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Review of Agricultural Policy and Policy Research

A Policy Discussion Paper



Theng Vuthy, Ph.D., Programme Coordinator for PARD
Koy Ra, Ph.D., Programme Coordinator for NRE

March 2011

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Executive Summary

Policy for promoting agricultural sector development

The Royal Government of Cambodia articulates its agriculture policy in the Rectangular Strategy: “To improve agricultural productivity and diversification, thereby enabling the agriculture sector to serve as the dynamic driving force for economic growth and poverty reduction.” Key elements of the agricultural development policy draw upon the Cambodian Millennium Development Goals (CMDG) 2003, the Socio-Economic Development Plan (SEDP-II) 2001-2005 and the National Poverty Reduction Strategy (NPRS) 2003-2005, and focus on 1) improving agricultural productivity and diversification; 2) land reform and mine clearance; 3) fishery reform; and 4) forestry reform.

The overall aim of Cambodia’s National Strategic Development Plan 2006-10 (NSDP) is to reduce poverty, and implement the government’s Rectangular Strategy for the enhancement of the agricultural sector. The NSDP further stipulate the primary need for developing a national Strategy for Agriculture and Water (SAW) by 2006. However, SAW 2006-2010 was only completed in 2007, lagging one year behind the plan. The SAW laid out five programmes: institutional capacity building; food security; agriculture and agri-business; water resources management; agricultural research and development.

The MAFF has formulated an Agricultural Sector Strategic Development Plan 2006-2010 outlining seven priority goals, and the constraints to and actions to be taken to reach these goals. These include: 1) food security, productivity and diversification; 2) improving and strengthening agricultural research and extension systems; 3) market access for agricultural products; 4) institutional and legislative development framework; 5) land reform, land tenure and pro-poor land access; 6) fisheries reform; and 7) forestry reform.

The government recently launched a policy to promote paddy rice production and milled rice export. This policy further refines the government’s major strategic policy measures to promote agricultural development, with emphasis on a new pace and scale. The aim is to further strengthen the foundations for economic growth, accelerate poverty reduction, and improve the living standards of the Cambodian people. Towards this end, this latest policy adopts a three pronged-strategy: productivity enhancement, diversification and agricultural commercialisation.

Other directives for agricultural development, food security and poverty alleviation include:

- the National Water Resource Policy
- Strategic Development Plan on Water Resources and Meteorology 2009-2013
- Circular No. 3 on Food Security and Nutrition in the Kingdom of Cambodia
- Statement of the government of Cambodia on the national fishery sector policy
- National Fisheries Sector Policy and Law on Fisheries (2006, MAFF)
- National Programme for Household Food Security and Poverty Reduction 2007-2011
- Strategic Framework for Food Security and Nutrition in Cambodia 2008-2012
- National Adaptation Programme of Action for Climate Change (NAPA)
- Law on Investment, 5 August 1994
- Law on Amendment on the Law on Investment (23 March 2003)
- Sub-Decree on Mortgage and Transfer of the Right over an Economic land Concession (29 Aug 2007)
- Royal Decree NS/RK/0609/009 (20 June 2009) to provide incentives for agricultural development in Cambodia.

Existing Policy research and knowledge gaps

There are several policy research institutes in Cambodia, including: SNEC, RUA, CDRI, CBNRM-LI, WorldFish Centre, NGO forum, EIC, CIDS. Access to policy research papers available in the public domain, however, is very limited, especially for public research institutes and 'think tanks'. This review focuses primarily on irrigation, agricultural crops, fisheries and livestock sub-sectors though some other related areas may also be discussed.

Water related policy research has covered governance issues, infrastructure, economic returns and some pilot studies of irrigation schemes. These studies found that low capacity of leaders and weak institutions are the major constraints in most irrigation schemes. Many irrigation schemes were inappropriately designed, resulting in water scarcity; this leads to imbalanced water distribution and conflict among water users. Some conflicts can be solved within the community, but others need intervention from provincial and national authorities. The participation of Farmer Water User Community (FWUC) members in fee payment, maintenance and ownership and water distribution was found to be critical to successful irrigation management. Research on groundwater in Cambodia is not yet available. Groundwater could potentially provide a year round source of water for irrigation, and help mitigate the impact of drought and climate change on agriculture and food security.

Some research on agricultural trade between Cambodia and ASEAN, and ASEAN with China, has been conducted. Many agricultural commodities such as livestock (pigs, cattle and buffaloes) and crops (rubber, cassava, maize, soybeans and rice) are traded; this cross-border trade could help stabilise market prices and expand markets for Cambodian agricultural produce. However, Cambodia benefits least and is less competitive than the other ASEAN countries; almost all commodities are exported as raw products through informal trade routes. Thailand and Vietnam have advantage over Cambodia as they process many of the commodities imported from Cambodia and then sell them on the world market.

There are very few studies on food security and food security mapping in Cambodia. These studies indicate that rice is a major staple food, accounting for two thirds of the total calorie intake, while fish and meat consumption is very limited, both making up only 6 percent of total calorie intake. Food security mapping found that nine provinces have experienced severe food insecurity, and five provinces were observed to have high rates of mortality, underweight, stunting and wasting. However, these studies were done in 2007; no recent or updated research findings are available, making it difficult to target the social safety net programme to mitigate vulnerability.

There is rich research on the relationship between economic growth and food security and poverty in Cambodia, employing cross-sectional and panel data analysis and qualitative methods. The studies reveal that poverty reduction is unlikely to be connected with economic growth, and that economic growth is not inclusive. Poverty and food insecurity remain high in the rural areas. Land ownership issues continue to be a significant determinant of poverty and food insecurity for Cambodian rural households. Large households with many dependent members, poor education and health are major internal correlates of poverty in rural communities. Poor access to public services such as education, health and vocational training, lack of access to credit, and poor infrastructure (road and irrigation) are the external variables to rural poverty. The agricultural sector is found to be the important factor contributing to improved livelihoods and food security in rural areas, while common property resources and wage labour opportunities serve as critical safety nets for the poor. The number of landless households is increasing markedly from year to year due to newly created family and the land market. The challenges and interaction between landlessness and food insecurity with social protection and vulnerability remain unknown.

Many policy research studies address inland fisheries issues in response to the government policy on fisheries sector reform. The performance and sustainability of fisheries co-management is constrained due to a lack of clearly defined property rights and resource boundaries and the absence of enabling legislation. This leads to conflicts between fisheries communities; conflict could also occur between fisheries and farming due to competition for different water resource use. Many of the fisheries community conflicts can be solved locally with support from higher level institutions. The poor have not yet benefited from access to fishing grounds; the average net income of a small fishing family is USD 12 and USD 4.6 per trip for open and closed seasons, respectively. However, if family labour is deducted from the net income, the real profit is only USD 4.5 in the open season and USD 1.6 in the closed season. Hydrology changes, sedimentation, agricultural development around the Great Lake, and the current fisheries communities' management capacity threaten the sustainability and environmentally friendly use of Tonle Sap Lake. In addition, the water level of the Mekong River is about 5 metres lower and that of the Tonle Sap Lake is about 3 metres lower than a year ago due to dam construction upstream. The low water levels will have negative impacts on inland fisheries ecology and habitats in Cambodia. The effect of lower water levels on inland fisheries population, fish breeding, and food security in Cambodia is as yet unknown. Comprehensive research on marine fisheries is not yet available.

Government policy on the livestock sub-sector does not have a clear direction; this sector also does not have a strategic plan to guide research and development. This sub-sector plays an important role in food security and draught power for agricultural production. Cattle and buffaloes are used for draught power and meat consumption. Pigs and chickens are raised for saving and consumption. Pigs and chickens are actively traded within and between rural communities. Cattle and buffaloes are mostly traded informally with neighbouring countries. No recent policy research is available for the livestock sector, signifying an urgent need for research to improve the development of this sub-sector and the socio-economic study of livestock should be prioritised.

Policy research has been conducted on improving the rice sub-sector and promoting rice export for the high potential that this crop holds for Cambodia's economic growth and food security. Rice has export potential; the promotion of agro-processing and agri-business will strengthen this sub-sector for export. Current rice milling capacity in Cambodia is low (less than 10 tonnes per hour), and can mill only one third of the paddy produced. Cambodia thus needs to increase milling capacity three fold in order to meet domestic milling demand. Rice also has huge potential for increased production and productivity if cultivation techniques could be improved and by investing in inputs – improved seeds, fertiliser and irrigation. However, future growth in rice productivity is uncertain as there are many constraints, for instance low inputs such as lack of credit, irrigation, and improved seed, poor extension services and rural roads.

The impact of climate change on the agricultural sector is a new research area in Cambodia, explaining the very few studies on this issue. Climate change has been found to have negative impacts on livelihoods. Households' income has gradually decreased over the period 1999 to 2008; associated factors include forest clearance for agricultural farming, crop failure due to longer dry-season and uneven rainfall, or denied access to forest. Rural and urban people have some knowledge of the effects of climate change on human health and agriculture: people are more susceptible to illness, the weather has become hotter, and floods and rain storms are more frequent, negatively affecting agricultural production. CARDI is screening early head rice variety (short duration variety) which can produce yield in a short time, thereby reducing water requirement.

Future research questions

Several key research themes have been identified to frame future research questions and interests, though this framework may not be able to respond to all the knowledge gaps:

Water resources management

1. What potential does groundwater hold for irrigation both as an integral aspect of Cambodia's water balance, and as a substantial natural storage of water that could be available as a year-round water source? What are the advantages and disadvantages of using groundwater for agricultural development and environment? What is the economic balance of groundwater between benefits and impact on soil property and fertility in the long run?
2. How can surface water use efficiency of the existing irrigation scheme be improved?
3. How can surface water users' participation in ownership and effective maintenance of irrigation schemes be strengthened? What is the economic return of investment in irrigation scheme maintenance?
4. What kinds of conflict exist around water scarcity and water resources allocation, and in what way can these be resolved effectively? In what ways can the share of public investment for irrigation infrastructure rehabilitation and construction be improved and made more effective?

Agricultural development and food security

1. How can the allocation of resources to improve agricultural development and growth be increased? How can agricultural research to promote agricultural growth be expanded? How can research agencies and technology users be more effectively linked? What is the best way to promote and encourage farmers to adopt new production practices to increase productivity and food security?
2. What appropriate technology and inputs use would intensify productivity for small landholders to produce enough food? What alternative job opportunities are there to diversify rural income besides farming income to improve livelihoods? How can rice-based farming with limited irrigation capacity be diversified to promote rural livelihood and poverty reduction?
3. How can the role of the commune council as the effective means of technology transfer in the community be promoted? What are the effective training programmes for capacity building for commune councils for their role in technology transfer? How can private sector involvement in technology transfer for producers be promoted? How can institutional and capacity building for extension agencies be strengthened to help farmers increase productivity more effectively? How can more resources be allocated to extension agencies?
4. How can better land use planning and agricultural crops zoning to increase agricultural growth be promoted? How can the rice production area be expanded to increase agricultural growth and promote export? How can the law be enforced to return idle land to productive use?

5. How can social land concessions for landless and near landless households be promoted? What are the risks and challenges to food security faced by landless households? What policies would be effective in reducing risk and food insecurity for landless households? What are the risks and challenges of households in the provinces who face severe food insecurity?
6. What is the agricultural technology shifts can happen in Cambodia as a developing country economy? What is the role of the agricultural sector in economic growth, employment, rural and urban food security and poverty reduction?
7. How can the risks to agricultural production and food security be reduced under the threat of climate change? How can effective groundwater use be designed and promoted to reduce the threat to agricultural land?

Fisheries sub-sector development

1. What are the negative impacts of low river levels on fisheries ecology, habitats and productivity in Cambodia's inland fisheries sector? How can the change in river levels be managed to sustain fish ecology, habitats and productivity?
2. How can fisheries community development and capacity building for effective and sustainable management of natural fisheries resources for income generation, food security and poverty alleviation be promoted and strengthened?
3. How can the roles of relevant agencies (MAFF, MoE, MoWRAM and MoI) be harmonised / coordinated for more effective management of the fisheries sector?
4. How can aquaculture production to reduce the threat to natural inland fisheries be improved? How can aquaculture be promoted in rural areas far from inland fisheries to improve animal protein consumption and income?

Livestock sub-sector development

1. How can the livestock sub-sector be promoted to improve rural income and food security? What is the integral relationship between livestock and agricultural production, rural household incomes and food security? What is the economic return from small scale livestock raising? What are the major risks and constraints of livestock raising faced by rural communities? How can these risks and constraints be mitigated?
2. How can a livestock market for small scale producers be developed? How can formal trade (e.g. cattle or buffaloes) to expand livestock market for Cambodia be fostered? What regulations are needed to improve the livestock market?
3. How can local swine production be improved to supply local market demand? What are the appropriate production practices to improve swine raising? What risks and constraints do swine producers face? What regulations and policies are in place to minimise the import of pigs and to promote local producers?

1. Introduction

Cambodia is a post conflict country, newly emerging from two decades of war and civil strife (1970s and 1980s) and a decade of internal conflict and unstable politics (1990s). Many of the critical development issues currently facing Cambodia such as food security and poverty reduction challenges can be attributed to these three decades. Cambodia transformed from a centrally planned to an open market economy starting in 1989 (Hang 2009). Land ownership was officially recognised in 1989; trade, industry and transport had also been liberalised and privatised by then. The free market economy policy was officially adopted in 1993 when the Royal Government of Cambodia (RGC) was formally established. Since the government's first Legislature, a number of national strategies and development plans have been drawn up to execute the development of the country. The overarching priority of national development policies is to promote socio-economic development to lift the country's poor out of poverty and place the country on a path of sustainable economic growth. The agricultural sector holds immense potential where its productive gains could boost sustainable outputs – employment and income – to alleviate poverty. In this sense, all the government's development policies address the agricultural sector as an engine for economic growth, food security, and poverty reduction. This short paper reviews existing government development strategies, specifically agricultural development and food security policies and existing policy research on Cambodia's agriculture.

The primary interest of this paper is to review both national and sectoral government policies that directly address the development of the agricultural sector. This review also focuses on existing policy research (research reports, related journals and articles, available survey and research data) directly related to Cambodia's agricultural development, food security and livelihoods. Three main agricultural sub-sectors—crops, livestock and fisheries—are the primary focus of this review, though other related issues are also highlighted.

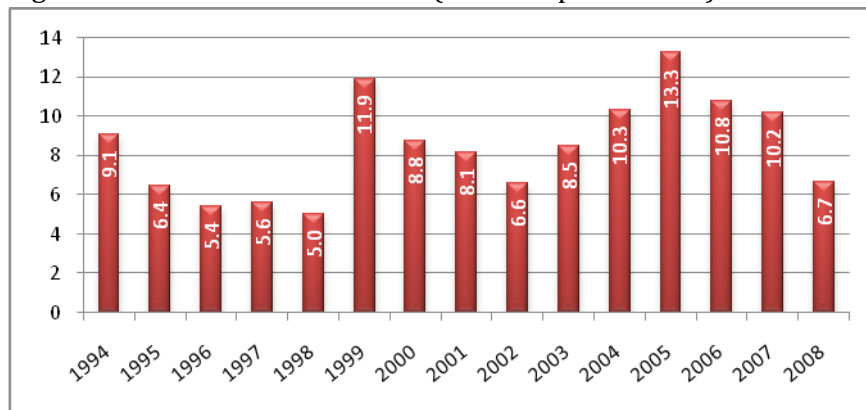
This paper is organised as follows: Section 2 provides a brief profile of the agricultural sector; Section 3 reviews government policy priorities for agricultural development; Section 4 looks at existing policy research on Cambodia's agriculture; Section 5 describes knowledge gaps in this sector; Section 6 discusses future interest research questions; and Section 7 concludes.

2. Agricultural Situation in Cambodia

Cambodia had been achieving impressive economic growth over the past decade before it was severely hit by the global economic crisis in 2009. Average GDP growth was 9.5 percent per annum for the period 1999-2008. The highest economic growth of 13.3 percent was recorded in 2005 (Figure 1). This growth was made possible by an open economy and a stable macroeconomic environment, increasing exports and foreign direct investment (FDI) and a low inflation rate of about 5.0 percent, except when inflation rose to about 22 percent in 2008 due to the sudden steep hike in food prices. However, growth has been narrowly based, with four key leading sectors: garments, tourism, construction and agriculture. The foundations of the economy have undergone profound transformation, with the agricultural sector ranking behind services and industrial sectors by 2006 (Figure 2; World Bank 2009)¹.

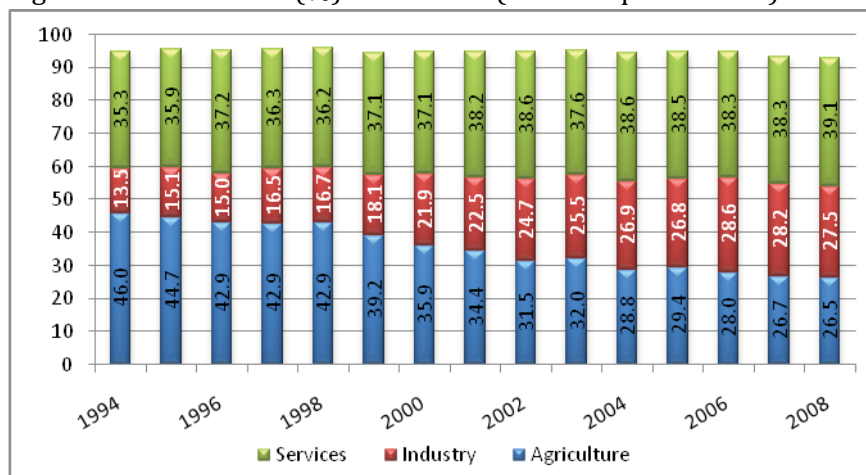
1 World Bank (2009), *Sustaining Rapid Growth in a Challenging Environment*

Figure 1: GDP Growth 1995-2008 (constant prices 2000)



Sources: NIS and National Account (2008), WB (2010)²

Figure 2: Share of GDP (%) 1995-2008 (constant prices 2000)

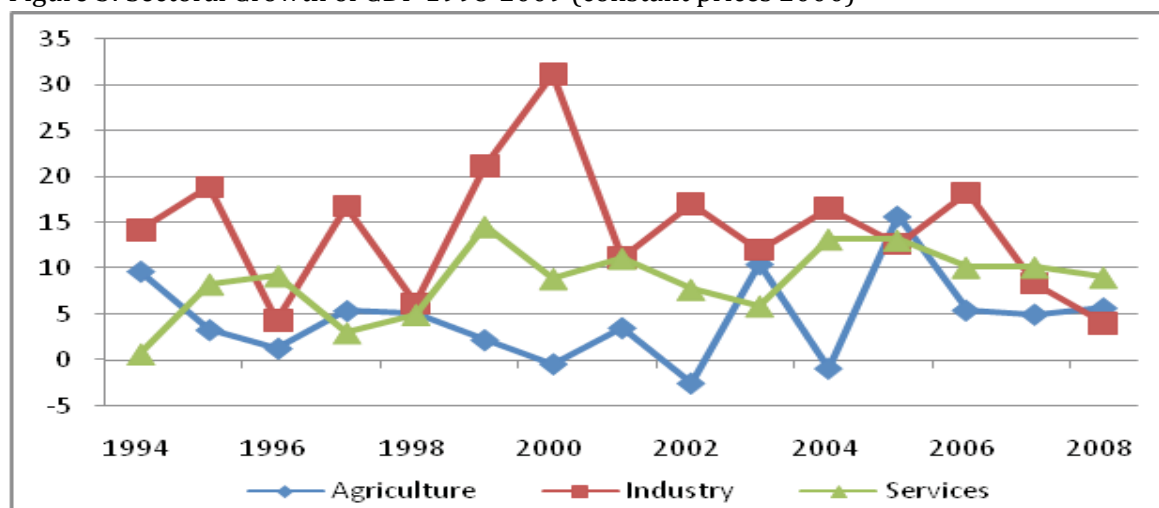


Source: NIS and National Account (2008)

The agricultural sector's share of GDP has been decreasing over time, but it remains a crucial part of Cambodia's economy, accounting for about 27 percent of GDP in 2008 (Figure 2). Average growth rate was around 4.5 percent per annum over 1998-2008 (Figure 3), contributing about 2 percent of GDP growth over that period (Guimbert 2010). The reduction of value added in agricultural sector GDP is due to the significant increase of that in the industrial sector. The industrial sector's value added rose from 15.1 percent in 1995 to 27.5 percent in 2008, while that of the service sector barely changed over the same period. The agricultural sector absorbed approximately 56 percent of the total employed labour force in 2007, and labour productivity improved by 2 percent from 1998 to 2007 (Figure 4a; World Bank 2009). The agricultural sector's share of the labour force dropped markedly from 70 percent in 2001 to 56 percent in 2007; however, the total population involved in this sector did not change over the same period. The workforce involved in industrial and service sectors increased remarkably, from 10.2 to 15.4 percent and 19.5 to 28.7 percent, respectively, over the same period (Figures 4a & b).

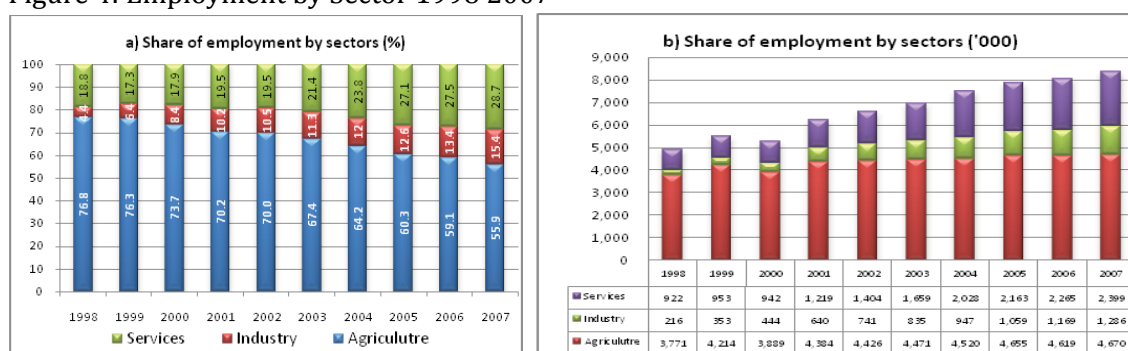
2 World Bank (2010), *Emerging Stronger from the Crisis*, pp. 39-41

Figure 3: Sectoral Growth of GDP 1998-2009 (constant prices 2000)



Sources: NIS and National Account (2008) and MAFF (2010)

Figure 4: Employment by Sector 1998-2007



Sources: IMF 2004 & 2009

Agricultural growth has been driven by land, labour and productivity gains. Growth was erratic due to weather conditions until 2005³, after which growth became stable (Figure 3 and Table 1). This was due to the expansion of crop production, with agricultural crops contributing 47.4 percent to agricultural GDP over 1998-2008. Rice is by far the largest crop sub-sector, contributing about 26 percent of sectoral GDP (Table 1). Rubber and cassava production grew markedly due to the expansion of planted areas and increased productivity. With strong market demand and with Thailand, Vietnam and China as main export destinations, these crops have become important to the Cambodian economy. However, growth in the agricultural sector is based on the value added of actual crop production with constant prices assumed. In terms of revenue, farmers became worse off due to the reduction in agricultural prices during the 2008 harvest season⁴ (Theng 2009; CDRI 2008).

Rice is the mainstay of agricultural sector growth in Cambodia. Its production increased by about 355,000 tonnes each year between 1999 and 2009. This growth is associated with significant expansion of the cultivated area (nearly 26 percent) and increased crop yield (40 percent). MAFF statistics show that crop area expanded by 2.9 percent and production by 7.4 percent per annum (Figure 5; MAFF 2010). Expansion of rice cultivation area was largely achieved by clearing forest

3 There were severe droughts and floods in 2001, 2003 and 2004 during the wet-season, but few interventions were made to pump water to save rice crops.

4 Farmers faced high production costs for labour, fertiliser and fuel during the planting season in 2008, but agricultural commodity prices declined during the harvest season in late 2008 and early 2009 (see Theng 2009; CDRI 2008).

(slash and burn farming in upland areas), and returning de-mined and idle land to productive use. The increase in rice yield has been higher in the wet season (4.6 percent) than the dry (3.2 percent), with an average rate of increase of 4.3 percent per annum (Table 2) from 1999 to 2008. However, annual growth rate was lower for wet season production (7.2 percent) than for the dry season cropping period (10.5 percent) (MAFF 2010; USDA 2010).

Table 1: GDP by Agricultural Sub-sector and Growth 1999-2008 (constant prices 2000)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Share of value added (percent)											
Agriculture	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
- Crops	43.5	44.8	43.5	42.4	46.8	46.1	50.9	50.8	52.3	52.8	47.4
+ Of which: Paddy	25.9	25.0	24.3	23.0	25.5	22.6	28.0	27.7	29.2	27.9	25.9
- Livestock and poultry	17.0	15.5	16.6	16.8	16.1	16.9	15.4	15.8	15.6	15.3	16.1
- Fisheries	28.4	30.0	30.6	31.6	29.1	28.8	26.3	25.9	24.9	25.1	28.1
- Forestry	11.1	9.7	9.3	9.1	8.0	8.1	7.4	7.5	7.2	6.9	8.4
Sub-sector growth (percent)											
Agriculture	2.2	-0.4	3.6	-2.5	10.5	-0.9	15.7	5.5	5.0	5.7	4.4
- Crops	12.1	2.4	0.6	-4.8	21.9	-2.3	27.6	5.3	8.2	6.6	7.8
+ Of which: Paddy	15.1	-3.8	0.7	-7.8	22.2	-12.2	43.7	4.4	10.7	4.1	7.7
- Livestock and poultry	-1.1	-8.8	10.8	-1.1	5.7	3.9	5.6	8.2	3.7	3.8	3.1
- Fisheries	-2.3	5.0	5.9	0.6	1.7	-1.7	5.6	3.8	0.8	1.5	2.1
- Forestry	-13.0	-12.4	-1.5	-4.3	-3.0	0.8	5.1	7.0	1.1	0.9	-1.9

Sources: IMF 2004 & 2009 and NIS 2008

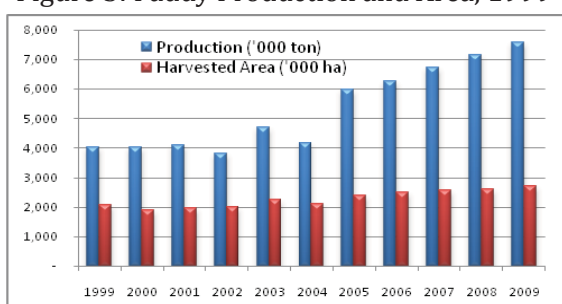
The increases in production and cultivation areas have significantly contributed to Cambodia's rice surplus. MAFF indicated that the country has had a history of rice self-sufficiency since 1995, and that this has kept increasing (MAFF, 2006). In 2000, Cambodia had surplus paddy of about 143,000 tonnes which rose to 3,507,000 tonnes in 2009 (Figure 6; MAFF 2010). Factors associated with the increased production included use of improved seeds⁵ (change from late to short and medium varieties); increased irrigation coverage and water management⁶; partial improvement in production techniques, particularly fertiliser and soil improvement techniques; and good weather since 2005 (USDA 2010). However, despite the paddy surplus, Cambodia continued to face food insecurity and high poverty rates, especially in rural areas⁷. From 2005 onwards, Cambodia has produced a paddy surplus of more than 2 million tonnes per year for processing and export. If milling capacity processed about 60 percent of the surplus, about 1.2 million tonnes of milled rice would have been available for export. However, official figures on milled rice export report less than 20,000 tonnes per annum, suggesting that most rice exports were unprocessed (Figure 6). Storage and processing capacity in Cambodia is largely undeveloped (RGC 2010b).

5 CARDI reported that 40 percent of rice growers adopted improved seed, and 75 percent changed to growing short and medium varieties in 2008 (CARDI 2009).

6 MOWRAM reported that the national irrigated area was 827,373 ha by the end of 2008, a substantial increase from 407,000 ha in 1998, 582,085 ha of which is for wet-season; it accounts about 31.6 percent of rice cultivated areas (RGC 2010a: pp. 48).

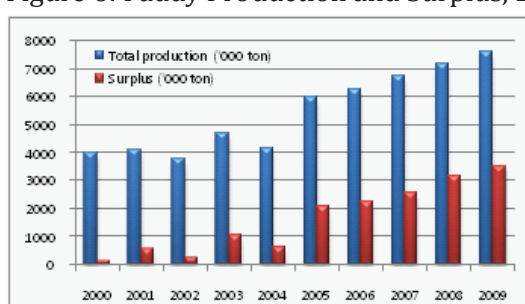
7 Surplus does not mean that everyone has enough food to eat. Farmers in some areas produce a significant surplus of rice, others suffer severe food shortage, and the poor do not have entitlement to access this food. Cambodia suffers the highest prevalence of chronic and child malnutrition in Southeast Asia (MAFF 2007-2011 2006).

Figure 5: Paddy Production and Area, 1999-08



Sources: FAOSTAT & MAFF 2010

Figure 6: Paddy Production and Surplus, 2000-09



Source: MAFF 2010

Notwithstanding the surplus paddy production from increased yields since 1995, Cambodia's rice yield of 2.75 tonnes per ha in 2008 was the lowest in the region partly because it uses the lowest inputs (Tables 2 and 3). Existing statistics reveal that Cambodian farmers apply the least inputs in terms of fertilisers and machinery use. They also have extremely limited access to paved roads, irrigation facilities and technical assistance from extension services⁸. This indicates that this sector is still below its real potential compared to other countries in the region (Tables 2 & 3).

Table 2: Cambodia's Paddy Yield and Regional Comparison (tonnes per ha)

Year	Cambodia	Indonesia	Laos	Malaysia	Myanmar	Philippines	Thailand	Vietnam
1999	1.94	4.25	2.93	2.94	3.24	2.95	2.42	4.10
2000	2.12	4.40	3.06	3.06	3.38	3.07	2.61	4.24
2001	2.07	4.39	3.13	3.11	3.42	3.19	2.62	4.29
2002	1.92	4.47	3.27	3.24	3.42	3.28	2.61	4.59
2003	2.10	4.54	3.14	3.36	3.55	3.37	2.65	4.64
2004	1.98	4.54	3.28	3.33	3.79	3.51	2.86	4.86
2005	2.48	4.57	3.49	3.42	3.75	3.59	2.96	4.89
2006	2.49	4.62	3.35	3.39	3.80	3.68	2.92	4.89
2007	2.62	4.71	3.47	3.53	3.84	3.80	3.01	4.99
2008	2.75	4.89	3.55	3.59	3.72	3.77	2.96	5.22
Average	2.25	4.54	3.27	3.30	3.59	3.42	2.76	4.67
Growth rate	4.74	1.55	2.80	2.24	1.78	3.42	1.89	2.83

Source: FAOSTAT 2010

Table 3: Agricultural Inputs

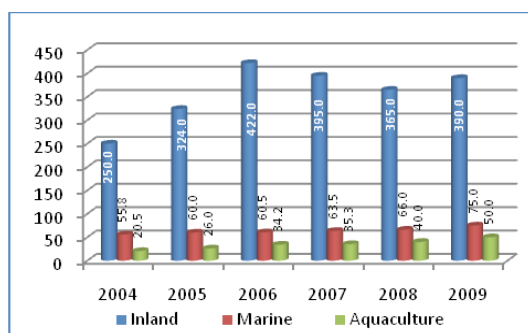
Inputs use	Cambodia	Laos	Malaysia	Thailand	Vietnam	China
Fertiliser consumption (Kg per ha of arable land, 2004)	5.0	-	821.3	123.3	374.3	327.9
Agricultural machinery (tractor per 100 sq. km of arable land, 2005)	11.0	9.8	241.0	529.6	256.6	124.3
Irrigated land (% of cropland, 2003)	7.0	16.5	-	28.2	33.7	35.6
Roads, paved (% of total roads, 2004)	6.3	13.4	79.8	98.5	47.6	70.7

Source: World Development Indicators 2009 & 2010

⁸ There are about 500 extension officers nation-wide, yet only 0.7 percent of farmers have access to any form of extension services. MAFF allocations for agricultural extension total less than 1 percent of its total budget (World Bank 2009).

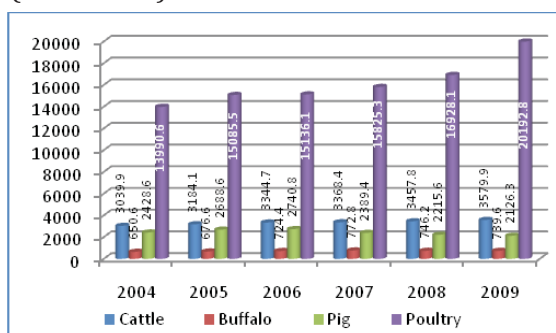
The fisheries sector constituted 25.1 percent of the agricultural GDP in 2008 (Table 1) and employed some 385,000 of the labour force or 4.7 percent of the employed population (IMF 2009). The growth of the fisheries sub-sector was 2.1 percent per annum from 1999 to 2008 which stemmed from inland fisheries (an increase from 250,000 tonnes in 2004 to 390,000 tonnes in 2009) and marine fisheries. Marine fisheries products are predominantly for export, but about 20 percent of marine catch is locally consumed. Marine catch reportedly increased from 55,000 tonnes in 2004 to 75,000 tonnes in 2009 (Figure 7; MAFF 2010). Aquaculture production was said to also have sharply increased from 2004 to 2009, possibly due to the demands of the growing population and marked improvements in aquaculture technology.

Figure 7: Fisheries Production ('000 tonnes)



Source: MAFF 2010

Figure 8: Livestock and Poultry Production ('000 heads)



Source: MAFF 2010

Livestock and poultry also play an important role in Cambodia's rural economy, making up 15.3 percent of agricultural GDP (Table 1). The dynamism of the sector has declined, however, its growth having slowed down from 10.8 percent in 2001 to 3.8 percent in 2008. The average growth rate was 3.1 percent from 1999 to 2008. The slowdown notwithstanding, the inventory of major livestock increased markedly – for instance, cattle increased from 3.039 million to 3.579 million heads while poultry went up from 13.99 million to 20.19 million (Figure 8; MAFF 2010). Cattle inventory grew 3.3 percent per annum, poultry grew 7.8 percent, but pig inventory growth was negative 2.5 percent, indicating that this sector was badly affected by imports from neighbouring countries – a disincentive to local production.

The forestry sector also made quite a significant contribution to the country's economy before the suspension of logging activities in December 2001. The sector accounted for 7 percent of agricultural GDP in 2008, down from 11.1 percent in 1999 (Table 1). The government declared a ban on logging and timber processing in 1999, and reinforced this with a *Prakas* in December 2001 to suspend all logging activities in Cambodia. Also strengthening this governmental action were the National Policy for Forestry of July 2002 and the Forestry Law of July 2002. Since the institution of all these regulations to curb the unsustainable use of forest, the sector has declined markedly at an average rate of 1.9 percent per annum between 1999 and 2008 (Table 1). Although representing the smallest measured value added in the agricultural sector, forestry continues to have an important support role for rural livelihoods in providing households with construction materials, firewood, livestock fodder, traditional medicines and additional incomes. MAFF (2010) statistics report that by 2009, 395 forestry communities with a total area of 325,130 ha managed by the communities themselves had been established. Approximately 61,000 of the labour force were directly involved in the forestry sub-sector in 2007 (IMF 2009).

3. Policy for Improvement of Agricultural Sector in Cambodia

Since the government's first legislature in 1993, a number of national and sub-national or sectoral development policies have been established. The policy visions are to directly promote sustained economic growth and share the benefits of growth to all Cambodians and ultimately to reduce poverty. Forming a core concern to these policies is the agricultural sector, which continues to have an important role in the country's economic growth, food security and poverty alleviation. This section reviews the national and sub-national policies on agricultural development and food security. Other policies indirectly related to agricultural development and food security, for instance, infrastructure development, health and education sectors do not focus in this review.

3.1 Socio-Economic Development Plan (SEDP)

After the UNTAC led national election in 1993⁹, the new government came to power in September the same year. To develop the country, which had suffered from 20 years of civil strife, the National Programme to Rehabilitate and Develop Cambodia (NPRD) was immediately adopted in 1994. The NPRD sought to achieve a just and peaceful society by accelerating economic growth, and to improve the living standards of all Cambodians by optimising natural resources use and enabling equitable access by the population to the benefits of growth. The priority sector in this policy was rural development, with a short term goal of improving rural livelihoods. Alongside rural development policy, agricultural sector policy prioritised the diversification of crops and livestock, and the efficient exploitation of forest and fisheries resources. The immediate government strategy for the agricultural sector was to produce sufficient rice for domestic consumption, improve the livestock sector and promote market orientation.

However, though NPRD had been implemented, due to political instability the economic development policy was not regularly executed until the first socio-economic development plan (SEDP-I) was implemented from 1996-2000 (Ho-Seop 2004). The SEDP I was largely formulated based on NPRD but was more orientated towards specific outputs to achieve economic growth targets. The primary goals and milestones set by SEDP I were: 1) prudent macroeconomic management aiming at high economic growth (to double the 1994 level of GDP by 2004 in real terms) focusing on agriculture, industry and tourism sectors; 2) improve rural livelihoods through sustainable agricultural sector development and rural development; 3) good governance; 4) foster investment in human resources, physical infrastructure, health and education; and 5) promote land reform and environmental protection. Recognising that poverty reduction is an integral part of social reconciliation and key to maintaining political stability, the government of Cambodia declared poverty alleviation as its single most important long term goal for the first time in 1996, and the eradication of poverty as the central thrust of the first five year Socio-Economic Development Plan (SEDP-I) (1996-2000). The basic goals set by the government for the agricultural sector are to: 1) ensure food security through the expansion of rice production and its availability through the market and secondary food crops; 2) contribute to economic growth and to foreign earning through exports; and 3) improve income opportunities for farm households by diversifying crop production.

Crops and livestock were central priorities in order to attain self-sufficient food consumption. To achieve this goal in the crops sector, government policies focused on rehabilitating selected irrigation and drainage systems and physical infrastructure, promoting fertiliser use and accelerating de-mining to expand the cultivation of abandoned land. Anticipating that it would not be possible to export rice to earn national revenue given the difficulties in predicting rice yield due to erratic rainfall and rapid population growth, government policy has promoted rubber sector exports

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by privatising state owned plantations through establishing joint ventures between foreign and local companies. For the livestock sector, there was no a clear cut policy to improve production even though it was recognised as an important sector for rural household economy. Some policies addressed issues such as disease control, vaccination, animal breeding, animal nutrition, and also marketing arrangements for cattle and buffalo as there was unofficial trade between Cambodia with Thailand and Vietnam.

With regard to fisheries and forestry sectors, as elaborated in NRDP, the government continued to exploit these resources, but with strict policy guidelines. Fisheries sector policy aimed to: 1) maintain or increase per capita consumption of fish protein in the country; 2) increase incomes generated from this sector; and 3) conserve the fisheries environment and ensure the expansion of production while sustaining fish stock. Aquaculture, like pond production, has been encouraged by the government to provide fish supplies and contribute to nutrition in remote areas far from the main inland fisheries. Forest sector policy focused on 1) sustainable management within concessions and enforcement of regulations; 2) control of illegal logging; and 3) geared exploitation to provide timber for local wood-based industries.

The Cambodian government's second mandate adopted the Triangular Strategy after the election in July 1998. This policy prioritised three pillars: 1) strengthening stability, peace, security and public order; 2) integrating Cambodia into regional and international communities; and 3) socio-economic development and poverty reduction. All three pillars are inter-related and are based on state reform i.e. good governance. At the near end of SEDP-I, SEDP-II 2001-05 was prepared (assisted by ADB) and embodied the government's development objectives, strategies and policies by integrating the Triangular Strategy and the Interim Poverty Reduction Strategy Paper approved by the Council of Ministers in October 2000. SEDP-II sets four broad main goals as priority: 1) private sector-led sustainable long term economic growth (6-7 percent a year); 2) equitable distribution of income and access to social and cultural development services – education, health, water and sanitation, power, credit, markets, information and appropriate technology; 3) sustainable natural resource use and environmental protection; and 4) reform of government administration for effective implementation of the Government Action Plan.

For sectoral policy, the government recognised that development of the agriculture sector is the key to poverty reduction and improved food security, and promoting community development and conservation of natural resources is the key to sustainability. The government set agricultural growth of 3.5 percent per annum over the period 2001-2005 as its goal. Agricultural sector policy in SEDP-II was more or less the same as in SEDP-I 1996-2000, prioritising agricultural crops – especially rice, livestock, and fisheries and forestry sector reform. With these policies, during the period of SEDP-II, fisheries and forestry reforms were taken seriously by the government; many fishing lots and forest concessions were transformed to communities and managed by local authorities and communities themselves. Forestry reforms started in 1999-2000 and were reinforced in 2002 by suspending all logging and processing activities (see Section 2 above), while fisheries reforms started in late 2000 and extended into 2001 with about 53 percent of the total lot area becoming available for family fishing, i.e. community fisheries.

3.2 National Poverty Reduction Strategy 2003-2005

During SEDP-II, two parallel development policies were prepared: National Poverty Reduction Strategy (NPRS) 2003-2005 and Cambodian Millennium Development Goals (CMDGs) 2003-2015. The Interim Poverty Reduction Strategy Paper (I-PRSP) was initially prepared in 1999, supported by IMF and World Bank, with the objective of serving as a condition for debt relief under the Enhance Heavily Indebted Poor Countries Initiative. This document then became the Poverty

Reduction Strategy Paper (PRSP) in 2002. Finally, Cambodia adopted this document and renamed it the National Poverty Reduction Strategy (NPRS) 2003-2005 in December 2002. Similarly to SEDP-II, the NPRS adopted the Triangular Strategy by tackling poverty alleviation through prioritising: high economic growth in the long run aiming at 6-7 percent per annum; equitable distribution of the benefits of growth and access to social and cultural services; sustainable natural resources use; and governance environment reforms.

In addition, NPRS also had similar sectoral policy guidelines to promote rural livelihoods with a range of policies including: improved access to land; agricultural development and diversification; one-village-one-product movement; water resource management and irrigation and drainage development; and infrastructure development. Agricultural development policy was designed to: (1) ensure an adequate legal framework and institutional environment; (2) strengthen capacity and improve the knowledge system of the government, stakeholders, and especially small-scale farmers; (3) promote intensification, diversification and security of agricultural production; (4) promote sustainable natural resources management and conservation; and (5) promote agricultural product processing and investment in agro-industries and strengthen the agricultural marketing system and market access.

Comparing SEDP and NPRS, the context of the policies are not significantly different and both documents refer to the same vision and strategies, incorporate most sectors in tackling poverty alleviation and elaborate on almost the same list of priority actions, the only difference being the style and structure of the documents. It was a waste of resources and time for the Cambodian government to adopt parallel national policies for the same mission, likewise for major donors like ADB and World Bank that failed to come up with a single collaborative country strategy (Shimomura & Ohno 2005).

3.3 Cambodia Millennium Development Goals 2003-2015

In parallel with SEDP-II, the Cambodian Millennium Development Goals (CMDG) 2003-2015 were also developed, prioritising poverty alleviation and human development. In addition to the eight universal MDGs, Cambodia has a ninth goal – de-mining. Among the nine CMDGs, two directly reflect the government's agricultural development and livelihood policy targets to be met by 2015. One of the two is CMDG-1 – the eradication of extreme poverty and hunger – which has the overall target of halving the proportion of the population whose income is less than the national poverty line to 19.5 percent, and whose food consumption is below the food poverty line (hunger and malnutrition) to 10 percent by 2015. Existing policies that contributed to CMDG-1 had been elaborated in SEDP-II and NPRS, the vision of both of which was to promote economic growth and poverty reduction in the long run, aiming at broad-based development through pro-poor growth, human resources development, promotion of agriculture and rural small and medium-sized enterprises, and good governance. To reach CMDG-1, three forerunning strategic frameworks were prioritised: macroeconomic environment, microeconomic environment, and social protection and risk reduction. The target set in CMDG-7 – ensure environment sustainability – is to maintain and protect forest and fisheries resources by prioritising policy to develop forestry and fisheries communities. SEDP-II and NPRS has set a clear policy for these sector reforms.

3.4 Rectangular Strategy

The Rectangular Strategy (RS) for growth, employment, equity and efficiency was the political platform for the government's third mandate (2003-2008). It was built on the achievement of the Triangular Strategy of the government's second Legislature. Key elements were selected from CMDG 2003, SEDP-II 2001-2005 and NPRS 2003-2005 through broad consultation with

national and international stakeholders. The RS is presented in a figurative form with its core good governance surrounded by four pillars of the environment in which it takes place and four strategic growth rectangles. The four strategic growth rectangles are: 1) enhancement of the agricultural sector; 2) further rehabilitation and construction of the physical infrastructure; 3) private sector development and employment; and 4) capacity building and human resource development. The enhancement of agricultural sector growth rectangle covers four priority strategic developments which were adopted from SEDP-II concepts including: 1) improving agricultural production and diversification; 2) land reform and mine clearance; 3) fishery reform; and 4) forestry reform.

In addition, some other policies that directly contribute to agricultural sector improvement and diversification have been prioritised in the growth rectangle strategy including: 1) the rehabilitation, construction, maintenance and efficient management of irrigation infrastructure, water reservoirs, canals, pipes, drainage systems, flood and water pumping stations to increase irrigated areas and boost agricultural production; 2) enhancing efficient management of the irrigation system by strengthening the institutional capacity of the relevant ministries and agencies.

Rectangular Strategy Phase II basically adopted the concepts of RS Phase I. RS-II has a long term strategy with four clear, concise priority goals to ensure: 1) sustainable peace, political stability, security and social order through specific measures to promote the rule of law, respect for human rights and dignity, and liberal multi-party democracy to create a favourable secure political environment for long-term sustainable development; 2) sustainable long-term economic growth at around 7 percent per year on a broader and more competitive economic base in the context of low, single-digit inflation, stable exchange rate and steady increase in international reserves; 3) equitable distribution of opportunities and the benefits of economic growth; 4) environmental sustainability, especially through sustainable management and use of natural resources. Agricultural and rural development policies to help in promoting rural livelihood and poverty reduction remain top priority. In addition, promotion of the “one village-one product” initiative has been prioritised by RS-II, encouraging entrepreneurship, agricultural diversification and self-confidence in rural areas.

3.5 National Strategic Development Plan

The National Development Strategic Plan (NSDP) 2006-2010 was developed in 2005 and implementation started in 2006. NSDP is a new and comprehensive planning approach that focuses on strategic goals and actions with emphasis on the results to be achieved, rather than merely on inputs, activities and processes as in the previous approach. The priority goals and strategies of NSDP are the rapid reduction of poverty and the achievement of the CMDG and socio-economic development goals for the benefit of all Cambodians. The NSDP is organised sector-wise, not ministry-wise, and more detailed goals and sub-goals for each sector will be developed by the government ministry or agency responsible for the policy implementation and monitoring of each sector.

Therefore, the NSDP is a practical, result-oriented implementation tool and provides the road map and guidelines for taking the country from its situation in 2006 to reach specific high priority national targets by 2010. The strategic plan for the key sector of agriculture (which adopted the Rectangular Strategy concept) set out the framework for improving and diversifying the agricultural sector (including nutrition and rural development), land reform and mine clearance, and fisheries and forestry reform. In response, the NSPD highlighted the need for detailed strategic planning by line ministries. The agricultural sector strategic development plan, the strategy for agriculture and water, household food security and nutrition, and the strategic development plan for water

resources, to mention but a few, have been developed to promote agricultural growth, food security and poverty alleviation (please see Section 3.7). NSDP 2009-2013 was updated from NSDP 2006-2010 with no significant changes and the strategic goals and frameworks of the previous plan were adopted in an attempt to reach the CMDGs and realise the vision of socio-economic development.

3.6 Policy Document on Promotion of Paddy Rice Production and Export of Milled Rice

The government launched a policy document on the promotion of paddy rice production and export of milled rice on 17 August 2010. This policy is a further refinement of the major strategic policy measures to promote agricultural development, with emphasis on a new pace and scale to further strengthen the foundations for economic growth, accelerate poverty reduction, and improve the living standards of the Cambodian people. To realise the vision of agricultural development, the government has adopted a three pronged-strategy – productivity enhancement, diversification and agricultural commercialisation (from subsistence to commercial agriculture) through implementing a package of interrelated measures: 1) infrastructure building and enhancement (roads, irrigation, energy/electricity, information and communication technologies (ICT); 2) improvement in the provision of extension services and agricultural inputs; 3) land management reform; 4) finance; 5) marketing; 6) farmer organisation; and 7) institution building and coordination.

In order to achieve the vision of transforming Cambodia into a “rice basket” and a major milled rice exporting country in the global market, the government has set 2015 as the target year to: 1) achieve paddy rice surplus of more than 4 million tonnes and milled rice export of at least 1 million tonnes; and 2) ensure the international recognition of Cambodian rice. To reach these goals, the government will adhere to the following key principle policy measures, each of which consist of quick win and medium to long-term gain, namely: i) paddy rice production, ii) paddy rice collection and processing, iii) logistics, and iv) marketing.

Table 4: Government Recurrent Expenditure for Some Selected Sectors (in billion riels)

Expenditure by sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009a	2010a
Total expenditure (current)	1,109	1,216	1,416	1,575	1,758	1,746	1,968	2,355	2,974	3,636	4,361	5,029
Defense and security	47.5	455.0	417.3	406.8	411.0	422.8	451.2	520.2	615.9	789.9	895.9	1150.5
Health	76.3	121.0	129.7	164.4	173.0	192.1	224.6	260.8	343.3	372.9	503.8	600.1
Education	166.8	183.2	209.2	289.7	300.5	325.9	350.8	445.6	491.4	506.1	742.5	824.9
Agriculture	24.0	26.0	30.5	39.7	39.0	38.6	47.1	55.9	57.7	63.2	77.0	87.5
Rural development	12.0	7.5	12.4	18.4	16.9	16.6	22.1	30.0	34.8	48.0	63.8	83.2
<i>Share of Agricultural budget</i>												
Share of agri. to total expt.	2.16	2.30	2.15	2.52	2.22	2.21	2.39	2.37	1.94	1.74	1.77	1.74
Share with agri. GDP	0.47	0.51	0.58	0.78	0.69	0.69	0.73	0.82	0.80	0.83	-	-

Sources: Key Indicators for Asia and the Pacific 2009, ADB (www.adb.org/statistics/cambodia)

a: National Expenditure Budget Law 2009 and 2010

With regard to these policy measures that tackle constraints in the sector ranging from production to the fragmented coordination within government ministries for rice export and trading, this rice policy reflects sound government thinking and clear understanding of the rice value chain. This policy also pinpoints that inter-ministerial roles and coordination between ministries are critical for speeding up the export process and encouraging private investment in the rice sector to meet the CMDG goal of milled rice export of at least one million tonnes by 2015. However, on the downside,

though the government has a good policy at national level, how it will be actioned in practice is a matter for discussion. For instance, the government has had a good and sound vision of promoting the agricultural sector to strengthen the foundations of and diversify economic growth since the implementation of RS-I, but the allocation of its budget for this sector has been very low, just below 2 percent of the total budget or less than 1 percent of agricultural GDP per annum (Table 4). It would be interesting to discuss how to increase the allocation of national budget to the agricultural sector which contributed 27.5 percent of GDP in 2008.

3.7 National Water Resource Policy

The government developed a national water resources policy for Cambodia in 2004. To ensure the effective, sustainable, wise and equitable use of water resources, this policy has broad goals and objectives to: 1) provide access for all to safe, adequate, and affordable drinking water; 2) provide sufficient water for agriculture, industry and economic activities; 3) tackle and minimise for all the threat of loss of life and livelihood as a result of water related hazards and 4) manage the water resource environment to avoid pollution. This policy also addresses the importance of water for improving the agricultural sector. To ensure the provision of sufficient water for improving agricultural production and productivity, the government has set priority policies as follows: 1) provide enough water for farmers within the limits of available water resources and technology; 2) promote the rehabilitation and construction of irrigation, drainage, and flood management infrastructure to provide sufficient water for agricultural production and to alleviate the adverse consequences of excess water; 3) promote the development and extension of appropriate water management technologies in rain-fed agricultural areas; 4) strengthen and expand participation in Farmer Water User Communities to manage and maintain irrigation infrastructure with effectiveness and sustainability; and 5) minimise the impact of agricultural chemicals on water resources by encouraging people to diversify agricultural production.

3.8 Sectoral Development Policies

3.8.1 Strategy for Agriculture and Water

MAFF and MOWRAM jointly developed a Strategy for Agricultural and Water (SAW) 2006-2010 which was completed in 2007. It is a detailed sector strategy required by the NSDP 2006-2010. The goal of this strategy is “to contribute to poverty reduction, food security and economic growth through enhancing agricultural productivity and diversification and improving water resources development and management”. To achieve this goal, it is important to focus on: 1) increasing food security and income of rural communities and households; 2) reducing vulnerability of rural communities and households; 3) increasing surpluses of agricultural products for processing and export; and 4) sustainable management and development of the nation’s land and water resources.

SAW encompasses five broad programmes: 1) institutional capacity building and management support programme for agriculture and water resources; 2) food security support programme; 3) agricultural and agri-business (value-chain) support programme; 4) water resources, irrigation management and land programme; and 5) agricultural and water resources research, education and extension programme. With these broad programmes, SAW is trying to achieve its long term vision i.e. “to ensure enough, safe and accessible food and water for all people, reduce poverty, and contribute to economic growth while ensuring the sustainability of natural resources”. SAW 2009-2013 was updated and targeted outcomes will be renewed by 2013 in accordance with NSDP 2009-2013. All programmes and its framework and concepts were adopted from the previous SAW 2006-2010.

3.8.2 Agricultural Sector Strategic Development Plan 2006-2010

Agricultural Sector Strategic Development Plan 2006-2010 was developed by MAFF in October 2005 in response to the needs of NSDP 2006-2010 by adopting RS-I concepts. This strategy was used as one of the major inputs for SAW 2006-2010. The main objectives of agricultural sector strategy are “to ensure food security, increase incomes, create employment and improve nutrition status for all people by improving the productivity and diversification and commercialisation of agriculture with regard for sound environmental protection and food safety”. To reach this goal, this strategy has defined seven priority programmes: 1) food security, productivity and diversification; 2) improve and strengthen agricultural research and extension systems; 3) market access for agricultural products; 4) institutional and legislative development framework; 5) land reform, which consists of land tenure and land market development and pro- land access; 6) fisheries reform – sustainable access; and 7) forestry reform by promoting conservation and management of sustainable forests and ensuring better management of protected areas. The first four programmes for this strategic plan have been incorporated into SAW 2006-2010, and the last three reform programmes have been directly implemented by MAFF.

3.8.3 Strategic Development Plan on Water Resources and Meteorology 2009-2013

Similarly to MAFF, MOWRAM has developed its strategic development plan in response to the need of NSDP. This plan presents the goals, objectives and activities of MOWRAM to be reached by 2013. The most important goal of MOWRAM that contributes to agricultural development is to increase irrigation system capacity by 1 percent equal to 25,000 ha each year and to expand irrigation coverage to 1.24 million ha by 2013. This strategic development plan was used to update SAW 2009-2013, and provide useful inputs for updating NSDP 2009-2013.

3.8.4 Other Related Agricultural and Food Security Policies

Circular No. 3 on Food Security and Nutrition in the Kingdom of Cambodia (RGC 2003)

The government adopted and circulated the Circular on Food Security and Nutrition in Cambodia in 2003. This circular aimed to effectively improve food security and nutrition in Cambodia and thereby alleviate poverty. To achieve this objective, the government recommended that line ministries, involved departments, and stakeholders: 1) conduct regular studies to identify drought zones and provide the mechanisms for appropriate and sustainable resolutions focusing on the provision and distribution of rice seeds, strengthening of irrigation systems, and the provision of pumps, pesticides and other agricultural materials to farmers; 2) develop mechanisms for encouraging household vegetable gardening, crop diversification, and animal raising for farming and additional incomes; 3) focus on the rehabilitation and construction of large-scale irrigation systems and small-scale irrigation systems for communities and families by requesting support from national and international organisations. The Council for Agriculture and Rural Development was responsible for coordinating the implementation of this food security and nutrition policy.

Statement of the royal government of Cambodia on the National Fishery Sector Policy

The government released the Statement on the National Fisheries Sector Policy in June 2005 towards the end of SEDP-II, and NSDP captured this national fisheries sector policy including fisheries reform. MAFF further developed the National Fisheries Sector Policy and Law on Fisheries in 2006, and adopted this policy framework, the vision of which is “management, conservation, and development of sustainable fisheries resources to contribute to ensuring people’s food security and to socioeconomic development in order to enhance people’s livelihoods and the nation’s prosperity”.

In order to achieve this vision, the government recommended seven broad policies namely: 1) management and development of the fisheries sector; 2) management of community and family fisheries; 3) management and development of aquaculture; 4) management and development of fish processing; 5) conservation of fisheries resources; 6) development of fisheries institutions and their infrastructure; and 7) budget and fisheries infrastructure.

National Programme for Household Food Security and Poverty Reduction 2007-2011

MAFF developed the National Programme for Household Food Security and Poverty Reduction 2007-2011. This programme forms part of the implementation of the NSDP, specifically its aims “on poverty reduction and removal of disparities and reduction in gaps between regions as well as between the haves and have-nots”. The implementation of this programme will significantly and directly contribute to the fulfillment of CMDG-1 i.e. the eradication of extreme poverty and hunger, and its target by 2015. The objective of the programme is to improve food security for about 2 million of the poorest Cambodians. To achieve this objective, the programme will focus on: 1) increased and improved food intake by food insecure people; 2) improved basic health of food insecure and vulnerable people; 3) strengthened food security safety nets and empowered community organisations; 4) empowerment of food insecure women; and 5) improved policies on food security. This programme is coordinated nationally by MAFF with the involvement of all stakeholders (donors, NGOs, ministries, and community members). This programme serves as a useful framework for a number of NGOs that are implementing projects in Cambodia, such as LWF, CARE, CONCERN, GTZ, IDE, GRET, to name a few.

Strategic Framework for Food Security and Nutrition in Cambodia 2008-2012

The Strategic Framework for Food Security and Nutrition (SFFSN) 2008-2012 is a document focusing on the cross-cutting issue of food security and nutrition in Cambodia. It was developed by CARD in consultation with TWG-FSN in 2007. This strategic reference is reflected in the priority national framework in the RS, NSPD 2006-2010 and CMDGs on improving food security and nutrition in Cambodia. The SFFSN goal is “By 2012, poor and food-insecure Cambodians will have substantially improved physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food reference for an active and healthy life”. Among the five broad based strategic objectives and priority actions to reach this goal, the strategic plan related to agricultural development is for “Food insecure households to increase food availability from their own agriculture and livestock production and from common property forest and fisheries resources”. This priority action focuses on four areas: 1) improving productivity and diversification of agriculture; 2) improving the management of water resources and irrigation; 3) enhancing fisheries reforms; and 4) enhancing forestry reforms. However, this strategic framework does not mention clearly how to further develop sector strategies that can be implemented and coordinated. The above mentioned priority actions were already included in the SAW 2006-2010, the Agricultural Sector Strategic Development Plan 2006-2010 and the National Programme for Household Food Security and Poverty Reduction 2007-2011 of MAFF development framework. In addition, this strategic framework was developed after the above policy frameworks had already been put in place for implementation, and specifically focused on improving agricultural development, improving food security and poverty reduction by similarly adopting the concepts of the RS, NSDP, NPRS and CMDGs. It seems a waste of resources and time for government institutions to be working on overlapping policy frameworks.

Gender Policy and Strategy in Agriculture

MAFF developed a gender policy for the agricultural sector in 2006, with respect to NSDP and RS-I. The policy statement is “Enhancement of gender equality in the agricultural sector through active cooperation of both women and men the opportunity to contribute and benefit equally from the activities of all sub-sectors in the agricultural sector” with the reference to the RS of RGC.

This gender policy provides a basic gender mainstreaming and a holistic approach to agricultural sector and coordination. To meet the above policy statement, MAFF has set four strategic objectives to be achieved by 2010: 1) increased gender awareness of MAFF ministry staff at every level of the agricultural sector; 2) integration of gender analysis and sex disaggregation targets and data into agricultural sector planning; 3) increase management opportunities and the number of women that have adequate skills and qualities for a leadership role in MAFF; and 4) increase the ability of rural women to access and manage resources and agricultural services.

Government policy to promote investment for agricultural development

The Law on Investment (5 Aug 1994), Amendment on the Law on Investment (23 March 2003), the Sub-Decree on Mortgage and Transfer of the Right over an Economic land Concession (29 Aug 2007), and Royal Decree NS/RK/0609/009 (20 June 2009) provide incentives for agricultural development in Cambodia. These include: 1) zero tariffs on importing agricultural materials (seeds, fertilisers, pesticides, and agricultural equipment); 2) profit tax exemption for qualified investment projects (QIP) in agriculture and agro-industry for a total of 9 years (trigger period 3 years, grace period 3 years and priority period 3 years). The government is planning to provide incentives for investment in processing facilities, milled rice exports and irrigation. A sub-decree on contract farming is being drafted and will serve as a tool to attract more investors to work with small farmers and contribute to improved rural livelihoods (Sok 2010).

National Adaptation Programme of Action to Climate Change

Climate change has become a real challenge for all countries throughout the world. The government of Cambodia clearly recognises this issue and is fully committed to global efforts to address climate change. The National Adaptation Programme of Action (NAPA) was developed by MoE in 2006 in accordance with priorities set by the government. The goal of NAPA is to provide a framework to guide the coordination and implementation of adaptation initiatives with relevant environment and development programmes in Cambodia. The objectives of the programme are: (1) to understand the main characteristics of climate hazards in Cambodia (flood, drought, windstorm, high tide, salt water intrusion and malaria); (2) to understand coping mechanisms to climate hazards and climate change at grassroots level; (3) to understand existing programmes and institutional arrangements for addressing climate hazards and climate change; (4) to identify and prioritise adaptation activities to climate hazards and climate change. The Cambodia NAPA supports the government’s development objectives as outlined in RS-I and NSDP 2006-2010, stressing the need to improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural calamities. Specific sectoral policy and action for agricultural development, food security and irrigation expansion and management has been prioritised in SAW 2006-2010 and SAW 2009-2013. However, very few studies focus on the socioeconomic effects of climate change on the agricultural sector and policy measures to reduce vulnerability to climate change.

4. Existing Policy Research on Cambodia's Agriculture

There are public and independent policy research institutes in Cambodia focusing on agricultural development. The major national agricultural research systems (NARS) headed by MAFF that address the challenges to agricultural development are as follows:

- CARDI: Cambodian Agricultural Research and Development Institute for crops research (a semi-autonomous institute).
- CRRI: Cambodian Rubber Research Institute for research in rubber.
- NAHPIC: National Animal Health and Production Investigation Centre for livestock research under the Department of Animal Health and Production (DAHP).
- FWSRI: Forest and Wildlife Science Research Institute for forestry research under the Forest Administration (FA).
- IFReDI: Inland Fisheries Research and Development Institute for fisheries research under the Fisheries Administration (FiA).

These research institutes mainly focus on techniques to improve productivity rather than on policy research¹⁰ (MAFF 2005b). The Supreme National Economic Council (SNEC) is the only government think-tank research institute that focuses on many aspects of policy research and policy formulations for the government. The Mekong River Committee (MRC) and the Royal University of Agriculture (RUA) have also conducted research on water resources management, agricultural development, and rural livelihoods. However, access to these public research findings in the public domain is really limited for most public research institutes.

Few independent research institutes are focusing on policy research in Cambodia. The major policy institutes include: CDRI – on governance, natural resource management, economic aspect, poverty, agriculture and rural development, and social development; the WorldFish Centre – on fisheries research, mainly inland fisheries; the Learning Institute (CBNRM-LI) – on natural resource management of the forestry sector; NGO Forum – on land conflict issues; the Economic Institute of Cambodia (EIC) and the Cambodia Institute of Development Studies (SIDS) – on economic development in Cambodia, not agricultural policy research.

Besides public and independent research institutes, other development partners are also involved in policy research in collaboration with local research institutes or through hired consultants. These include: ADB – on agriculture development and food security around the Tonle Sap Lake; AusAID/ACIAR/CAVAC on crop improvement and agricultural value chain; World Bank – on rural livelihood and poverty (less focus on agricultural development as indicated in its priority programme); FAO – on agriculture, food security and livestock; and USAID – on improving micro, small and medium enterprises in the agricultural sector. Some of these research findings are accessible on the internet, but access to some research findings is limited, especially new research initiatives.

10 The Master Plan for National Agricultural Research was developed by MAFF in 2005. This plan took over 12 months to complete, through consultation with stakeholders using SWOT. The plan serves as a framework and guidance for the national agricultural research systems (NARS) for the period 2006-2015. MAFF prioritises six research institutes to conduct research addressing the weakness of the sectors through SWOT, including crops, livestock, fisheries, forestry, rubber and agro-industry. The NARI consists of CARDI, CRRI, NAHPIC, FWSRI, IFReDI and DAI (Department of Agro-Industry for improvement of agro-industry sector).

Due to time limitation and difficulty accessing available policy research in the public domain, this section only reviews existing policy research related specifically and directly to agricultural sector development. Thorough review of existing policy research could allow us to identify knowledge gaps for future research to improve agricultural sector development and food security, so contributing to economic growth and poverty alleviation. (It should be noted that this section is only the first draft, and will be further improved based on comments from the round table discussion in November 2010 and access to wider literature.) Existing policy research on Cambodian agriculture is classified according to relevant themes as follows:

4.1 Irrigation and Water Management Research in Agriculture

Through available research on water irrigation related to agricultural development, CDRI has conducted both literature reviews and empirical research covering governance, physical infrastructure and the economics of water resource management, including some pilot studies. These studies include: framing research on water resources management in Cambodia¹¹; empirical evidence on the issues and challenges of irrigation management in the Tonle Sap Basin¹²; local governance of water resource management in Cambodia¹³; the problems, conflicts and solutions of irrigation water use for both wet and dry season rice in southern Cambodia¹⁴; and farmer participation in Farmer Water User Community (FWUC) and irrigation system management in Cambodia¹⁵. In brief, these studies found the main governance issues to be weak leadership, weak institutions, and lack of law enforcement for almost of the schemes. For effective irrigation scheme management, coordination between farmers, between farmers and FWUCs, and between FWUCs needs to be strengthened, and these users need to operate inline with all relevant agencies. Most of the existing schemes are inappropriately designed, resulting in water scarcity. Imbalance of water allocation between upper and downstream water user communities often leads to conflict. Sometimes, conflict also occurs due to competition between different types of water use, for instance, between fishers and rice farmers. Conflict resolutions need to be well coordinated within the water user communities, and sometimes need intervention from provincial and national authorities. Good lessons learned from successful water use and irrigation management were FWUC members' participation in the payment of irrigation fees, maintenance and ownership of irrigation schemes, and water distribution.

The Mekong River Commission (MRC) and public institutes have also been involved in research on water management and the role of water in agricultural development. An MRC study on improvement of water irrigation in paddy fields in the lower Mekong Basin¹⁶ tried to estimate the efficiency of water use. It was found that the overall command area efficiency received only 72.4 percent for dry and 86.3 percent for the wet season. These values did not reach the height efficiency due to insufficient infrastructure. The Technical Working Group of Agricultural and Water Strategy

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- 11 CDRI 2008, Framing Research on Water Resources Management and Governance in Cambodia: A Literature Review, CDRI WP 37
 - 12 CDRI 2010a, Empirical Evidence of Irrigation Management in the Tonle Sap Basin: Issues and Challenges, CDRI WP 48
 - 13 CDRI 2010b, The Local Governance of Common Pool Resources: The Case of Irrigation Water in Cambodia, CDRI WP 47
 - 14 Thun V. 2008, Irrigation Water Use in Takeo Province: Problems, Conflicts and Solutions, ADR 2007/08, CDRI, Phnom Penh
 - 15 Ros B. 2010, Farmer Participation and the Success of Farmer-managed Irrigation Systems: A Case Study of the O-treng Farmer Water User Community, Kampong Speu Province, ADR 2009/2010, CDRI, Phnom Penh
 - 16 MRC 2008, Improvement of Irrigation Efficiency on Paddy Fields in the Lower Mekong Basin: Field Observations and Data Analysis for Improvement of Irrigation Efficiency on Paddy Fields at Kamping Pouy Irrigation System in Battambang Province; and Mekong River Committee (MRC) 2009, MRC's Role in Agriculture and Agriculture Water Management, Strategy Paper

(TWGAW) conducted a review of experiences on modes of intervention and lessons learned from the Participatory Irrigation Management and Development (PIMD) programme in Cambodia¹⁷. This study was used to contribute to the effective design of the irrigation programme in the middle-term of SAW. Currently, an empirical study on the benefits of water irrigation in agricultural production i.e. a cost and benefit analysis of water irrigation in Cambodia, mainly for rice cultivation is being estimated by CDRI, with support from AusAID.

These indicate some research is being done on surface water irrigation management issues; however, there is a lack of knowledge related to ground water in irrigation research and its long term impacts on agricultural land and productivity in Cambodia. Ground water can be used as a mitigation strategy against the future impact of climate change on agricultural production and food security in the long run. Some rice production areas have already started using shallow ground water for irrigation in both dry and wet seasons to mitigate drought; long term use of shallow ground water can have a negative impact on agricultural land due to the high content of calcium carbonate (CaCO₃). No research on the benefits and drawbacks of ground water use in Cambodia is available.

4.2 Agricultural Trade Research

There are some studies on trade between Cambodia and ASEAN countries, and ASEAN with China. Research on livestock trade, conducted by CDRI in 2007¹⁸, found that cross-border trade can help stabilise market prices and find broader markets for livestock. It was noted that cattle and buffalo trading from Cambodia to Thailand and Vietnam was mostly informal. The un-regulated trade or importing of pigs from Thailand and Vietnam into Cambodia was studied by USAID and FAO in 2008¹⁹. Its impact on the local pig raising sector and trans-boundary disease control was also captured in this study.

The Early Harvest Programme: Implications for Cambodian Agriculture²⁰ is a CDRI study to investigate the benefit of ASEAN-China Free Trade Agreement. It was found that this agreement provides advantages and economic benefits to all member countries through increasing trade in agricultural products, economic efficiency and investment cooperation. However, Cambodia has less benefits from ASEAN-China FTA, because Cambodia's agricultural products (cassava, rubber, maize and soybeans) are mostly traded with Thailand or Vietnam, not directly with China; two research papers^{21,22} also confirm this argument.

Rice and rubber are the main crop sub-sectors for Cambodia, and have potential for export to the world market. Cambodia was also a member of WTO, but there is little research addressing trade of these crops in the region and world market. We found some research about Cambodia's rice export promotion in post-WTO accession²³; unfortunately we could not access this paper to understand more about Cambodia's rice trading (please see Section 4.4 for further details on the rice sector)

17 TWGAW 2006, Review of Experiences: Modes of Intervention, Results and Lessons Learned, the report of TWGAW on Participatory Irrigation Management and Development (PIMD) in Cambodia

18 Ballard B. & Vathana T. 2007, Livestock Production and Veterinary Services in Cambodia, ADR 2006/07, CDRI, Phnom Penh

19 USAID and FAO 2008, Swine Marketing in Cambodia: Reducing Market Distortions, Improving Competitiveness, and Ensuring Safe Trade

20 Hing V. & Nou K. 2006, Early Harvest Programme: Implication for Cambodian Agriculture

21 Hing V. & Thun V. 2009, Agricultural Trade in the Greater Mekong Sub-Region: The Case of Cassava and Rubber in Cambodia, CDRI WP 43

22 Fitzgerald R. & Spriggs J. 2009, Improving the Marketing System for Maize and Soybeans in Cambodia

23 Bonnavoit C., Viseth K., Sophal Y. 2007, Cambodia's Rice Export Promotion in Post-WTO Accession

and Cambodia's rubber trade competitiveness in the GMS²⁴. Cambodia's rubber crop is a potential agricultural product for export and trade in the GMS markets. However, competitiveness of the rubber sector is low compared with other countries in the region owing to low technology and low productivity, high wage labour costs, high transport costs, and high processing costs due to high electricity tariff. The performance of the rubber sector could be improved if production techniques, market access, cost of electricity, and long term financing to producers could be improved.

4.3 Agricultural Development, Poverty and Food Security

Rural livelihood and food security

As the major food consumed by Cambodian people, rice provides two thirds of household total calorie intake.^{25,26} Maize is a secondary food crop accounting for 7 percent of total calorie intake. Meat and fish consumption remains limited. Mapping of food security and nutrition in Cambodia has identified that nine provinces have experienced severe food insecurity²⁷: Ratanakiri, Mondulakiri, Preah Vihear, Kampong Speu, Oddor Meanchey, Svay Rieng, Siem Reap, Prey Veng and Pursat. High levels of mortality, underweight, stunting, and wasting have been found in the five provinces of Siem Reap, Prey Veng, Ratanakiri, Mondulakiri, and Preah Vihear. Provinces that experienced a moderate degree of food insecurity were Kampong Thom, Takeo, Stung Treng, Kratie, Kampong Cham and Kandal. However, this research was done in 2007; the situation may well have changed since then but we do not have recent or updated figures on these indicators.

There is rich research on the relationship between economic growth and food security and poverty in Cambodia, including the use of cross-section^{28,29} and panel data analysis^{30,31,32} and qualitative methods^{33,34}. In general, the research findings reveal that the poverty reduction over the past decade is unlikely to have been connected with economic growth³⁵, and that economic growth is not inclusive. Poverty and food insecurity remain high in rural areas. Land ownership issue remains the significant determinant of poverty and food insecurity for Cambodian rural households. Large households with a high number of dependent members, poor education and health are the major internal determinants of poverty in rural communities. Poor access to public services – education, health, vocational training, lack of access to credit, and poor infrastructure (road and irrigation) are the external determinants of rural poverty. The agricultural sector is found to be the important

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- 24 Saing Chan Hang 2009, Export Competitiveness of the Cambodian Rubber Sector Relative to Other Greater Mekong Sub-region Suppliers: A simple Descriptive Analysis, ARTNeT, GMS Initiative Discussion Paper Series, No. 1
 - 25 Murshid K. 1998, Food Security in an Asian Transitional Economy: The Cambodian Experience, CDRI WP 6
 - 26 FAO 2010, Ranking the Food Security Crops, Chapter 2 in Household Level Impacts of Increasing Food Price in Cambodia available at www.fao.org/docrep/012/i1664e/i1664e.pdf (accessed ddmmyy)
 - 27 FAO 2007, Mapping of Food Security and Nutrition (FSN) situation and On-going Field Agent efforts in Cambodia
 - 28 Engvall A., Sjöberg Ö. & Sjöholm F. 2007, Poverty in Rural Cambodia: The Differentiated Impact of Linkages, Inputs and Access to Land, Research Institute of Industrial Economics, IFN Working Paper No. 706
 - 29 Koy Ra & Em Sorany. 2009, Building Community Capacity for Poverty Reduction Initiatives in the Tonle Sap Basin, CDR, Volume 13 (1), CDRI, Phnom Penh
 - 30 Chan S. & Sarthi A. 2002, Facing the Challenge of Rural Livelihoods: A Perspective from Nine Villages in Cambodia, CDRI WP 25
 - 31 Fitzgerald, I. & So, S. 2007, Moving Out of Poverty Study? Trends in Community Well-Being and Household Mobility in Nine Cambodian Villages
 - 32 So, S.; Tong K. & Theng V. (forthcoming), Poverty Dynamic Study, CDRI report for the World Bank on Longitudinal Poverty Study in Cambodia
 - 33 Kim S., Chan S. & Sarthi A. 2002, Land, Rural Livelihoods and Food Security in Cambodia: A Perspective from Field Reconnaissance, CDRI WP 24
 - 34 Ballard B., Christian S., David W.; Fitzgerald I., Murshid K.A.S, Hansen K., Phim R. & Lim S. 2007, We are Living with Worry All the time: A Participatory Poverty Assessment of the Tonle Sap, CDRI, Phnom Penh
 - 35 Economic growth was 8.5 percent in real terms between 1994 and 2008, but poverty reduced 1-1.5 percent per annum. This picture suggests that Cambodia's high growth economy was not necessarily pro-poor; and that economic growth may not be a sufficient condition for poverty alleviation (CDRI Poverty Dynamic Study, forthcoming).

factor contributing to improved livelihoods and food security in rural areas, while common property resources and wage labour opportunities serve as critical safety nets for the poor. As indicated above, rice is a major staple food for Cambodians, but rice production faces many constraints (see Section 4.4) and though these constraints have been identified for decades, they remain unresolved. The number of landless households is markedly increasing from year to year, due to new family creation and land market. The challenges and interaction between landlessness and food insecurity with social protection and vulnerability remain unknown.

Fisheries sub-sector researches

There are some research studies on Cambodia's inland fisheries, especially Tonle Sap Lake. Two policy studies address fisheries policy reform and co-management of fisheries communities^{36,37}. The co-management tool is new to Cambodia's fisheries sector, and this government strategy aims to achieve sustainable and equitable use and management of fisheries resources. However, the finding highlighted that the performance and sustainability of co-management are constrained due to a lack of clearly defined property rights and resource boundaries and the absence of enabling legislation. Another study by CDRI also confirms this issue, and that it leads to conflict among communities. Conflicts also occur due to competition for resource use between fisheries and farming; many conflicts remain unresolved. The poor have not yet benefited from access to fishing grounds³⁸. Some of the fisheries community conflicts can be resolved locally with support from higher institutions. Socio-economic assessment of small-scale inland fishing in the lower Mekong Basin pointed out that the average net income of a small fishing family was USD12 per trip in the open season and USD4.6 in the closed season³⁹. However, when family labour is deducted from the net income, the real profit was only USD4.5 per trip in the open and USD1.6 in the closed season. The government of Cambodia, with support from Sida, has conducted a study on the assessment of development challenges facing the Great Lake⁴⁰. This study tried to assess the effect of hydrology changes and fisheries in Tonle Sap, sedimentation and risks, agricultural development around the Great Lake, and the management of fisheries communities in the Tonle Sap.

Many studies address inland fisheries issues, but there is no study on marine fisheries yet, except for an FAO assisted project which is assessing the baseline study of fisheries communities in coastal areas of Cambodia. The level of the Mekong River is now 3 to 4 metres lower than it used to be due to dam construction upstream; this will have a negative impact on inland fisheries in Cambodia. We have no knowledge about the effect of lower Mekong River levels on inland fisheries population, fish breeding, habitats and food security in Cambodia.

36 Somony T. 2002, Fisheries Policy Reforms and the Current Perspective about Community Fisheries and Co-management of Fisheries: A Case Study of Selected LotAareas in Siem Reap and Battambang

37 Viner K., Ahmed M., Bjørndal T., Lorenzen K. 2006, Development of Fisheries Co-management in Cambodia: A case Study and its Implications, WorldFish Centre, Discussion Series No. 2

38 So, S., Blake D. R., Mam K., & Kim S. (forthcoming), Conflict and Collective Action in Tonle Sap Fisheries: Adapting Institutions to Support Community Livelihoods, CDRI WP

39 Hap N. & Bhattarai M. 2009, Economics and Livelihoods of Small-scale Inland Fisheries in the Lower Mekong Basin: A Survey of Three Communities in Cambodia., *Water Policy 11 Supplement 1 (2009) 31–5*

40 Chadwick M. Juntopas M. & Sithirith M. 2008, Sustainable Tonle Sap: An assessment of Development Challenges Facing the Great Lake, The Sustainable Mekong Research Network, funded by Sida

Livestock sub-sector research

Government policy on the livestock sector has no clear direction⁴¹; this sector also has no long term strategic plan to guide research and development⁴². Livestock sector plays an important role in food security and draught power for agricultural production. Cattle and buffaloes are used for draft power in production and for meat consumption. Pigs and chickens are raised for saving and consumption⁴³. Pigs and chickens are actively traded within and between rural villages. Cattle and buffalo trade is mostly done informally with neighbouring countries. There is no recent policy research available for the livestock sector, with the exception of research being conducted by CelAgrid on animal feeding (mainly for pigs). Therefore, there is an urgent need for research to improve the development of this sector; the socio-economic study of livestock should be prioritised.

Agricultural development support programmes

This sub-section reviews the development partners who are supporting the development of Cambodia's agricultural sector. In response to the government's identification of the agricultural sector as driving force for economic growth and poverty reduction, MAFF and development partners (WB, CIDA and GTZ) conducted an agrarian structure study in 2005⁴⁴ to evaluate the agricultural sector in order to determine a strategic approach for agricultural development and land management. This extensive study covered agricultural production systems and land use and management across Cambodia⁴⁵. It also focused on value chains, enterprise models and cost and benefits analysis, but did not focus in detail on the livestock sector.

Supporting the Cambodian agricultural development strategy, AusAID conducted a diagnostic study in 2006⁴⁶ aiming to determine the potential values and the feasibility of different programme activities to be implemented over 2007 to 2012.^{47,48} AusAID's major agricultural development support programmes included value chain development and policy, capacity and management programmes. Activities supported in value chain development are technology transfer, market and value chain linkages, irrigation management and infrastructure and market infrastructure. The target areas of AusAID programmes are in southern Cambodia, and mainly focus on rice-based farming systems.

ADB is assisting agricultural development programmes in the Tonle Sap area including agricultural and rural development (ARD) policy and sector management, rural infrastructure, irrigation, and rural development pilot projects. ADB has conducted an assessment of its assistance to ARD in Cambodia over 1995 to 2008; its loans and grants for technical support of projects/programme total USD 240.7 millions. The evaluation study provides constructive guidance for prioritising, designing and implementing ADB's future technical support and lending operations in this

41 Sophal Ear 2005, The Political Economy of Pro-poor Livestock Policy in Cambodia, PPLPI WP No. 26 FAO Pro-Poor Livestock Policy Initiative

42 FAO is assisting the Department of Animal Health and Production to develop a long term strategic plan which will be finalised within 2010.

43 FAO 2004, Review of the Livestock Sector in the Mekong Countries Livestock Sector Report: Cambodia-Lao-Thailand-Vietnam

44 This agrarian study served as a very important input for designing the Strategy for Agriculture and Water (SAW)

45 ACI 2005, Cambodian Agrarian Structure Study, report prepared by Agrifood Consulting International for MAFF, supported by World Bank, CIDA & GTZ

46 This diagnostic study served as a useful input for designing the Strategy for Agriculture and Water (SAW)

47 ACI 2006a, Diagnostic Study, Phase 1 of Design, Agricultural Programme, Cambodia (2007-2012), programme concept note prepared by Agrifood Consulting International and CamConsult for AusAID

48 ACI 2006b, Cambodia Agriculture Sector Diagnostic Report, diagnostic study prepared by Agrifood Consulting International and CamConsult for AusAID

sector^{49,50}. Future ADB assisted programmes will focus on rural road and irrigation infrastructure, water supply, rural microfinance, land tenure, and strengthening institutional capacity. ADB plans to expand its activities to other areas in Cambodia, learning from its past successful programmes in the Tonle Sap Lake basin.

USAID provided funding to implement micro, small and medium enterprise (MSME) project on pig, fish and agriculture machinery sub-sector value chains in the southern part of the country^{51,52}. In summary, the assessment found that the project has had major impacts on improving the productivity and business performance of these enterprises, with wider beneficial impacts at the value chain level. However, not all targets could be achieved in a short three year period and not all potential benefits of project assistance could be fully exploited. The results from this assessment could be built on to add further value to these enterprises and value chains in the future.

4.4 Rice Sub-sector Research

There are some policy studies that focus on rice sector improvement and rice export promotion as the sector holds high potential for Cambodian economic development. Rice has new promising export potential for Cambodia⁵³; the promotion of agro-processing and agribusiness will strengthen the sector for export to the world market⁵⁴. The current capacity of rice milling in Cambodia is low (less than 10 tonnes per hour) and can only mill one third of the paddy produced in the country; Cambodia needs to increase its milling capacity three fold to meet domestic milling demand⁵⁵. Rice crop has huge potential for increased productivity by improving cultivation techniques and investing in inputs – improved seeds, fertiliser and irrigation⁵⁶. However, the future potential of growth in the rice sector is uncertain, as there are many constraints, for instance low inputs – lack of credit, irrigation, improved seed, poor extension services and rural roads⁵⁷. ACIAR/CAVAC is working on improving rice establishment methods to increase productivity by introducing mechanisation and appropriate inputs use⁵⁸. The rice value chain and rice contract farming have also been studied within Cambodia^{59,60,61}, but knowledge of Cambodian milled rice value chain link with the international market has yet to be established (RGC 2010b). (For comprehensive details of research findings please refer to the full papers, references of which are provided in the footnotes.)

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- 49 ADB 2009, Agriculture and Rural Development Sector in Cambodia: Evaluation Study of Independent Evaluation Department of ABD
 - 50 ADB 2010, Agriculture and Rural Development Sector in Cambodia, independent evaluation of ADB assistance to ARD Sector in Cambodia
 - 51 USAID/Cambodia 2007, Evaluation of the Cambodia Strengthening Micro, Small and Medium Enterprise Programme: Mid term Evaluation
 - 52 USAID 2008, Cambodia MSME Project Final Monitoring and Evaluation Report
 - 53 Sophal Ear 2009, Sowing and Sewing Growth: The Political Economy of Rice and Garments in Cambodia, Stanford Center for International Development, WP384
 - 54 Muniroth S. and Purcell T. 2009, Potential for Agribusiness Investment in the Cambodian Rice Industry, PowerPoint presentation of Agricultural Development International (ADI)
 - 55 Tong K. and Puy P. 2010, Promoting Export of Cambodia's White Gold, *Cambodia Development Review Vol. 14, Issue 2*, CDRI, Phnom Penh
 - 56 Yu B. and Fan S. 2009, Rice Production Responses in Cambodia, *IFPRI Discussion Paper* 00939
 - 57 USDA 2010, Cambodia: Future growth rate of rice production uncertain, <http://www.pecad.fas.usda.gov/highlights/2010/01/cambodia/> (Accessed on 3/5/2010)
 - 58 ACIAR/CAVAC project on "Improved Rice Establishment and Productivity in Cambodia and Australia 2010-2013"; this project is being implemented by CARDI in southern Cambodia.
 - 59 ADB-Institute 2008, Rice Contract Farming in Cambodia: Empowering Farmers to Move beyond the Contract towards Independence
 - 60 DGS 2003, Towards A Private Sector-led Growth Strategy for Cambodia, Vol. 1 Value Chain Analysis, Global Development Solutions, LLC report prepared for the World Bank
 - 61 Agrifood Consulting International 2002, Rice Value Chain Study: Cambodia. Report Prepared for the World Bank

4.5 Agriculture and Climate Change

The impact of climate change on the agricultural sector is a new research area in Cambodia; therefore few studies have addressed this issue. Research has found that climate change impacts negatively on livelihoods; households' income has gradually decreased over 1999 to 2008 owing to many associated factors such as forest clearance for agricultural farming, denied access to forest, or crop failure due to longer dry-season and uneven rainfall^{62,63}. Both rural and urban people are aware of the effect of climate change on agriculture and human health: people are more susceptible to illness, the weather becomes hotter and hotter, and there are frequent floods and rain storms which have been negatively affecting agricultural crops⁶⁴. In addition, climate change has also affected the fisheries sector in Cambodia which supplies livelihoods for millions of people and up to 80 percent of all animal protein in the diet⁶⁵. In response to the threat of climate change, some research has been conducted on how to adapt to the new challenges of climate hazards. CARDI is screening early head rice variety (short duration variety) which can produce yield in a short time, so reducing water requirement⁶⁶. The NAPA is also conducting pilot studies on improving farmer adaptive capacity to climate change (NAPA 2006).

4.6 Agriculture and Food Security in the Global Financial Crisis

Cambodia was hit hard by the global economic downturn as were other countries in the region. Three pillars of Cambodia's economic growth contracted – garments, construction and tourism sectors (World Bank 2010); only the agricultural sector kept growth at 5.0 percent during 2008 and 2009 (MAFF 2010). Although the agricultural sector was healthy and resilient during the crisis, some studies are assessing its impact on agriculture and food security. They are: Food and Financial Crises – Impact on Agriculture and Policy Priorities for Pro-Poor Agricultural Growth⁶⁷; Managing Through the Crisis—Strengthening Key Sectors for Cambodia's Future Growth, Development and Poverty Reduction: Agriculture and Rural Development⁶⁸; A Double Blow to the Poor: Cambodia's Food Security in the Face of the Food and Economic Shocks⁶⁹; and How did Cambodian Rural Households Cope with Shocks from Food and Oil Price Increases?⁷⁰ The research found that the food prices reduction may have benefited net food buyers, but agricultural producers (cassava, soybeans, maize, and rubber) lost significant revenue except rice producers whose income remained positive. The real income of rural households decreased by 31 percent, food consumption dropped by 32 percent and non-food consumption declined by 10 percent between September 2008 and September 2009 (Kimsun *et al.* 2009). Rice consumption reduced by 36 percent on average over the same period.

62 CDRI 2010, Sustainable Pathways for Attaining the Millennium Development Goals: Cambodia Case Study, CDRI Special Report

63 BBC World Service Trust (forthcoming), The Public Understanding of Climate Change in Cambodia-Using KAP Approach: A Presentation of Findings at Cambodia Development Research Forum, Sept 2010

64 Final report of public understanding of climate change in Cambodia using KAP at nation-wide will be launched within the next few months by the BBC World Service Trust in Cambodia.

65 WorldFish Centre 2009, Climate Change and Fisheries: Vulnerability and Adaptation in Cambodia

66 ACIAR/CAVAC project on "Enhancing Rice Germplasm Development for Transforming Production Systems in Cambodia and Australia"; this project is being implemented by CARDI over the period 2010-2013.

67 Theng Vuthy 2009, Food and Financial Crises – Impact on Agriculture and Policy Priorities for Pro-Poor Agricultural Growth, Cambodia Development Review, Vol. 13 (2), Phnom Penh, CDRI

68 Nam Tum & Theng Vuthy 2009, Managing Through the Crisis—Strengthening Key Sectors for Cambodia's Future Growth, Development and Poverty Reduction: Agriculture and Rural Development, Cambodia Development Review, Vol. 13 (2), Phnom Penh, CDRI

69 Jalilian H. Ray G. & Lun P. 2010, A Double Blow to the Poor: Cambodia's Food Security in the Face of the Food and Economic Shocks, ADR 2009/10, CDRI, Phnom Penh

70 Tong Kimsun 2010, How did Cambodian Rural Households Cope with Shocks from Food and Oil Price Increases? ADR 2009/2010, CDRI, Phnom Penh

5. Knowledge Gaps in Policy and Policy Research in Agricultural Sector

This section primarily analyses existing government policy that prioritises the agricultural sector and existing policy research and thus reflects policy and knowledge gaps for this sector. In addition, CDRI consulted various government ministries to identify future priority research issues for its Country Research Strategy 2020 in July and August 2010. Some of the priority research issues identified during this consultation are also incorporated in this section.

Policy gaps:

- The government has identified the agricultural sector as the engine for inclusive growth for most of the policy platforms of the government's mandate. However, the government budget allocated for this sector is very low, about 2 percent of the total budget or less than 1 percent of agricultural GPD (Table 4). This suggests that action for agricultural development has not been given the same high priority by the government as stipulated in its strategic policy.
- The livestock sub-sector is a very important sector for agricultural production, food security and diversifying household income. However, government policy has no clear directive to improve this sector; priority policy primarily focuses on disease control services, animal breeding, animal feed and food safety in terms of meat consumption. In addition, the sectoral strategic plan also has no clear policy direction or milestone to achieve for the livestock sub-sector as indicated in the agricultural sector development plan 2006-2010 and the SAW food security programme.
- There is also no long term strategic plan for the crop sector, even though this sector is growing markedly and accounts for about 50 percent of agricultural GPD (Table 1). The strategic policy sets clear objectives for rice and rubber crop production only. Maize, soybean, mungbean and cassava are produced in response to market demand with a high risk of unsecured demand; there is no clear policy to improve these potential crops for market oriented production.
- A number of policies focus on improving agricultural production in order to provide food for all people. In addition, land reform policy also clearly mentions land distribution for landless households (pro-poor land access) (RGC 2004 & 2006; MAFF 2005). However, about 25 percent of rural households (Hang 2010) still have limited or no access to agricultural land; these groups are subject to food shortage and poverty. The specific measures for these groups have not been addressed nor has serious action been taken.
- Policy targets and practices are unclear. Based on the NSDP 2006-2010, rice yield was set at 2.4 tonnes per ha and the rice cultivation area was set to expand to 2.5 million ha by 2010. However, Cambodia has been producing 2.5 tonnes of rice per hectare since 2005 (Table 2; RGC 2008), and the cultivated rice area had reached the target of 2.5 million ha in 2006 (Figure 5). The rice yield target was then revised to 2.8 tonnes per ha by 2010 (RGC 2010a). This indicates poor coordination and or cooperation in the planning process as set in the policy among relevant departments or ministries.

Knowledge gaps:

- There has been much in-depth research in response to government policy on irrigation improvement and expansion, covering governance, physical infrastructure and economic benefits of irrigation systems. However, there is a lack of knowledge and long term planning related to ground water management. Some rice production areas have already started using shallow ground water for irrigation in both dry and wet seasons to mitigate drought. Ground water could be used as a long term mitigation strategy against the future impact of climate

change on agricultural production and food security. However, long term use of ground water could have negative impacts on agricultural land and productivity, especially shallow ground water; knowledge of this issue is not yet available.

- As indicated above, many policy studies address the issue of inland fisheries in response to the government policy on fisheries sector reform; however, there is no comprehensive study on marine fisheries. In addition, the level of the Mekong River is about 5 metres lower and that of the Tonle Sap Lake is 3 metres lower than a year ago due to dam construction upstream; the low water levels will negatively impact on inland fisheries ecology and habitats in Cambodia. The effect of lower water levels on inland fisheries population, fish breeding, and food security in Cambodia is not yet known.
- Food security mapping was done four years ago and the situation may have changed since then, making it difficult for policy implementation to target vulnerable groups in an appropriate way. Food security mapping should be updated for the effective coordination of food security and social protection policy.
- There is rich knowledge on the links between growth and poverty and food security. However, the number of landless households is notably increasing from year to year due to new incomers and land market development. The challenges and interaction between landlessness and food insecurity with social protection and their vulnerability remain unknown.
- Government policy aimed to develop a land capability and land suitability classification by way of contributing to land use planning and crops zoning (MAFF 2005). However, apart from the land use map that was produced in 2002, no official updated land use map has been made available. This indicates the gap between policy and implementation. Agricultural zoning and land use planning is very important for agricultural improvement, investment planning, and potential expansion of cultivation areas as Cambodia has a rich agricultural land. For example, it is estimated that the rice cultivation area could be expanded up to 3.5 million ha (USDA 2010).
- Cambodia's economy has been transforming from an agricultural to an industrial base which leads to increased rural-urban migration. There has been a shortfall of labour in the agricultural sector and wages have increased; this would seem to have negative implications for increasing agricultural development if agricultural production continues to be labour intensive. In this context agricultural production practices seem to be shifting from human labour to mechanisation. However, the shift in agricultural technology during the transition of the economy has not yet been studied. In addition, rural-urban linkage and urban food security and their vulnerability should also be assessed.
- Policies related to agricultural improvement have taken into account many aspects of rural development including rural road construction and marketing. However, knowledge on how to bring small-scale producers to the market has been poorly disseminated. In addition, a sub-decree on contract farming is being drafted and expected to be adopted shortly. How contract farming benefits small scale producers and contractors and its negative effects (pros and cons) has not been widely studied yet.
- The strategy set in SAW is to build a sound institutional, administrative, research and education base to support and improve the effectiveness of those working in the fields of agricultural and water resource development and management. However, very few courses have been provided within tertiary education institutions such as the Royal University of Agriculture (RUA), or the Institute of Technology of Cambodia (ITC), and they are neither fully related to agricultural production nor rural livelihoods (Ngo undated). This reflects the gaps between human resource development and the required skills for implementing the policy.

- Government policy emphasises building and strengthening the capacity of the commune council as the development authority for technology transfer (role of extension worker) and information sharing to farmers (MAFF 2005; MAFF & MoWRAM 2007). This strategic policy clearly responds to the lack of extension workers to provide assistance to improve farmers' production practices. However, the advantages and disadvantages of this policy on technological transfer (e.g. agricultural technology) to farmers are not known. In addition, it is not clear what specific capacity building or training the commune councils need for them to become effective technological mediators in their rural communities.
- In the livestock sector, there are huge gaps in strategic policy and policy research. Research on the socioeconomic aspects of the livestock sector is critical if both productivity and production practices and marketing for small and medium scale enterprises are to be improved. Study on the economic returns of small and medium scale livestock production is also urgently required.

6. Questions for Future Food Security

Several key themes have been identified to frame future research interests, though this framework may not capture all knowledge gaps: water resources management, agricultural improvement and food security, fisheries and livestock. The research questions that need to be studied to improve agricultural sector and food security and poverty alleviation are set out below.

Water resources management

1. What is the potential of ground water management for agricultural development?
 - What is the potential of groundwater for irrigation as an integral aspect of Cambodia's water balance, and could it provide a substantial natural water reserve that would be available as a year-round source of water?
 - What are the advantages and disadvantages of groundwater for agricultural development and environment?
 - What is the economic balance of groundwater between benefits and the impact of ground water irrigation on soil property and fertility in the long run?
2. How can surface water use efficiency in existing irrigation schemes be improved?
3. How can surface water users' participation in ownership and effective maintenance of irrigation schemes be strengthened? What is the economic return from investing in irrigation scheme maintenance?
4. What kinds of conflicts exist around water scarcity and water resources allocation, and how can these be resolved effectively? In what way can the share of public investment for irrigation infrastructure rehabilitation and construction be effectively improved?

Agricultural development and food security

1. How can the allocation of resources for agricultural development and growth be increased? How can agricultural research to promote agricultural growth be expanded? How could the links between research agencies and technological users be more effective? What is the best way to promote farmers' adoption of new intervention production practices to increase productivity and food security?

2. What appropriate technology and inputs use would intensify productivity for small landholders to produce enough food? What alternative job opportunities are there to diversify rural income besides farming income to improve livelihoods? How can rice-based farming be diversified to promote rural livelihood and poverty reduction?
3. How can the commune council as the effective means of technology transfer in their community be best promoted? What are the capacity building training programmes for commune councils in their role of technology transfer and how effective is the training? How can the private sector's involvement in technology transfer to producers be promoted? How can institutional and capacity building for extension agencies be promoted to assist farmer productivity more effectively? How could more resources be allocated for extension agencies?
4. How can better land use planning and agricultural crops zoning be promoted to increase agricultural growth? How can the rice production area be expanded to increase agricultural growth and promote export? How can the law to return idle land to productive use be enforced?
5. How can social land concessions for landless and near landless householders be promoted? What are the risks and challenges to food security for landless households? What policies would be effective in reducing risks and food insecurity for landless households? What are the risks and challenges of households in the provinces facing severe food insecurity?
6. What is the technology shift in the transition economy? What is the role of the agricultural sector in economic growth, employment, rural and urban food security and poverty reduction?
7. How can the risks to agricultural production and food security be mitigated under the threat of climate change? How should groundwater irrigation be designed and how could groundwater use be promoted to reduce the threat to agricultural land?

Fisheries sub-sector development

1. What are the negative impacts of low river levels on fisheries ecology, habitats and productivity in Cambodia's inland fisheries sub-sector? How can these changes be managed to sustain fish ecology and habitats and productivity?
2. How can fisheries community development and capacity building be promoted and strengthened for effective and sustainable management of natural fisheries resources, income generation, food security and poverty alleviation?
3. How can the relevant agencies (MAFF, MoE, MoWRAM and MoI) be better coordinated to make management of the fisheries sector more effective?
4. How can aquaculture production be improved to reduce the threat to natural inland fisheries? How can aquaculture be promoted in rural areas far from inland fisheries to improve animal protein consumption and income?

Livestock sub-sector development

1. How can local pig production be improved to meet local market demand? What are the production practices? What are the risks and constraints faced by pig farmers? What regulation and policy would be effective to minimise import of pigs and to promote local pig farming?
2. How can the livestock sector be promoted to improve rural income and food security? What are the integral relationships between livestock and agricultural production, rural household

incomes and food security? What are the economic returns of small scale livestock raising? What major risks and constraints to livestock raising do rural communities face? How could those risks and constraints be mitigated?

3. How can the livestock market be developed for small scale producers? How can formal trade (e.g. cattle or buffaloes) be promoted to expand Cambodia's livestock market? What regulations are needed to improve the livestock market?

7. Conclusion

This review paper has presented current government policy on promoting agricultural sector development for economic growth, food security and poverty alleviation. It has also overviewed a range of policy research that, in response to government policy, addresses agricultural development, rural livelihoods and food security. This paper is intended as an initiative document for discussion, not to provide in-depth analysis, but it does allow us to identify gaps in terms of strategic policy and knowledge to improve the agricultural sector. Finally, key research issues that could frame the basic collaborative research agenda for future research have been brought forward

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