



Demand Analysis Report-Kingdom of Cambodia



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Contours for Demand Analysis of Cambodia

Why Demand analysis?

Demand Analysis of a country for identifying training priorities of the target countries helps to achieve Agricultural Development. Demand Analysis indicates training priorities to achieve the Agricultural development. Agricultural development dependents on development of sectors such as Agriculture, Horticulture, Animal husbandry, Fisheries etc. Building the capacity of public and private extension functionaries is prerequisite for achieving the development. The training priorities are technical in majority of the cases besides covering extension and other aspects. Majority of the training priorities are felt, based on the existing problems. However, several other unfelt training needs to be considered based on critical analysis of the existing situation. Training priorities are also influenced by National priorities, Existing policies, Programmes, Vision documents besides existing status of extension manpower in the country. Training priorities should push reforms and innovations which would take care of Agricultural Development.

Training is an educational process which requires more than just information-giving or skills development. It requires the trainers to have a thorough understanding of the training process and the role and value of proper and systematic planning in it. There is a need to sensitize trainers to the qualitative aspects of training through better planning in determining trainees' needs, as well as appropriate training contents, instructional methodologies and learning materials.

Methodology: Demand Analysis was done based on information collected from different sources viz., Internet, Library, Report of World Bank, Asian Development Bank, African Development Bank, FAO, sources from Indian Missions, USAID Missions, Individuals and Partner Institutions in respective countries, MANAGE trained Executives, Missions of Partner countries in India and Visit report of MANAGE faculty. Additional sources were also used. Critical analysis of information obtained from different sources were done using the T-NAT methodology (ref TNAT interpretation grid (fig below), Training need is the gap between Mastery level for a particular Skill, Knowledge or attitude trait to perform a particular job and the level of the individual this gap aggregated for a country leads to training priority areas of each country.



Ref: V.K.J. Rao 2016, NAARM TRAINING MATERIAL

The Broad contours of Demand Analysis are done on the following lines:

i. <u>An over view of country</u>:

Cambodia once known as the Khmer Empire, is a country located in the southern portion of the Indochina Peninsula in Southeast Asia. Its total landmass is 181,035 square kilometers (69,898 sq. mi), bordered by Thailand to the northwest, Laos to the northeast, Vietnam to the east, and the Gulf of Thailand to the southwest.

Cambodia has a population of over 15 million. The official religion is Theravada Buddhism, practiced by approximately 95 percent of the population. The country's minority groups include Vietnamese, Chinese, Chams, and 30 hill tribes. The capital and largest city is Phnom Penh, the political, economic, and cultural centre of Cambodia. The kingdom is a constitutional monarchy with Norodom Sihamoni, a monarch chosen by the Royal Throne Council, as head of state. The head of government is Hun Sen, who is currently the longest serving non-royal leader in South East Asia and has ruled Cambodia for over 25 years.

In 802 AD, Jayavarman II declared himself king, uniting the warring Khmer princes of Chenla under the name "Kambuja. This marked the beginning of the Khmer Empire which flourished for over 600 years, allowing successive kings to control and exert influence over much of Southeast Asia and accumulate immense power and wealth. The Indianized kingdom built monumental temples including Angkor Wat, now a World Heritage Site, and facilitated the spread of first Hinduism, then Buddhism to much of Southeast Asia. After the fall of Angkor to Ayutthaya in the 15th century, a reduced and weakened Cambodia was then ruled as a vassal state by its neighbours. In 1863 Cambodia became a protectorate of France which doubled the size of the country by reclaiming the north and west from Thailand.

Cambodia gained independence in 1953. The Vietnam War extended into the country with the US bombing of Cambodia from 1969 until 1973. Following the Cambodian coup of 1970, the deposed king gave his support to his former enemies, the Khmer Rouge. The Khmer Rouge emerged as a major power, taking Phnom Penh in 1975 and later carrying out the Cambodian Genocide from 1975 until 1979, when they were ousted by Vietnam and the Vietnamese backed People's Republic of Kampuchea in the Cambodian–Vietnamese War (1979–91). Following the 1991 Paris Peace Accords Cambodia was governed briefly by a United Nations mission (1992–93). The UN withdrew after holding elections in which around 90 percent of the registered voters cast ballots. The 1997 coup placed power solely in the hands of Prime Minister Hun Sen and the Cambodian People's Party, who remain in power as of 2016.

The country faces numerous challenges and sociopolitical issues, including widespread poverty, pervasive corruption, lack of political freedoms, low human development, and a high rate of hunger. Cambodia has been described by Human Rights Watch's Southeast Asian Director, David Roberts, as a "vaguely communist free-market state with a relatively authoritarian coalition ruling over a superficial democracy. While per capita income remains low compared to most neighboring countries, Cambodia has one of the fastest growing economies in Asia with growth averaging 6 percent over the last decade. Agriculture remains the dominant economic sector, with strong growth in textiles, construction, garments, and tourism leading to increased foreign investment and international trade. Cambodia scored dismally in an annual index (2015) ranking the rule of law in 102 countries, placing 99th overall and the worst in the region



- Today, over 80 percent of the population of Cambodia lives in rural areas and about 73 percent depends on agriculture for their livelihoods. However, only about 20 percent of the land is arable.
- Thrust areas include agricultural productivity, irrigation, livestock production and health, fisheries, food security, consumer protection and food safety, promotion of access to new markets, forestry and the environment, and small-scale craft agro-industry.
- As a knowledge institution, the role of Extension to the national development process are to support capacity building and the provision of qualified science-based technical advice.



Map of Cambodia



An over view of Agriculture sector, policies, programmes, priorities: <u>Climate</u>

Cambodia's climate, like that of the rest of Southeast Asia, is dominated by monsoons, which are known as tropical wet and dry because of the distinctly marked seasonal differences.

Cambodia has a temperature range from 21 to 35 °C (69.8 to 95.0 °F) and experiences tropical monsoons. Southwest monsoons blow inland bringing moisture-laden winds from the Gulf of Thailand and Indian Ocean from May to October. The northeast monsoon ushers in the dry season, which lasts from November to April. The country experiences the heaviest precipitation from September to October with the driest period occurring from January to February.

Cambodia has two distinct seasons. The rainy season, which runs from May to October, can see temperatures drop to 22 °C (71.6 °F) and is generally accompanied with high humidity. The dry season lasts from November to April when temperatures can rise up to 40 °C (104 °F) around April. Disastrous flooding occurred in 2001 and again in 2002, with some degree of flooding almost every year.

ii. An over view of Horticulture, Animal Husbandry and Fisheries

Cambodia registered a significant decline in the number of undernourished people since the early nineties. The table below from the FAO SOFI Data Report indicates the hunger numbers and proportions in Cambodia between the periods of 2000-2007.

	Total	Number	of	People		Populatio	n		of
Country	Population	Underno	urished			Undernou	urished	in To	tal
[undernourishme	2005-07	1990-92	95-97	00-02	05-07	1990-92	95-97	00-02	05-07
Cambodia	14.1	3.8	4.7	3.7	3.0	38	40	29	22

The undernourished population is decreasing while the Agricultural GDP is also decreasing



The Global Financial Crisis affected drastically the GDP growth in Cambodia



The soaring food prices have also affected negatively the Cambodian Agricultural Sector & Cambodia has a lesser index of adaptability to climate change.



Although Cambodia has recently experienced reductions in poverty rates and progress in economic growth, poverty and food insecurity are still prevalent in the country, especially in the rural areas. The situation has been made worse by volatile prices for basic foodstuffs and goods, as well as recurrent natural disasters, such as droughts and floods, which are linked with climate change. As a result, achieving food security has remained one of the continuous priorities for the Royal Government of Cambodia.

Agriculture

Agriculture is one of the most complex industries since it involves many stakeholders in different sectors. Cambodia has huge potential to develop agriculture industry since it has vast flat fertile land and about 80 percent of its population living in the rural area. However, the productivity of this sector is still a big challenge. In addition, agricultural export is still limited due mainly to lack of certified quality standard, finance, crops diversification, and market information. In order to develop agriculture, Cambodia needs to cooperate with different partners especially development partners and private sectors to address the gaps in order to reach its potential. Cambodia is self-sufficient and exporter of rice and one of the main actors in regional and world food security.

Cambodia has succeeded in generating high economic growth in its recent history, but the challenges are whether it can manage to sustain rapid growth for an extended period. Nearly a decade long of rapid growth had a significant impact on income per capita with more than a doubling from US\$288 in 2000 to US\$900 in 2009. As a result, Cambodia is one of the few countries that have achieved sustained rapid growth: of 194 countries with data, 46 have achieved 7 percent annual growth on average for 14 consecutive years. Taking into consideration the time period from 1998 to 2007.Cambodia's growth performance ranks 6th in the world.

Food security

Improving food security of the farming families affected by the volatile food prices calls for sustainable crop production and intensification of rice and vegetables, strengthened management of rice post-harvest, fisheries, water management, and nutrition. Increasing food production of poor smallholders and achieving greater self-reliance on local food supply, where producers are not wellconnected with markets or the outside economy.

Livestock

The livestock sub-sector has been combating Avian Influenza (AI) programme. Initial interventions were to redress a state of non-preparedness including a lack of basic infrastructure, minimal funds for operating and salaries, and low levels of technical capacity. Later interventions focused on surveillance, diagnostics, response and farmer awareness, animal health legislation, structuring the veterinary service and looking into the socio/economic impact on poultry

producers and consumers. With AI outbreaks in Cambodia and the region the overall programme has been very relevant. Today greater level of awareness exists at community and national levels.

Other animal health issues are foot and mouth disease and classical swine fever, the Department of Animal Health and Production (DAHP) of the Ministry of Agriculture, Forestry and Fisheries (MAFF), works in all 24 provinces of Cambodia with special focus on the provinces bordering Viet Nam, Thailand as well as the provinces around the Tonle Sap River and lake:

- Immediate technical assistance to strengthen emergency preparedness for Highly Pathogenic Avian Influenza (USAID, FY10 US\$400 000)
- Avian and human influenza control and preparedness emergency project (WB US\$1 367 595 for period 2010-2012)



Fisheries

Cambodia runs a community-based natural resource management (CBNRM) includes the introduction of the concept as a means for the sustainable development and use of fishery resources in Siem Reap and other provinces surrounding the Tonle Sap Great Lake. This includes the ADB-funded Tonle Sap Environmental Management Project (TSEMP) implemented by FAO. Work on community fisheries was accelerated when in 2000-2001, 56 percent of commercial fishing lots on the Tonle Sap were released by the government providing the potential to expand the concept of CBNRM and an opportunity to develop the policy and legislative reform required to effectively manage the expansion. Development of inland fisheries and assisting 168 community fisheries organizations through the steps towards legal recognition are the present status.

With the realization of the importance of CBNRM in the development of sustainable resources, the interventions are very relevant. They are consistent with sector policy and address some threats to the inland fishery. The projects have largely driven the work in CBNRM policy development, they have included capacity building both in the government forestry and fishery administrations and at the level of community-based organizations (CBOs) and they have worked on developing some livelihoods support. Currently, four projects are implemented in the fisheries sector:

Partners	Title	Total Budget	Implementation Period
FAO/RGC	Capacity Building to enhance fish quality control and standardization services and contribute to poverty alleviation	US\$304 000	2009-2011
FAO/AECID	Regional fisheries livelihoods programme for South and Southeast Asia	US\$19 549 000	2009-2013
FAO/EC	Micro and small enterprise development to achieve food security, food safety and self-	US\$340 000	2011-2014
FAO/EUFF	Improve the food security of farming families affected by the volatile food prices	US\$14 900 000	2009-2011

The project Capacity Building to enhance fish quality control and standardization services and contribute to poverty alleviation aims at tackling the critical gaps of lack of specific technical capacity and knowledge in the post-harvest fisheries sector. In particular, there is need for training, technical guidance and sound technical advice to improve living standards of poor households by enhancing their capacity to more effectively use fish after capture through better fish processing, handling, storage, transportation and trade. The project consists of four main phases:

- Assessment of the current status and needs of the post-harvest fisheries sector with respect to technical capacity to improve fish handling practices in different segments of the food chain; fish inspection for safety and quality and training of trainers.
- Capacity building of competent authority including their regional offices through training workshops.
- Enhancing capacity to develop standards for local products.
- Development of a National Action Plan (NAP) for improving post-harvest fisheries sector; facilitation of networks for knowledge and experience sharing.

The project Regional fisheries livelihoods programme for South and Southeast Asia is being implemented in 6 different countries, including Cambodia. Its objective is to strengthen capacity among participating small-scale fishing communities and their supporting institutions towards improved livelihoods and sustainable fisheries resources management. In targeting coastal fishers, processors, traders and their families, organizations and local authorities, the project seeks to achieve the following outputs:

- co -management mechanisms for sustainable utilization of fishery resources;
- measures to improve safety and reduce vulnerability for fisher communities;
- measures for improved quality of fishery products and market chains;
- diversified income opportunities for fisher families;
- facilitated access to microfinance services for fishers, processors and vendors;
- regional sharing of knowledge in support of livelihood development and reduced vulnerability for fisher communities and of sustainable fisheries resource management.

Food security of farming family's needs improvement due to the volatile food prices through increases in productivity, improved management practices, improved access to agricultural inputs and services, diversification and improved feeding practices.

Fish refuges which conserve wild fish from the watershed are to be expanded, and hatcheries to support farmers with suitable fish fingerlings will be upgraded with quality brood-stock and training to improve operational skills.

The inputs will benefit over 2 000 farmers plus 350 poor households, and will increase local fish production by over 125 000 kg a year. Over 7.5 million fingerlings of 5 species will also be produced. The project has improved 1 000 fish ponds for household use over five provinces (Kampong Speu, Takeo, Svay Rieng, Prey Veng and Siem Reap).

Production inputs have been supplied including different species of fingerling, post larvae of Giant Freshwater Prawn (*Macrobrachium rosengergii*), lime (35 375 kg), urea (14 150 kg) and DAP (7 150 kg) for reconditioning of ponds before stocking with fingerlings. The project has supported the creation or improvement of rice field aquaculture systems for 100 smallholder farmers with rain-fed rice fields, who will be assisted to grow fish and freshwater prawns in these fields.

Rehabilitating 82 Community Fish Refuge (CFR) ponds in nine target provinces are underway, where there are surface waters that can be delineated and declared to be refuge ponds to be managed by local communities. The CFR ponds have a dual function, – conserving stocks of wild fish in the watershed; and providing a source of fish protein for the poor families of the commune. These ponds sites have been identified and community consultation is underway to begin the social contract underpinning the CFR ponds.

Support is being provided for capacity building and networking of local hatchery operators so that they can improve their technical and marketing capacity and their hatchery systems in five provinces. In addition, assistance is being given to support fish farmers who desire to be local fingerling producers in the districts where there are less local hatcheries. Training assistance for the fisheries component includes support for fisheries officers, fish farmers, communities associated with fish refuge and hatchery operators. The training activities are supported by provision of training materials and international consultant contributions. In addition, the project contributes to sustainable outcomes by creating a hatchery network to link together operators and share information.

Forestry

Cambodia has approximately 10.7 million hectares covering 58.9 percent of its land area. It is the 30th largest tropical forest in the world and the 13th most forested country. Cambodia covers an area of 181 035 km2. The Mekong River dominates its geography but in the centre lies the Tonle Sap Lake which is rich in biodiversity.



Overview of Cambodia's forests

Forest cover 2006 source: www.cambodiaatlas.com

The forests of Cambodia vary from province to province but include evergreen, semievergreen (west and northwest), deciduous (northeast), swamp, mangroves and bamboo forest. There are also re -growth and plantation forests as well as open forest types including evergreen shrub land and dry deciduous shrub land.

However, the extent and quality of Cambodia's forest has declined in recent decades. Considerable areas have been degraded due to logging, forest fires, land grabbing, encroachment and intensified shifting cultivation. Between 2002 and 2005/6 Cambodia lost about 379 485 hectare averaging about 0.8 percent a year. As a consequence, Cambodia has been classified as a 'high forest cover, high deforestation' country.

The rural economy is dominant in Cambodia and the majority of the rural populations are subsistence farmers; 75 percent of these depend on access to natural forest resources for essential products, energy and food. Forests also provide supplementary income and employment. A rough estimate based on limited data sources suggests that forest resources account for 10-20 percent of household consumption and income resources for roughly one third of the population.

While forests have substantially provided the basis for rural livelihoods they have also been a source of conflict and exploitation. The Khmer Rouge used the forests for cover, and its resources to finance their activities in the 1970s, thus in the 1980s forest resources were used to finance restoration work.

The creation and implementation of the National Forest Programme (NFP) shows the willingness of the RGC in achieving sustainable forest management. Through the NFP Facility, The NFP was created under the guidance of the Forest Law 2002, the Independent Sector Review (ISR) 2004, the establishment of the Technical Working Group on Forest and Environment (TWGFE) 2004, and the Cambodian Millennium Development Goals (1&7). During the creation of the NFP, input was given from International Development Partners such as: DANIDA, FAO, DFID, NZAID, World Bank, JICA, GTZ and ITTO.

The Operational Framework of the NFP consists of six implementation programmes, one of which is community forestry. These programmes will be complemented by shorter term (5 year) rolling plans and quantified one-year action plans:

- Forest Demarcation, Classification and Registration
- Conservation and Development of Forest Resource and Biodiversity
- Forest Law Enforcement and Governance
- Community Forestry Programme
- Capacity and Research Development
- Sustainable Forest Financing

The Community Forestry Programme has three sub- programmes:

- Community Forest Identification and Formalization
- Community, Institutional and Livelihoods Development
- Community Forestry Development Support

The community forestry programme meets NFP objectives through a few ways. CFs aim at managing permanent forest estates in a sustainable way – all CFs will be permanently demarcated and registered as public land; multi-purpose forest management will take into account biodiversity conservation and environmental services; CF will allow public participation in decision- making and if mobilized, they can protect the forest through considerable human resources; CF modalities can enhance socio- economic development; this programme will develop effective models and tools for supporting communities for sustainable forest governance and management, utilization, marketing and benefit distribution; furthermore, CF contributes to mitigation of climate change through forest conservation.

At this point in time, the first 7 steps to formalizing CF have been completed and the steps to completing the legalization process are underway. Sub-programme 2 – Community, Institutional and Livelihoods Development – is the most important phase in the CF Programme and will thus be the main focus.

Community Forestry

Community Forestry has gradually developed since the mid-1990s, through small pilot projects supported by the government, and international and national Non-Government Organizations (NGOs), which have demonstrated that community forestry has considerable potential to protect the forests and enhance their productivity and capacity to support rural livelihoods, while at the same time stabilizing critical watersheds and ecosystems.

The establishment of CF began in approximately 1991. To date there are 377 community forests with 347 740 ha established; besides which, there are 13 potential areas with 20 203 ha to be established.

Climate change

Climate change in Cambodia is projected to impact broadly across ecosystems increasing pressure on all livelihoods. As climatic patterns change, the spatial distribution of agro-ecological zones, habitats, distribution patterns of plant diseases and pests, fish populations and ocean circulation patterns which can have significant impacts on agriculture and food production particularly in Cambodia. Adaptation – to reduce risks in the face of climate trends or events and mitigation-actions to slow global warming are the two main ways to achieve resilience. Marginal development gains attained during this decade in rural areas, after a turbulent past can be wiped out by climate change and variability. Therefore, there is an urgent need to build their currently low capacity to adapt to climate change and variability to achieve resilience.

Cambodia has been participating actively on global discussions on climate change, such as the Conference of Parties (COP) 13 in Bali, and COP 15 in Copenhagen towards the development of "Reducing Emissions from deforestation and forest Degradation" (REDD+) mechanism and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. Most recently, at the COP 16, in Cancun, Mexico, RGC reassured its support to the existing national climate change secretariats, providing support for capacity building of experts on climate change adaptation and mitigation, as well as national teams working on the preparation and implementation of policies to improve climate change resilience in the country.

The country also has created the National Committee on Climate Change (NCCC) and a National Adaptation Program of Action (NAPA) to Climate Change, has been developed to mainstream climate change resilience in the national programmes and projects.

iii. <u>Present status and challenges in Agricultural Extension, Marketing, Insurance,</u> Agriculture Mechanization, Food Processing, Infrastructure and any other relevant issues.

- Priority Area 1: Sustainable improved agricultural productivity for smallholder farmers;
- Priority Area 2: Improved consumer protection and market access to agricultural and related products;
- Priority Area 3: Improved food security;
- Priority Area 4: Improved natural resource management;
- Priority Area 5: Climate change mitigation and adaptation,
- and disaster risk management.

Cambodia Agricultural Development Policy

Being aware of the significant role of agriculture in poverty reduction, the government integrates agriculture to be one of the priorities in Royal Government of Cambodia's Rectangular Strategy. The four sides of this rectangle are: (i) improving agricultural productivity and diversification (including animal husbandry, food security and nutrition, and rural development); (ii) land reform and de-mining; (iii) fisheries reform; and (iv) forestry reform (including environment protection and conservation). Notable features during the last two and half years were: continued RGC efforts in arresting depletion of natural resources and environment; rehabilitating and enhancing irrigation potential; favourable weather conditions; some diversification into cash crops; issuance of more land titles to the farmers; and, further improvement of rural infrastructure. The National Strategy for Agriculture and Water, 2006- 2010, was developed through a consultative process and adopted in 2007.

The Royal Government's overall goal is "poverty reduction and economic growth through enhancement of agriculture sector development". The sectoral goal is to "ensure food security, increase incomes, create employment and improve nutrition status for all people by improving productivity and diversification, and commercialization of agriculture with environmentally sound protection and food security".

An "Agriculture Sector Strategic Development Plan: 2006-2010" was prepared by the Ministry of Agriculture, Fisheries and Forestry (MAFF) in October 2005 in order to achieve RGC's strategic goals as well as NSDP 2006-2010. A Strategy for Agriculture and Water Sectors that has been prepared by TWG for Agriculture and Water and with the coordination of DPs was adopted in March 2007. However, a sector-wide programme to implement this strategy is expected to be finalised and approved in 2010.

"Agriculture Sector Strategic Development Plan: 2006-2010" has identified the following seven strategic objectives for the agriculture, fisheries and forestry sectors: Food security, productivity, and diversification. Improve and strengthen agricultural research and extension systems.

- Market access for agricultural products.
- Institutional and legislative development framework.
- Land reform land market development and pro-poor land access.
- Fisheries reform sustainable access.
- Forestry reform promote sustainable conservation and management of forests, ensure better management of natural protected areas.

Over the years 2006-2008, the overall agricultural production has increased, provided that concerned institutions have been striving to change farmers' behavior in crop farming practices, crop preservation and harvesting and to increase irrigation capacity together with favorable weather conditions. The share of the agriculture sector was 5.5 percent in 2006, 5.0 percent in 2007, and 5.7 percent in 2008. In 2008, the total cultivated land area was 2.61 million hectares, producing about 7.15 million metric tons of paddies resulting in an average yield of 2.74 tons per hectare and a surplus of 2.02 million metric tons of milled rice.

Over the 2004-2008 period of time, the livestock production has moderately increased and the number of cattle raised has increased by 2.5 percent on a yearly average. The number of pigs raised has declined from 2.42 million heads in 2004 to 2.21 million heads in 2008 due to an increase in in-flows of pigs and other pig-related products from neighboring countries. The animal husbandry sub-sector's contribution to the economy has steadily increased and accounted for about 4 percent. This sub-sector needs to grow in order to meet local needs to improve nutrition and to serve the tourism industry.

The high priorities of MAFF include:

(1) The development of legal and regulatory framework and human resource;

(2) The reduction of animal morbidity and mortality rates;

(3) Improving public health particularly in relation to zoonotic diseases and food safety;

(4) Promotion of animal feed production;

(5) Improving the quality of animal breeding stocks;

(6) Promoting the use of animal manures for bio-gas production;

(7) Enhancing and strengthening research and extension programmes on livestock production and veterinary activities;

(8) Improving credit services for livestock production;

(9) Promoting the investment in livestock production and veterinary activities;

(10) Promoting the markets for animals and animal-originated products.

- Notwithstanding the significant progress that has been made, a number of challenges remain to:
- Increase productivity in rice and other crops; increase and improve access to
 extension services, credit and inputs; increase irrigation; ensuring better benefits
 for farmers through marketing; lack of farmer's knowledge in using agricultural
 inputs, techniques and soil improvement management.
- Develop appropriate legal and regulatory tools and law-enforcement capacity for monitoring and control of agricultural inputs and management of agricultural soil and soil fertility such as Law on Agricultural Lands which defines land areas to be targeted for agricultural production and proper soil fertility management.
- Improve post-harvest management; promote export and domestic markets for agricultural products (including rice – not merely paddy, fruits and vegetables); promote agro-industry including post-harvest processing; improve quality of standard of agricultural products; organize farmers' organizations for better bargaining power; aim for optimum use of land and other resources; and, encourage and increase private sector investments and participation.
- Establish mechanisms at local level that can provide techniques and services to the farmers; promote programme of agricultural extension at local level; and promote the formation of farmer to be effective and partner with private sector. The livestock production in Cambodia has been adversely effected due to:
- Repeated threats from pandemic of severe animal diseases in particular HPAI and
- H1N1 and from natural disasters such as Ketsanna storm, which have caused a great deal of losses of resources and claimed many people and animal lives.
- Resources for prevention of the widespread of severe animal diseases and for animal health protection and cares are still limited.
- The reluctance of investors to invest in livestock production after the incidence of HPAI and the effect of animal products imported from neighboring countries.

- Lack of market competition for meat and animal feed resulting in high costs of animal feeds.
- Comprehensive laws and regulations pertaining to this sub-sector have not been adequately put in place for the effective implementation.

	Unit	2008	2009	2010	2011	2012	2013
Land under crops	000 ha	596	645	774	930	1000	1000
Irrigated land area	000 ha	1120	1145	1170	1195	1220	1245
Paddy: cultivated area	000,000ha	2.61	2.63	2.65	2.65	2.65	2.65
Yield per hectare	Tons	2.74	2.77	2.8	2.83	2.87	3
Fishing Lots	Sq.Km	415	415	415	415	415	415
Released to Community Fishing	%	56.4	56.4	56.4	56.4	56.4	56.4
Fish Catch (from all sources)	Tons	471	515	617	668	726	788
	% of land						
Reforested (cumulative total							
from 1985)	На	10.81	18.92	73	73	73	73
	% of						
Fuel Wood Dependency	households	73	67	61	59	56	54
Forest Demarcation	Km	321	228	413	500	500	500
Forestry Communities	no.	124	210	350	400	405	450

Agriculture Statistics of Cambodia

Source: NSDP Update 2009-2013

The potential for growth in agriculture is significant due to efforts by the Government, private sector, local community, NGOs and development partners in promotion of agriculture and rural development in the sectors. Provided the RGC can solve the issues related to rice export in the same way as it has done for the garment sector, a substantial value added will be retained in the country and the gains generated from the process could directly contribute to economic growth, i.e. in the form of employment for more than 70% of rural people, an income increase, and particularly a reduction of poverty and an improved living condition for farmers and most Cambodian people engaging in rural economic activities. The sector could provide additionally a mechanism for equitable redistribution of economic gains, and have spillover effects on broader economic activities, which could lead to a complete change in the image of Cambodia's rural economy.

Cambodia can be used as a model for LDCs in economic development starting from agriculture with great cooperation among the related ministries/institutions, local authorities,

development partners and agencies, national and international NGOs, private sector and the community for the cooperation and support provided to the formulation of action plans and implementation to increase efficiency and quality and accelerate progress in the agriculture sector. These efforts and contribution spirit are a big catalyst for realizing the vision of the agricultural sector.

Cambodia really has a potential for agro-products exporter, especially rice. However, to move from food self-sufficient or subsistent production to food exporter is not an easy task. It is a time consuming and persistent work. Changing people behavior from private and family business to a commercial corporate or production community is still a daunting duty.

Providing irrigation network, low interest credit for agricultural inputs such as fertilizers and seeds. Irrigation and rural roads and improve access to markets domestically and internationally. The forthcoming royalty from offshore gas/oil in Cambodia, as confirmed by Government, could be partly utilized to develop Cambodia's agricultural, together with strengthening education in the rural areas. Irrigation, roads, agricultural research and development, and rural education have proven to be the most important productivity enhancing and poverty reduction in Cambodia.

Rice Productions with big scale and world quality: The dry season rice must be promoted throughout the country, especially starting with areas where they are near the water sources. It is important for farmers to know what sort of rice species and quality that is demanded by the local and international markets so that we could orientate our rice production to answer those demands. National standard in different categories of rice should be finalized by the Institute of Standards of Cambodia (ISC) so that Cambodia can have its own standards to access to markets. There has been argument that exporting paddy rice is easier because there is no need to fulfill the customs and/or trade procedures. But we should also see that exporting paddy results in loss of value added stuff such as rice bran, broken parts, husk and also jobs for our people. It has been studied and estimated to be some 600 million US dollars' loss if we were to export a sum of three million tons of rice in the form of paddy. It is therefore a must for us to change the situation whereby all value added stuff will be retained in the country. Farmers such as rice farmer should form "farmer association" or "rice production community" to make big scale of production and ensure the same seed and quality. This will facilitate access to bank loan as well.

Diversification into new markets and new products: The rice sector could have a big potential comparable to that of the garment sector in terms of gross export value and value added generated throughout the supply chain including employment. Cambodia needs to build on its existing capabilities and develop new ones as a step towards diversifying its economy. The remarkable economic growth of the past decade could be sustained only if Cambodia increases its competitiveness and diversifies away from its current narrowly based form of growth.

- Need for complementarily with new sectors: Agriculture will continue to be important, but needs to be complemented by development in other sectors.
- Agro-industries in rural areas, i.e. non-farm activities (e.g. rice milling, trade)
- should be major sources of growth.
- Foreign investors which can bring access to global value chains, technology, and finance to invest in contract farming should be encouraged and attracted.
- Market linkages for fish products, fish processing technology and investment, and the ability to produce international certificates for food safety needs to be capitalized.
- Securing additional source of financing for production and export. Cambodia's financing, which comes primarily from foreign savings, highlights the adverse impact on growth in Cambodia as a result of tighter conditions in international financial markets.
- Need for multi prong partnerships: Large investments to undertake with the partnership with foreign investors. In the rice sector, serious and credible foreign involvement in the export has started.
- With national dialogue partners: The recent adoption of the rice export policy provides the incentive to develop a hand-in-hand partnership between the government and the rice milling industry.
- There are opportunities to increase sub regional trade within the Greater Mekong Sub region (GMS), making Cambodia the bridge between the two of the largest cities in South East Asian, Ho Chi Minh and Bangkok.
- Priority efforts should focus on connecting Cambodia's agricultural firms into the sub-regional supply chains by attracting Vietnamese, Thai, and Chinese firms to locate their processing factories in Cambodia. The rice export sector has an opening in exports to the EU through its zero tariff for Least Developed Countries initiative "Everything but Arms".
- Implementing existing cross-border transport agreements with neighboring countries would further stimulate the cross border trade flow.

Capacity building issues for development of training plan for Cambodia

I. Capacity building for exporting firms on export procedures:

Human resource remains the main constraint for the majority of Cambodia medium exporting firms. In the area of capacity building, there is a clear need for training medium size provincial rice millers on the actual process of international trade, on the specificity of the export procedures. With the exception of the top ten rice millers, most of the three hundred rice millers have only a vague idea of the export process. Capacity building strategies should therefore be on practical, hands on, and network based. All the institutional actors, both public and private, should be brought in one training session to explore all the hypothetical scenario surrounding a few export cases. The role of practitioners within a particular government agency as much as those of the shipping agent's / freight forwarders and port authorities are crucial in order to address issues surrounding export procedures and documentation. As a result of an efficient and effective information exchanges the trade and transport community will benefit from faster time-to-market, substantial cost-savings, and increased firm-level competitiveness.

II. Capacity building on market access conditions:

The regional institutions such as ESCAP, IFC, and ADB should further engage and implement more trade projects to support Cambodia promising exporting firms by helping them, first, to understand concrete export opportunities arising from numerous regional and sub-regional trade agreements and, second, to understand the export rules and regulations and other procedural aspects of international trade.

III.Mobilization of private sector rice actors.

There are a clear need to mobilize more formally the many number of private sector representative bodies (e.g., provincial rice millers associations or groupings and the Federation of Rice Millers Associations led by Okhna Phou Puy, le Rassemblement des producteurs du riz driven by Green Trade), which would be in a better position to present a common position and interest of their members to deal with government with regards to specific trade facilitation issues and the development of the rice export industry as a whole.

iv. Status of Agricultural Extension and Research system.

The Ministry of Agriculture, Forestry and Fisheries (MAFF) is the apex body responsible for Agricultural research and Extension in Cambodia, is the government ministry of Cambodia that is responsible for governing activities of agriculture, forestry and the fishery industry in Cambodia comprises the national agricultural research system (NARS).

Challenges facing Cambodian agriculture

Cambodia's NARS faces a numb er of challenges over the ten-year Master Plan period. These include the development of new technologies to cater for increased competition resulting from the country 's admission to the WTO, an acceleration in the distribution of large tracts of land requiring new technologies; an expansion in private sector investment in agriculture requiring a different approach to research; an increased involvement of farmers in the management of community resources; and the promotion of increased agricultural diversity plus the intensification of agriculture placing a heavier load on the research system.

Inclusion in the WTO will open Cambodia to increased competition both in terms of price and quality of agricultural commodities. Local farm produce needs to meet international standards for both domestic consumption and for export. It will also be strategically important for researchers to concentrate on improving the productivity of agricultural commodities in which Cambodia possesses a comparative advantage to its neighbors while ensuring the poor are food-secure. The RGC promotion of "one village, one product" may lead to agro-ecological zone preferences for production, making the research requirements even more specific.

Agricultural commodities identified as having considerable potential for investment by the private sector for export include rice, freshwater fish, rubber, livestock and fruit crops including mangoes and cashews plus silk, sugar palm and bamboo products (MOC,2002, 2005).

The center of origin of "jasmine" aromatic rice is in the NW of Cambodia and NE of Thailand. The rainfed conditions in this area are conducive to the production of high quality aromatic rice which commands a premium on the international market. To improve production, investment is required in plant breeding and seed multiplication to ensure high quality seed is available for farmers. Increasing production without a resulting loss in grain quality is also a research challenge. This will be particularly the case if Cambodia was to produce rice for the "organic product" market, a market Cambodia is particularly qualified to supply considering the low level of chemical inputs presently applied to the predominant rainfed lowland rice ecosystem. Current production of quality rice is fragmented and suppliers (farmer associations and millers) need to be formed to ensure large quantities of high, consistent quality product reaches the millers. Investment from the private sector is also necessary to improve the milled quality of grain to exportable quality.

The Tonle Sap lake in Cambodia is the largest freshwater lake in SE Asia and covers

almost 10% of the country during flood periods. During flood periods, 15-20% of the nation is covered with free standing water. The potential for producing fresh water fish in this environment to supply the expanding global market is very large. Technologies need refining for cage and pond production and management techniques for cage and the natural resources extended to farmers. Private investment in fish processing is also necessary to meet the high WTO standards.

Cambodia's rubber industry has a known comparative advantage to neighboring countries because of the industry 's excellent soil type and rainfall conditions. As a result, the potential yields and product quality are high. However, certification of its products on the international market have been slow. As a result, prices for the product have been discounted by 10-15%. Certification is slowly being achieved and the state owned plantations will be divested in 2006 propelling the industry towards higher economic efficiency. Production challenges remain and further research is required to select higher producing clones and develop farming systems to bring higher returns to plantations replanting old trees.

Cambodia's low population density, particularly in the uplands provides considerable potential for increasing livestock numbers to feed the huge regional and global market for live animals. Caged and lot fed animal production in Cambodia is also undeveloped and there is high potential for this industry to grow in the future. Challenges remain in the supply of low cost animal feed and maintaining product quality.

The acceleration of land distribution to private concessions will place increasing pressure on researchers to develop new or adapt existing technologies for use in these areas to improve production and limit resource degradation. The development of sustainable resource management techniques will become increasingly important in the research portfolio. Large areas will become available for fruit and nut tree production particularly mangoes, oranges and cashews, crops that grow particularly well in Cambodia and are known to be of high quality on the domestic market. Mulberry trees can also be grown to supply the manufacture of silk products unique to Cambodia. The challenge will be to prepare these products cost effectively and to high enough standards for the international market. Up land cropping will require more interdisciplinary research than is needed for the low land ecosystems resulting in the need for closer inter-department and inter research institute collaboration.

The Cambodian climate and many of its soils are conducive to the cultivation of sugar palm. This palm is recognized as being Cambodia's national tree and is ubiquitous to many regions of the country. Cambodia can exploit this palm to produce products "uniquely Cambodian" for tourist consumption and export. Products include hats and baskets from the leaves and sugar and alcohol products from the inflorescence sap. Utilizing the palm products effectively is a challenge for the agro- industrialists.

Cambodia does not possess either a robust agro-processing industry or a strong commercial farming sector. The RGC strategy to encourage private sector investment in agriculture will stern then non-government presence in the industry. The research needs of the private sector may be different to those of the traditional farming co immunity and require addressing. At the same time, the small contributions to research currently forthcoming from tobacco companies, feed mill operators, plantation owners and animal lot centers may increase to reflect private sector interest in agricultural production and processing.

DAE (Department of Agricultural Extension, Ministry of Agriculture, Forestry and Fisheries, Cambodia): The Department of Agriculture Extension (DAE) of the Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF) was established in 1995 to develop a demand-driven, district-implemented, provincially-managed and centrally-overseen extension system appropriate to the needs of Cambodia. DAE aims to improve food security, rural income and agricultural production in Cambodia by improving the quantity and quality of agricultural production in Cambodia. DAE, through its district and community-based extension workers, represents Cambodia's frontline efforts to sustainably improve agricultural production, provide farmers with access to vital agricultural information and support the development of farmer organizations and agricultural communities.

Cambodian Agricultural Research and Extension Policy (CAREP) statement developed in 1998 govern the Extension system of Cambodia These include:

- Basing and managing the extension system in the provinces;
- o Delivering services to groups rather than to individual farmers and
- Encouraging the private sector to be involved.

Large companies such as CP Corporation (Charoen Pokphand *Company*), BATC (British American Tobacco (Cambodia) Limited) and the Royal Fertilizer Company all have active extension programs. A Farmer Cooperative Program under DAE(Department of Agricultural Extension, Ministry of Agriculture, Forestry and Fisheries, Cambodia) and an Agricultural Marketing Office under departments of Agronomy and Land Improvement, DAALI; Agricultural Machinery , DAM , Agricultural Extension, DAE and Planning, Statistics and International Cooperation, DPSIC facilitate interaction between farmers,

extension services and researchers and to provide them with information concerning prices and market information.

The following institute of NARS Cambodia are actively involved in Research and development

- Cambodian Rubber Research Institute (CRRI) for research into rubber
- National Animal Health and Production Investigation Centre (NAHPIC)
- Department of Animal Health and Production (DAHP) for livestock research
- Forest and Wildlife Science Research Institute (FWSRI) under Forest Administration (FA) for forestry research.
- Inland Fisheries Research and Development Institute (IFReDI) under Department of Fisheries (DOF) for fisheries research
- Department of Agro-industry (DAI) for improvement in the agro-industry sector. the role of RUA (Royal University of Agriculture), PNSA (Prek Leap National College of Agriculture) and KCNSA (KamPong Cham National School of Agriculture),

All these fall under the responsibility of MAFF. Each of these institutes conduct research during the education of under graduate and post graduate students. Their research is supplemented by further academic studies conducted at Maharishi Vedic University (MVU) and by NGOs Cleared (Center for Livestock & Agriculture Development) and CEDAC (Cambodian Center for Study and Development in Agriculture). These educational units and NGOs have the potential to play a major role in agricultural research in the future, the main constraints for each of the sub sectors in order of priority is as follows:

Crops

- improvement to currently used varieties and cultivars, improved cultural techniques
- agricultural zoning
- pests and diseases, post-harvest technologies
- low soil fertility

Livestock

- improvement to animal husbandry practices disease control
- animal breeding
- socio-economics
- public health and animal waste management

Fisheries

• techniques for aquaculture production

• better management and protection of aquatic resources & Socio economics of fisheries

Forestry

- forest resource management and conservation
- rehabilitation and restoration of degraded forest
- community based management of forest resources

Agro-industry

- Quality, price and services in the market
- Farming, planning and services in agro-industrial development
- Food processing and storage

Rubber

- Improved selection of rubber clones
- Physiology agronomy of rubber trees and plantations
- Chemistry of rubber production

v. Public and Private institutions and their relevance in Agricultural development

Public and Private institutions and their relevance in Agricultural development include:

- Royal University of Agriculture (RUA)
- Cambodia Agricultural Research and Development Institute (CARDI)
- The Cambodian Agricultural Research and Development Institute (CARDI) is the semi-autonomous government research agency responsible for increasing agricultural productivity, improving crop diversification and ensuring environmental sustainability and stability of rural livelihoods through agricultural research and technology utilization. CARDI is responsible for assisting the Royal Government of Cambodia to achieve its rural development objectives. CARDI works in partnership with extension agents, NGOs and the private sector to increase the impact of improved technologies. CARDI aims to apply research and technologies that have the largest impact on poverty alleviation and living standards.
- Prek Leap National College of Agriculture (PNCA)
- Kampong Cham National School of Agriculture
- Agricultural Input Company
- Cambodia Rubber Development Company
- Cambodia Rubber Research Institute

- Rubber Import, Export, Transport and Equipment Company
- Rubber Plantation Companies
 - Chup Rubber Plantation Co.,
 - Krek Rubber Plantation Co.,
 - Memut Rubber Plantation Co.,
 - o Snoul Rubber Plantation Co.,
 - o Chamkar Andong Rubber Plantation Co.,
 - Beungket Rubber Plantation Co.
 - Peam Cheing Rubber Plantation Co.

vi.Present capacity building programmes and potential areas

Availability of financial and human resources, facilities, equipment and existing information networks for research institutions Human Resources MAFF employed a total of 8,699 staff members in 2004. Staff were located at the central MAFF buildings, departments, research institutes, public institutions and in the provinces. Sixty percent (5186) work in the provincial agricultural offices and the remainder are within the MAFF organization, mostly located in Phnom Penh. Of the total, 31 (0.3%) have PhDs, 222 (2.6%) M asters,1551 (17.9%) Bachelors, 2371 (27.3%) dip lamas and 4517 (51.9%) p assesses no degrees or dip lamas. A high proportion (43%) of the PhDs are presently working at CARDI and most of 222 MSc graduates employed by MAFF work at the central offices in management or administration works. Only 22 MSc graduates are located in Provincial centers.

The high number of PhD graduates at CARDI compared with other institutes is a result of concentrated financial support in the 1990's to promote crop research by development projects. Most graduates from CARDI and many MAFF departments completed their post graduate studies through research rather than coursework and are experienced in the field as well as academically.

CARDI staff numbers and qualifications are adequate to lead crop based agricultural research in the near future. However, training of their staff needs to continue for the researchers to remain current with technical developments.

Other Cambodian research organizations need to hire or train personnel with higher degrees to raise the level of research experience. Data from the Department of Personnel and Human Resources Development illustrate the lack of higher degrees in research institutes other than CARDI.

Another option to improve the effectiveness of the research system is for smaller research organizations to improve their linkages with those possessing more qualified staff to assist with research design, analyses and reporting. Overall, there are sufficient qualified and experienced staff in MAFF to manage a large adaptive research program in Cambodia if the research is conducted on a collaborative basis. Expertise on experimental design, data collections systems, statistical analysis and report writing methods are transferable across disciplines. In addition, as demonstrated with the CARF program, projects are particularly productive when research institute and educational organizations work together.

Qualification	RRIC	RUA	CARDI	IFReDI	NAHPIC	FWSRI	DAI	Total	%
PhD	1	4	12	3	0	0	4	24	6
MSC	0	33	10	12	1	10	2	68	17
BSc	16	59	13	23	22	13	10	156	38
Diploma	30	11	2	1	4	6	4	58	14
Labourers	13	60	15	4	3	5	0	100	25
Total	60	167	52	43	30	34	20	406	100

Personnel qualifications in main research organizations

The existing Government salary structure of \$20-40 p er month is insufficient to retain highly qualified research staff. International NGOs p ay \$200-\$350 per month to retain qualified, experienced researchers and \$300-\$450 p er month for management staff. This payment level is considered to be reasonable to remunerate all research and management staff. Some Government personnel receive salary supplements or training allowances from projects and development programs. Self- generated funds are also available for salary support at the public institutions of CRRI, CARDI, RUA, PNSA and KCNSA. However, this income stream is not permanent and a longer term solution is required. The Government salary structure is currently under review. In the meantime, staff support programs using non-government resources need to continue until sufficient salary levels are reached.

Agricultural research conducted outside of Government institutes includes that being done by the private sector and NGOs through development projects. Staff at CelAgrid, formerly employed at the University of Tropical Agriculture, supervise Master's degree students and receive grants from international training institutes to support these activities. As mentioned above, NGO staff generally receive higher salaries than government staff. Private, commercial enterprise personnel are also well remunerated. Administrative facilities Government research institutes for crop s (CARDI), livestock (DAHP/NAHPIC), fisheries (IFReDI), rubber (CRRI), teaching (RUA, PNSA and KCNSA) possess good (KCSNA) to excellent (CARDI) buildings to house research requirements. Almost all of these institutions have had new buildings constructed over the past five – ten y ears. New administrative buildings will not be needed at these institutes for the foreseeable future. Facilities at DAI are limited but adequate for the 25 employees of the department. Extra rooms may need to be sourced at a later date to house an expanded research program.

Laboratory facilities: All laboratories currently within MAFF suffer to some degree from

a) A shortage in trained staff,

b) A lack of equipment,

c) Poor laboratory facilities to house the equipment and

d) A lack of operational funds.

The CARDI laboratories are in a new building requiring the installation of fume extraction equipment and safety measures. The institute also does not have trained personnel capable of operating the new equipment on order, nor are there sufficient analytical reagents to conduct the analyses. DAALI has well trained staff but possesses old broken equipment and IFReDI possess the laboratory space but does not have a full complement of equipment. The FWSRI, DAM and DAI possess no laboratory space and no laboratory equipment.

Laboratory space is available at all MAFF technical departments and research institutes excepting the FWSRI, DAM and DAI. It is not necessary for DAM and DAI to possess analytical laboratories to keep pace with the current level of research at these departments, but some basic equipment will be necessary for FWSRI to operate effectively. This may be limited to microscopes and other equipment for measuring tree growth rates and wood density. Wildlife carcass post mortems can be conducted at DAHP/NAHPIC. The DAI may need to construct laboratories in the future if its research program expands as envisaged.

Both DAALI and CARDI have recently constructed or will soon complete construction of laboratory buildings for analysis of soil, plant tissue, seed, fertilizer and water. Similar facilities are also found at RUA on a smaller scale. Duplication can be avoided and large savings made if samples from all sectors are forwarded to one laboratory for analysis. This also applies for the analysis of pesticides and pesticide residues. DAALI laboratories can service all M AFF requirements including CARDI, DOF, DAHP, Bureau of

Agricultural Materials Standards, RUA and other regulatory, research, and educational organizations.

Large expenditure on buildings and equipment over the past decade has not resulted in an efficient laboratory system for research and development. The lack of operational funds constrains the activities of all laboratories in MAFF although CRRI which is able to charge and retain some fees for service in the rubber industry. All other laboratories do not have sufficient analytical reagents to properly operate their services. Most rely on special project funds to purchase the necessary chemicals. This causes delay s, lack of continuity and constant frustration. The lack of operational funds also limits the number of samples passing through the facilities, dramatically reducing the efficiency of their operations. This could be remedied if laboratories are able to charge a fee for service and the fee is reinvested back into the laboratory.

Information networks can be either manual systems (e.g. mail, libraries), electronic (telephones, mobile p hones, radio, television, p agers) or computerized (e.g. e-mail, web pages) for communicating information.

On a national basis, Cambodia is extremely under resourced regarding information and communications technology and other information network expenditure compared with the rest of the world. For example, there are only 2 line telephones per 1000 head of population compared with 502 for East Asia and the Pacific, 1.5 computers compared with 19, 119 radios compared with 287 and 8 televisions compared with 266 (World Bank data for 2002).

Despite this poor statistical comparison, Cambodian research institute and extension personnel have adopted the use of the mobile telephone as part of their daily routine. Verbal communication between researchers is therefore not difficult. Most researchers are also computer literate and have access to computers, email and the internet. Breakdowns at institute facilities are compensated by cheap (by international standards) access to the internet at internet cafes found in the capital and Provincial centers.

Although the numbers are small, radio and television coverage is wide spread in Cambodia and events at research institutes or advertising of field days and training courses receive good cover age on government controlled and private networks.

Traditional book libraries established in MAFF departments during the early 1990s languish without adequate maintenance although most printed material of interest to the agriculture sector is now housed in a recently established document center at MAFF

headquarters. CARDI possesses one of the largest libraries in Cambodia for rice and other agronomic crops. However, digital copies of reports and other information are gaining popularity and will soon rep lace the expensive hard copies as a means of extending information.

Adult literacy levels are approximately 70% country wide and posters plus handouts are regularly p art of extension systems employed in rural Cambodia.

The Public Sector Agricultural Research Structure and Linkages are depicted in the following diagram



IPM (Integrated Pest Management), farmer field schools and IFAD (International Fund for Agricultural Development) or World Bank (WB) funded rural development programs. The Australian funded CARDI assistance project (CARDI-AP) and the Cambodia Australia Agricultural Extension Project (CAAEP) also support research activities through government research institutes and departments. NGO supported research is conducted both within and outside of the government system. The Cambodia Development Research Institute (CDRI) researches and analyzes socio-economic development issues; the Centre for Livestock and Agriculture Development (CelAgrid) conducts research related to livestock, forage crop s and renewable resource utilization; World Vision International (WVI) and CARE conduct individual social studies for their rural development programs as does the Cambodian Center for Study and Development in Agriculture (CEDAC), and the Adventist Development Relief Agency (ADRA) who also perform agronomic research as part of their agenda. American Friends Service Committee (AFSC), Lutheran World Service (LWF) and Venerinares Sans Frontires (VSF) have all supported animal health and production programs, some of which involve research into small and large animals.

Private enterprise funded research also partners with government institutions. The CP Group Ltd working with RUA on pig genetics and poultry research is one example. Other companies finance and implement their own research programs. British American Tobacco Cambodia (BATC) manages its own tobacco research program and the Mong Riththy Group examines the advantages of feeding oil palm waste and cassava as stock feed.

Short descriptions of selected MAFF research institutes (CARDI, NAHPIC, and IFReDI); one M AFF department involved in research (DAI); one university (RUA) and one private enterprise (BATC) are attached. Summaries include the organization's mandate, personnel numbers and qualifications, linkages with other organizations, financial support and research programs. The strengths, weaknesses, opportunities and threats of a select number of research organizations.

Other Government Ministries conducting research that may influence the development of technologies for agriculture include the Ministry of Water Resources and Meteorology, MOWRAM; Ministry of Environment, MOE and the Ministry of Planning, MOP.

vii. Training priorities of Cambodia in Agriculture and allied sectors

The TNA revealed that training materials and technical data were in much needed. Existing training modules were mainly focused on adaptation techniques, vulnerability assessment and cost-benefit analysis among others, while very less focuses on agricultural aspects in adaptation. It was recommended that funding should be provided to the particular training programmes.

The existing training programs were conducted on climate change and agriculture and that the climate change department (CCD) does not have any training program on agriculture while Provincial Agriculture Departments did not have any training program on climate and climate change. Although funds are allocated at each level they are not sufficient. The assessment revealed that training materials and technical data were the facilities that were much needed. The content requirements were mainly concerned with adaptation techniques, vulnerability assessment and cost-benefit analysis among others. Also the challenges in the implementation were identified as module implementation from funding point of view, participation and cooperation among the concerned institutions.

The induction trainings will be targeted to cadre of newly recruited staff at national level who do not have an understanding of the concept of CC and CCA in agriculture sector. While in-service trainings should be targeted for the extension workers at the district and commune levels to enhance their capacity on the knowledge and skills related to "CC adaptation technology on rice production.

For in-service training, the target groups should be changed to fit with the project objectives. The CCA component has to be incorporated into the existing training programs and a new/separate module need not be developed.

- The induction training should be targeted to extension workers.
- Although brainstorming is a strong technique, it should not be used too much in a training program.
- The methodology seems to be repeated in several sessions so need to be revised. Also contents are very general like pest management, animal production etc. which need to be more focused.

Some the Training needs of Cambodia include

(i) Identify training needs by class of officers rather than PDA, GDA department-wise.

- trainings in the country are carried by department wise and not by level of officers.
- (ii) Include job descriptions of officers interviewed
- Module: Enabling objective: to enhance the capacity: Qualify it either knowledge and skill, etc. (Make them 'SMART').
- Gender and ethnic groups: Women's groups will be directly approached by sub sector working groups to ensure their technology development concerns are met. At least 30% of training courses will be attended by women and in provinces possessing different ethnic groups these groups will be targeted for attending workshops and training courses.
- Linkages development with these groups through provincial centers.
- there is a shortage of post graduate qualifications in all the major research organizations apart from CARDI. MAFF will ensure that each of the research institutes have sufficiently qualified personnel by targeting staff for training and that qualified staff are retained.

- Expanding the number of trained staff in the research institutes may be achieved by sponsoring staff to study for Master's degree training at RUA (or even for PhDs at private universities).
- MAFF will promote specific research staff members to take advantage of post graduate training programs offered by USAID, AusAID, JICA and the EU plus at CGIAR centers on condition that they return to the research institute for set period. As p art of its mandate, CAREC will provide extra impartiality to the process by taking responsibility for interviewing prospective applicants for higher degree training.
- In Cambodia, the CARF was established to provide Cambodian scientists further training and up evidence in sourcing g research funds from competitive grants and managing the projects. The Research Trust Fund is open to Government, university or colleges and NGOs based in Cambodia which have a clear ability and mandate to implement research aceptable proposals need to be in the areas of crop production, protection and post-harvest technologies, livestock production and health, natural resource management, farming g systems, farm economics, rural socio-economics and aquaculture in farming systems. Grants of up to \$10,000 p er annum are awarded for projects which may span over 1-3 years.
- The training of 20-30 PhDs and 50 MSc level research staff over a ten year period will require the Department of Personnel and Human Resource Development at MAFF to target personnel from selected research organizations to apply for academic scholarships offered by Government and non-Government organizations. For example, Australia offers 20 post graduate scholarships each year. Japan, EU, the USA and other countries offer similar training schemes at Universities in their respective countries. MAFF may also sponsor candidates to study at local universities to improve their academic qualifications. Sponsorship of research personnel to short term courses and to attend seminars and conferences will assist develop and maintain linkages with international research and academic organizations plus keep p ersonnel current with recent scientific developments.

Human resources development for agricultural research in

Cambodia

	Year						
	1	2	3	4	5		
Training program	<mark>2006</mark>	<mark>2007</mark>	<mark>2008</mark>	<mark>2009</mark>	<mark>2010</mark>		
Formal short term training courses							
On-the-job training							
Technical exchange	• • • • • •						
Field visits							
Study tours							
Conferences and symposiums							
Donor funded post graduate cours es							

- Short term training courses will be arranged directly by individual research centers and collaboratively with other research programs. CAREC will take a lead role in the organization of collaborative short term training g courses. MAFF will not embark on a self-financed program of long term training to increase the number of post graduates in the system for the initial five-year period.
- On-the-job training will include assigning qualified personnel to research programs within the same organization, between collaborative organizations within the same working groups and across disciplines where skills can be transferred. Where possible, personnel from international collaborative research programs will also be requested to work closely with the researchers.

Critical Analysis of different sectors reveal the following Thematic areas of training for Cambodia

I. NATURAL RESOURCE MANAGEMENT

- Disaster management with special emphasis to Drought & flood management
- Natural resource management to sustain long term rapid growth
- Reducing Fuel Wood Dependency in communities, alternate energy sources and technologies like *turbo stove* in Philippines

II. MARKETING MANAGEMENT

- Assessment of certified quality standards, finance, crops diversification, and market information
- Export Certification of rubber products.
- Connecting producers with markets (Vertical integration)
- Enhancing capacity to develop standards for local products

- Market access for agricultural products
- promoting the markets for animals and animal-originated products.

III AGRICULTURAL FINANCE

- improving credit services for livestock production;
- promoting the investment in livestock production and veterinary activities

IV. FISHERIES MANAGEMENT

- Post captures fish processing, handling, storage, transportation and trade.
- community-based natural resource management (CBNRM) in fisheries
- Co-management mechanisms for sustainable Fishery resource utilization
- Safety improvement & vulnerability reduction for fisher communities;
- improved fishery products quality and market chain linkage.
- Diversified income generation for fisher families
- Management of Community Fish Refuge (CFR) ponds and brood stock management of Giant Freshwater Prawn (*Macro brachium rosengergii*)
- Capacity building and networking of local hatchery operators for better supply and value chain management
- increases in productivity, improved management practices, improved access to agricultural inputs and services, diversification and improved feeding practices in inland fisheries
- fish processing technology of freshwater CATFISH (Pangasianodon gigas)
- Microfinance services for fishers, processors and vendors

V. ANIMAL HUSBANDRY

- Avian and human influenza control and preparedness for emergency and contingency planning
- reduction of animal morbidity and mortality rates;
- improving public health particularly in relation to zoonotic diseases and food safety;
- promotion of animal feed production;
- improving the quality of animal breeding stocks;
- promoting the use of animal manures for bio-gas production
- Low cost animal feed production technology

VI. JOINT FOREST MANAGEMENT

- Community Forest Identification and Formalization
- Community, Institutional and Livelihoods Development for Forest farmers'
- Community Forestry Development & management

VII. CLIMATE RESILIENT AGRICULTURE

- Climate resilient Agriculture strategies
- commercialization of agriculture
- diversification of agriculture
- environmental protection and food security

VIII. AGRICULTURAL POLICY

- Land reform land market development and pro-poor land access.
- Fisheries reform sustainable access.
- Forestry reform promote Joint forest management natural protected areas.
- Legal and regulatory framework for human resource development.
- Strategies for attracting Vietnamese, Thai, and Chinese firms to locate their processing factories in Cambodia.
- Partnership between government and the rice milling industry.
- Fee structure for testing laboratories for self-financing

IX. AGRICULTURAL EXTENSION

- change farmers' behavior in crop farming practices, crop preservation and harvesting and to increase irrigation capacity together with favorable weather conditions
- enhancing and strengthening research and extension programmes on livestock production and veterinary activities; like F&M management, swine flu management and Avian Influenza management
- Global value chains & contract farming Management
- value addition of rice through "farmer associations"
- Agro-industries & non-farm activities through farmer's associations e.g.., Rice milling
- Capacity building on market access conditions
- Mobilization of private sector rice actors
- Training on "one village, one product" concept
- Capacity building for exporting firms on export procedures
- Use of ICTs in e-extension and m-extension

X. CROP PRODUCTION

- Export rice quality management
- dry season rice production and Management
- Production technology for quality "jasmine" aromatic rice

- "organic rice production"
- Rubber based farming systems
- sustainable resource management
- Sugar palm products development and utilization
- oil palm waste and cassava as stock feed production and management

XI.HUMAN RESOURCE MANAGEMENT

- Need for higher degrees in research institutes
- Expertise on experimental design, data collections systems, statistical analysis and report writing methods needed
- installation of fume extraction equipment and safety measures
- Collaborative research techniques and sharing of research facilities

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