



Kingdom of Cambodia
Nation Religion King

Ministry of Agriculture,
Forestry and Fisheries

**Situation Analysis on
Sustainable Land Management
in Cambodia**
(Issues, Challenges, and Opportunities)

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ABSTRACT

This paper covers an overview on Sustainable Land Management (SLM) situation analysis of other relevant stakeholders, achievements, recommendations and lessons learned undertaken by Ministry of Agriculture, Forestry and Fisheries (MAFF) of Cambodia within alternative agro-ecosystems with a goal to develop sustainable land management based farming system for sloping land and soil fertility management for lowland.

Land degradation through soil erosion and fertility decline is recognized as a major limitation to cropping red soil in Cambodia (Croker, 1962) needed to find solutions by erosion control through contour plantings of barrier crop based farming systems solutions to observe surface and gully erosion problems.

SLM is strongly compatible with key result areas to improve agriculture and rural development, maximize environmental sustainability and effective partnerships and delivery of the aid program with excellence.

With its medium-term objectives, Department of Agronomy and Agricultural Land Improvement (DAALI) has achieved the national network of SLM in which information has been analyzed as to explore the principal areas of environment, social and economic impacts and the factors that contribute to success. Acceptance of these impacts, SLM identified the farming system models for semi-commercial producers which consider soil fertility, erosion control, productivity of the hedges/barriers to be used, and farmer needs.

The SLM is the most important to establish sustainable agriculture and land use stability to ensure contribution to the Medium Development Goal (MDG) of Cambodia on poverty reduction and protection of biodiversity and environment. It primarily aims to engage long-term agricultural productivity and land use stability. The expected outcomes of SLM include: (1) established enabling environment to harmonize policy decision and support to agricultural productivity and land use stability; (2) developed and harmonized transfer of skills and knowledge on the use of innovative tools for micro-nutrient management, organic-based farming and livelihood; (3) promotion of conservation agriculture and effective farmer-to-farmer technology transfer; (4) established linkage of farmers with technology providers, market players and policy makers; (5) promotion of consensus knowledge and agricultural land use stabilization; (6) mainstreamed best practices to promote support for sustainable agriculture. These outcome will help for poverty alleviation through capacity building and mainstreaming of lessons learned and best practices.

Timely technical assistance, training, capacity building, workshops, administration, management and information systems on SLM allowed a balanced approach to the network management function, effective distribution of information as printing materials, effective links with similar local programs, and network support activities to the stakeholders.

Under the leadership of MAFF, lessons have been learned among stakeholders in various degrees across the implemented areas (1) to address SLM issues in order to be functioning very well for the next step, (2) to support MAFF takes a leadership as a full

function for development and guidance supporting a longer-term intervention and well enough experience in collaboration with other international projects in term of parting country for the benefits all working together to minimize risks , (3) to mainstream all beneficiaries stakeholders (including political decision-makers) in SLM into/or parallel the national objectives, (4) to be effective respects from partnerships stakeholders in dynamic SLM approaches and to make sure to other stakeholders in institutionalizing and continuing these approaches for longer-term interventions, (5) to encourage peer recognition as *good work* by institutionalizing international and/or national forum, by exchanging staff and on-the-job training to the trainees, and by networking scientifically publications among international and/or national agencies.

A sound platform for information and experience sharing within the network is (1) appropriate documentation methodologies to conduct SLM research and development activities and issues, (2) timely technical backstopping activities and effective appropriated staff exchanges, (3) improvement of quality control in On-farm and development activities, (4) bottom-up working rather than top-down to encourage communication and the spread and ownership of initiatives at operational levels to enhance their integration as mainstream organization activities.

Additionally, the quality of researches especially where institutional and individual capacities are likely still weak, where there is questionable commitment on behalf of the participants to the common goal or when resources are very limited.

SITUATION ANALYSIS OF SUSTAINABLE LAND MANAGEMENT

1. BACKGROUND

Cambodia is a tropical country located on the peninsula of mainland Southeast Asia with a land area of 181,035sq km. It is adjacent to the gulf of Thailand and has a coastline of approximately 435 km. Its land border of 2,438 km. runs along Thailand to the west, Vietnam to the east and Laos PDR to the north. . The country consists mainly of low plains traversed by many rivers that flow into the Mekong River and the great **Tonle Sap Lake**. There are low mountain ranges in the southwest of the country and along the northern border with Thailand while the northeast is forested plateau with higher altitude than the central plain. Rainfall varies in different parts of the country as well as from year to year. Rainfall is uneven and irregular, resulting in periodic droughts or floods, sometime concurrently in different parts of he country. The period of heavy rainfall is frequently interrupted by so called “small dry season”, a period of normally one or two weeks of relatively less, or even no rainfall for July.

Cambodia has a total area of 11.1 million hectares or 61% of the national land area (MAFF 2002), 3.3 million hectares of which are designated as protected areas. Between 2.7 to 3.1 million hectares are cultivated croplands representing approximately 18% of the national land area. Land with mines and unexploded ordinance is estimated at 109,000 hectares. The category of concession management by large business operations is reported by MAFF to cover a total of over 5.5 million hectares, however, other sources use concession area of 8 million hectares.

2. SITUATIONS OF SUSTAINABLE LAND MANAGEMENT

2.1. Environmental Situation

Land degradation in Cambodia, as elsewhere, is brought about by both human-induced and natural causal factors. The National Action Plan (NAP) document states that land degradation assessment and monitoring have not been carried out. The current efforts are very much fragmented and require close coordination between and among agencies that have taken initiatives to address the problem of poor information and knowledge on land degradation.

Recent studies such as the National Capacity Self-Assessment (NCSA) indicate that information on the extent of land degradation in relation to agriculture is very scarce. This is due to inadequate technical capacity to carry out soil mapping classification, and soil analysis to identify and differentiate natural degradation (soil acidification and chemical deterioration) from human-induced degradation attributed to wrong land use practices.

One of the most striking examples of localized degradation is the uncontrolled exploitation of forest resources for fuel wood in the inundated and highly populated areas of **Great Lake**. Some of the identified significant users of fuel wood are bricks and tile manufacturers (28,775 cubic meters annually), bakeries (10,800 cubic meters annually), and

the traditional palm sugar production (3-4 kg of fuel wood per kg of palm sugar). It is estimated that 90,000 metric tons fuel wood annually is consumed for the production of palm sugar.

The Ministry of Environment (MoE) reported that during the last 30 years, the forestlands were reduced from 73% to 61%. In addition to the negative effects of deforestation, cleared lands easily lose their organic matter due to the use of these lands by subsistence farmers who, for lack of capital and savings, resort to unsustainable land management and inappropriate farming systems. Improper use of chemical fertilizers causes nutrient imbalances and exacerbates micronutrient deficiencies.

85% of the rural population is dependent on agriculture as their main source of income. Majority of the rural farming families live in fragile subsistence that revolves around rice, fish and foraging. Agricultural productivity has been low because 96% of the farms lands have poor acid and shallow soils aggravated by seasonal sporadic rainfall that limits production to one crop per year.

About 90% of the soils in Cambodia, are chemically degraded, generally acidic, sandy and have poor soil fertility, which is the result of soil formation processes. These soils classified as Latosols, Acrisols, and Ferrasols, aside from being chemically degraded are associated with thin surface soils, very low organic matter, depleted in calcium and magnesium.

Soil erosion and loss of soil fertility have been recognized as major forms of land degradation. However, conflicting information on the nature and extent of soil erosions exist. Researchers have indicated that in areas with active rill erosion, crop yield is reduced by 20-25% in the 2nd. year of cultivation and by 40-50% in the 4th. year of cultivation. International Soil Reference and Information Center (ISRIC) indicated on their global land degradation report that there is only 3.2% of soil erosion. Furthermore, the MoE reported that no data is currently available to show the actual degree of soil erosion. This was corroborated in the other report by the National Action Plan (NAP) which emphasized that data and information about land degradation is simply non-existent.

Agricultural production is strongly connected to the annual cycle of flooding where 4 million hectares of the country becomes wetlands during rainy season. Cambodian farmers rely on floodwater for rice production and fishing, as well as for a range of other products derived from flooded forests and wetland areas. However, despite being ranked third in Southeast Asia for its abundance in water, Cambodia suffers from seasonal water shortages and constraints on domestic and agricultural water supply.

Rainfall varies in different parts of the country as well as from year to year. Rainfall is uneven and irregular, resulting in periodic droughts or floods, sometimes occurring concurrently in different parts of the country. The period of heavy rainfall is frequently interrupted by so-called “small dry season”, a period of normally one or two weeks of relatively less or even no rainfall for June/July. This period is observed to be very critical for rice cultivation.

Land degradation is a serious threat to the country's food security considering that a majority of population are poor and are fully dependent on the natural resources for food and have limited financial capacity to augment their food supply. Below are some important facts that point to the very serious concerns regarding land degradation:

- 90% of total cropland of 2.5 million hectares is planted with rice for some parts of the year;
- rice provides 70% of the nutritional energy needs in Cambodia;
- 96% of soils are of low fertility due to natural and human induced factors; and
- absence of reliable soil map with sufficient detail soil property information for site-specific determination of soil fertility and land degradation status.

The overall soil conditions limit not only productivity but also contribute to:

- food insecurity among subsistence farmers who has no way of making good use of these soils since not much help is coming from technicians who themselves are unaware of the technical requirements of the acid soils; and
- the overall long-term decline in the population carrying capacity resulting from accelerating effects of continuing misuse and increasing human induced land degradation.

The general lack of soil cover caused by deforestation and agricultural land degradation has very serious negative effects on the following:

- regeneration of natural forest species;
- agricultural productivity and livelihood of vulnerable and poor communities;
- water retention capacity of the soil surface;
- natural habitat regeneration for agro-biodiversity; and
- biodiversity.

The 120 km irrigation canal in Takeo province, the largest irrigation system within the **Tonle Sap** ecosystem, was constructed with the objective of improving crop intensity and annual rice output from the previous system of floating rice cultivation where yield was 0.5 ton annually. The construction of the canal, however, has created adverse impact on some fish habitats.

2.2. Socio-economic Situation

Based from the 1993 Constitution, is a unitary state administratively divided in Provinces and Municipalities, Districts, and Communes. There are currently 20 provinces and 4 municipalities that include the capital city of **Phnom Penh** and towns of **Sihanouk-ville**, **Keb** and **Pailin**. There are 171 districts and 14 **Khans**, 1,510 communes and 111 **Sangkats**.

Cambodia is moving away from a post-conflict situation towards development. With the return of peace and the restoration of macroeconomic stability after the 1993 elections, Cambodia has the opportunity to make far-reaching reforms in all facets of economic and social life. The objective is ultimately to alleviate poverty by raising productivity and living

standards in the context of lower levels of per capita income the world. Cambodia has resolutely embraced principles of liberal democracy and human rights, free enterprise and the market economy, and full integration into the regional and world economy. The country is in the early stages of a long road paved with high expectations and severely limited resources.

The population according to the 1998 Census stands at 11.4 million, broken down into 5.5 million males and 5.9 million females. The population growth rate is 2.5% per annum. Nearly 85% of population lives in rural areas. High population growth affects poverty by increasing the number of dependents to income earners within the household and by increasing under and unemployment rate. Rapid population growth in rural areas is likely to lead to deforestation, degradation of the land, depletion of water resources and reduction in biodiversity. In addition, high population growth is often associated with increasing conflict over land in rural areas and to social ills in urban areas.

Cambodia has several challenges to overcome. Despite prolonged economic growth during the past decades, there are indications that poverty have been declined slowly. Rural growth has barely kept pace with population growth and relies directly on natural resources for their livelihoods. These livelihoods and socio-economic development in general are under threat due to environmental degradation and unsustainable exploitation of natural resources. Natural resources must remain the focus of attention to pass on the tremendous legacy of a rich environment heritage to the next generation. The challenge is how to achieve sustainable utilization of natural resources that will benefit people in an equitable manner, while preserving environment.

Despite many years of technical assistance with liberal funding from various donor institutions, the performance of rice, which occupied as much 90% of cultivated lands remain low at less than 3.0 tons per hectare.

The MAFF estimated that 6.4 million hectares of land is suitable for agriculture. Rice cultivation takes the most land among agricultural crops at 2,5 million ha during 2006-2007. However, this is still smaller than that prior to wartime at 2.7 million ha. Other food crops take 438,000 ha. Livestock and aquaculture also need land to respond to the market demand.

Land and soil degradation prevent growth of the agriculture sector. National paddy production increased about 19% from 4.7 million tons in 2003 to 5.8 million tons in 2007 resulting from the introduction of new high yield varieties with new farming technologies. However, rice yields remain low compared to neighboring countries' performance. Other constraints are inappropriate use of fertilizer and pesticide, monocropping and lowland rain-fed rice farming practiced by about 80% of farmers, which contributes to low investments in agricultural inputs.

Farmers in the Great Lake wetlands have developed rice-based farming systems that follow the natural bio-hydrological rhythm that is made to coincide with the different phases of vegetative and reproductive growth of paddy rice. Farmers have adopted a wetland system of planting a mix of modern and traditional floating varieties which varies in maturity and in specific elevations of the natural drainage topo-sequence, which control the timing of water

elevation with the change in season. However, despite the natural adaptation of rice farming systems to the natural bio-hydrological rhythm of Great Lake ecosystem, rice yields remained low, with most areas producing less than two 2 t/ha.

While this unique indigenous knowledge operates on optimality of water availability, the farmers and technicians are unable to understand the role of seasonal flooding in natural soil fertility development. The farmers and the technicians do not understand the added impact of improper soil nutrition management practices in flooded landscapes that contribute to further soil degradation in the form of soil chemical imbalance and induced micro-nutrient deficiency that particularly limits yield levels of rice cultivation in the wetlands.

Poverty is primarily a rural phenomenon. The overwhelming majority of the poor derive their livelihood from agriculture. Moreover, the incidence of poverty is also higher among farmers than among other occupation groups.

2.3. Policy and Institutional Situations

Article 59 of the constitution of Cambodia stipulates the need for every citizen to protect the environment and balance the use of natural resources.

The Government's goal is to manage, conserve and protect environment and natural resources in an ecologically sustainable manner to help in alleviating poverty throughout the nation. For the agricultural sector, Cambodia has clearly determined the development objective in accordance with the national development framework "Achieve and ensure food security and conserve natural resources". This development objective is supported by Cambodia's set of policies for agricultural development.

Cambodia is endeavoring to implement a coordinated set of laws, programmes of work, and institutional arrangements regarding land which are directed towards enabling the achievement of national goals of economic development, poverty reduction and good governance, as described in the Socio-Economic Development Plan (SEDP), National Poverty Reduction Strategy, and Government Action Plans.

The development of the agriculture sector is the core element of the 2001-2005 SEDP-II. This involves increasing the output from this sector in addition to reducing poverty incidence. As agriculture contributes about 40% of the GDP, it becomes incumbent upon the Government that policies and strategies for economic development and poverty reduction are focused on agricultural development, which is likewise the effective way to create more employment.

The government's food security policy emphasizes sustained growth in farm production, processing and marketing activity. Expansion into more crop, livestock, fisheries and forestry production will only uplift people out of poverty if specific measures are taken to protect and assist the poor.

The Law on Environmental Protection and Natural Resources Management approved for implementation in December 1996 remained the major law to address natural resources management.

Broad guidelines for environmental management were established in the First 5 Year SEDP, which states among others, that the country lacked a coherent management structure for the sustainable use of the available natural resources. The plan identified seven key environmental issues. It suggested that local area management plans target specific types of problems, and it also indicated that this planning should be developed by MoE in conjunction with National Committee for Land Management, Urbanization, and Construction (now the MLMUPC).

Overall support to the implementation of the country objectives with respect to Natural Resource Management and Environment comes from the very broad mandate of the MoE that includes the following general aspects:

- Protection of the environment against adverse effects of economic development;
- Conservation through the creation of protected areas;
- Development of laws and sub-decrees with respect to environmental management, conservation and protection;
- Strengthening of existing laws and sub-decrees with respect to environmental management, conservation, and protection; and
- Preparation and implementation of national and regional environmental action plans through co-ordination functions; and, ensuring sustainable development.

The objective of Land Administration Policy is to clarify and record ownership and other rights to and the location of all properties in order to strengthen land tenure security, improve the efficiency and reliability of land markets, and protect social harmony by presenting or resolving disputes.

The State Land Management Policy allows the State to identify and locate its different properties in a systematic way. This also allows the State to clearly protect areas of public interest, and to maximize the benefits of the State from the granting of sales, lease, concessions or possession rights on land in the private domain of the State. Its objective is to ensure that land and natural resources are used in an efficient manner in order to support sustainable and equitable socio-economic development, protect land, natural resources and human settlements from deterioration or undesirable use, and support to the decentralization, effectiveness and accountability of governance. Table 2 summarizes their roles and responsibilities;

2.4. Causes of Land Degradation

As elaborated earlier, land degradation in Cambodia comes in two forms: nature-induced soil chemical degradation which will explain the common reference to the dominance of poor acid soils all over country and the human-induced land degradation caused by abuse and misuse by land users, largely represented by poor vulnerable communities who have no motivation and capacity to invest on sustainable land management. The second form, while

visually recognized is not properly documented while the first form, chemical degradation, is vaguely documented but not fully understood and not even properly studied.

The draft NAP identified that the major causes of land degradation which is discussed in Table 3.

Land use is a primary problem in the country. Following the recent cancellation of non-performing forest concessions, almost 5 million ha of forest areas have now reverted to “forest reserve”, for which management arrangements still have to be defined. An additional 1.73 million ha seem to be scrubland, undergrowth, non-wooded land and similar unused areas not yet declared to be under any specific ownership, control or use. The new Land Law will further increase the reserve of land potentially available for agricultural development by cancellations of 16 land economic concessions with the total areas of 123,680 ha. However, the exact way of using these areas and potential for development under agriculture or agro-forestry has yet to be assessed.

The current urbanization efforts clearly provide, employment opportunities to many, however, the long-term effects of uncoordinated conversion of the wetlands of Great Lake is very serious because this part of Cambodia is the center of development. Aside from its impact on Great Lake biodiversity, land use conversion can be a major cause of undefined flooding or a shift in water concentration that may threaten human life and major infrastructures. Reclamation of active portions of the lake due to the fast growing food industry, construction of buildings and roads was observed to have resulted in undefined and aggravated flooding. This urban land use conversion will add new forms of land-linked freshwater degradation associated to pollution of the surface and ground water which will later become the major cause of irreversible land and water degradation.

Cambodia lacks the rationalized land management policy to adequately address the accelerating land degradation of agricultural land and cleared forestlands. Considerable attention, but fragmented investments to afforestation of degraded lands in the forestry sector; investment on irrigation, planting materials, availability of chemical fertilizers, and support services to agriculture and rural infrastructures but very limited if any on investments on cross-cutting technical interventions for sustainable land management practices.

Primary investments and national budget allocation are for agronomic improvement, irrigation development for rice which represent 90% of agricultural crops in Cambodia, fertilizers, support infrastructures like roads, and office buildings for ministries which merely represents infrastructure investments but hardly any on the consideration for improvement of agricultural land management and technology options, alternative development scenarios and of long-term sustainable agricultural land use.

Cambodia lacks the capacities to actively engage in SLM which can be seen in other least developed countries. The farmers still have limited knowledge, skill and access to proper fertilizers including micronutrients, technology, and overall notion of SLM. In addition, capacity in the concerned government agencies is also limited in terms of lack of SLM regulation and guidelines on among others, the use of fertilizers and pesticides, monitoring, and the roles and responsibilities between and among sectors to support the enforcement of

laws and regulations. This requirement is highlighted by the apparent lack of coordination among implementing institutions for SLM.

Reliable data and information on land degradation to develop concrete steps to arrest land degradation is simply non-existent. This is related to the lack of national awareness and appreciation on the value of SLM in sustainable agriculture and natural resources management.

Due to lack of understanding and capacity to implement SLM in national land use development, the national government has yet to identify and formulate sub-decrees to address SLM concerns.

2.5. Capacity and Mainstreaming Needs for Sustainable Land Management

Past and current efforts on sustainable land management are mostly directed towards improvement of agricultural productivity and farmers' conditions. Most if not all actions are accomplished through donor-funded programs which brought in substantial financial resources to support sustainable land management.

Land degradation has never been given serious attention by all sectors and for this reason, sustainable land management principles and implementation have not been mainstreamed in the country plans and programs, policies and regulations, and more so in educational curriculum.

MAFF being the focal point must be equipped with trained staff on soil science and resource economics to provide substantial technical basis for the formulation of appropriate SLM measures and in defining priorities for agricultural investment and development.

MAFF has created a wealth of baseline knowledge, lessons to be learned and unlearned which can be sorted out and re-tested for transferability and repackaging. Without these donor driven-knowledge generations, Cambodia would have difficulty acquiring them since their basic weakness is the inadequate trained staff who has the clear understanding of land degradation.

Cambodia has to initiate actions to develop the knowledge systems for SLM to ensure long term sustainability of agriculture production without compromising the quality of the natural resource base. There is a need to circulate as wide as possible all SLM information materials defining the best practices and defining marketable crops.

The experiences, lessons learned and unlearned on SLM and other concerns for sustainable agriculture and natural resources have to be mainstreamed into the sustainable agriculture policy of MAFF as well in the future plan of mobilizing DAALI for implementing the NAP action plan for SLM and land degradation in the country.

Further, MAFF must develop innovative financial mechanisms and mobilize private investments on environment friendly land uses.

2.6. Policy Advocacy for Sustainable Land Management

At present, sector-wide policy formulation/decision making and implementation on SLM is not done, resulting to overlapping activities and ineffective financial resource use. To create an enabling environment and harmonize policy decision for SLM, sector-wide experts' dialogues and workshops and policy advocacy will be conducted to ensure integration of SLM and Natural Resource Management (NRM) with production and livelihood.

To facilitate the exchange of lessons learned and unlearned from success stories on community-based SLM workshops will be organized to provide adequate baseline experiences for the formulation and effective implementation. Technologies and livelihood products from the success stories will be showcased through "Agri-Tech-Fair".

2.7. Mainstreaming of Sustainable Agriculture and Land Use Stabilization

The mainstreaming of sustainable agriculture and land use stabilization measures to support integration of SLM will formulate policy, regulatory and economic incentive frameworks regarding sustainable agricultural practices in mitigating land degradation. These frameworks will contribute to increased adoption of SLM in improving agricultural production and natural resource management to alleviate poverty and arrest land degradation.

Table 1. Estimates of Land Tenure/Use, CDRI, July 2001

Category	Area (million hectares)	Percent Share
Cultivated areas	2.71	14.97
Towns, infrastructures	1.00	5.52
Land mines contaminated areas	0.10	0.55
Scrub lands, non-wooded lands etc.	1.73	9.56
Forest not under forest concessions	3.25	17.96
Forest concessions	4.21	23.26
Protected areas/forests	3.27	18.07
Agricultural concessions	0.83	4.59
Fishing concessions	1.00	5.52
Total	18.10	100.00

Table 2: Institutions Involved in Land Management

Institutions	Task
1. MAFF	Management of all agricultural, forestry and fisheries land outside the protected areas or national parks, development and extension of economical land use practices
a. DALLI	<ul style="list-style-type: none"> - Land use and agricultural issues - Agricultural research - Agricultural extension work - Agricultural land improvement and management
b. FA (Forestry Administration)	<ul style="list-style-type: none"> - Forest Policy, planning and management - Monitor and enforcement of RGC's forestry law and regulations - Administrative guidance on forestry issues - Conduct forestry research

2. MoE	Natural resource management and land use planning in protected areas and national parks
a. DNCP	<ul style="list-style-type: none"> - Natural resource management and prevention of environment degradation - Nature and cultural tourism
3. MoI	Political and conceptual guidance of the decentralisation and de-concentration process in RGC
4. MIME	<p>Implement industry policies of the RGC.</p> <p>Monitor the activities of industries</p>
5. MoP	<p>Preparation of National 5-years socio-economic development plans</p> <p>Conduct socio-economic surveys, undertake census surveys</p>
6. MOWRAM	<p>Surface and ground water</p> <p>Water quality mapping</p>
7. MLMUPC	Lead and manage the affairs of land management, urban planning, construction, cadastre and geography.
a.GDCG	<ul style="list-style-type: none"> - Research and develop provisional regulations related to administration and land use - Conduct cadastral survey and mapping - Issuing of land titles - Carry out cadastral registration and inspection of conformity - Define parcel boundaries - Registering state properties
b. GDLM UP	<ul style="list-style-type: none"> - Making proposals and implementing the strategic policy of land management and urban planning - Collect information and data - Advise, monitor and encourage the coherent implementation of the policy of land management and urban planning - Preparation of industrial, tourism development plans
8. MRD	Rural development, preservation of environment and natural resources in rural areas
9. MoE	Land tax

DAALI : Department of Agronomy and Agricultural Land Improvement
 FA : Forestry Administration
 MoE : Ministry of Environment
 DNCP : Department of Natural Conservation and Protection
 MoI : Ministry of Interior
 MIME : Ministry of Industry, Mine and Energy
 MoP : Ministry of Planning
 MOWRAM : Ministry of Water Resource and Meteorology
 MLMUPC : Ministry of Land Management, Urban Planning and Construction
 GDCG : General Department of Cadastre and Geography
 GDLM UP : General Department of Land Management and Urban Planning
 MRD : Ministry of Rural Development
 MoE : Ministry of Economy and Finance

Table 3: Causes of Land Degradation as Identified in the NAP

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
<p>1. Land degradation, as a general phenomenon</p>	<ul style="list-style-type: none"> ▪ Loss of land productivity ▪ Loss of ground cover ▪ Loss of biodiversity ▪ Loss of livelihood ▪ Exacerbate poverty 	<ul style="list-style-type: none"> ▪ Inadequate human and institutional capacity; weak policy and financial support; SLM not mainstreamed in the macro-economic policy and legal framework of national government ▪ Lack of productivity tools and knowledge for SLM • Weak coordination on information harmonization and exchange of experiences among key institutions ▪ Lack of monitoring system of land degradation at local level for long term investment <ul style="list-style-type: none"> ○ Lack of data for land 	<ul style="list-style-type: none"> ▪ Formulation and implementation of policies and integration of program and projects in the national and local institutions and inclusion of land degradation in academic curriculum; national investment programs for SLM and sustainable agricultural programs ▪ Promotion and establishment of Commune Learning Network for Conservation Agriculture for farmer-to-farmer exchanges of knowledge and information ▪ Establish information and data-sharing mechanisms for common results and policy formation and recommendations among key institutions ▪ Establish and integrate multi-level, multi-sectoral land degradation information and monitoring system into existing information systems ▪ Regular policy dialogues among implementing institutions with policy makers and leaders to support initiatives for SLM dissemination and implementation ▪ Devise handy and simple productivity tools for SLM ▪ Multi-level, multi-sectoral participatory approach in land degradation, agricultural land use and NRM assessment, planning and implementation ▪ Development of capacity building programs for farming communities, extension workers/technicians ▪ Development of early warning systems to mitigate the effects of drought and flooding in order to prevent disruption in plant growth for their role in providing effective soil cover and in carbon sequestration

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
		<p>use zones demarcation</p> <ul style="list-style-type: none"> ○ Lack of land degradation and land use information system arrangement and mechanisms for information exchange and harmonization ● Poor transfer of information, knowledge and skills to the field <ul style="list-style-type: none"> ○ Farmers are still limited capacity to get knowledge and skills from technical extension workers ○ Lack of practical technical extension workers ○ Information sharing and learning are very low and weak ○ Technical implementation has not been collaborated ○ Lack of scientific knowledge and skills ○ Lack of human and institutions technical capacity on SLM, specifically on land 	

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
		degradation concerns <ul style="list-style-type: none"> • Frequent droughts/failure of monsoon and their link with global climate phenomena 	
2. Soil degradation	Loss of soil fertility and agricultural land productivity	<ul style="list-style-type: none"> ▪ Poor and incoherent policy thrusts on land protection and soil/water conservation ▪ Unsustainable soil and water management practices ▪ Lack of individual and institutional capacity for soil mapping, classification and soil/land degradation analysis 	Mainstream SLM practices to combat soil degradation into programs and budget of national and local institutions
2.1 Natural soil degradation	<ul style="list-style-type: none"> ▪ Soil acidification, stable soil aggregates (sandy-like soil materials with surface soils), low soil fertility due to aluminum and iron toxicity, low organic matter, thin surface soils; low soil phosphorous availability 	<ul style="list-style-type: none"> ▪ Constant, prolonged rainfall which cause leaching of bases deep into the soil profile and eventual creation of soil surface acidity ▪ Lack of technical understanding of soil degradation and natural soil acidification ▪ Soil science and agricultural land conservation technologies are not 	<ul style="list-style-type: none"> ▪ Develop capacity of local and national institutions, particularly, agriculture schools and colleges for soil science, soil classification and mapping, nutrient change monitoring, and balanced use of organic and inorganic fertilizers, management of acid soils and proper use of fertilizers and amendments ▪ Empower farmer to adopt, share and implement SLM by establishing strong linkages with technology and market service providers ▪ Create enabling environment for the synthesis and sharing of knowledge learned and best practices from various projects by experts, decision makers, and farmer leaders ▪ Develop farmers-policy makers' bodies to regularly review annual program and budget support for SLM

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
		<p>fully developed and lack actual field experiences on soil mapping and characterization</p> <ul style="list-style-type: none"> ▪ Farmers and soil/water users are poorly involved in land and water health management initiatives 	
2.2 Human-induced soil degradation	<ul style="list-style-type: none"> ▪ Agricultural soil erosion, rapid depletion of organic matter, loss of effective soil depth for root development; reduction in soil capacity for moisture and nutrient storage and supply for optimum plant growth; deterioration of plant vigor for effective soil cover 	<ul style="list-style-type: none"> ▪ Subsistence farming and intensive cropping of farmlands; ▪ Declining fallow period in shifting cultivation ▪ Improper farm waste management (burning of rice straw) ▪ Inappropriate farmer's education and training and transmission of knowledge on lessons learned and best practices on soil and water for Conservation Agriculture ▪ Poor farmers' practices on land and water health management 	<ul style="list-style-type: none"> ▪ Develop capacity of farmers and extension technicians and government institutions on soil and water conservation, integrated farming systems and improved their understanding on effects of land degradation on their crop production and income ▪ Develop capacity of farmers, extension technicians and government institutions on soil fertility improvement, with emphasis on micro-nutrient fertilization, and monitoring using simple, innovative tools on soil analysis, rapid composting and organic farming ▪ Develop regular SLM extension education/training programs for farmers and extension technicians ▪ Development of rainwater harvesting and storage facilities for runoff control and water provision for crops, livestock and fish production, including water for domestic and recreational facilities for rural communities ▪ Develop capacity of farmers an extension technicians on on-farm drainage and water management for waterlogged and flood prone areas ▪ IEC campaign on sustainable use of water resources ▪ Enhance knowledge on compost technology for farm waste management ▪ Development of balanced fertilization technique, soil micro-nutrient

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
	<ul style="list-style-type: none"> ▪ Accumulation of saline/alkaline material ▪ Micro-nutrient deficiency ▪ Air and water pollution 	<ul style="list-style-type: none"> ▪ Poor & Inefficient Irrigation Practices, over extraction of ground water, particularly in the coastal regions resulting in saline intrusion into aquifers ▪ Prolonged flooding and land inundation, water logging due to improper irrigation and drainage water management ▪ Burning of rice straw ▪ Improper use of herbicides (POP), chemical fertilizers and other soil amendments 	<p>fertilization for flooded and improvement of organic farming methods by introduction of rapid soil testing and rapid composting techniques</p> <ul style="list-style-type: none"> ▪ Develop institutional capacity for organic-based balanced fertilization and production of rapid testing kits for soil analysis quick and timely assessment and monitoring of micro-nutrients and persistent organic pollutants and Trichoderma fungus for rapid composting
3. Water Degradation	<ul style="list-style-type: none"> ▪ Decline in water productivity and reduction the capacity of open water bodies as carbon sink for carbon 	<ul style="list-style-type: none"> ▪ Unsustainable watershed land use practices and lack of national land use plan and urban land use control 	<ul style="list-style-type: none"> ▪ Mainstreaming and Capacity building for national land use planning and watershed land degradation mapping and assessment

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
3.1 Lake Water degradation	<p>sequestration</p> <ul style="list-style-type: none"> ▪ Enrichment with eroded soils, nitrates and phosphates from excessive fertilizers ▪ Excessive pollution load from nearby populated areas ▪ Loss of lake-water based biodiversity (forest, freshwater fishes, and many others that are not adequately assessed and monitored) 	<ul style="list-style-type: none"> ▪ Seasonal sediment-loading from the Mekong and Tonle Sap watersheds ▪ Increased population and rural to urban migration; ▪ Uncontrolled, irrational Land use conversion due to lack of land use guidelines and national land use planning program (no information and data on unsustainable land use and management practices) 	<ul style="list-style-type: none"> ▪ Develop capacity for Ecosystem based Multi-level, multi-sectoral Participatory assessment of land degradation and agricultural land use for National Land Use Planning ▪ Develop local ecosystem-based PLUP framework and template
4. Deforested land degradation	<ul style="list-style-type: none"> ▪ Loss of land productivity and loss of capacity for regeneration of vegetation/habitat for agro-biodiversity 	<ul style="list-style-type: none"> ▪ Incoherent forest use and forest conservation policies and practices 	<ul style="list-style-type: none"> ▪ Develop and mainstream legal instruments and national policies to include SLM into the budget of national and local programs and projects
4.1 Deforested agricultural land degradation	<ul style="list-style-type: none"> ▪ Soil erosion, soil organic matter depletion, ▪ Loss in land cover, exposed are unprotected from the seasonal 	<ul style="list-style-type: none"> ▪ Weak implementation of national land use and urbanization policy ▪ Weak coordination among key institutions ▪ Uncontrolled land use and forest clearing: 	<ul style="list-style-type: none"> ▪ Effective implementation sound national land use and urbanization policy, including financial support ▪ Capacity development for multi-level assessment of causes and impacts of land degradation in farmed and unfarmed deforested land and identify barriers for SLM implementation ▪ Modify existing PLUP approach to Ecosystem-Based, Multi-level, Multi-sectoral Participatory Approach which (a) provides

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
	<p>variation in weather;</p> <ul style="list-style-type: none"> ▪ Loss of biodiversity and its habitat, sedimentation of rivers and tributaries, open water bodies (e.g. Tonle Sap Ecosystem) 	<p>1992-2003 a total forest cleared is about 1.6 million hectares forest land cleared</p> <ul style="list-style-type: none"> ▪ Shifting cultivation (contributed to 3,500 to 5,000 has. degraded lands in each province ▪ National and local Government authorities have limited capacity to monitor and implement policies and legal instructions to use and management of forest and agricultural lands. ▪ Road development and access into the forest areas ▪ Uncontrolled village settlement and increasing trend to use uplands (>100 meters elevation) even in areas with inherently low soil fertility ▪ Ineffective population pressure control measures on human and forest systems 	<p>improvement in land suitability analysis by emphasizing crops and commodities that have ready market and (b) provide support to the conduct and design of farmer-expert led community based research and development on identification and assessment of land degradation in relation agriculture and land use stability.</p> <ul style="list-style-type: none"> ▪ Develop capacity of students and teachers of agricultural schools and colleges for analysis of economic assessment of land degradation and agricultural land uses and recommend the best land use options and the cost of doing or not doing activities for each option ▪ Introduce local settlement zoning as part of the PLUP ▪ Develop capacity and enhance multi-sectoral, multi-level policy dialogues for integrating land degradation with existing thematic land use data and related information into the RS/GIS analytical system construct Maps of Agriculture and Water Zones and Maps of Habitat for Agro-biodiversity ▪ Sharing of knowledge and experiences on SLM lessons learned and to be unlearned knowledge ▪ Promote and support the establishment of Commune Networks for Conservation Agriculture to enhance farmer-to-farmer exchange/sharing of knowledge and lessons learned on SLM ▪ Cataloguing and synthesis of lessons learned and best practices form various agriculture and forest development projects ▪ Develop farming systems and livelihood for poor and vulnerable communities dependent on minor forest products ▪ Develop simple SLM techno-guides for use and sharing of knowledge by technicians and farmer experts
5. Forest land Degradation	<ul style="list-style-type: none"> ▪ Loss in minor forest food 	<ul style="list-style-type: none"> ▪ Weak coordination among key institutions 	<ul style="list-style-type: none"> ▪ Establish data-sharing mechanisms among key institutions ▪ Develop information on the actual status of degradation of forest

Types of Land Degradation	Impacts of Resource base	Root causes	Mainstreaming and Capacity Building Measures
	<p>medicinal products, subsequently decline in livelihood sources derived from minor forest products;</p> <ul style="list-style-type: none"> ▪ Soil compaction and reduced infiltration and increased run-off ▪ Decline in effective soil/land cover; ▪ Decline in water capture and water release to the atmosphere to sustain hydrological cycle ▪ Reduction in biodiversity 	<ul style="list-style-type: none"> ▪ Overgrazing of forest lands ▪ Excessive fuel wood extraction (current annual rate of extraction is seven (7) times in excess of the prescribed sustainable levels) ▪ Unsustainable forest management practices ▪ Uncontrolled forest land clearance for agriculture ▪ Forest fires ▪ Road development ▪ Poor and ineffective settlement planning in forest zones and margins 	<p>lands;</p> <ul style="list-style-type: none"> ▪ Promote and support the establishment of Commune Networks for Conservation Agriculture to enhance farmer-to-farmer exchange/sharing of knowledge and lessons learned on SLM ▪ Develop capacity for and promote community tree plantation and alternative livelihood for the wood gatherers ▪ Strengthen community participation, particularly indigenous communities, and women, in forestland management and settlement planning (The draft NAP noted that sharing of data in and between different departments/institutions is not a common habit. The foreign advisers/consultants are often the bridge between the different departments and are always sourcing various information/data.)

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