iied

Climate Change Adaptation:

An M&E Framework for Cambodia's Ministry of Agriculture, Forestry, and Fisheries

International Institute for Environment and Development

July 2016

Contents

Acronyms

ASDP	Agricultural Strategic Development Plan
CCA	Climate Change Adaptation
CCAP	Climate Change Action Plan
CCCN	Cambodia Climate Change Network
CCCSP	Cambodia Climate Change Strategic Plan
CCD	Climate Change Department
DPS	Department of Planning and Statistics
LDC	Less Developed Country
MAFF	Ministry of Agriculture, Forestry and Fisheries
M&E	Monitoring and Evaluation
MOE	Ministry of Environment`
MOWRAM	Ministry of Water Resources and Meteorology
NCCC	National Committee on Climate Change
RGC	Royal Government of Cambodia
TAMD	Tracking Adaptation and Monitoring Development
TWGCC	Technical Working Group on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change

Introduction and Overview .

Cambodia was one of the first least-developed countries (LDCs) to embrace climate change adaptation (CCA) [1] at the policy level. It ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, and it formulated one of the first LDC National Adaptation Programme of Action to Climate Change (NAPA) plans in 1996 (CCCN 2014). Today it actively partners with a number of international climate change initiatives. An inter-agency General Secretariat of the National Council for Sustainable Development hosted by the Ministry of Environment, has been in place since 2006 (formerly known as National Climate Change Committee (NCCC)), and there are Climate Change Action Plans for the national government and multiple ministries. Cambodia's 2013 Climate Change Strategic Plan (CCCSP) 2014–2024 articulates a clear vision, mission, goals and strategies. They are:

- Vision: Cambodia develops towards a green, low-carbon, climate-resilient, equitable, sustainable and knowledge-based society.

- Mission: Creating a national framework for engaging the public, private sector, civil society organizations and development partners in a participatory process for responding to climate change to support sustainable development.

- Goals:
  - Reducing vulnerability to climate change impacts of people, in particular the most vulnerable, and critical systems (natural and societal)
  - Shifting towards a green development path by promoting low-carbon development and technologies;
  - Promoting public awareness and participation in climate change response actions.

- Strategic objectives:
  - Promote climate resilience through improving food, water and energy security;
  - Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts;
  - Ensure climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal ecosystems, highlands, etc.), biodiversity, protected areas and cultural heritage sites;
  - Promote low-carbon planning and technologies to support sustainable development;
  - Improve capacities, knowledge and awareness for climate change responses;
  - Promote adaptive social protection and participatory approaches in reducing loss and damage due to climate change;
  - Strengthen institutions and coordination frameworks for national climate change responses; and
  - Strengthen collaboration and active participation in regional and global climate change processes.

[1] Climate change *adaptation* refers to efforts to manage the effects of climate change, such as increasingly severe or erratic weather. Climate change mitigation, by contrast, seeks to reduce the extent and pace of climate change itself through reducing the levels of greenhouse gases in the atmosphere.

The CCSP explicitly recognises the importance of building a national monitoring and evaluation (M&E) framework that measures and tracks how well the country is managing climate risks and meeting development targets. From an M&E perspective, climate change poses a distinct bundle of thorny methodological challenges: interventions encompass an enormous diversity of policies and programmes, spanning scales, sectors, and levels of intervention. In the absence of a clear CCA metric or measure, there are challenges in assessing progress towards the aims set out in Cambodia's CCCSP.

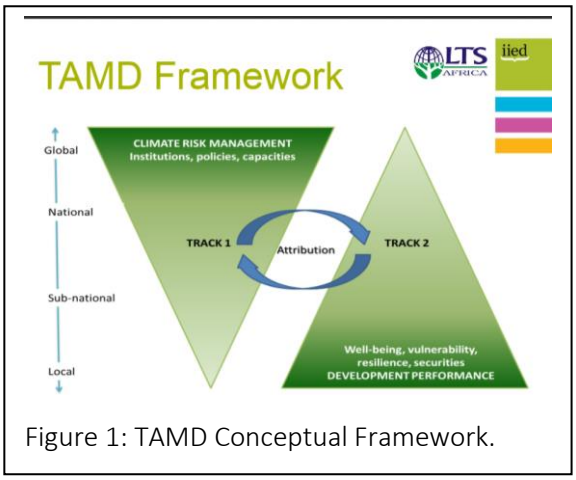


Figure 1: TAMD Conceptual Framework.

The Department of Climate Change (DCC), General Secretariat of the National Council for Sustainable Development, coordinates climate change efforts across ministries. To this end, in 2013 the CCSP developed a national-level M&E framework applying the Tracking Adaptation and Measuring Development (TAMD) model. TAMD is a globally-recognized methodology for CCA M&E of CCA. It was developed by the International Institute for Environment and Development (IIED) as a 'twin-track' approach to M&E of CCA at the national level; the framework is also flexible enough to be applied in other contexts, including at the Ministry level. The twin tracks encompass "how widely and how well countries or institutions manage climate risks (Track 1) and how successful adaptation interventions are in reducing climate vulnerability and in keeping development on course (Track 2)" (IIED 2012, p. 1). A number of Cambodian Ministries already have approved Climate Change Action Plans (CCAPs) in place, each with a detailed M&E framework. The TAMD framework is now being applied to selected ministries to bridge the detailed sectoral M&E systems to the national CCA M&E framework.

This report presents the first iteration of applying this framework to Cambodia's Ministry of Agriculture, Forestry and Fisheries (MAFF). The sectors covered by this Ministry are exceptionally vulnerable to climate change: they are highly affected by floods, droughts, and other "natural" disasters, and are also exceptionally sensitive to even subtle weather and climate variations. The Royal Government of Cambodia's (RGC) overall CCA policies thus include considerable emphasis on work within MAFF's mandate. RGC has set ambitious goals to increase rice yields and otherwise expand productivity and commercialization of the agricultural sector, and CC represents a serious potential threat towards meeting those targets. Adaptation strategies in agriculture, forestry, and fisheries are essential to meeting Cambodia's overall economic development aims. To this end, MAFF's 2014-2018 Climate Change Action Plan (CCAP) articulates the following goals:

1. To ensure food security and farmers' livelihood improvement through an increase of crop production and agro-industry at 10% per annum;

2. To enhance sustainable natural rubber development by focusing on climate change's adaptation and mitigation measures;
3. To increase sustainable livestock production (3% p.a.) and animal health control, and contribute to reduce 1% greenhouse gases emission from animal production after 2015;
4. To enhance sustainable forest management through forestation and reduce emission from forest degradation and deforestation, to obtain carbon credit, and to enhance forestry communities by ensuring zero balance deforestation by 2020; and
5. Enhance management, conservation and development of fishery resources in a sustainable manner through strengthening capacity, taking appropriate actions and actively participating to deal with climate change (p. iv-v).

This report presents the outcomes of a participatory process and expert stakeholder workshop to apply the TAMD framework to MAFF, in order to support measurement of sectoral responses to climate change responses. It is *not* intended to replace the more detailed M&E framework presented in the Ministry's CCAP, but rather complements it by distilling key elements and tying them to the national CCA framework. To this end, IIED partnered with MAFF to develop key 'scorecards' to measure institutional readiness to address CCA within the Ministry (Track One), together with results indicators (Track Two) focusing on the key MAFF priorities identified in its CCAP. These indicators were validated in a participatory workshop in April 2016, and then finalized in a May 3 closing meeting chaired by a senior MAFF representative. The outcomes from that key stakeholder consultation were applied to formulate baseline data presented here. The results can be re-calculated annually to assess progress towards key MAFF adaptation priorities.

MAFF Institutional Readiness Indicators: Track One

TAMD's Institutional Readiness ("Track One") indicators are designed to measure the extent to which the Cambodian MAFF's efforts have resulted in the integration of climate risk management into its policy and programming, and enhanced institutional capabilities to respond to climate change. Four process indicators will be assessed on regular intervals using score cards given below to understand how MAFF is integrating climate resilience into sectoral systems and responding to climate change. The indicators are:

- **Indicator 1: Status of climate change integration into sectoral planning: *Level of inclusion of climate change adaptation into MAFFs long, medium and short-term planning.***
- **Indicator 2: Status of coordination: Status and functionality of *sectoral coordination mechanism for climate change response and implementation of Climate Change Action Plan*.**
- **Indicator 3: Status of climate information: Status of p*roduction, access and use of climate change information at the sectoral level.***

- **<u>Indicator 4: Status of climate integration into financing</u>: Status, *availability and effectiveness of a financial framework for climate change response at the sectoral level.***

The four indicators are common across the national climate change M&E framework, and are being applied across participating Ministries; however, the 'scorecard' is individually tailored to each of them. The scorecard is used to understand how MAFF stands in the overall process of climate change policy and institutional development and how the sector is moving towards achieving its milestones. The scorecard describes the process that the indicator is measuring starting from initial phases (even if they have already been completed) through advanced ones in a 'ladder' approach.

The MAFF scorecard was developed in consultation with MAFF participation, using as models Track One scorecards for other Cambodian institutions. The scorecard was validated during an expert stakeholder workshop on April 6-8, 2016; MAFF invited representatives who were knowledgeable about MAFF's climate change policies and programs (Track One), and/or had relevant expertise to validate the suggested Track Two indicators. Participants also assigned points and narrative justifications to the Track One indicators at the same workshop. A final meeting was held on May 2, 2016 to confirm scores, reconcile any outstanding differences or issues, and further elaborate on the narrative justification for the scores. Each item on the scorecard 'ladder' was judged as yes (2 points), partial (1 point), or no (0 points). The answers to these questions are added together to yield an overall raw score, and then a total percentage for each of the four indicators. The scorecards and results are listed below:

Indicator 1			
1. <u>Status of climate change integration into MAFF planning</u>: *Level of inclusion of climate change adaptation into MAFFs long, medium and short-term planning*			
Step	**Milestone**	**Yes: 2 points Partial: 1 point No: 0 points**	**Evidence / Supporting Narrative**
1	**CC adaptation is integrated into MAFF's Agricultural Sector Strategic Development Plan (ASDP) in a way which has changed over-arching priorities and strategies for this sector.**	Partial	CCA is included in the ASDP, but CC concerns have not had a transformative effect on policy or strategies.

2	**MAFF has an approved Climate Change Action Plan (CCAP), which is up-to-date according to scheduled planning processes with clear actions and timeframe for implementation.**	Yes	CCAP followed the government directions/template, including clear priorities, strategies, timeframe, cost estimates, etc.
3	**A specific department or unit within MAFF has been assigned responsibility for M&E of CC adaptation and is effectively collecting and analysing data.**	Partial	There is a mandate for M&E in general certainly, and while there is also one for CCA specifically it is not strong.
4	**MAFF and its partners are systematically including climate-related tools and concerns into its assessments.**	No	Occasionally this is done, but not systematically
5	**MAFF's staff capacity building priorities include training on climate-related risks and adaptation strategies.**	Partial	A few departments are conducting training to Focal Points.
6	**MAFF chairs a Technical Working Group on CC which meets regularly to discuss key policy issues and make critical decisions.**	Partial	There is a TWG which meets regularly, but its members are very busy with other priorities so it does not always work as effectively as it could.
7	**MAFF has dialogue mechanisms to engage civil society and the private sector in discussion on CC issues.**	Partial	There is some discussion, but often ad hoc rather than systematic.
8	**MAFF's CCAP strategies and M&E frameworks are effectively linked to national one.**	Partial	
	Total score:	8 points 50%	

Indicator 2

2. Status of coordination: *Status and functionality of sectoral coordination mechanism for climate change response and implementation of MAFFs Climate Change Action Plan***.**

Step	Milestone	**Yes: 2 points** **Partial: 1 point** **No: 0 points**	**Evidence / Supporting Narrative**
1	**Individuals ("focal points") and a working group have been assigned specific responsibility for addressing and coordinating climate change within MAFF.**	Yes	There are focal five for all 5 the sub-sectors in the CCAP (agriculture, rubber, livestock, forestry, and fisheries.)
2	**MAFF focal points have sufficient knowledge, training, and access to information to perform their technical role effectively.**	Partial	There is some technical expertise, but there is certainly room for more. Also, not all five sub-sectors are at the same level of sophistication in terms of technical knowledge and training.
3	**Technical Working Group on Climate Change (TWGCC) has sufficient training, access to information, and support to perform its role effectively.**	Partial	The TWGCC is functional and meets regularly, but is not fully resourced. One major constraint is that all the members are very busy with other competing priorities.
4	**The focal points and TWGCC have sufficient resources, training/capacity, and authority to fulfil their responsibilities.**	Partial	More resources and training would be very welcome.

5	**There is a CC capacity building plan to reach MAFF staff and partners working at the local level.**	Partial	This is much more the case for agriculture than the other sub-sectors.
6	**This year, MAFF is training staff and partners at local level regarding CC.**	Partial	Agriculture has a two-year training effort starting up, although it does not reach the entire country. There is also a less-intensive plan for fish and livestock, but nothing for rubber.
7	**Capacity building and training support is being provided this year to national-level MAFF staff so that they integrate CC issues in their work.**	Partial	There is no specific plan, but they often participate in various trainings, symposia, etc.
8	**Trained MAFF staff consider CC adaptation perspectives in their everyday work.**	Partial	Sometimes, the climate change "buzzwords" are used, but nothing is really done differently than before.
9	**Focal Points and Technical Working Group regularly influences MAFF's projects, strategies, and priorities.**	No	Normally, the CC people do their *own* projects when there is money for it, but there is a lack of 'upward influence.' In other words, CC is not transforming or driving larger policies, strategies, or priorities.
10	**Focal Points and Technical Working Group coordinates well with CCD and NCCC through regular meetings.**	Partial	Usually, coordination is project-based, and occurs when there is a specific need.
11	**Regular CCAP Plan progress reports are submitted to NCCC.**	No	Not yet.

12	**Regular meetings are organized to review the progress of the MAFF CCAP aligned with CCCSP and ASDP.**	No	Not yet.
	Total score:	10 points 42%	

Indicator 3	
3	Status of climate information**:** *Status of production, access and use of climate change information by MAFF.*

Step	Milestone	Yes: 2 points Partial: 1 point No: 0 points	Evidence / Supporting Narrative
1	**MAFF personnel and partners have access to detailed weather and climate information.**	No	There is some access, but it is scattered rather than detailed or complete.
2	**MAFF personnel and partners are able to understand and interpret weather and climate data and the implications for their work.**	No	There are significant unmet needs in this regard, including an agro-meteorological specialist, an agro-climate bulletin, and more courses taught at university level in Cambodia.
3	**There is a database or web portal which MAFF personnel and the public can access to get detailed climate and weather information.**	No	The MOWRAM information is generic and not always available. Farmers continue to rely on traditional knowledge, and young people don't know this body of knowledge. Moreover, traditional

			knowledge has become less reliable due to climate change.
4	**MAFF personnel and partners routinely receive weather forecasts and early warnings about extreme weather.**	No	They do not know how to get detailed information from MOWRAM.
5	**MAFF has access to critical information about available sources of climate finance.**	Yes	The Climate Change Department (CCD) of the Ministry of Environment (MOE) has this information and shares it with MAFF's Technical Working Group on Climate Change (TWGCC)
6	**Climate related information and analysis (vulnerability assessments, scenario planning, climate forecasts) is routinely used by planners and decision makers.**	Partial	Reports are available, but the information is usually not used or applied.
7	**Sub-national personnel and partners have access to data and information about climate and know how to use it.**	No	They do not.
	Total Score=	3 points 21%	

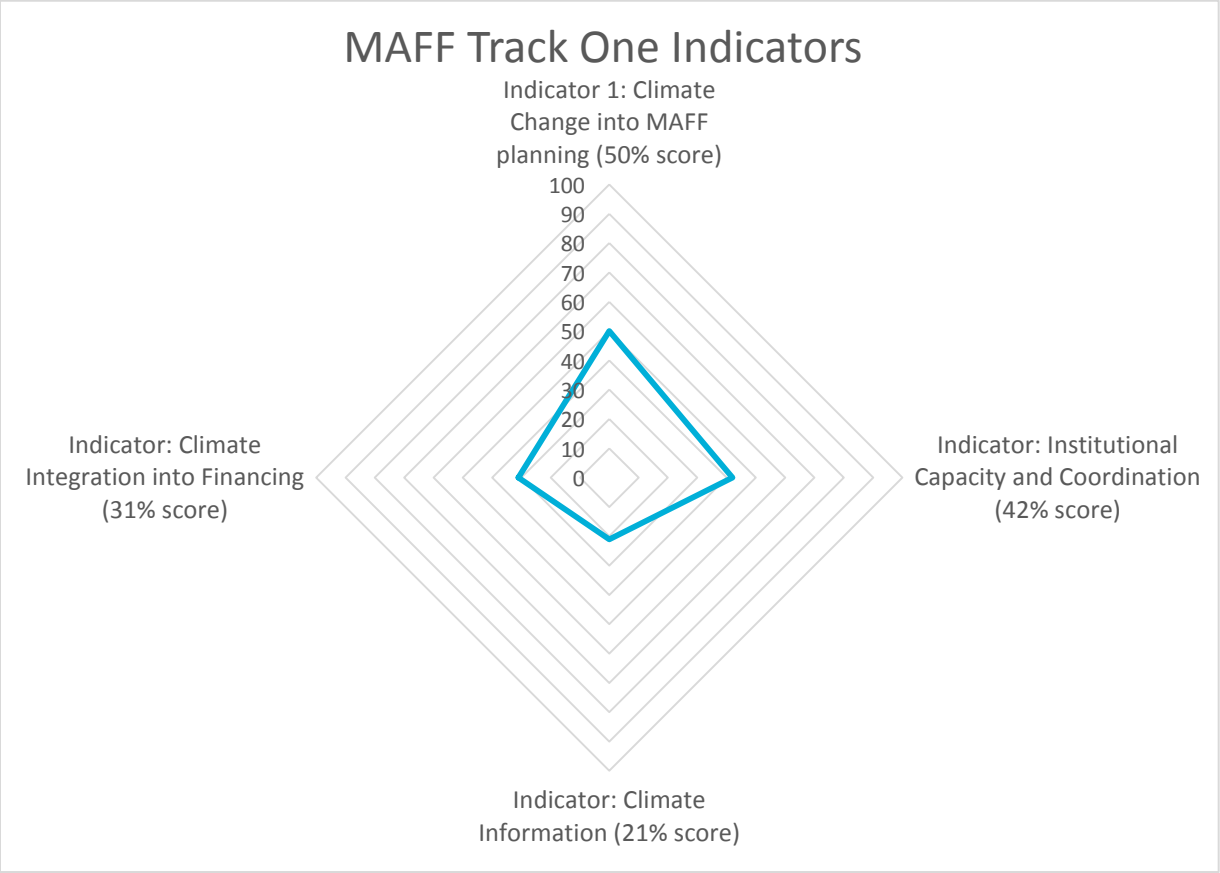
Indicator 4
4 **Status of** climate integration into financing: Status, *availability and effectiveness of a financial framework for climate change response at the sectoral level.*

Step	Milestone	Yes: 2 points	Supporting evidence/narrative

		Partial: 1 point No: 0 points	
1	**The Climate Change Action Plan includes a detailed estimated budget.**	Partial	There is an estimated budget, but it is not detailed. Moreover, some of the cost estimates are lump-sum "guesstimates."
2	**Funding for identified climate-related MAFF issues has increased due to awareness of the implications of climate change.**	Partial	Some money has been directed towards CC-related issues.
3	**MAFF has accessed climate finance to support specific CC projects and priorities outlined in CCAP.**	Partial	Some climate finance has been accessed, but other components of the CCAP still do not have funding.
4	**MAFF's CCAP priorities are reflected in the Public Investment Programme**	Partial	There are examples of CCAP priorities reflected in the PIP, including resilient rice varietals.
5	**MAFF's CCAP priorities are included in the ministry's budget, strategic plan, and programme budget.**	Partial	Yes, the CCAP priorities are included but only recently so and in some cases only superficially.
6	**A tool to track % of CC-related expenditure has been established and is being used.**	No	This is not yet in place.
7	**A Climate Change Expenditure Review is regularly conducted at the sectoral level and reported in the**	No	This is not yet in place.

	CCAP progress report.	
8	**The MAFF CCAP has funding this year from government and development partner sources. (No = less than 33%; Partial = 34-63%; Yes = 64-100%)**	No
	Total score:	5 Points 31%

The results from each scorecard are summarized in the following radar diagram:



The findings across these four indictors are telling. The scores range from 21% - 50%, highlighting that CCA mainstreaming process are well underway, particularly in terms of planning (Indicator 1, 50%) and capacity/coordination (Indicator 2, 42%). The weakest point, by contrast, is systematically accessing and applying climate information and data (Indicator 3, 21%). The indicator which measures climate integration into financing (4) falls in between, garnering a score of 31%. The data – including narrative justifications

– highlighted that the need for adaptive strategies is well-recognized within MAFF, and that CCA is included within formal planning and coordination processes. There has also been considerable effort to secure climate finance. However, there are also considerable gaps and challenges, particularly regarding human capacity and resources. Moreover, while formal structures are in place implementation is not a given. This reflects in part that the CCAP is not fully funded – plans are far more comprehensive than actual resources. Workshop participants also emphasized considerable need for capacity building to enable effective implementation. They also noted that at times there were differences across MAFF's three units (i.e., agriculture, forestry, and fisheries) and that care must be taken to ensure that *all* are adequately resourced.

MAFF Impact Indicator Framework: Track Two

The MAFF CCAP includes a wide range of indicators across its over-arching strategies and action fiches. In consultation with the Ministry and expert stakeholders, a small and highly-selective number of impact indicators were identified to serve as overall Track Two indicators for the five pillars of programming set out in the Ministry's CCAP: key total outputs in the agriculture, livestock, fisheries, rubber sectors, plus % of forest cover.

There have been challenges in reaching consensus among key stakeholders in selecting impact indicators for MAFF. Earlier drafts were more ambitious, seeking to compare key indicators to actual disaster data, however several key issues were raised including data reliability, validity, and availability. In early May 2016 a senior representative from MAFF's Department of Planning and Statistics (DPS) instructed the team to simplify the scope and reach of the impact indicators. Chief reasons for this include: the indicators were too complex and difficult to interpret, and questions were raised about data reliability and availability. Moreover, MAFF has a policy *against* using non-MAFF data for official purposes; MAFF does not collect disaster or weather data and therefore there is no approved, official data source. MAFF prefers to have simple, straightforward output indicators which are easier for Ministry staff to update, understand, and use, and rely solely on their own data. The IIED team was subsequently sent a specific MAFF database, with clear instructions to use only this data source and align all draft Track Two indicators to reflect those which appear in the authorized database. This also necessitated some adjustment to some draft indicators: for example, '% forest cover' was changed to '# of hectares of protected forested/wildlife conservation protected areas.' For some indicators, data is disaggregated to the provincial level, but for others only national-level data is available in the approved database.

Concerns were subsequently expressed by other stakeholders, that the unadjusted output scores (e.g., total number of pigs) are too 'blunt' and do not meaningfully capture

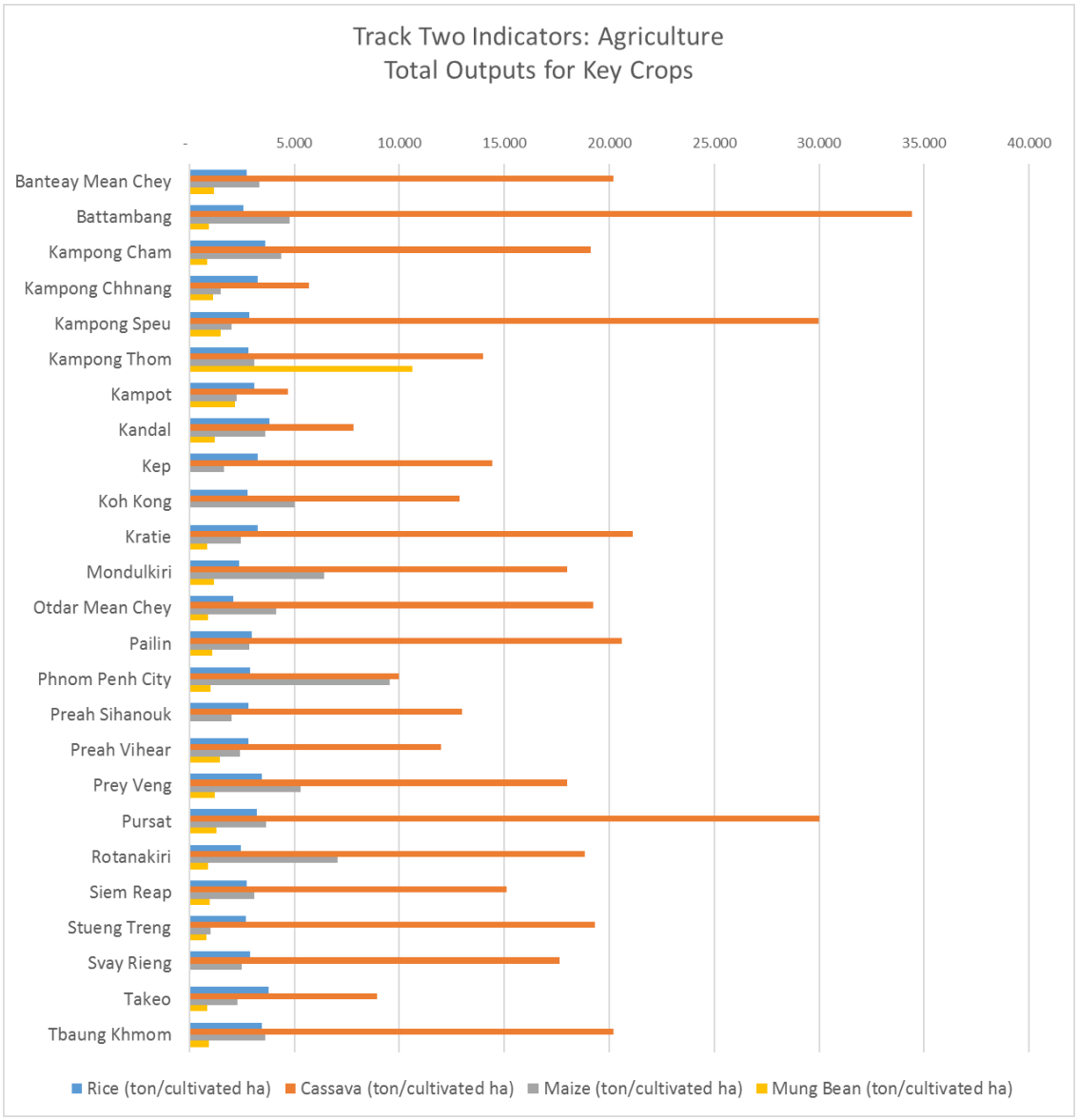
climate change results per se, and are therefore inadequate from a technical standpoint. We are therefore presenting two sets of findings: simple outputs from the MAFF database, and then the same findings adjusted for total rainfall (to the extent that that makes sense), using 2015 data from the Ministry of Water Resources and Meteorology (MOWRAM). Although this rainfall data is external to MAFF, it is from a government agency and the data is simple, straightforward, and easy to use, access, and interpret. It is the responsibility of the senior government stakeholders within MAFF and the NCCC to make a final decision on this matter.

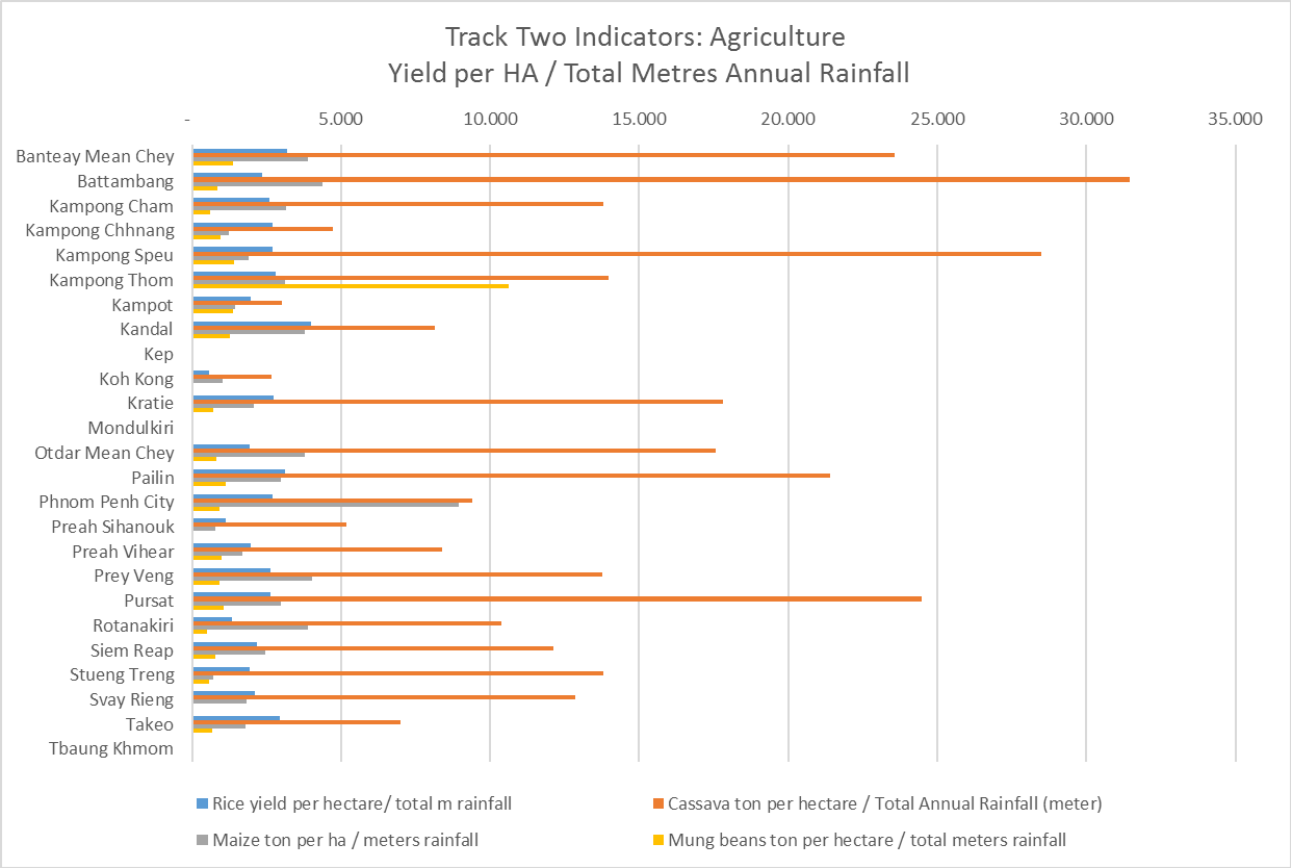
Agriculture

The impact (Track Two) indicators identified for the agriculture sector are:

- Rice yield per hectare
- Cassava yield per hectare
- Maize yield per hectare
- Mung bean yield per hectare

The first set of data presented below shows overall 2015 agricultural outputs disaggregated by province; the second shows the same results per annual meter of rainfall. Numerical data tables can be found in the appendices.


Track Two Indicators: Agriculture
Total Outputs for Key Crops
-
5.000
10.000
15.000
20.000
25.000
30.000
35.000
40.000
Banteay Mean Chey
Battambang
Kampong Cham
Kampong Chhnang
Kampong Speu
Kampong Thom
Kampot
Kandal
Kep
Koh Kong
Kratie
Mondulkiri
Otdar Mean Chey
Pailin
Phnom Penh City
Preah Sihanouk
Preah Vihear
Prey Veng
Pursat
Rotanakiri
Siem Reap
Stueng Treng
Svay Rieng
Takeo
Tbaung Khmom
Rice (ton/cultivated ha)
Cassava (ton/cultivated ha)
Maize (ton/cultivated ha)
Mung Bean (ton/cultivated ha)



Some comparative data is useful to interpret these results. The table below shows our selected crop yields adjusted for rainfall for the last two years. We can see slight increases in production of all four crops despite rainfall variation. While there are undoubtedly multiple contributing factors which influence rice yield, this result is a positive sign. Over time, if climate change interventions are being effective in the agriculture sector, we would expect to see rice yield rates continue remain stable or improve. Monitoring this ratio at either national or provincial level helps enable policymakers and analysts to consider the impact of climate change programming in the agriculture sector.

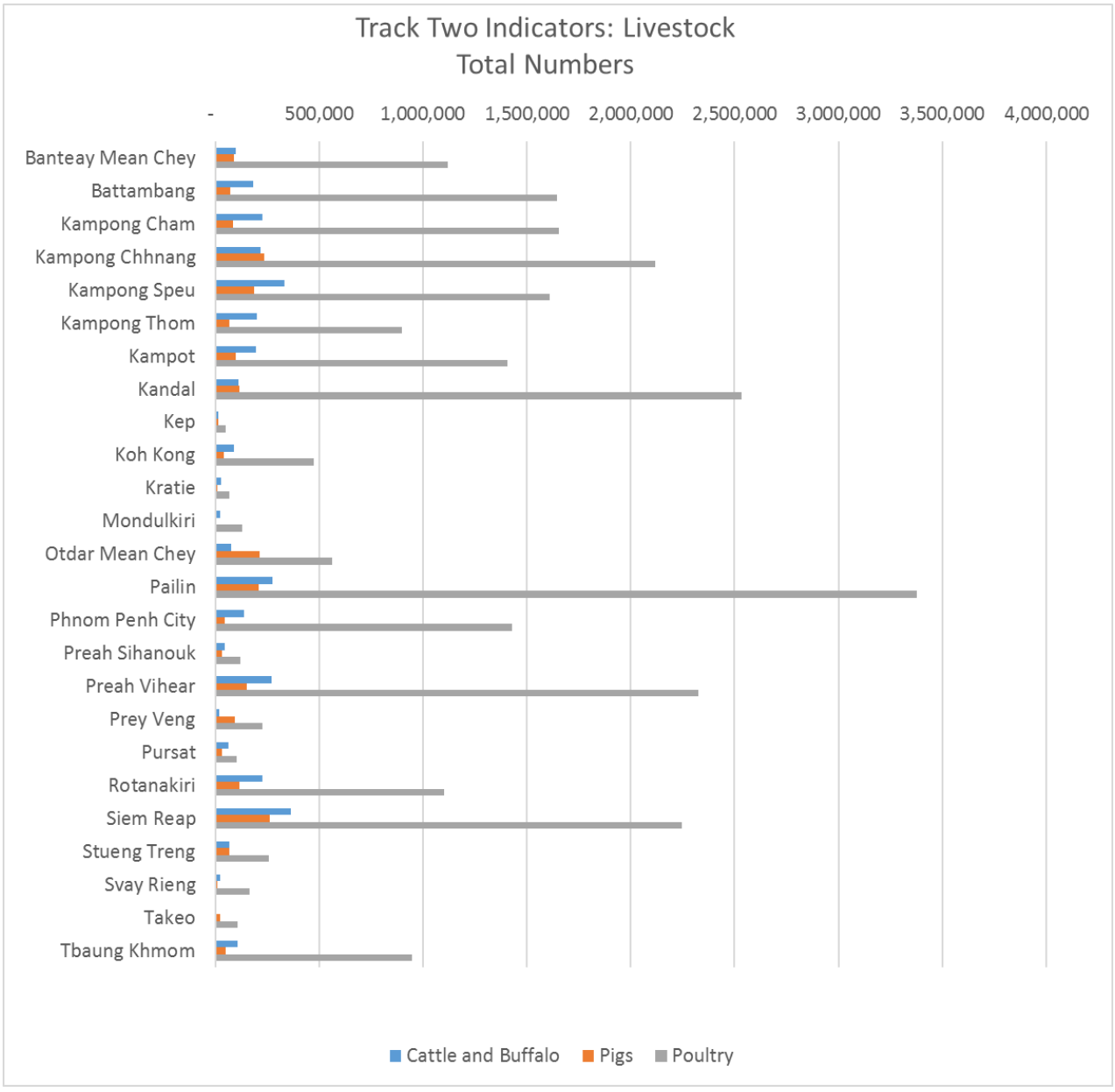
	2014 Annual Rainfall (meters)	2015 Annual Rainfall (meters)	National Yield (ton/hectare) 2013-2014	National Yield (ton/hectare) 2014-2015	National Yield / Rainfall 2014	National Yield Rainfall /2015	Difference
Rice	36.5086	31.8236	3.1630	3.0790	0.0866	0.0968	0.0101
Cassava	36.5086	31.8236	18.8274	22.9034	0.5157	0.7197	0.2040
Maize	36.5086	31.8236	3.8659	3.8296	0.1059	0.1203	0.0144
Mung Beans	36.5086	31.8236	1.2439	1.1381	0.0341	0.0358	0.0017

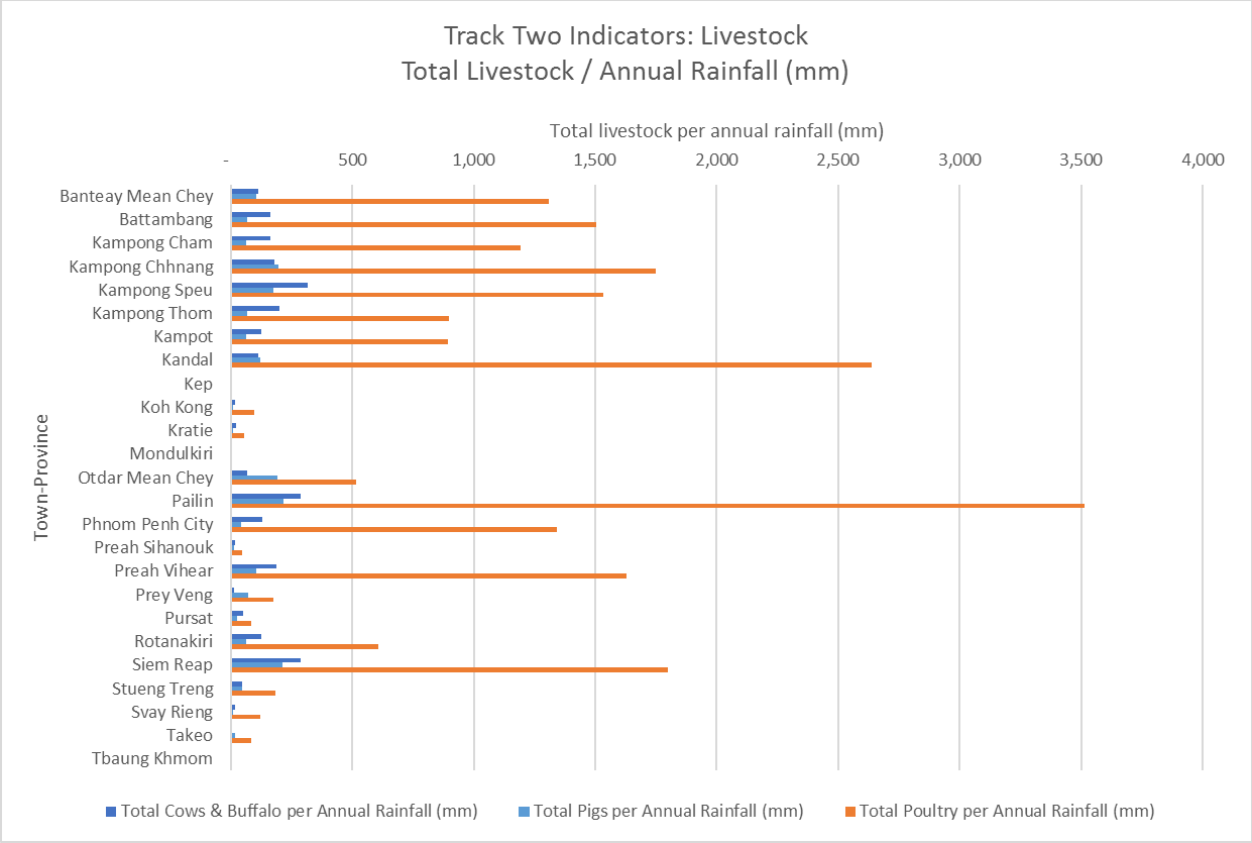
Rubber

The Track Two indicator for rubber is total national rubber production; province-level data on rubber yield was not available in the specified database. In 2015, the national yield was .326 tons per hectare, of which 38.5% was grown on family farms. Adjusting for rainfall (i.e., dividing by meters of rain in Cambodia in 2015), we see that .0102 tons of rubber are produced for each meter of rain nationwide. It should be noted that rubber tree yields would be expected to reflect the influence of several years' precipitation, so these results need to be interpreted cautiously. Looking back for the previous year, the figure for 2014 is less: .0074. If efforts are 'on track' to manage extreme variations in rainfall, we would over time expect to see stability or continued improvement in this figure. Comparing 2014 and 2015 show positive results, however.

Livestock

The Track Two indicators for livestock production are: total number of cattle, pigs, and poultry per province; 2015 data are presented in the chart below and numerical charts listed in the appendix. The second chart presents the same findings, adjusted for rainfall. While the link between number of livestock and rainfall is less straightforward than for agricultural crops, we would expect extreme weather to affect animal health and therefore size of flocks and herds; it also affects livelihood strategies. For example, in the event of a poor harvest, families are likely to either consume or sell their animals.


Track Two Indicators: Livestock
Total Numbers
-
500,000
1,000,000
1,500,000
2,000,000
2,500,000
3,000,000
3,500,000
4,000,000
Banteay Mean Chey
Battambang
Kampong Cham
Kampong Chhnang
Kampong Speu
Kampong Thom
Kampot
Kandal
Kep
Koh Kong
Kratie
Mondulkiri
Otdar Mean Chey
Pailin
Phnom Penh City
Preah Sihanouk
Preah Vihear
Prey Veng
Pursat
Rotanakiri
Siem Reap
Stueng Treng
Svay Rieng
Takeo
Tbaung Khmom
Cattle and Buffalo
Pigs
Poultry



Again, it is useful to compare data over time. The data below outlines *national* figures for total numbers of critical farm animals, divided by rainfall.

	2014 Annual Rainfall (meters)	2015 Annual Rainfall (meters)	# of Heads	# of Heads	Heads / Rainfall 2014	Heads / Rainfall 2015	Difference
Cows and Buffalo	36.5086	31.8236	3,595,308	3,409,585	98478.3859	107140.1387	8661.7528
Pigs	36.5086	31.8236	2,360,823	2,357,839	64664.8461	74090.8914	9426.0454
Poultry	36.5086	31.8236	25,630,027	26,688,675	702027.1114	838644.1327	136617.0213

Once again, we see improvements in the ratio of farm animals to rain from 2014 to 2015. While there are undoubtedly multiple influences at work, the results are encouraging. We particularly see a dramatic increase in numbers of poultry. While further analysis would be necessary to explain the difference, the most likely explanation is recovery of bird stocks since the avian influenza outbreaks. This point highlights that it is important to interpret findings with awareness of other contextual factors.

Fisheries

The Track Two output indicators for the fisheries sector are:

- Total 2014[2] national yield from inland fishing: 487,905 tons;
- Total 2014 national yield from marine fishing: 120,055 tons.
- Total 2014 national yield from aquaculture: 143,141 tons.
- Hectares of planting in inundated/mangrove forest: 75 hectares.

The relationship between rainfall (or disaster) data and fisheries is a complex one, and largely irrelevant for marine fishing and mangrove planting. However, precipitation does influence freshwater wild and aquatic environments, as well as household livelihood strategies. Adjusting for rainfall (in 2014, a total of 36,508.6 millimeters nationwide), we see a rate of 13.36 tons of inland wild fish caught per millimeter of rain, and 3.92 tons for aquaculture.

Forestry

The 2015 Track Two indicators for forestry are:

- Forest protection and wildlife conservation areas: 1.60 million hectares.
- Forest replantation area: 4,690 hectares.

This indicator would be unaffected by weather variation.

Conclusion

This report presents the methodology and baseline data for tracking progress in CCA within Cambodia's MAFF. We have applied the approved TAMD framework, tailoring it to the specificities of the Ministry and its CCAP, and in a way which links in directly to the RGC's overarching inter-ministerial CCSP and CCA M&E framework. TAMD encompasses two parallel approaches, measuring institutional readiness (Track One) and sectoral impacts (Track Two) on key indicators for each of the five pillars of programming identified in MAFF's CCAP: agriculture, rubber, livestock, fisheries, and forestry. Track One and Track Two indicators were identified together with MAFF representatives and validated (and, in the case of Track One, scored) in a participatory expert stakeholder workshop held in 2016. Senior MAFF stakeholders were very firm that the impact indicators should be straightforward and easy to use, interpret, and calculate, and be drawn only from an official MAFF data source. However, technical

[2] Please note that 2015 data was not listed in the specified database.

objections were raised that simple total outputs (e.g., average rice yield per hectare) were insufficient insofar as they do not measure the relationship between disasters and the sectors covered by MAFF. We have therefore presented two sets of data: one of total outputs from the MAFF database, and then a second set presenting the same data adjusted for precipitation (to the extent that it made sense to do so). If CCA interventions are successful, we would ideally see yields stabilize or improve despite extreme weather.

References

Cambodia Climate Change Network (CCCN), 2014, *Many factors in an uncertain future: Situation climate change among local community priority in Cambodia.* Phnom Penh: Author.

IIED, 2012. TAMD, a framework for assessing climate adaptation and development effects, Briefing paper. International Institute for Environment and Development (IIED).

Ministry of Agriculture, Forestry and Fisheries (MAFF), 2014, *Climate change priorities action plan for agriculture, forestry and fisheries sector 2014–2018.* Phnom Penh: Author.

National Climate Change Committee (NCCN), 2014, *Cambodia climate change strategic plan 2014-2023*. Phnom Penh: Author.

Appendix: Data Tables

2015 Agriculture Data

Province	Total annual rainfall (mm)	Rice yield (tons per hectare)	Rice yield per hectare/ Total Annual Rainfall (meter)	Total cassava yield (tons per hectare)	Cassava ton per hectare / Total Annual Rainfall (meter)	Total maize yield (tons per hectare)	Maize ton per ha / Total Annual Rainfall (meter)	Total mung beans yield (tons per hectare)	Mung beans ton per hectare / Total Annual Rainfall (meter)
Banteay Mean Chey	856.8	2.743	3.202	20.185	23.559	3.327	3.883	1.189	1.388
Battambang	1095.3	2.579	2.354	34.432	31.436	4.776	4.360	0.938	0.856
Kampong Cham	1384.4	3.599	2.600	19.123	13.813	4.387	3.169	0.861	0.622
Kampong Chhnang	1210.0	3.253	2.688	5.711	4.720	1.476	1.220	1.147	0.948
Kampong Speu	1051.7	2.852	2.712	29.971	28.498	2.000	1.902	1.500	1.426
Kampong Thom	1000.9	2.815	2.813	13.990	13.977	3.112	3.109	10.639	10.629
Kampot	1568.5	3.084	1.966	4.712	3.004	2.246	1.432	2.178	1.389
Kandal	960.5	3.827	3.984	7.826	8.148	3.620	3.769	1.217	1.267
Kep	-	3.257		14.420		1.657			
Koh Kong	4799.5	2.791	0.582	12.859	2.679	5.000	1.042		0.000
Kratie	1184.8	3.236	2.731	21.108	17.816	2.464	2.080	0.835	0.705
Mondulkiri	-	2.379		17.978		6.438		1.181	
Otdar Mean Chey	1095.5	2.104	1.921	19.245	17.567	4.132	3.772	0.904	0.825

Pailin	961.2	2.988	3.108	20.584	21.415	2.859	2.974	1.101	1.145
Phnom Penh City	1064.7	2.881	2.706	10.000	9.392	9.535	8.956	1.000	0.939
Preah Sihanouk	2504.3	2.830	1.130	13.000	5.191	2.000	0.799		0.000
Preah Vihear	1429.3	2.812	1.967	12.000	8.396	2.424	1.696	1.440	1.007
Prey Veng	1309.0	3.447	2.634	18.000	13.751	5.277	4.031	1.200	0.917
Pursat	1225.7	3.231	2.636	30.000	24.476	3.650	2.978	1.300	1.061
Rotanakiri	1817.5	2.448	1.347	18.844	10.368	7.053	3.881	0.904	0.497
Siem Reap	1248.8	2.735	2.190	15.126	12.112	3.076	2.463	0.972	0.778
Stueng Treng	1401.1	2.712	1.936	19.317	13.787	1.000	0.714	0.800	0.571
Svay Rieng	1370.4	2.905	2.120	17.635	12.869	2.500	1.824		0.000
Takeo	1283.7	3.760	2.929	8.959	6.979	2.290	1.784	0.867	0.675
Tbaung Khmom	-	3.449		20.186		3.634		0.920	

2015 Livestock Data

Province	Total 2015 Rainfall (mm)	Total Cows and Buffalo	Total Cows & Buffalo per Annual Rainfall (mm)	Total Pigs	Total Pigs per Annual Rainfall (mm)	Total Poultry	Total Poultry per Annual Rainfall (mm)
Banteay Mean Chey	856.8	97,496	114	91,009	106	1,120,158	1,307
Battambang	1095.3	181,452	166	73,899	67	1,647,315	1,504

Kampong Cham	1384.4	229,268	166	87,154	63	1,652,059	1,193
Kampong Chhnang	1210.0	218,984	181	235,922	195	2,116,480	1,749
Kampong Speu	1051.7	334,336	318	187,321	178	1,611,242	1,532
Kampong Thom	1000.9	199,664	199	68,946	69	898,621	898
Kampot	1568.5	197,213	126	99,548	63	1,405,372	896
Kandal	960.5	110,722	115	118,451	123	2,533,962	2,638
Kep	-	14,277		15,887		51,111	
Koh Kong	4799.5	92,045	19	42,076	9	474,185	99
Kratie	1184.8	28,434	24	10,447	9	66,745	56
Mondulkiri	-	22,791		6,582		132,091	
Otdar Mean Chey	1095.5	76,027	69	212,557	194	564,831	516
Pailin	961.2	276,560	288	209,395	218	3,376,954	3,513
Phnom Penh City	1064.7	138,420	130	46,108	43	1,430,193	1,343
Preah Sihanouk	2504.3	46,873	19	32,323	13	120,674	48
Preah Vihear	1429.3	271,480	190	153,093	107	2,325,460	1,627
Prey Veng	1309.0	18,395	14	94,608	72	228,843	175
Pursat	1225.7	61,571	50	34,750	28	104,991	86
Rotanakiri	1817.5	227,584	125	117,283	65	1,102,302	606
Siem Reap	1248.8	362,185	290	264,279	212	2,246,418	1,799
Stueng Treng	1401.1	67,049	48	67,419	48	255,974	183
Svay Rieng	1370.4	23,097	17	12,632	9	165,933	121
Takeo	1283.7	5,982	5	24,212	19	108,114	84
Tbaung Khmom	-	107,680		51,938		948,647	