issue rather than one that can be managed through watershed management)	
Other Notes:		
WSC agreed to consider the Action Plans (pre-identified solutions to the issues) when drafting their plan in many sectors.		
People are aware of the issues and solutions which will be adopted by district strategies: (i) Eliminate Shifting		People are aware of the issues and solutions, and that the development should start with

<p>Cultivation by the end of 2009 which is one part contributing to the climate change and (ii) Poverty Alleviation by the end of 2010 (1US\$ per capita/day in 2010). It should start with Land Use Zoning and Land Use Planning with the purpose of stabilizing agricultural activities.</p>	<p>Land Use Zoning and Land Use Planning with the purpose of stabilizing agriculture activities.</p>
<p>The district vice governor express his thanks and advised his staff from different sectors to consider the Watershed Action Plan into their sector working plan in the future. There is a need for continuing improvement of communications between sectors.</p>	

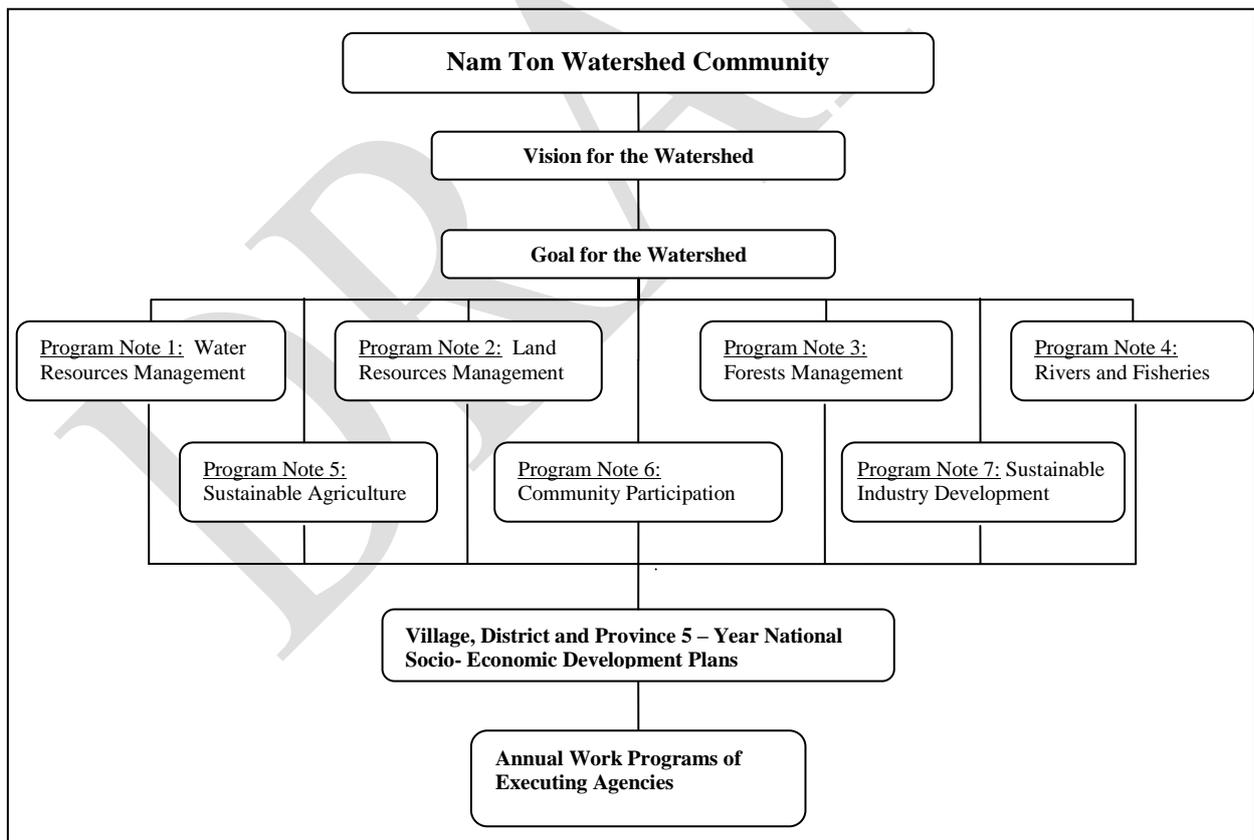
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Chapter F: The Watershed Plan of Action

Protection and where possible, improvement of watershed functions is crucial to the future wealth, livelihoods and living conditions of the Nam Ton watershed community. This Chapter presents the recommended ‘*Plan of Action*’ for implementation by the Nam Ton community and government agencies responsible for management of the watershed.

The Plan of Action has been prepared after consultation with relevant government agencies and with the watershed community. From this information and analysis of the issues and possible management options discussed previously, Program Areas have been prepared to guide the actions of government agencies and the watershed community. Program Implementation Notes have been prepared for each of these areas and are presented in Annex 2. The framework for the Nam Ton Watershed Plan of Action is shown in Figure F-1.

Figure F-1: Watershed Plan of Action Implementation Framework



Criteria for Selecting Program Areas and Prioritized Actions:

Criteria for identification of Program Areas, Strategies and Actions are:

1. Importance of the action to achieving the Vision and Goal of the Nam Ton Watershed Plan of Action (NTWSPA).
2. The action is directed at and specific to the Nam Ton Watershed.
3. The actions are within the executive power and responsibilities of District administrations and the watershed community.
4. The action has been shown to be important from technical studies and / or consultations with watershed stakeholders.
5. The action requires the support and is within the scope of responsibility of governments at District levels, sectors and/or the watershed community.
6. The action is feasible and practicable.

Vision for the Nam Ton Watershed

The Nam Ton community's vision is for an economically prosperous, socially developed and environmentally sustainable Nam Ton Watershed

Goal for the Nam Ton Watershed Plan of Action

The Nam Ton Watershed Plan is to secure desired watershed functions through the sustainable use of the water and related resources of the watershed for the welfare and economic benefit of the watershed's people whilst protecting and where possible improving the environmental conditions of the watershed and downstream communities

Achieving the Goal and Vision

This vision and goal is to be achieved by:

- improving water resources data and water resources assessments so that sustainable use of water resources can be achieved and conflict minimised,
- the protection and conservation of rivers, waterways and their connect riparian zones,
- the protection and conservation of forests covering erosion sensitive areas,
- the sustainable management of degraded and secondary forests and the diversification of existing farming systems through the establishment of smallholder plantations,
- development of irrigation where it is justified based on water resources assessments

- ensuring new developments are based on an understanding of the carrying capacity of the watershed and that they are subject to stringent environmental assessment and environmental management plans prior to approval

The Program Areas for the Plan of Action are described below. The relationship between these Program Areas and the issues and possible responses discussed in Chapter E are shown in Table F-1.

Program 1: Water Resources and River Management

Objective: To improve and where possible improve the health of watershed rivers and ensure the long term, reliable and sustainable access to good quality surface and groundwater for economic, environmental and social purposes.

Program Strategy: The Program will undertake a water resources and rivers inventory, strengthen water related information and develop and implement activities which will lead to improved water resources and watershed functions.

Program 2: Land Resources Management

Objective: To ensure that the watershed's land resources are managed sustainably with downstream impacts minimised.

Program Strategy: Undertake and implement land zoning, land use planning and allocation so that land is used sustainably and within its capacity. This is to be supported by programs which together will rehabilitate degraded lands as well as, where relevant, raising the productivity of the land and household livelihoods.

Program 3: Forests Management

Objective: To ensure that the watershed's forest resources are managed sustainably to protect the forest resource for the benefit of the watershed's community, biodiversity and other functions.

Program Strategy: To develop and implement an overall forest management plan for the watershed which integrates the soil and biodiversity protection benefits of forests with their use for NTFP and the development of plantation forests and intercropping systems.

Program 4: Sustainable Village Based Farming Systems

Objective: To ensure development and adoption of villager base sustainable systems of agriculture in the Nam Ton watershed to improve livelihoods whilst minimising the impacts on other users and the environment.

Program Strategy: Build the knowledge of farmers and their capacity to implement sustainable and profitable farming systems so as to improve their livelihoods and watershed conditions and functions.

Program 5: Community and Stakeholder Participation and Awareness Raising

Objective: To raise stakeholder and the watershed community's awareness, understanding and participation in improving and protecting the watershed's functions

Program Strategy: Raise the awareness and participation of the watershed's community so that they contribute to improving the watershed's functions and collect local information that can be used to improve government programs.

Program 6: Development of Sustainable Industries

Objective: To ensure that industry development is planned and managed in a way that sustains the watershed's functions.

Program Strategy: Build the capacity and cooperation of District and Provincial offices to ensure that sustainable industry development takes place by ensuring project environmental and social assessments and plans include consideration and management of any impacts on watershed functions.

Program 7: Implementation of the Watershed Management

Objective: To ensure the effective management of the Nam Ton watershed and implementation of the 'Nam Ton Watershed Plan of Action'.

Program Strategy: Support the Nam Ton Watershed Dialog so that the watershed plan is implemented effectively and so that the Nam Ton Watershed Plan of Action is revised and improved as new and better information becomes available.

Table F-1: Relationship between Identified Issues, Possible Responses and Recommended Programs

Issue	Possible Responses	Recommended Programs
Water resources are threatened	Water resources 1. Prepare a Water Resources Inventory of the Watershed 2. Prepare a Water Sharing Plan Groundwater 1. Undertake a Groundwater Monitoring Program	Water Resources and River Management
Erosion is degrading land productivity and water resources	Erosion 1. Land Use Planning (LUP) and Land Allocation (LA) 2. Riparian buffers- 3. Community Awareness and Participation	Land Resources Management
Underutilised and unproductive lands should be managed to improve productivity and reduce water resource degradation	Underutilised and unproductive lands 1. Land Use Planning (LUP) and Land Allocation (LA)- 2. Development of Forestry and Plantations Development Plan- 3. Improvement of pasture land - 4. Awareness Raising	Forests Management
Protected and unprotected forests are reducing areas and degrading conditions	Protected and unprotected forests 1. Vegetation Management Plan 2. Non-Timber Forest Products development 3. Awareness Raising	Sustainable Village Based Farming Systems
Rivers and fisheries are degrading	Rivers and fisheries 1. Extend Riparian Buffer Strips throughout the Watershed 2. Reduce watershed erosion and sedimentation in the watershed 3. Undertake Basic Water Quality Monitoring to improve the understanding of water quality issues in the watershed 4. Assess Basic River Health in the Watershed 5. Watershed Fisheries Management Plan 6. Include environmental flows in the Watershed Water Resources Inventory 7. Community Participation	Community and Stakeholder Participation and Awareness Raising
Increased irrigation is likely to affect existing users and the environment	Irrigation 1. Manage water use carefully and secure minimum water flow in streams: 2. Carefully plan for and rehabilitate justified irrigation areas 3. Beware of and assess the impacts of water storages on fisheries and sedimentation.	Development of Sustainable Industries
Immigration into the watershed is causing resource degradation and conflict	Immigration 1. Manage immigration and re-settlement carefully according to land and water resource capacity: 2. Awareness Raising	Implementation of Watershed Management
New industry development zones may cause resource degradation	Industrial Development Area 1. Undertake a Feasibility and Impact Assessment of Industrial Zone Development 2. Develop and implement an environmental management plans	Implementation of Watershed Management
Mining developments are likely to reduce resource conditions and affect other users	Mining 1. Carry out Social and Environmental Impact Assessment of increased mining activities	Implementation of Watershed Management

Budget Summary

The required budget is summarised in the following table and totals \$US 4,620,000. Implementation of the respective Programs will depend upon the availability of budget resources.

Table F-2: Summary of Required Plan of Action Budget

Program	Total (\$,000)	Donor (\$,000)	Gov. (\$,000)
1. Water Resources and River Health	350	200	150
2. Land Management	270	150	120
3. Forest Management	300	170	130
4. Sustainable village based farming systems	2,900	2,420	480
5. Community Participation and Awareness Raising	300	225	75
6. Sustainable Industry Development	100	45	55
7. Implementation of Watershed Management	400	220	180
TOTAL	4,620	3430	1190

PROGRAM 1: WATER RESOURCES AND RIVER MANAGEMENT

Objective: To improve and where possible improve the health of watershed rivers and ensure the long term, reliable and sustainable access to good quality surface and groundwater for economic, environmental and social purposes.

Background and Justification

The water resources of the Nam Ton watershed are plentiful in the wet season but much less so in the dry season. Overall there is limited hydrological or rainfall information on which to base a water resources assessment so that uses of the watershed's resources can be planned more confidently. Field assessments conducted during the preparation of this Plan of Action suggested that runoff models used in the watershed may not be sufficiently accurate for policy or management purposes.

There is evidence of water shortages for some uses in some parts of the watershed. This is expected to worsen in future as plans to expand irrigation are implemented. This will further reduce the fisheries, water quality and environmental conditions in and along rivers.

Water quality is not a serious problem in the watershed at this stage although sedimentation is higher than expected in the upper watershed and there are local isolated problems in the dry season as flows become very small, pools isolated and stock wallow in the streams.

Although there has not been a consistent watershed wide assessment of river health, there is clear evidence that rivers are not in ideal condition and are slowly degrading including degraded and slumping river banks, stock wallowing and fouling rivers, and lack of shading of the water body.

Groundwater is a very important water source for village water supply, however there is evidence that groundwater levels are falling and there are also evident risks to groundwater quality such as close proximity of wastewater disposal pits.

Program Strategy:

The Program will undertake a water resources and rivers inventory, strengthen water related information and develop and implement activities which will lead to improved water resources and watershed functions.

Tasks:

1. Register of Water Users

- Identify existing seasonal, urban and rural surface and groundwater uses in the watershed and compile a spatial water users register according to national guidelines

2. Assessment of Watershed Water Resources

- Prepare an updated, but interim, assessment of monthly runoff using corrected climatic data from nearby stations, runoff models and local flow monitoring.
- Design and implement a long term and low cost flow monitoring and / assessment program recognising that cost and maintenance issues makes a more formal monitoring approach problematic.

3. Assessment and Improvement of River Health and Environmental Flow Needs

- Systematically assess the river health of the Nam Ton river and major tributaries and prepare a long term community based monitoring program.
- Assess the environmental flow needs along the Nam Ton river and tributaries at key times of the year including appraisal of minimum dry season flows, flows at fish migratory times, flows required to prevent sedimentation of deep river pools, impediments to fish migration.
- Identify and implement specific measures to improve the health, environmental conditions and functioning of the watershed's rivers, particularly in regard to water quality and fish habitat. This should include development of a consistent watershed-wide policy for riparian buffer strips and incorporate this policy in the watershed's land zoning and land use planning processes
- Prepare and implement a plan to improve the health and functioning of the watershed's rivers with particular emphasis given to improving rivers for native fish.

4. Water Balance

- Assess future (10 year) water demands by new developments and the scope for efficiency savings from existing uses
- Prepare spatial, (tributary and mainstream) water balance under current and future demands and identify locations of possible water shortage and conflict, as well as scope for water re-allocation (including for the environment) from improved water use efficiencies.

5. Future Work Plan

- Based on the findings of the above studies prepare a forward work program to achieve sustainable use and sharing of the watershed’s water resources.

Implementation Responsibilities

Implementation of this Program is the responsibility of WREA DWR and DMH and their District offices supported by the WERI.

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

i. Register of watershed users	December 2009
ii. Assessment of river health and environmental flow needs and plan of action	June 2010
iii. Interim runoff, flow and water balance throughout the watershed	June 2010
iv. Water balance under current and future demand patterns and water savings	December 2010

Total Cost

The budget for the Water Resources Management Program is \$480,000 over 3 years.

Task	Total (\$k)	Donor (\$k)	Government ¹ (\$k)
1. Register of water users	40	20	20
2. Runoff and flow assessment	50	40	10
3. River health and environmental flows	120	70	40
4. Water balance	70	50	20
5. Preparation of Future Workplan	80	20	60
TOTAL	350	200	150

¹ Staff time and information

PROGRAM 2: LAND RESOURCES MANAGEMENT

Objective: To ensure that the watershed's land and forest resources are managed sustainably with downstream impacts minimised.

Background and Justification

It is estimated that 39% of the total land area in the watershed is underutilized, degraded, or unproductive. In addition, land is being used beyond its sustainable capacity such as the traditional swidden agriculture on highly sloping.

Evident impacts of land being used beyond its capacity in the watershed include:

- erosion and loss of top soil and hence loss of land function,
- widespread concern and evidence of stream turbidity and sedimentation which degrades river health and water supply,
- increased flash flooding and reduced dry season flows

Land zoning, land use planning and land allocation have not yet been carried out throughout much of the watershed and clear and transparent procedures and systems are required to do this. Additionally, immigration into the watershed appears to be placing excessive pressures on the watershed's resources and degrading the watershed functions.

Program Strategy:

Undertake and implement land zoning, land use planning and allocation so that land is used sustainably and within its capacity. This is to be supported by programs which together will rehabilitate degraded lands as well as, where relevant, raising the productivity of the land and household livelihoods.

Tasks:

1. Undertake Land Use Zoning and Land Use Planning

- Form interagency land use planning task force to oversee and undertake land zoning and land use planning and prepare project execution plan

- Clarify zoning and planning procedures including riparian buffer strips and conservation of sensitive habitats and landscapes
- Train of staff in preparation of land use plans
- Prepare watershed land zoning and land use plans as well as an implementation plan and targets
- Annual reports made to the WSM Dialogs on progress in preparing land zoning and use plans

2. *Implement Land Use Plans*

- Implement land use plans and allocation including issuing of land use permits in all watershed villages
- Undertake education and training of villagers so that land use plans are implemented
- Monitor land use and implementation of land use plans
- Annual reports to the WSM Dialogs made on implementation of land use plans

3. *Concession Approvals Procedures*

- Prepare a systematic approach for reviewing and approving land use concessions which is consistent with the Watershed Land Zoning and Land Use Plans.
- Ensure that the approach includes a system for public notice, community comment and consultation so that plans have community support and, where necessary, benefit sharing.

Implementation Responsibilities

Land zoning and land use planning will be undertaken by a joint effort involving Land Management Authority, MAF- Planning and NAFES, and their District offices.

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

Annual reports of land use zoning and planning activities to WSM Dialogs	From June 2009
Land zoning completed in the watershed	March 2011
Land use planning completed in half of the watershed's villages	March 2011

Land use planning completed in all watershed's villages	March 2012
Concession approvals procedures reported and agreed	December 2009

Total Cost

The budget for the Land Management Program is \$ 300,000 over 3 years.

Task	Total (\$k)	Donor (\$k)	Government ¹ (\$k)
Support to land use planning task force	80	40	40
Land Use Zoning and Planning	110	60	50
Implementation of Land Use Plans	80	50	30
Concession Approvals Procedures	30	20	10
TOTAL	300	170	130

¹ Staff time and information

PROGRAM 3: FORESTS MANAGEMENT

Objective: To ensure that the watershed's forest resources are managed sustainably to protect the forest resource for the benefit of the watershed's community, biodiversity and other functions.

Background and Justification

Forest cover is currently at 43%, decreasing by nearly 2% per year. Village protection and conservation forests and the Phou Phanang National Protected Area, cover approximately 26% of the total land area of the watershed, and the vast majority of dense forestland throughout the area. These areas continue to be encroached for agricultural purposes and timber utilization because the district authorities lack of the resources and expertise to enforce the existing laws. Communities typically do not understand the importance of their conservation and its policy, or inadequately informed about policy and laws. Residents must be more involved in the development and implementation of conservation policies, and provided with livelihood alternatives

Forest protection and conservation is essential to the enhancement of the watershed's functions and for increasing the livelihoods and living conditions of the watershed's community. Such an approach should target erosion prone areas to prevent erosion, soil loss and degradation and water quality. It should also target the conservation of the bio-diversity within protected areas such as the Phou Pha Nang NBCA but also other areas of biodiversity significance including and the conservation and protection forests under the responsibility of the district authorities and villages. These areas cover approximately 26% of the watershed and are mainly covered by dense and degraded forests. These areas also include degraded forest land, where encroachment areas exist

Forests are also an important source of Non Timber Forest Products (NTFP) for parts of the watershed community, however, forests and harvesting methods need to be carefully managed to ensure a sustainable supply.

Forestry plantations are an important possibility for the successful management of the watershed, particularly as an alternative to upland rice production on sloping lands. Such

plantations however should be planned within the overall land use, cover and biodiversity needs of the watershed.

Program Strategy: To develop and implement an overall forest management plan for the watershed which integrates the soil and biodiversity protection benefits of forests with their use for NTFP and the development of plantation forests and intercropping systems.

Tasks:

1. Prepare and Implement an Overall Watershed Forest Management Plan

- Develop a Watershed Vegetation Management Plan, linked to LUP, which both improves the protection of protected forests and which builds on them as a nucleus for conserving and linking important remnant vegetation areas outside of the protected areas. This should lead to building biodiversity as well as the resource base for NTFP.
- Villagers should be closely involved in the development of the plans and in deciding the forest uses as timber production, firewood collection, bamboo extraction and more important biodiversity areas.
- Residents must be actively involved in the development and implementation of conservation policies, and provided with livelihood alternatives.
- Forest management agreements should be considered to ensure agreed forest management

2. Develop and Implement a Forestry and Plantations Plan

- As a component to the overall forest management plan, develop new forestry and plantations plan and which designates areas where plantation forestry will be promoted.
- Draft guidelines for concessions and promote sustainable techniques and plantation types.
- Support and promote short and long term plantation intercropping systems, provide technical support and assist in building technical expertise of villagers.
- Consider development and environmental impact of needed infrastructure for caring and harvesting plantations and draft a plan for sustainable development.

3. *Develop and Implement a Plan for NTFP*

- Develop a sustainable NTFP management plan, improve knowledge about NTFP and provide access to markets.
- The plan should include a strong education component targeted at participating villagers. The general community awareness raising aspects should be included in the plan of Actions community participation and awareness raising program.

Implementation Responsibilities

MAF and its District Offices will be responsible for implementation of the Program

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

1. Prepare an Overall Watershed Forest Management Plan	June 2010
2. Develop a Forestry and Plantations Plan	December 2010
3. Develop a Plan for NTFP	December 2009

Total Cost

The budget for the Water Resources Management Program is \$ 170,000 over 3 years.

Task	Total	Donor	Government¹
Watershed Forest Management Plan	70	50	20
Forestry and Plantations Plan	60	40	20
Plan for NTFP	50	20	20
TOTAL	170	110	60

¹ Staff time and information

PROGRAM 4: SUSTAINABLE VILLAGE BASED FARMING SYSTEMS

Objective: To ensure development and adoption of villager base sustainable systems of agriculture in the Nam Ton watershed to improve livelihoods whilst minimising the impacts on other users and the environment.

Background and Justification

Raising the livelihoods of the watershed's community is a priority objective of District level governments. However this needs to be achieved using agriculture systems which are sustainable and do not degrade the watershed's functions.

This raising of community living conditions is best achieved through local, village based farming systems, rather than through large development concessions managed externally so that profits do not remain in the watershed.

Sectors which are particularly significant are:

Irrigation needs to be developed in the watershed so that available water is used efficiently and does not degrade the watershed's rivers or use water which is already used by downstream users. There are existing and proposed irrigation projects in the watershed however there is also seasonal water shortage which new irrigation projects might exacerbate. Existing irrigation areas, needs and scope for improvement needs to be evaluated before new irrigation projects are considered. New irrigation infrastructure projects should pass strict tests regarding water availability, acceptable downstream impacts, minimising the impacts of any weirs on fish passage and project economics.

Forestry provides a diversification option for villagers and is particularly important as it can target already degraded land that is currently often used for low input and low production upland cropping systems. Such land is mainly covered by fallow and shrub land and is thought to be a potential area of approximately 10.500 ha in both districts and includes gently sloped land and foot slopes between 6% and 36%. The systems need to include intercropping, and simple and cost-effective soil conservation measures such as grass strips and soil traps for steeper sloping land.

Pasture Land which is based on sustainable forage systems are a productive way of improving land condition, reducing erosion whilst increasing farmer income. Such systems have been demonstrated elsewhere in Laos

Fisheries are an important opportunity to diversify household income as well as providing an increased source of locally produced protein. Fish production systems however should be planned so as to minimise harm and competition with local fish species.

Program Strategy:

Build the knowledge of farmers and their capacity to implement sustainable and profitable farming systems so as to improve their livelihoods and watershed conditions and functions.

Tasks:

1. Sustainable Irrigation Development

- Prepare a plan for the sustainable development of irrigation in the watershed.
 - Consult with Program 1 of this Plan of Action to identify water availability.
 - Existing irrigation areas: Identify and assess all existing irrigation projects including seasonal water demand and use, scope for water saving, irrigation infrastructure condition and rehabilitation needs, levels and adequacy of system operation and maintenance, cropping patterns and scope to improve productivity.
 - Identify all proposed new irrigation projects and make a pre-feasibility assessment including of project economics so that only feasible projects are studied in detail.
 - Prioritise investment opportunities on basis of financial and economic returns, acceptable environmental impacts, water availability, project feasibility, willingness of communities to form WUGs and maintain systems.
- Implement attractive projects including undertaking detailed surveys, designs and prepare a detailed proposals and environmental impact assessments for assessment by WREA.
- Monitor and report on implementation

2. Promote Village Level Forestry

- Develop and promote systems and plan for multi-purpose trees including rubber, indigenous timber trees (teak/hardwoods) and domesticated NTFPs (paper mulberry) consistent with the Watershed's Forestry and Plantations Plan (Program 3).

- Provide technical advice concerning the selection of natural seeding and secondary growth stands as well as advice on household financing.
- Offer seedling and fencing materials would be provided by the Project as an incentive, together with a partial compensation for the labor and time input of the farmer.
- Monitor and report on plan implementation

3. Improve Pasture Land

- Prepare and implement plan for promoting use of soil improving and stabilizing forage crops as well as cut and carry systems of livestock production
- Provide technical advice concerning appropriate forage and feed systems, incentives and access to improved species as well as advice on household financing.
- Monitor and report on plan implementation

4. Promoting Fisheries and Aquaculture

- Form user organizations (for example ‘Fisheries Management Committees’)
- Prepare Fishery Management Plan including:
 - jointly decided management measures, such as fishing rules, regulations and their enforcement,
 - fisheries enhancement through local fish breeding for fingerling production for stocking and sale to fish pond operators, and others
 - Marketing arrangements to maximise producer prices and volume
 - Performance monitoring
- Monitor and report on plan implementation

5. Extension of Sustainable Farming, Land, and Forest Use System

- Prepare a plan for improving the farming system knowledge and skills of farmers, including the sustainable use of land, forests and water resources. The Plan should take a comprehensive approach to farmer training and include agricultural and agronomy skills, business management and decision making skills, resource management and clean production systems etc. The Plan should extend skills and knowledge so that implementation of the other tasks in this Program are implemented effectively.
- Train district staff on the implementation of the sustainable farming system approach effectively and in conducting farmer extension and training.

- Undertake farmer targeted outreach using group extension methodologies.
- Monitor and report on implementation

Implementation Responsibilities

The Program will be implemented by District/Provincial Agriculture and Forestry Offices (DAFOs/PAFOs), and the Living Aquatic Resources Research Center (LARReC) of NAFRI/MAF.

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

Plan for Sustainable Irrigation in the Watershed	December 2009
Plan for village level forestry	December 2009
Plan for improvement land improving pasture land and fodder production	December 2009
Fisheries and aquaculture management plan	December 2009
Implementation reports based on milestones listed in Plans	Quarterly

Total Cost

The budget for the Program is \$ 2,820,000 over 5 years.

Task	Total	Donor	Government ¹
1. Sustainable Irrigation Development	1,200	1,000	200
2. Promote Village Level Forestry	1,100	900	200
3. Improve Pasture Land	70	50	20
4. Promoting Fisheries and Aquaculture	30	20	10
5. Extension of Sustainable Farming, Land, and Forest Use System	500	450	50
TOTAL	2,900	2,420	480

¹ Staff time and information

PROGRAM 5: COMMUNITY AND STAKEHOLDER PARTICIPATION AND AWARENESS RAISING

Objective: To raise stakeholder and the watershed community's awareness, understanding and participation in improving and protecting the watershed's functions

Background and Justification

The actions of the watershed's community are a major determinant of the condition of the watershed's functions. In addition, local community members have a very good understanding of local issues and conditions and can be used to inform District authorities so that policies appropriate to the needs of the communities are developed.

The environmental awareness of local communities needs to be raised so that the Plan of Action and its different management plans, such as forests, NTFP, fisheries, biodiversity and improving river conditions are implemented effectively.

Involving communities in the Plan of Action will:

- Build support for the Plan and trust in the process and government intentions
- Create solutions that are tailored to the local situations and more likely to be adopted
- Result in better and more cost-effective solutions
- Form stronger working relationships within and between communities and between communities and governments
- Share responsibility and accountability for decisions or actions
- Enhance communication and coordination of resources

It is important to note that whilst community participation doesn't override or bypass government laws and regulations but rather greatly enhance watershed management efforts to complement and support laws and policies which aim to conserving and improve the watershed's functions such as water supply, water quality, protecting drinking water supplies, protecting forests, and restoring habitats.

Program Strategy:

Raise the awareness and participation of the watershed's community so that they contribute to improving the watershed's functions and collect local information that can be used to improve government programs.

Tasks:

1. Review community participation and awareness raising activities undertaken elsewhere (eg. MRC, internationally).
2. Develop and implement a plan for community participation and awareness raising including:
 - Regular (eg. twice a year) community and stakeholders consultation and watershed hearings to identify and address topical watershed issues
 - Raising environmental awareness and of relevant laws and government policies as well as awareness of the Plan of Action and its priority programs.
 - Villager responsibilities in managing the watershed natural resources and '*Watershed Plan of Action Programs*'
 - Community monitoring activities such as water quality, water levels and flow, rainfall, fish, endangered species and indicators of watershed health
 - Involvement in development and implementation of village level environmental management plans
3. Monitor and report on implementation

Implementation Responsibilities

Program implementation will be the responsibility of District offices of Water Resources and Environment supported by DAFO

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

A formal watershed community and stakeholders hearings taking place	September 2009
Awareness raising materials and activities taking place	December 2009
Community monitoring projects developed and being implemented	March 2010
Progress reporting to watershed Dialog	Bi-annually

Total Cost

The budget for the Water Resources Management Program is \$300,000 over 3 years.

Task	Total	Donor	Government¹
Community and Stakeholder Hearings	80	60	20
Awareness raising activities	20	15	5
Community Monitoring	200	150	50
TOTAL	300	225	75

¹ Staff time and information

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PROGRAM 6: DEVELOPMENT OF SUSTAINABLE INDUSTRIES

Objective: To ensure that industry development is planned and managed in a way that sustains the watershed's functions.

Background and Justification

There is increasing industry activity in the Nam Ton watershed. In some cases, such as mining, large concessions such as plantations, as well as development of possible industrial zones by District administrations, these developments can have serious impact on the watershed resources such as water quality. In some cases, projects may require a secure and reliable supply of good quality water.

It is important that District governments are aware of these impacts and that appropriate checks and balances are in place to ensure that any developments are undertaken sustainably and with acceptable impacts on the environment.

An approved and best practice approach is needed which includes:

- protection of watershed functions as part of sectoral development projects,
- consultation with the local community and affected stakeholders,
- opportunity for the public to comment on any proposals,
- notification and involvement of the watershed Dialog in the approval of projects which may affect watershed functions.

Program Strategy:

Build the capacity and cooperation of District and Provincial offices to ensure that sustainable industry development takes place by ensuring project environmental and social assessments and plans include consideration and management of any impacts on watershed functions.

Tasks:

1. Review national policy settings regarding assessment and approval of natural resource development projects/plans and clearly identify specific responsibilities between the different levels of government.
2. Prepare and maintain a spatial database of all development projects in the watershed.
3. Assess approaches and processes used by District and Provincial Offices to ensure sectoral resource development projects are sustainable and protect watershed functions and are included in Environmental and Social Management Plans. Prepare report with recommendations for improved management.

4. Ensure new developments have satisfactory Environmental and Social Management Plans which protect and where possible improve watershed functions.

Implementation Responsibilities

National, Provincial and District Offices of Water Resources and Environment.

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

Report with recommendations on project Environmental and Social Management Plans.	December 2009
Database of sectoral natural resource development projects in the watershed	December 2009
Implement recommendations to improve sustainability of development projects	2010

Total Cost

The budget for the Program is \$400,000 over 3 years.

Task	Total	Donor	Government¹
Report on EMPS and SMPs	30	15	15
Database of Development Projects	20	10	10
Implementation of report recommendations	50	20	30
TOTAL	100	45	55

¹ Staff time and information

PROGRAM 7: IMPLEMENTATION OF THE WATERSHED MANAGEMENT

Objective: To ensure the effective management of the Nam Ton watershed and implementation of the '*Nam Ton Watershed Plan of Action*'

Background and Justification

Strong management arrangements are needed to ensure that the plan is implemented effectively and so that best value is obtained from available funds. Strong linkages are required between the Dialog and District governments so that the priority tasks of the Plan of Action are embedded within the District socio-economic plans.

Special and on-going effort is needed to:

- build capacity to undertake integrated watershed planning,
- coordinate sectoral planning and activities to protect and improve watershed functions,
- ensure information is collected and maintained at a whole of watershed scale,
- promote the Nam Ton watershed to potential investors highlighting the environmental amenity and sustainability of the watershed.

Program Strategy: Support the Nam Ton Watershed Dialog so that the watershed plan is implemented effectively and so that the Nam Ton Watershed Plan of Action is revised and improved as new and better information becomes available.

Tasks:

1. *Provide Watershed Dialog Secretariat Support:* A small watershed dialog secretariat will be required to arrange and record meetings. It will also be required to administer plan funds, monitor performance and coordinate sectoral activities including information collection and storage.
2. *Convene meetings of the Watershed Dialog:* Half yearly meetings of the Nam Ton Watershed Dialog will take place and rotate between Districts and include presentations and field visits to sites of particular relevance.
3. *Prepare and Implement the Plan of Action's Work Plan:* A 3 year work plan will be developed and agreed by the Watershed Dialog to address the Plan's priority programs and including monitoring implementation.
4. *Undertake capacity building of Watershed Dialog members:* Capacity building will be arranged using study tours to nearby watershed dialogs and presentations on topical water resource management issues for the watershed.

5. *Prepare State of the Watershed Report:* Review and update the watershed profile with improved information in year 3, including preparation of a summary, community friendly version.

Implementation Responsibilities

District WRE Offices supported by Land Management Offices and DAFO's.

Expected Milestones and Outputs

The expected outputs, subject to funding, are:

Secretariat support of WSC	
Meetings of WSC (2/ year from June 2009)	June 2009
Prepare Plan of Action work plan for agreement by WSC	September 2009
Quarterly reporting on Plan of Action work plan implementation	From September 2009
Activities to build capacity of WSC members	On-going
Updated ' <i>State of the Nam Ton Watershed</i> ' report	April 2012

Total Cost

The budget for the Program is \$400,000 over 3 years.

Task	Total	Donor	Government ¹
Secretariat support of WSC	80	50	30
Meetings of WSC (2/ year from June 2009)	100	60	40
Prepare Plan of Action work plan for agreement by WSC	60	15	45
Quarterly reporting on Plan of Action work plan implementation	40	20	20
Activities to build capacity of WSC members	80	50	30
Updated ' <i>State of the Nam Ton Watershed</i> ' report	40	25	15
TOTAL	400	220	180

¹ Staff time and information