

Guidelines for Integrating Climate Change Considerations into Commune Development Planning



Cambodia Climate Change Alliance (CCCA)

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2014

Foreword

It is my pleasure to present the Guidelines for Integrating Climate Change Considerations into Commune Development Planning - Overall. The report is the result of a fruitful collaboration between government agencies at all levels, provincial, district and commune authorities engaged in coastal development and climate change. This report is one in a series of reports demonstrating activities and approach for mainstreaming climate change adaptation at the sub-national level and developing structures and capacity for implementation of climate change adaptation measures.

The present report focus on providing guidelines for integrating climate change considerations into commune development planning in Cambodia. The Guidelines are intended to be used based on the recommendations for what data should be collected for the relevant communes and used in the climate change planning.

The rich natural resources and the environment in e.g. the coastal zone have over the past years been under increased pressure due to development activities. Beyond the development pressure also climate change affect the living conditions in the coastal area especially in low laying areas by e.g. increasing the risk of flooding, saline intrusion and coastal erosion. There is a need for improved management in order to ensure much needed socio-economic improvements and economic development in the area without degrading the natural resources and the environment. This is particularly urgent in light of impact of climate change on present livelihood that the coastal communities are developing adaptation to build stronger resilience in the communities which can at the same time be used for replication and expansion to other parts of the coastal area and to other provinces. The present guidelines will be useful for such expansion to other provinces.

The main users of this Guideline will be commune, district, and province authorities and provincial departments dealing with the complex issues related to socio-economic development alongside climate change and sustainable environment and natural resources management. It is expected that the report will prove valuable for a wider audience, including national level policy-makers, planners and government agencies, NGOs, other projects and the private sector.

I hope all users will find the present report to be a valuable resource for climate change work in Cambodia.



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15th March 2014

Acknowledgements

The report on Guidelines for Integrating Climate Change Considerations into Commune Development Planning was produced under the Coastal Adaptation and Resilience Planning Component, implemented by the CCCA. Its findings are based on lessons learnt from activities implemented under the component.

On behalf of the Coastal Zone Working Groups, I would like to express my profound gratitude to His Excellency **Say Samal**, Minister of Environment and Deputy Chairman of the Cambodia's National Coastal Management and Development for his strong and continued motivation, guidance and support provided to the effort of the working group in developing this report. My profound thanks go to the members of Project Steering Committee, National Focal Point, Provincial Technical Working Groups, National and International Consultants and all relevant stakeholders who contributed and shared their good ideas and comments to this report.

Last but not least, I would like to express my profound thanks to the Cambodia Climate Change Alliance (CCCA) for supporting Coastal Adaptation Resilient Component (CARP) through DHI implementation in a good collaboration with the Ministry of Environment.

Phnom Penh, 15 March 2014



Dr. Vann Monyneath
Permanent Vice Chairperson,
Project Steering Committee

Manual Chapters

No.	Title	Outputs	Inputs
1.	Introduction	What the Guidelines Do and Don't Do	
2.	Planning Context	Review of proposed National, Provincial and/or District plans/projects/policies which may impact upon the Commune	Higher level plans from agencies
3.	Use of Statistics	An understanding of how to interpret Commune Data Books. Consider IDPoor data.	Commune/IDPoor Data (2004 – 12)
4.	Population	An understanding of population dynamics in terms of growth rates, household formation, migration, gender & vulnerable persons.	Population Data (2006 – 12)
5.	Economy	An understanding of the economic structure of the commune and how/why this may have changed.	Economic Data (2006 – 12)
6.	Housing & Utilities	An understanding of changes in the quality of housing and access to utilities and how/why this may have changed.	Housing and Utilities Data (2006 – 12)
7.	Accessibility	An understanding of how accessibility within/from the Commune has changed.	Access Data (2006 – 12)
8.	Identified Issues	A review of issues previously identified and mapped by the Commune and which affect living and working conditions.	Issues Map & Chapters 3 – 7
9.	Land Use Planning & Climate Change Adaptation	An understanding of how Climate Change may result in a need for the Commune to adapt to changing circumstances.	Topographical Data & Chapters 3 – 8
10.	Disaster Risk Management	A review of the Commune's preparedness for extreme weather events.	Commune Feedback
11.	Inputs to Commune Development Planning	Map and description of future projects considered by the Commune to be relevant in addressing Climate Change and extreme weather event concerns in the area.	Projects Map & Chapters 3 – 10

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- Annex 1: Commune Data Book Extracts (2006 – 12)
 Annex 2: Data from IDPoor Surveys (2004 – 12)

1. Introduction

Existing Guidelines and Manuals

There are a number of recent guidelines and manuals related to development planning within Communes. These include:

- Sub-Decree on Commune/Sangkat Land Use Planning Procedure, (May 2009);
- Implementation Manual on Commune Land Use Planning (CLUP) (2009)¹; and
- Guideline on C/S Development Plan (CDP) and C/S Investment Program (CIP), prepared by Inter-ministerial Working Group (July 2007)

It is therefore not intended that the contents of this CARP² Manual should replace or conflict with those guidelines and procedures in any way.

The Purpose of this Manual

This Manual is solely designed to add Climate Change considerations into the planning process to complement existing data/analysis, so that decisions and investments can be made with an understanding of climate change projections and/or the expectation of extreme weather events.

These considerations are particularly intended to assist practitioners to assess:

- if there is evidence of climate change in the specific coastal areas being studied, using existing data;
- whether any such climate change is significantly affecting the economic, social and/or environmental conditions in the area;
- whether the vulnerability of the area and/or its population to climate change is changing over time; and
- whether there are adaptation measures which can be incorporated into the planning process to increase the resilience of the area and/or its population to climate change.

These assessments would then form the basis for inputs into the respective Commune Development Plan (CDP) and accompanying Comprehensive Land Use Planning (CLUP) processes from which any agreed Adaptation measures should flow. The CLUP process every 5 years (with a vision of 10 to 15 years and annual review) is timed to coincide with the CDP (also 5 yearly) and annual Commune Investment Program (CIP) preparation cycle.

It is not intended that additional data should be collected now as part of this assessment beyond that already assembled³, although investigations might be required at a later date to identify any appropriate Adaptation measures which may be required. Some basic training material⁴ has been produced by others which provides a useful background to Climate Change.

¹ Prepared by the Ministry of Land Management, Urban Planning and Construction (MLMUPC). Supported by Natural Resource Management and Livelihood Program (NRM&L), funded by Danida/DFID/NZAid. These are comprehensive guidelines for land use planning at the commune level (and are otherwise known as the “Green Book”).

² Coastal Adaptation and Resilience Planning (CARP) Component, Cambodia Climate Change Alliance

³ All Communes have already contributed information on current issues affecting their areas together with proposed priority projects to address these issues.

⁴ Teacher Training Manual for Climate Change in the Coastal Zone by Save Cambodia's Wildlife, undated.

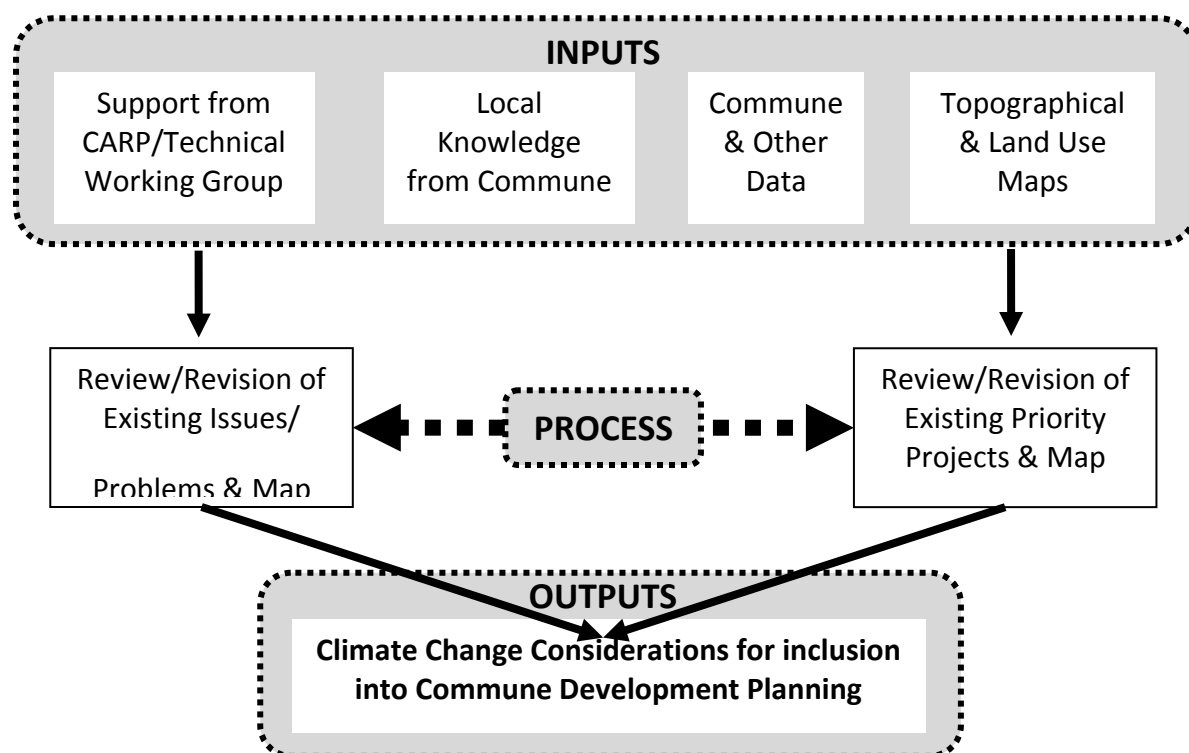
Identification of Climate Change Issues in Commune Planning Processes

There are a number of potential means whereby climate change related issues could be identified and addressed within the overall Commune Planning Processes. These means include:

- Provincial Hot Spot Map: based upon issues identified and mapped at Provincial level. This map is intended to identify areas which require special protection although their small scale (1: 100,000 or 1: 250,000) mean that only broad locations will be included. Any other available Hot Spot maps from District or Commune level should also be reviewed.
- Detailed Land Use Map: this map may identify changes in land use which could be climate change related as their scale (1: 10,000 to 1:30,000) is large enough to potentially delineate changes over time in crops, coastal erosion and/or river courses.
- Problem Map: on which the Commune Planning and Budgeting Committee (PBC) and commune individuals can identify problems, causes and possible solutions.
- Data Books for Districts, Communes and Villages: identifying issues or by a comparison of data book information over time.
- Inputs from any village level Participatory Land Use Planning (PLUP), Commune Agro-Ecosystems Analysis (CAEA) or other formal processes.
- Comparative data from the Identification of Poor Households (IDPoor) Programme.
- Other Surveys and Investigations: not part of the 5 year CLUP process, initiated from either a top-down (e.g. review of time-series RS imagery) or bottom-up (disaster event reporting by officials and/or residents) process of problem identification. Includes local Hotspots.
- Experience and knowledge of residents who will have lived in the area for many years and who are intimately aware of subtle changes in the characteristics of their own Commune.

Communes will be encouraged to use all available sources of information in the preparation of the required Outputs in addition to those supplied by CARP.

Process for Using the Guidelines



Planning Context

Outputs Expected
<ul style="list-style-type: none"> • A review of proposed National, Provincial and/or District plans/projects/policies which may impact upon the Commune
Data Availability
<ul style="list-style-type: none"> • Provincial and District plans, detailing currently budgeted projects which will be implemented over the next 10 years.
Information
<p>Commune Development Planning should be undertaken with the knowledge that there will be plans, projects and policies developed at higher levels which, if implemented, may have a major impact on the functioning of the Commune. Such projects may include new infrastructure such as roads, dykes or water supply networks. Policies may also be promoted which provide incentives for people to live in the area, e.g. promoting new faster growing rice varieties.</p> <p>At the same time, proposals developed in each Commune can provide valuable inputs into higher level plans in terms of potential priority projects for short-term implementation and expected costs.</p>
Process
<p>Review any Plans/Policies and/or Projects which are provided to you from National, Provincial or District agencies, and in conjunction with Provincial/District staff, determine:</p> <ul style="list-style-type: none"> • Which plans, projects and/or policies have the potential to have a major impact upon Development Planning in your Commune; and • Assess whether the Commune Development Planning should be revised to incorporate such higher level proposals.

Use of Statistics

Outputs Expected
<ul style="list-style-type: none"> • A review of selected parts of Commune Data Books for 2006 – 12 to identify issues for consideration during the training process and for compiling future databases • A review of the comparative results of available Commune data from the IDPoor surveys.
Data Availability
<ul style="list-style-type: none"> • Commune Database for 52 individual items in 4 categories (Population, Economy, Household and Accessibility) for the years 2006 – 12 is contained in Annex 1 to this Manual. • Comparative indices for all Communes from Round 5 of the ID Poor surveys from 2004 – 12 are contained in Annex 2 to this Manual.
Information
<p>District, Commune and Village Data Books</p> <p>These Data Books contain a number of questions, the responses to which could be used to make a Vulnerability Assessment of various current and changing Vulnerabilities⁵ to climate change, whether they be to structures, systems or to people. These Data Books are produced annually (in December) and contain a wealth of extremely detailed information about District, Commune and Village life. As such they can provide the basis of a bottom-up analysis of whether climate change is affecting such communities.</p> <p>There are several ways in which such data can generally be used:</p> <ul style="list-style-type: none"> • As a comparison of the Commune/Village with other Communes/Villages or averages for the whole District, Province or Country. This can be used for comparing growth rates and other performance related data (e.g. national standards for service provision) to assess if the area is different from other areas. This should lead to an investigation or discussions into any reasons for differences. It can be done for one point in time or preferably as a time series. • As a comparison of data over time within the same Commune/Village. A mass of detailed information now exists from 2006 which provides sufficient time to examine any trends or anomalies which may be apparent in the data sets. <p>Abridged versions of the Data Books can be found online on the National Committee for Sub-National Development (NCDD) web site http://ncdd.gov.kh/.</p> <p>However, there must be confidence that available statistics are accurate if they are to be used to analyse changes or as a comparison between areas and then used as an input to future planning. Much of each Commune's data should logically be a sum of the various villages in the Commune. Much District data will be a sum of data in all of its Communes. However, when data is collected there can often be interpretation of what is required, which can often lead to inaccuracies. This can mean that data from year to year and from place to place cannot easily be compared. A recent expansion of the number of items to be collected has also provided a challenge for those wishing to compare new categories with older ones.</p>

⁵ Vulnerability is defined as “the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards”. Vulnerability Assessment is defined as “assessment as to the degree of loss to a given element at risk (or set of elements) resulting from a given hazard at a given severity level”.

This is therefore an exercise to look at the assembled data and ensure that it reflects reality as far you understand it. Any anomalies or inaccuracies can then be taken into account during the training and it can also be used as an input for improving the data collection system in future years. The following data should be checked for each Commune as examples of figures which require further investigation. They have been identified because perhaps they do not follow an expected trend, they may be erratic or they may not correspond with other data which has been collected.

Commune Ou Oknha Heng	Year 2010: numbers raising fish. Year 2009: houses with electricity. Earth roads 2009 – 10. Distance to health centre 2011.
Commune Prey Nob	2011: own no rice land. Unprotected dug wells 2011 – 12. Source of water all years. Roads earth and non-earth 2009.
Commune Tuol Totueng	Rice mills 2010 onwards. Potable wells all years. Unprotected dug wells all years. Bridges (metres) 2009 onwards.
Commune Sameakki	Houses with electricity 2011. Potable wells 2010. Unprotected dug wells 2011. Access (village centre to nearest road) 2011 – 12.
Commune Tuek L'ak	Own rice land 2011. Rice mills from 2010 onwards. Road access (village centre to nearest road) 2011 – 12.
Commune Tuek Thla	Rice area and % used from 2010 onwards. Motor boats from 2010 onwards. Water source all years. Earth roads 2010. Road access (village centre to nearest road) 2011 – 12.
Commune Peam Krasaob	Raising fish 2008 onwards. Potable wells 2011. Road (non-earth and earth) 2008 onwards. Bridges (metres) 2008. Drainage culverts 2008 onwards.
Commune Tuol Kokir	Unprotected dug wells 2011. Earth roads 2010 – 11. Bridges 2007 onwards.

ID Poor Programme⁶

The household questionnaire of the ID Poor survey collects information regarding various socioeconomic characteristics of poverty which are easily observable and verifiable, including household construction materials, main income activity, asset ownership and dependency ratio. Responses to these questions are weighted and summed to produce an ID Poor Score for every interviewed household, whereby the highest ID Poor Scores are associated with the poorest households. The weights given to each question were determined in close consultation with communities throughout Cambodia; as such, the contribution of a socioeconomic characteristic to a household's ID Poor Score conveys the relative importance of the characteristic in understanding poverty as defined by the communities themselves.

The ID Poor survey provides an opportunity to assess each Commune's relative vulnerability to risk throughout the country and an indication of how that vulnerability has changed over time.

Process

Review the statistics provided for your Commune for 2006 – 12 and determine:

- If there are individual numbers which need to be reviewed and reconsidered; and
- Whether the statistics generally describe the situation in your Commune for the given years.

⁶ The Identification of Poor Households (IDPoor) Programme was established in 2006 within the Ministry of Planning to officially establish national procedures for identification of poor households and to realise their implementation throughout Cambodia

Population

Outputs Expected

- An understanding of population dynamics in the commune from 2006 – 12 in terms of growth rates, household formation, migration, gender and vulnerable persons

Data Availability

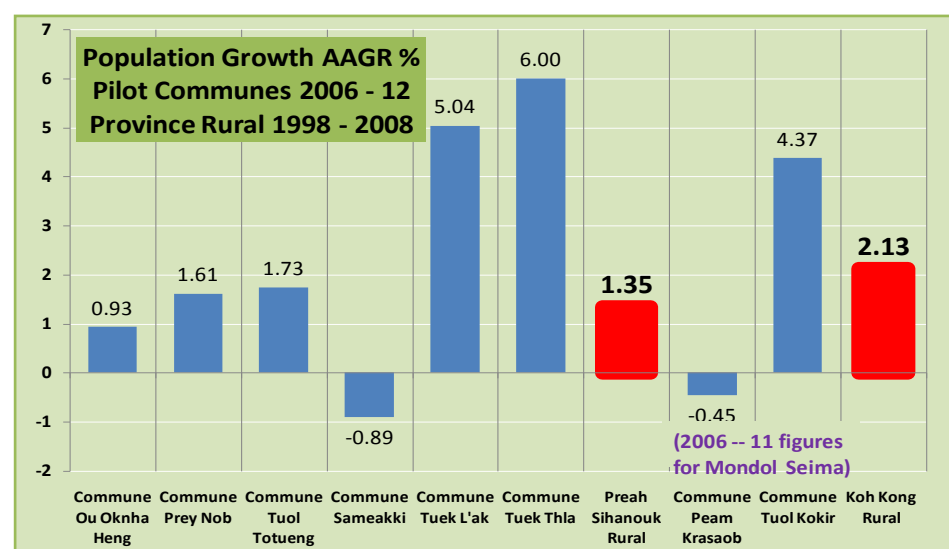
- Commune Database Online categories as follows (2006 – 12):

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Population • Families • Female Headed Families • Population at working age (18 - 60) • Vulnerable Elderly No Guardian • Victims of Natural Disasters • Vulnerable Disabled | <ul style="list-style-type: none"> • Migration: Permanent In • Migration: Permanent Out • Migrants going out for work • Of which Female • Migration: Temporary In |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Information

“Population” is being examined to assess the relative growth in numbers of people over time which can be used a proxy indicator of the overall attractiveness of the area to residents and potential migrants. The following graphic (**Figure 1**) depicts the population growth rates (Average Annual Growth Rates or AAGR) of the 8 pilot Communes over 6 years (5 years for Communes in Mondol Seima) from 2006 – 12. This is compared to the AAGR of the rural parts of both Koh Kong and Preah Sihanouk between the two Census periods of 1998 – 2008. This is not intended as an exact comparison: it uses data which is easily available and which can be used to alert practitioners to potential issues which can be studied in more detailed in other data.

Figure 1: Population Growth of Communes and Rural Provinces



It is clear in Preah Sihanouk Province that Communes Prey Nob, Tuol Totueng and Ou Oknha Heng have population growth rates at about the rural provincial average. Two other Communes, Tuek L'ak and Tuek Thla have higher rates and Sameakki has negative growth rates. In Koh Kong, Commune Tuol Kokir has substantially larger than average growth rates while Peam Krasaob is negative.

The wide variety of rates suggests that each Commune has very different characteristics which could be influential in attracting or even deterring settlement in the area. It will obviously be important to understand the reasons for this variety. Other more detailed data may be able to assist in this task.

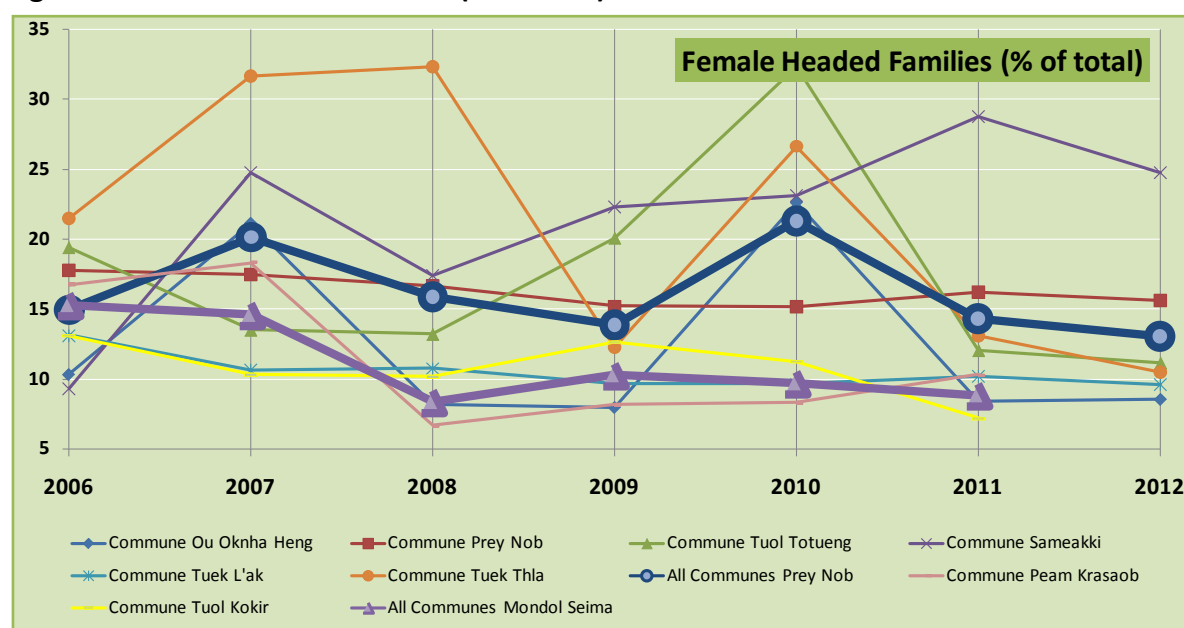
The rates of population growth may also be important when considering the potential future vulnerability of the people to climate change risks. An increasing and vulnerable population can be more susceptible to the impacts of climate change if they locate in potentially disaster prone areas or live in hazardous conditions.

Gender and Vulnerable Persons

The number or proportion of female headed families is often taken as an indicator of vulnerability especially when a disaster hits an area. Women with a reduced support network and often with young children, will have special needs at such times but may have limited resources to deal with disasters. The number of disabled and elderly persons may also be examined to assess the potential mobility of residents and the speed at which they could react to adverse events.

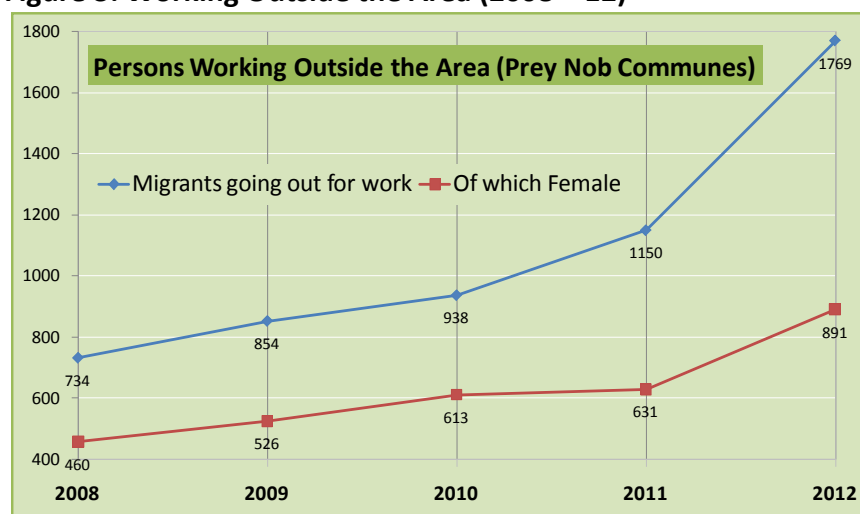
However, in the case of the 6 pilot Communes in Prey Nob District the data is inconclusive as shown (**Figure 2**). Rates of female headed households within Mondol Seima (in the 2 pilot Communes) are around 9% and stable over the past few years. In the 6 pilot Communes in Prey Nob the current average is about 13% with significant variations over time and between communes. There are higher figures in both Prey Nob and Samakki communes with the latter having a quarter of all households being female headed.

Figure 2: Female Headed Families (2006 – 12)



There is a clear relationship with migration numbers in terms of the male/female mix of those seeking work outside the Prey Nob pilot Communes although not in those Communes in Mondol Seima. The number of persons going out to seek work in these communes has increased from 734 to 1769 persons annually (2008 – 12), although, since 2010, these are increasingly men (**Figure 3**). Clearly, more males are going out to search for work with the women staying behind to look after the family. All things being equal, this suggests an increased vulnerability to natural disasters such as extreme weather events.

Figure 3: Working Outside the Area (2008 – 12)



Process

Review the available data for your Commune and answer these questions:

Population

- Has your Commune's population (2006 – 12) grown slower or faster than the Provincial average?
- What do you think is the reason for this difference in growth rates?
- Is there any way to reverse the outward migration of people, especially women?

Climate Change

- Do you think any of these reasons for faster/slower population growth relates to climate change or extreme weather events? If so, what reasons.
- Which events caused the "Victims of natural disasters" given in the statistics?

Economy

Outputs Expected

- An understanding of the economic structure of the commune and how/why this may have changed from 2006 – 12.

Data Availability

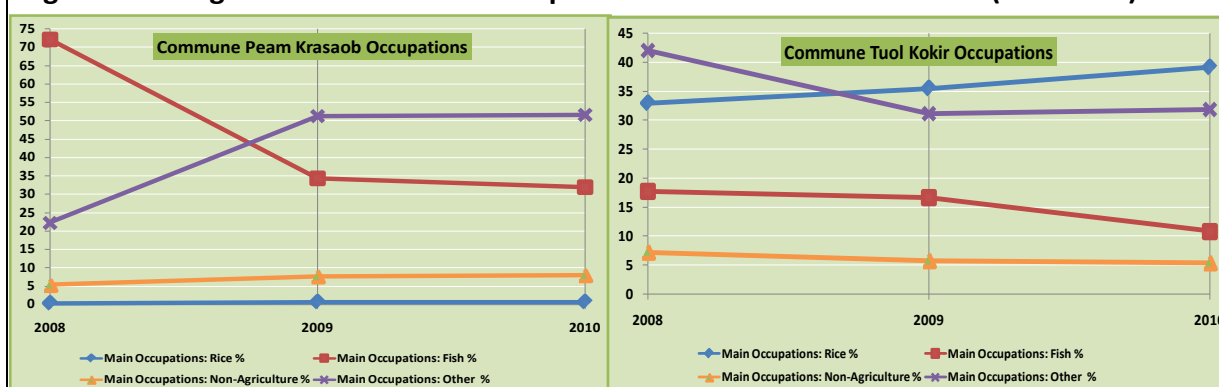
- Commune Database Online categories as follows (2006 – 12):

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Main Occupations: Rice • Main Occupations: Fish • Main Occupations: Non-Agriculture • Wet Rice Yields • Rice Area • Rice Area • Rice Area irrigated in dry season • Access to Irrigation System • Own Rice Land < 1 ha. • Own No Rice Land • Rice Mills (small, medium & large) | <ul style="list-style-type: none"> • Total Motor Boats • Raising Fish • Of which in Pond (others in cage) • Fish Ponds • Raising Shrimp/Prawn • Shrimp/Prawn Ponds • Shrimp/Prawn Ponds |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Information

Worldwide the proportion of urban dwellers has increased over time and now exceeds 50%. The same can be said for occupations, with a smaller proportion needed in and wanting to be involved in rural activities. The type of livelihood undertaken will vary according to many factors, including climate change. The following chart (**Figure 4**) depicts extremely different employment patterns for the main occupations for families in two Communes in the same District. A practitioner might want to investigate why the proportion of families involved in fishing in Peam Krasaob declined and was replaced by other agricultural employment. The number of those involved in fishing in Tuol Kokir also declined in the same period but was replaced by rice farming.

Figure 4: Changes in families' main occupations in Mondol Seima District (2008 – 10)



Unfortunately, from 2011 onwards this data relates to individuals and not families so more recent data cannot easily be compared.

Process
Review the available data for your Commune and answer these questions:
Population
<ul style="list-style-type: none"> • Has your Commune's employment (2006 – 12) in each of the following: rice, fish and non-agricultural jobs, increased or decreased? • Why do you think these increases/declines have occurred? • Is there potential to increase the areas (hectares/m²) or season (weeks/months) allocated to either rice or shrimp farming? • Do you expect a change in the proportion of people employed in rice, fish and services in future? If so, why?
Climate Change
<ul style="list-style-type: none"> • Do you think any of these reasons for previous changes in types of employment relates to climate change or extreme weather events? If so, what reasons. • Do you expect climate change and/or extreme weather events to influence employment in future?

Housing & Utilities

Outputs Expected

- An understanding of changes in the quality of housing and access to utilities and how/why this may have changed from 2006 – 12.

Data Availability

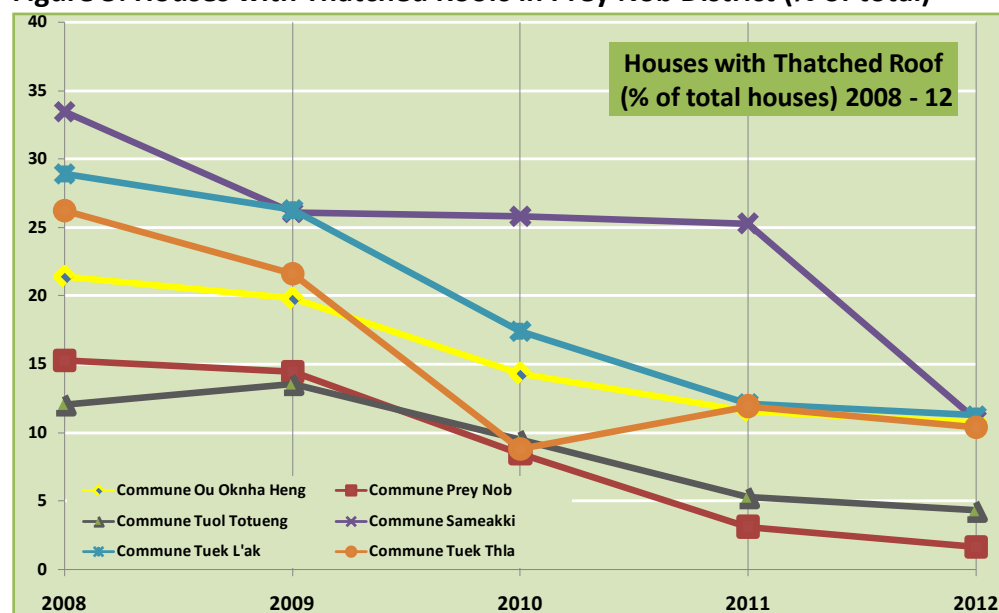
- Commune Database Online categories as follows (2006 – 12):
- Housing: Total
- Housing: Thatched Roof
- Housing: with electricity
- Living on Public Land
- Battery Charging
- Potable Wells (Pump, mixed, ring)
- Of which unusable dry season
- Wells (pump, mix, ring) need repair
- Unprotected dug wells
- Of which unusable dry season
- Source >150 m from home
- Dry season safe water (pump, mix, well)
- Dry season unsafe (ring, dug, pond, river)

Information

Housing Quality

The following chart (**Figure 5**) shows details of the number of houses with thatched roofs in all 6 of the Prey Nob communes. Commune leaders could compare data between areas as a proxy for development progress and income levels in their commune or as potential vulnerability to a disaster such as a windstorm/cyclone. In this example all Communes have dramatically reduced their vulnerability in recent years by changing to zinc/fibro roofs.

Figure 5: Houses with Thatched Roofs in Prey Nob District (% of total)



Electricity

Similarly, data on electricity can be used as a proxy for development progress. A comparison of data for the pilot communes in both Prey Nob and Mondol Seima shows that indeed the percentage of houses with electricity has increased in recent years, but much faster (from a lower

base) in Prey Nob. (Figure 6).

Access to Potable Water

Some data does immediately suggest that there may be an issue to be resolved. In the chart (Figure 7) below, accessibility to safe and unsafe potable water is shown for families in the 2 pilot Communes in Mondol Seima District. The data suggests that in Commune Peam Krasaob accessibility to safe water has improved during 2008 – 10 while the reverse seems to be true for Commune Tuol Kokik. It would certainly benefit for the two Communes to liaise to examine what factors have changed in the 2 years to create such a big difference in results. Unfortunately, this data does not seem to be available for years 2011 onwards.

Figure 6: Houses with Electricity in Prey Nob and Mondol Seima (2008 – 12)

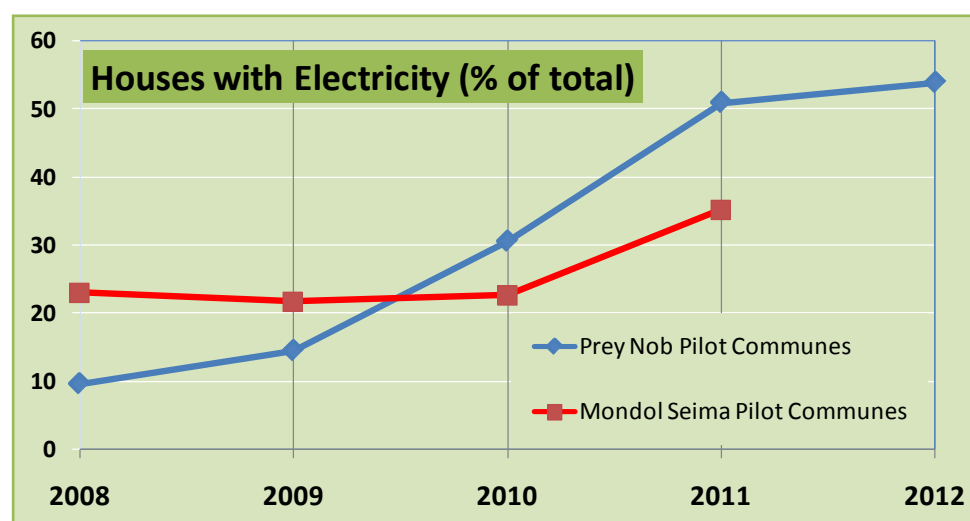
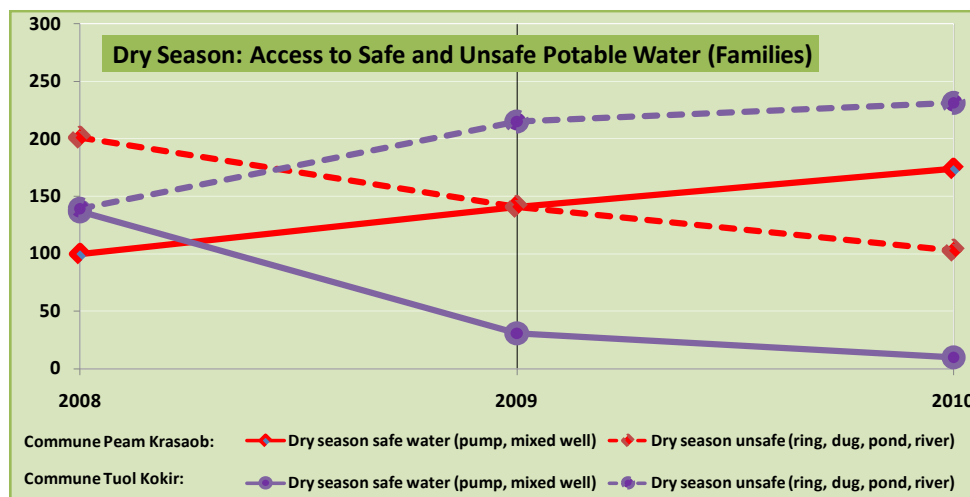


Figure 7: Dry Season: Access to Safe Potable Water, Mondol Seima District



Potable water provision in future will increasingly be through a centralised supply rather than individual wells as this can be made more secure in terms of pollution and seasonality. There is data on current potable water supplies in terms of wells and how many of these are unusable in the dry season. However, this data is extremely erratic and seems to have been discontinued from 2011 onwards.

Solid Waste Disposal

Although often not considered to be of high priority, the uncontrolled disposal of solid waste has the potential to cause health issues through increased breeding of disease vectors, contamination of water supplies and blockage of water channels. This can become a major issue when solid waste is dumped in areas subject to flooding and SLR.

Process

Review the available data for your Commune and answer these questions:

Housing

- Compare changes in population and housing in your Commune (2006 – 12). Have they changed at similar rates or is there now a housing shortage or surplus?
- Has the quality of housing generally improved since 2006?

Utilities

- Is the electricity supply mostly reliable or do people still need to rely on batteries/generators when there are power cuts?
- Are there any major communal or shared water supply sources, especially for the dry season? Please locate them on the map and describe what sort of facility (e.g. piped, well, tank, lake).
- Which areas tend to have problems with water supply (quality, amounts), especially during the dry season? Please locate them on the map.
- Is there any potential to create a centralised water supply system which can collect water and serve the whole Commune?
- Is there a solid waste disposal site in the Commune? If no, where do people dispose of their waste? If yes, is it a controlled site?

Climate Change

- When housing is improved or newly built do the owners/builders include any provision for climate change in the designs? If yes, list any such as:
 - raising building on stilts or raising foundations,
 - including gutters and rainwater harvesting
- Do any buildings utilise renewable forms of energy?, e.g. solar/photovoltaic panels or wind.
- Are public buildings designed to take account of any unstable/weak soils in low lying areas (e.g. through piling or minimising weight of structures)?
- Have Dry Season safe water supplies been increasing or decreasing (number, quality) in recent years? If supplies have been decreasing is it due to climate change or to an increase in the population and demand for water?

Accessibility

Outputs Expected

- An understanding of how accessibility within and from the Commune has changed from 2006 – 12.

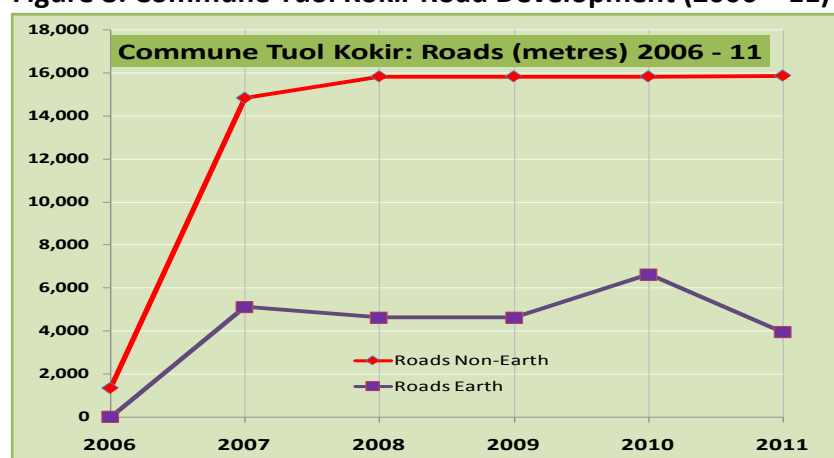
Data Availability

- Commune Database Online categories as follows (2006 – 12):
- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Roads Non-Earth • Roads Earth • Bridges • Bridges • Drainage Culverts | <ul style="list-style-type: none"> • Road Access • Distance to nearest primary school • Distance to Market • Distance to Health Centre |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Information

Improved accessibility can be shown through changes in both the length and quality of roads within a Commune. So as shown below (**Figure 8**) for Tuol Kokir, it can be seen that the total length of roads (metres) has increased (2006 – 11) as has the amount of non-earth roads. Such information can also be supported by increases in numbers/metres of bridges and culverts. In the figure it can be seen that several metres of earth road were converted to non-earth during 2008.

Figure 8: Commune Tuol Kokir Road Development (2006 – 11)



Improved accessibility should also reflect the general development of the Commune and thus reduced distances to key facilities such as markets, health centres and schools. At present there is a wide range between Communes in accessibility to such facilities. Distances for the 8 Communes range from 0.38 – 1.63 km for Primary Schools; 6.5 – 19.5 km for Markets; and 2.5 – 22 km for Health Centres.

Improvements in accessibility are made through “projects” which also show that the government and the people living in the Commune are committed to the future of the area. Areas with less potential and support tend to have less projects which in turn leads to out-migration. Similarly, Villages/Communes which are close to existing District/Provincial centres and main roads tend to receive more projects and support than settlements which are more remote.

In terms of Climate Change, there is a tendency for engineers to automatically refer to expected SLR and then specify a higher Elevation Code (EC) for roads/buildings to address this issue.

However, raising the level of roads and/or buildings can often have adverse affects elsewhere unless fully considered at the planning and implementation stages. The raising of road heights needs to be considered in conjunction with transverse drainage to ensure that any flood waters can be drained from the area after heavy rain and not remain to cause prolonged and worse flooding. Raising of road heights should also consider intersections with other roads which may not be raised, access for those living (often below the new EC) alongside the road and also for bridges along routes which may be expensive to raise.

The raising of buildings by filling can also lead to “ponding” of water and flooding of low-lying plots in the vicinity, so the area’s drainage needs to be carefully considered prior to such works. Ponding can also lead to health risks from stagnant water and/or increase in mosquito breeding sites.

Process

Review the available data for your Commune and undertake the following:

Accessibility

- Draw the main access route from each Village in the Commune towards the nearest main (National/Provincial/District) road either within or outside the Commune.
- Locate the position of any Primary School, Health Centre or Market within the Commune on the map (or the nearest ones if outside your Commune).
- If you want to sell/buy goods do you go to this Market or elsewhere? If elsewhere, where and how far away (Km/Minutes)?
- Indicate on the map any new/improved routes (earth or non-earth) which would improve peoples’ accessibility
- For those with water access, locate any existing jetties. Indicate on the map any new/improved jetties/moorings which would improve peoples’ accessibility.

Based on the above:

- Has accessibility within the Commune increased since 2006?
- Can accessibility be improved more? If yes, how?
- In Figure 8 can you spot an anomaly in the data that should be investigated?

Climate Change

- Locate the positions of any roads which regularly flood
- Locate the positions of any roads/bridges/culverts which are subject to erosion
- Locate the position of any dykes and highlight any areas (including water control devices) requiring improvement
- If the Commune was to experience a SLR of 100 cm (refer to topographical map) which routes would be affected? Would the whole Commune still be able to gain access to a main (National/Provincial/District) road
- Do all your road/bridge/culvert project proposals include an allowance for possible Climate Change or extreme weather events in terms of:
 - SLR (increased height of structure),
 - Salinity (reduced exposure or increased protection for metal)
 - Heat (materials, especially road surfaces)
 - Allowance for unstable and weak soils in low lying areas (e.g. piling)
- If road proposals are for higher elevations, do they consider the impact of the raised road on drainage patterns, especially the potential for inadvertently retaining flood waters after heavy

rains?

- If there have been any proposals for structures such as dykes or jetties, have they included an allowance for Climate Change? (e.g. SLR, storm surges, wave action, cyclone winds)
- If there have been any proposals for structures such as dykes or jetties, have they included an allowance for unstable and weak soils in low lying areas? (e.g. piling)

Identified Issues

Outputs Expected

- A review of issues which were previously identified and mapped by the Commune and which affect living and working conditions in the area

Data Availability

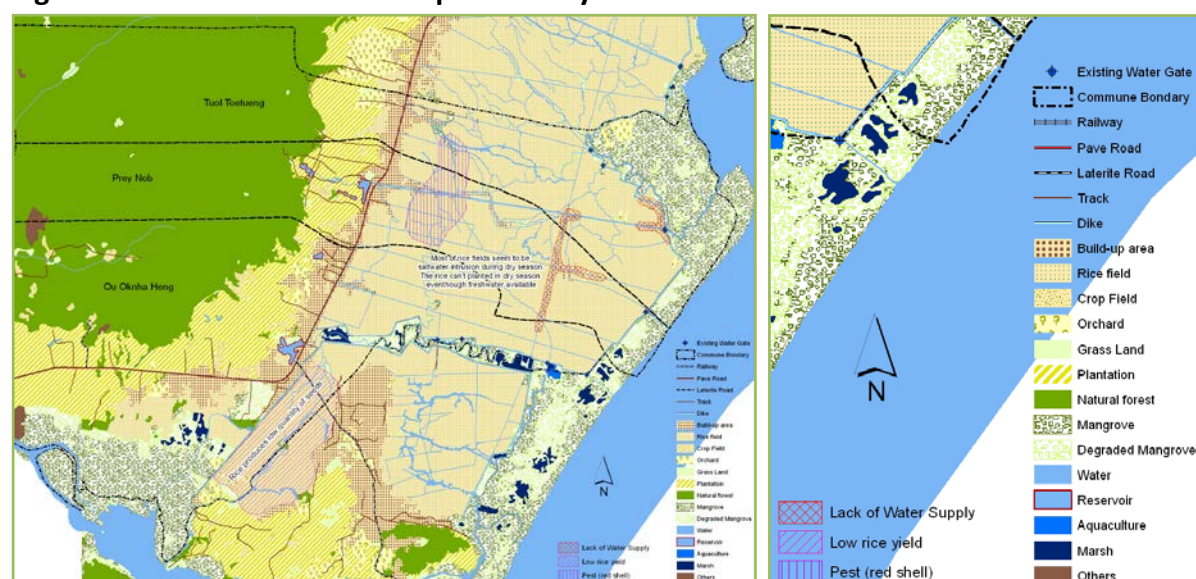
- Maps provided by CARP on which each Commune has added its identified issues

Information

In conjunction with the CARP project, commune representatives have previously identified and mapped the locations of major issues in their area which affect living and working conditions. These issues include extreme weather events such as storms and floods, as well as other potential climate change related issues including low rice yields, impact of pests and restricted water supply.

The example given below (**Figure 9**) is from the southern part of Prey Nob District. Highlighted problems on the land use base focus on areas where representatives from the pilot Communes have identified a lack of water supply, low rice yields and occurrence of pests.

Figure 9: Identified Problems in part of Prey Nob District



Process

Review the maps that were previously prepared for your Commune and:

- Consider whether you wish to make any changes to the information already provided
- Add any additional issues that you may have identified as a result of this training session today.

NOTE: Any identified projects to address these issues should NOT be added at this stage

Land Use Planning & Climate Change Adaptation

Outputs Expected
<ul style="list-style-type: none"> An understanding of how Climate Change may result in a need for the Commune to adapt to changing circumstances.
Data Availability
<ul style="list-style-type: none"> Maps provided by CARP on which topography has been marked.
Information
<p>Assumed Climate Change in Cambodia</p> <p>The ADB recently reported⁷ that “Cambodia’s high vulnerability to climate change is attributed to its low adaptive capacity and high reliance on climate-sensitive sectors such as water resources and agriculture. The 2011 floods alone, for example, caused an estimated \$451 million in damage and \$174 million in losses. Analysis of 14 general circulation models suggests that the onset of rainfall will commence later, wet season rainfall will increase (bringing more flooding) and dry season rainfall will decrease (leading to droughts). Finally, Cambodia’s 435-kilometre coastline and large parts of the Mekong River flood plain may be affected by Sea Level Rise, which is projected to make additional areas vulnerable to floods, salinity intrusion, and coastal inundation, with adverse implications for food and water security and infrastructure stability. Climate change thus poses a serious threat to sustainable development in Cambodia”.</p> <p>The CARP project⁸ has assumed the following:</p> <ul style="list-style-type: none"> A Sea Level Rise of 18 to 56 cm by the 2090s. An increase in rainfall along the coast by 2 to 6% by 2050. And a consequential increase in frequency and intensity of flooding events due to more frequent episodes of heavy rainfall. An increase in mean annual temperatures by 0.3 to 0.6 °C by 2025, by 0.7 to 2.7 °C by the 2060’s and by 1.4 to 4.3 °C by the 2090’s. This increases the risk of periodic droughts as well as a substantial increase in the number of ‘hot’ days and nights. <p><i>Sea Level Rise (SLR)</i> combined with a decline in mangroves, and an increase in the frequency and intensity of storms and storm surges, has already led to some coastal inundation. A consequence is the salinization of the land surface as well as the groundwater, impacting the fertility of farming areas as well as freshwater ecosystems. This poses a threat to food security and livelihoods because most agriculture in the coastal zone is concentrated on these flood-prone low-lying coastal areas. Infrastructure in the coastal zone also comes under pressure, leading to increased vulnerability over time and lost/interrupted income due to reduced accessibility.</p> <p><i>Increasing rainfall</i> particularly at the coast. Storms occur almost every year from mid October and through December. However, with climate change causing more variable weather, there may be an increase in both the intensity and frequency of flooding events. Flooding, heavy rainfall and storms destroy property and productive assets, such as crops and livestock. Flooding will often lead to polluted water supply and unsanitary/unhygienic conditions, causing serious health issues</p>

⁷ Kingdom of Cambodia: Mainstreaming Climate Resilience into Development Planning, Project Number: 45283. Capacity Development Technical Assistance (CDTA). September 2012.

⁸ Assessment of Community Vulnerability and Risks from Climate Change in the Coastal Zone of Cambodia. October 2012.

and outbreaks of disease. An increased frequency of storms will also affect cultivation, fisheries and coastal erosion.

Temperature rises increase the likelihood of droughts and hot days/hot nights. Droughts or heat waves will ultimately cause water scarcity. All such issues have a detrimental effect on the overall health of people, crops and livestock. An increase in temperature or occurrences of heat waves will also reduce the ability of people to work due to heat stress. Though only a minor concern in coastal areas today, this scenario may escalate if the weather becomes more irregular, in which case the coastal area will be particularly vulnerable.

Coastal Communities and Climate Change

Without assistance those living in coastal areas will struggle to adapt to climate change through lack of capacity to act, as stated in a recent policy brief⁹:

- Lack of capacity to secure fisheries and agriculture activities in coastal villages to bring continuity to food security
- Lack of capacity amongst coastal villagers to meet water resource needs economically during flood and drought cycles outside of rice production needs
- Lack of capacity amongst coastal villagers to lower the impact of drought on home based food production systems to ensure food security throughout the year
- Lack of capacity amongst coastal villagers to access development services appropriately, e.g. micro-finance institutions, livelihood technologies, and natural resource management capacity development
- Lack of capacity amongst coastal villagers to engage in local level participation in natural resource management initiatives to sustain a diverse set of rural livelihood strategies and family nutritional needs

All of these issues have relevance for land use planning in terms of community involvement in decision making with regard to CDPs and CLUPs and also in the design and implementation of supporting infrastructure and other facilities.

Land Use Planning and Climate Change

Land Use Planning relates mainly to the zoning of land for defined purposes and to the locating of infrastructure/services in a way which best serves the current and future expected needs of the immediate community and the wider public good (e.g. delineation of national parks). Together with building control it can be used to create a regulatory framework within which areas are intended to develop.

As a matter of course land use planners consider current land suitability and availability as key considerations as part of a plan generation process. Climate change is relevant to both as land may become both unsuitable and/or unavailable in future depending on actual changes in climate such as Sea Level Rise (SLR). Planners must therefore consider that such factors are not fixed and may change over time.

Appreciation of the potential magnitude of climate change impacts has meant that land use planners now have to consider future scenarios of where future development should be located as well as considering how to deal with climate change threats potentially affecting currently

⁹ Climate Change Adaptation Knowledge Platform. Policy Brief: Climate Change Resilience in Coastal Cambodia – Adaptive Capacity and Human Development. 2011.

developed areas. It is clearly not sensible to plan future areas in a form or location so that they will be affected by projected climate change in the short and medium terms.

The future (not mutually exclusive) options for both governments and individuals with regard to planning are to:

- Continue current activities with climate change adaptation options being limited to local funding of incremental improvements in current systems of water supply, coastal protection and accessibility with experiments in alternative livelihoods (SHORT-TERM, LOCAL & INCREMENTAL);
- Accept that external (technical/financial) assistance is required through possible changes in livelihoods to adapt to changing circumstances (e.g. mixed rice/shrimp production); more robust infrastructure including water supplies and coastal protection; and individual house improvements to better adapt to climate change (MEDIUM-TERM, EXTERNAL & EVOLUTIONARY);
- Relocate some properties and infrastructure to locations which can be better protected from increasing climate change impacts but make use of opportunities created through a retreating coastline or maintenance of coastal protection devices (LONG-TERM, STRATEGIC & RELOCATIONAL).

However, for individuals or families these options should not necessarily be seen as logically following each other. One person's short-term adaptation approach may be similar to another's long-term solution. Many people have already moved away from coasts to what they perceive to be safer locations while others are more prepared or resigned to remain and adapt over time to changing circumstances.

But governments and especially planners must weigh up the relative costs and benefits of remaining and protecting as opposed to relocating and rebuilding. For example, the financial or economic arguments in deciding whether to build a 5 km seawall to directly protect 200 families from SLR are complex. All providers of public services whether they be roads, power poles or buildings, must take into account some assessment of expected SLR during the projected life of the structure.

As decision making becomes more long-term and strategic it needs to consider expected impacts of climate change and make choices between adaptation in situ or relocating to more suitable locations. These decisions will involve the allocation of huge amounts of investment in infrastructure and services by the government and directly impact on the private sector and individuals in their choices of where to live, work and play.

Interconnectivity between rural and urban areas

The coastal area consists of a mixture of land uses, from large urban areas to small hamlets and from mangrove fringed paddy fields to elevated natural forests. However, they are intimately connected. The urban areas serve as the means to market rural produce and in turn provide centralised services utilised by those living in rural areas. On one hand, there is a need to relate what is planned and implemented at the urban level with the rural activities that support urban functions. At the same time, if rural activities are affected by sea-level rise or increased salinity, this will feed into production, incomes, employment and investment and directly influence the well-being of the urban area.

Unlike urban areas, the majority of the population in the rural coastal project areas relies heavily and directly on agriculture and therefore on expected seasonal climatic fluctuations, particularly

in rainfall. Lack of fresh water or uncertain/erratic supplies has historically always had severe implications both for livelihoods and the direct ability of the population to survive. The resilience of such population is being further tested by SLR together with associated increases in seasonal salinity in water courses and water supplies. This is increasingly an issue during the dry season and means that drinking water has to be purchased from elsewhere and alternative livelihoods to growing rice need to be sought. In addition, the potential impacts from extreme weather events may be more devastating than gradual climate change events such as any currently expected rise in sea levels. Disaster Risk Management (DRM) initiatives may therefore become a higher priority in future if the frequency/magnitude/duration of such events increase¹⁰.

This situation has contributed to a significant shift to urban areas in the search for more lucrative, secure and less physically demanding work. Over the last 10 years the urban population of Cambodia has grown at a rate of between 3.9 and 4.5% AAGR. (2003 – 2010). The rural parts of both Koh Kong and Preah Sihanouk provinces (which contain the project's 8 Communes) have grown at 1.4 – 2.1 % over the period 1998 – 2008. Incomes have risen slower in rural areas and a significant part of rural incomes now comes from non-agricultural sources such as service employment (including tourism) and remittances from family members living elsewhere. It is increasingly the case that rural populations are unable to survive purely from traditional agricultural and other rural activities.

Adaptation

In urban areas, potential adaptation measures are mostly related to the preservation of the built environment and involve large numbers of people with similar circumstances. However, in coastal rural areas the impacts of climate change can be reflected in changes of land cover (e.g. through erosion, increased salinity), livelihoods undertaken (e.g. moving from rice to shrimp farming) as well as the viability of infrastructure and services (e.g. contaminated wells or pressure on dykes).

In urban areas the sheer weight of population numbers and investments means that adaptation rather than relocation is usually the preferred option. In coastal rural areas it can be expensive to plan for climate resilience, given the small numbers of people involved and if they still cannot be persuaded to remain following any adaptation investments.

However, climate change is only one of several factors influencing land use planning decision-making. Other factors such as the government's socio-economic policies and investment plans are likely to be more significant. In rural areas, land tenure is probably the most important factor in development decisions. So although these guidelines are intended to incorporate climate change into land use planning, it should not be assumed that climate change considerations per se will be the main factor determining decisions.

Process

Some Climate Change models have projected SLRs of up to 1 metre (100 cm) by the end of this century. Using the topographical information provided you are requested to try to imagine a situation where average SLR was 150 cm. As planners and if such a situation occurred, you are asked to decide how the Commune could still function. Review the available data for your Commune and undertake the following:

¹⁰ The issue of frequency of events requires more study: whether such a weather event would occur more often (perhaps a 1 in 10 year event) instead of every 50 years. Such information would have a major influence on government investment decisions and construction standards in affected areas (protect, adapt or relocate) and also on those of businesses and residents.

Climate Change
<ul style="list-style-type: none">• Locate all land remaining above the 150 cm contour.• Decide which populations may have to adapt or be resettled.• What would be required for populations to adapt and not be resettled?• Identify which land may be suitable and available for resettlement.• Identify which schools, clinics, markets may need to be relocated.• Suggest viable livelihoods for those living in the Commune in such circumstances

Disaster Risk Management (DRM)

Outputs Expected
<ul style="list-style-type: none"> • A review of the Commune's preparedness for extreme weather events
Data Availability
<ul style="list-style-type: none"> • Feedback from Commune representatives on current plans and procedures
Information
<p>Extreme weather events include storms, floods, cyclones and/or fires which can occur on a seasonal or occasional basis. Compared to more gradual climate change, extreme weather events are usually short-lived, but with the potential for immense focused damage as well as longer-term impacts. This is especially so for those living in often flimsy buildings in low-lying coastal areas which are more susceptible to both water and wind based events.</p>
Process
<p>Review the procedures that are in place for the Commune to be warned and to pass on warnings of expected extreme weather events. Specifically:</p> <ul style="list-style-type: none"> • What are the procedures for the Commune to receive warnings about expected extreme weather events (e.g. siren, mobile phone, SMS)? • How does the Commune leadership pass on any warnings to the people? • What actions do any early warning plans/training propose in the event of any impending event (e.g. escape route, nominated safe buildings, rendezvous points, responsibilities for evacuation)? • Could the current system be improved, and if so, how? • Do any infrastructure/facilities need to be improved specifically for addressing potential extreme weather events?

Inputs to Commune Development Planning

Outputs Expected

- A map and description of future projects which are considered by the Commune to be relevant in addressing Climate Change and extreme weather event concerns in the area.

Data Availability

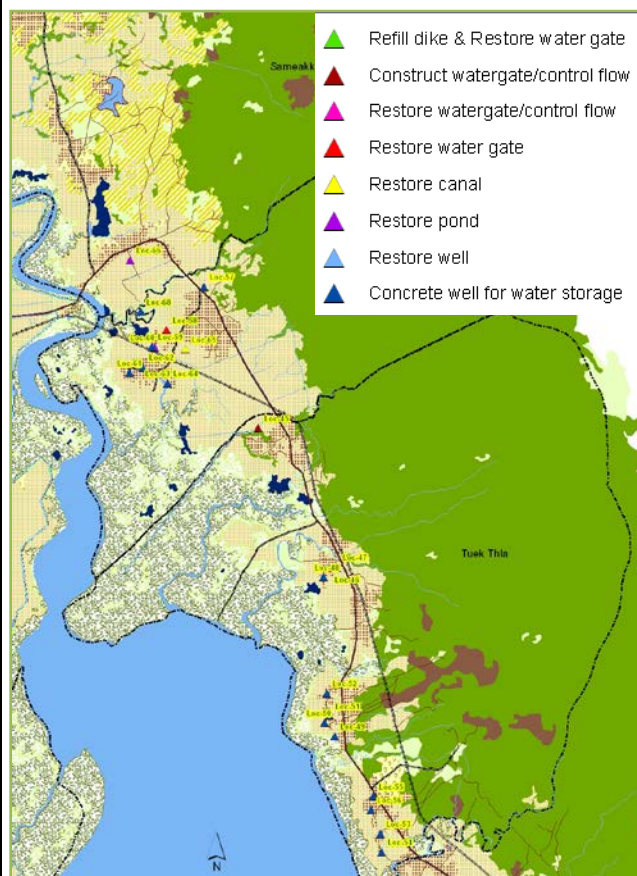
- Maps previously provided by CARP on which each Commune has added its identified issues, together with any additional work prepared during the training session.

Information

You have now worked with statistics, maps and Provincial/local knowledge to understand how your Commune functions as part of the District/Province and also what challenges exist in future for the continued successful functioning of your Commune. In this final chapter of the guidelines you are asked to review your current Commune Development Planning and supporting projects in light of all that has been discussed.

In conjunction with the CARP project, commune representatives have previously identified and mapped the locations of proposed priority projects which they believe will address climate change impacts. The example given below (**Figure 10**) is from Mondol Seima where the pilot Communes have identified a number of water related projects which mostly relate to extending the provision of potable water longer into the dry season.

Figure 10: Proposed Priority Projects in Mondol Seima Pilot Communes



Process
On the basis of discussions during the training session as well as previously mapped knowledge you are requested to:
Policies, Plans and Projects and Climate Change
<ul style="list-style-type: none"> • Refer to any proposed National/Provincial/District projects which may have relevance for the Commune. • Review previously proposed projects that the Commune considered priorities in addressing Climate Change and extreme weather event concerns in the area. • Revise/add to priority projects based upon knowledge gained as part of the training process. • Provide broad costs (e.g. < \$10,000, or above that to the nearest \$10,000) and proposed phasing of proposed projects • Propose any other actions, (e.g. Disaster Risk Management, Studies) relating to Climate Change or extreme weather which would be of benefit to the Commune

Annex 1: Commune Data Book Extracts (2006 – 12)

			Commune Ou Olukha Hong										Commune Prey Nob										Commune Tuel Tdueng										TOTAL ALL Communes										Measure
No	Item	Unit	2006	2008	2009	2010	2011	2012	2006	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012								
1	Population	Number	8124	7896	7946	8051	8078	8414	8590	6778	6605	6531	6630	7112	7315	7465	4153	4337	4325	4359	4342	4467	4608	31730	31721	32121	32095	32757	33968	34555							Relative Growth: Attractiveness						
2	Families	Number	1449	1460	1471	1488	1497	1571	1587	1162	1165	1209	1221	1337	1397	1395	739	766	753	814	824	859	865	5796	5909	5976	6313	6566	6780	6836							Family Size						
3	Female Headed Families	Number	149	308	120	118	338	132	135	206	203	201	185	202	226	217	143	103	99	163	266	103	96	866	1190	948	875	1399	971	891							Vulnerability						
4	Population at working age (18 - 60)	Persons			4099	4258	4235	4476	4626			3289	3263	3547	3453	3486			2090	1988	2105	2062	2168			0	0	15932	16074	16446	16727	17034					Attractiveness of Area						
5	Migration: Permanent In	Families	1	13	12	6	10			10	4	2	5	6			34	8	16	16	5		54	32	41	37	25	0	0								Attractiveness of Area						
6	Migration: Permanent Out	Families	4	8	1	4	6			7	4	11	4	6			25	8	25	8	0		39	23	46	34	17	0	0								Attractiveness of Area						
7	Migrants going out for work	Persons		219	246	298	227	281				221	242	265	234	340			58	107	111	271	310		0	0	734	854	938	1150	1769						Attractiveness of Area						
8	Of which Female	Persons		150	158	205	127	138				139	155	166	121	140			53	71	72	111	140		0	0	460	526	613	631	891						Vulnerability						
9	Migration: Temporary In	Families	6	2	2	21	14			29	2	3	5	6			31	7	8	7	4		76	18	33	39	38	0	0								Attractiveness of Area						
10	Vulnerable Elderly No Guardian	Persons	0	5	7	9	8	12	9	11	14	5	10	19	5	6			5	1	3	0	3	3	42	40	35	45	56	62	73						Vulnerability						
11	Victims of Natural Disasters	Families	2	24	20	180	0	15	0	4	24	20	180	0	63	50	0	0	1	0	0	0	3	3	874	1873	142	1725	891	96	55							Historical Disasters					
12	Vulnerable Disabled	Persons	9	14	19	34	18	85	87	5	9	15	2	10	24	27	42	20	33	33	27	35	42	98	93	98	109	75	221	221							Vulnerability						
13	Main Occupations: Rice ^{Note 1)}	Families		963	977	996	2199	2183				1016	1016	1028	2073	2100			721	789	765	1315	1420		0	0	4643	4885	4880	10387	10291						Changes in activities						
14	Main Occupations: Fish	Families		203	166	181	284	295				6	6	14	42	42				0	0	0	14	26		0	0	593	561	723	843	904						Changes in activities					
15	Main Occupations: Non-Agriculture	Families		283	267	272	1408	1458				71	94	173	1143	1218			29	21	35	384	596		0	0	555	605	666	4062	4324						Changes in activities						
16	Wet Rice Yields	Tons/Ha	2.2	0.8	2.3	1.5	2	2.5	3	2.5	1	2.5	2.5	3	2.9	2.9			1.5	3	2.5	3	3	2	0	1.1	2.3	1.8	2.1	2.5	2.4						Attractiveness of Rice						
17	Rice Area	Hectare	1000	750	925	925	970	970	1350	1450	1340	1350	1350	1400	1400	1400			872	872	872	872	872	5102	5477	5813	5832	5877	5667	5667							Attractiveness of Rice						
18	Rice Area	% used	88.5	100	100	100	100	100	100	100	93.1	100	100	100	100	100			98.6	99	100	100	100	98.1	89.7	90.6	90.7	90.2	93.6	93.6							Attractiveness of Rice						
19	Rice Area irrigated in dry season	Hectare	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0							Attractiveness of Rice						
20	Access to Irrigation System	Farming Families		917	966	841		867				990	1016	1028		1060			611	648	765		650		0	0	2518	2630	2634	0	2577						Attractiveness of Rice						
21	Own Rice Land < 1 ha.	Farming Families		661	605	594	235	227				408	402	424	334	334			422	288	368	210	201		0	0	2607	2533	2559	1995	2081						Land Tenure						
22	Own No Rice Land	Farming Families		122	168	133	39	43				223	210	192	84	149			149	164	174	46	46		0	0	667	777	686	375	444						Land Tenure						
23	Rice Mills (small, medium & large)	Number	37	29	40	22	22	19	18	11	11	15	15	10	35	35			8	8	8	4	21	17	70	122	116	100	90	89	87						Attractiveness of Rice						
24	Total Motor Boats	Number		82	87	83	70	70				34	35	41	16	24			12	42	47	70	65	0	0	463	580	615	495	512							Water based economy						
25	Raising Fish	Families	0	3	1	7	54	3	4	41	15	31	42	24	4	3			1	0	1	2	1	1	46	26	42	117	157	9	8						Attractiveness of Fish/Prawn						
26	Of which in Pond (others in cage)	Families	0	3	1	7	54			22	15	6	17	24					1	0	1	2	1	1	26	25	16	87	156	0	0						Attractiveness of Fish/Prawn						
27	Fish Ponds	Number	0	3	2	8	54			7	8	13	56	51					1	0	1	5	1	1	10	17	23	129	190	0	0						Attractiveness of Fish/Prawn						
28	Raising Shrimp/Prawn	Families	0	0	0	0	0	0	1	0	1	0	0	0	0	0			0	0	0	0	0	1	1	1	1	0	0	0	0						Attractiveness of Fish/Prawn						
29	Shrimp/Prawn Ponds	Hectare	0	0	0	0	0	0	0	0	1	0	0	0	0	0			0	0	0	0	0	1	1	1	1	0	0	0	0						Attractiveness of Fish/Prawn						
30	Shrimp/Prawn Ponds	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0			0	0	0	0	0	1	1	1	1	0	0	0	0						Attractiveness of Fish/Prawn						
31	Housing: Total	Number		1384	1451	1440	1530	1498				1148	1171	1285	1346	1389			682	770	752	853	863		0	0	5662	6118	6269	6634	6684						Changes in Housing Quality						
32	Housing: Thatched Roof	Number		296	287	206	177	161				175	169	109	42	23			82	104	71	45	37		0	0	1273	1227	855	739	538						Changes in Housing Quality						
33	Housing: with electricity	Number		134	18	425	890	755				95	425	761	1077	1140			188	178	248	544	648		0	0	547	889	1919	3384	3606						Changes in Housing Quality						
34	Living on Public Land	Families	5	9	12	12	10	10	102	15	4	4	4	2	9				40	38	41	58	62	71	67	248	197	211	266	271	213	217					Land Tenure						
35	Battery Charging	Places	3	5	6	6	5			5	5	6	6	3					2	2	2	1	2		12	16	22	22	15	0	0						Changes in Housing Quality						
36	Potable Wells (Pump, mixed, ring)	Number	113	82	119	134	187	275	218	351	321	352	362	385	289	268			184	69	213	152	320	344	137	1047	965	1186	1131	1279	1665	1482					Water supply conditions						
37	Of which unusable dry season	Number	57	12	33	42	41			27	53	57	65	67					39	20	110	53	54		259	243	254	288	248	0	0						Water supply conditions						
38	Wells (pump, mix, ring) need repair	Number	66	21	38	43	37			47	32	36	33	54					52	7	17	15	15		281	158	228	277	183	0	0						Water supply conditions						
39	Unprotected dug wells	Number	37	108	88	91	81	120	118	142	12	24	24	15	136	124			306	391	378	294	282		391	378	294	282	675	551							Water supply conditions						
40	Of which unusable dry season	Number	5	32	35	38	32			136	8	4	6	9					15	15	0																						

			Commune Sineakkei										Commune Tuek L'ak										Commune Tuek Thla										TOTAL ALL Communes										Measure
No	Item	Unit	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012													
1	Population	Number	4170	4309	4458	4060	3991	4330	3952	3787	3872	3956	4050	4111	4206	4632	4718	4702	4905	4945	5123	5236	5308	31730	31721	32121	32121	32095	32575	33968	34555	Relative Growth, Attractiveness											
2	Families	Number	755	816	823	893	909	953	971	778	783	792	852	876	877	890	913	919	928	1045	1123	1123	1128	5796	5909	5976	6313	6566	6780	6836	Family Size												
3	Female Headed Families	Number	70	202	143	199	210	274	240	102	83	85	82	84	87	89	83	196	291	300	128	299	147	118	866	1190	948	875	1399	971	891	Vulnerability											
4	Population at working age (18 - 60)	Persons	2118	2033	1999	2035	1826				1725	1789	1881	1935	2117		2611	2743	2679	2766	2811			0	0	15932	16074	16446	16727	17034	Attractiveness of Area												
5	Migration: Permanent In	Families	3	2	1	2	1	2	3	3	2	2	0	3	2	0	6	4	6	6	3			54	32	41	37	25	0	0	Attractiveness of Area												
6	Migration: Permanent Out	Families	1	15	1	1	1	1	0	1	1	1	1	1	1	3	2	7	2	3			39	23	46	34	17	0	0	Attractiveness of Area													
7	Migrants going out for work	Persons	46	63	37	55	100				63	68	90	160	435		127	128	137	203	303			0	0	734	854	938	1150	1769	Attractiveness of Area												
8	Of which Female	Persons	21	20	24	32	44				32	51	62	86	219		65	71	84	154	210			0	0	460	526	613	631	891	Vulnerability												
9	Migration: Temporary In	Families	1	0	0	0	0	1	1	2	2	2	2	4		9	6	17	4	12			76	18	33	39	38	0	0	Attractiveness of Area													
10	Vulnerable Elderly No Guardian	Persons	3	16	16	14	17	34	34	1	1	1	2	4		10	22	3	7	8	15			42	40	35	45	56	62	73	Vulnerability												
11	Victims of Natural Disasters	Families	216	342	38	39	41	0	0	0	457	778	20	545	0	0	195	705	43	781	850	15	2	874	1873	142	1725	891	96	55	Historical Disasters												
12	Vulnerable Disabled	Persons	8	13	12	14	11	32	16	6	11	2	4	2	19	20	28	26	17	22	7	26	29	98	93	98	109	75	221	221	Vulnerability												
13	Main Occupations: Rice	Families	753	756	784	2013	1733				779	826	843	1533	1567		411	521	464	1254	1288			0	0	4643	4883	4880	10387	10291	Changes in activities												
14	Main Occupations: Fish	Families	0	0	0	0	0	0	0	0	4	5	0	3	5		380	384	528	500	536			0	0	593	561	723	843	904	Changes in activities												
15	Main Occupations: Non-Agriculture	Families	70	132	97	86	125				5	20	32	248	337		97	71	37	593	590			0	0	555	605	666	4062	4324	Changes in activities												
16	Wet Rice Yields	Tons/Ha	1.5	1.5	2.5	2	17	27	2.3	1.5	0.7	2	1	1.5	2	1.7	1.2	1.1	1.5	1.2	1.5	2	1.5	2.0	1.1	2	1.8	2.1	2.5	2.4	Attractiveness of Rice												
17	Rice Area	Hectare	730	740	1010	1020	1020	1020	715	700	701	700	700	700	700	435	965	965	965	705	705			5102	5477	5813	5832	5877	5667	5667	Attractiveness of Rice												
18	Rice Area	% used	100	100	100	100	96.08	100	100	100	100	100	100	100	100	100	100	100	45	45	45	61.7	61.7	98.1	89.7	90.6	90.7	90.2	93.6	93.6	Attractiveness of Rice												
19	Rice Area irrigated in dry season	Hectare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Attractiveness of Rice												
20	Access to Irrigation System	Farming Families	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Attractiveness of Rice												
21	Own Rice Land < 1 ha.	Farming Families	405	403	417	403	406				450	456	482	382	482		261	379	274	431	431			0	0	2607	2533	2559	1995	2081	Land Tenure												
22	Own No Rice Land	Farming Families	110	110	100	109	113				33	38	48	42	51		30	87	39	55	42			0	0	667	777	686	375	444	Land Tenure												
23	Rice Mills (small, medium & large)	Number	0	29	8	8	7	10	11	6	32	32	32	4	5	0	13	13	15	15		1	70	122	116	100	90	89	87	444	Attractiveness of Rice												
24	Total Motor Boats	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	243	328	361	226	236			0	0	463	580	615	495	512	Water based economy												
25	Raising Fish	Families	0	4	4	15	7	3	4	4	5	5	8	7		0	0	0	46	63	2		46	26	42	117	137	9	8		Attractiveness of Fish/Prawn												
26	Of which in Pond (others in cage)	Families	0	4	4	15	7	3	4	4	3	4	4	7		0	0	0	42	63			26	25	16	87	156	0	0		Attractiveness of Fish/Prawn												
27	Fish Ponds	Number	0	4	4	15	7	3	4	2	3	3	6		0	0	0	42	71			10	17	23	129	199	0	0			Attractiveness of Fish/Prawn												
28	Raising Shrimp/Prawn	Families	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	Attractiveness of Fish/Prawn											
29	Shrimp/Prawn Ponds	Hectare	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	Attractiveness of Fish/Prawn											
30	Shrimp/Prawn Ponds	Number	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	1	Attractiveness of Fish/Prawn											
31	Housing: Total	Number	798	893	907	953	971				754	807	804	852	845		896	1026	1081	1100	1118			0	0	5662	6118	6269	6634	6884	Changes in Housing Quality												
32	Housing: Thatched Roof	Number	267	233	234	241	106				218	212	140	103	95		235	222	95	131	116			0	0	1273	1227	855	739	538	Changes in Housing Quality												
33	Housing: with electricity	Number	14	121	134	98	204				4	4	112	208	209		112	143	239	567	650			0	0	547	889	1919	3384	3606	Changes in Housing Quality												
34	Living on Public Land	Families	14	14	14	15	9	9	0	0	5	7	0	0	0	101	135	135	171	180	121	122	248	197	211	266	271	213	217		Land Tenure												
35	Battery Charging	Places	5	5	3					1	2	1	2	0		1	2	2	2	2	2		12	16	22	22	22	15	0	0		Changes in Housing Quality											
36	Potable Wells (Pump, mixed, ring)	Number	145	222	198	206	173	325	356	135	195	205	165	132	295	351	119	76	99	112	82	137	152	1047	965	1186	1131	1279	1665	1482	Water supply conditions												
37	Of which unusable dry season	Number	0	66	10	27	4				74	69	27	70	72		259	243	254	288	248			259	243	254	288	248	0	0		Water supply conditions											
38	Wells (pump, mix, ring) need repair	Number	0	13	11	37	1				109	46	106	119	60		27	21	20	30	17		281	158	228	277	183	0	0			Water supply conditions											
39	Unprotected dug wells	Number	17	150	149	73	71	110	48	88	48	58	41	41	131	179	52	43	58	57	47	59	62	366	391	378	294	282	675	551		Water supply conditions											
40	Of which unusable dry season	Number	0	75	2	0	0	0	0	0	27	12	10	10	10		22	27	16	35	29		205	169	84	89	99	0	0			Water supply conditions											
41	Source > 150 m from home	Families	41	262	351	174	103				331	370	472	203	144		528	367	471	597	461			0	0	3107	3541	3254	2334	2383		Water supply conditions											
42	Dry season safe water (pump, mix well)	Families	208	349	310	340	171				292	371	15				113	135						0	0	1797	1885	1746	0	0		Water supply conditions											
43	Dry season unsafe (ring, dug, pond, river)	Families		615	544	599					499	780	861				815	910	1123					0	0	4178	4427	4860	0	0		Water supply conditions											
44	Roads Non-Earth	Metres	13800	14991	16011	17841	17869	19844	20854	3800	6150	7112	7987	10380	11407	12683	4012	4005	4815	5717	7795	9820	11048	40690	52049	49081	49983	60721	67606	74467	Internal Accessibility												
45	Roads Earth	Metres	2500	1000	0	0	6000	8000	6990	1200	0	0	0	0	0	0	0	0	0	0	0	0	16890	7240	5180	0	21000	22000	18745			Internal Accessibility											
46	Bridges	Number	0	4	0	1	4				0	0	0	0	0		0	0	0	0	0		2	8	5	5	8	0	0	0		Internal Accessibility											
47	Bridges	Metres	0	31	0	6	24				0	0	0	0	0		0	0	0	0	0		50	131	126	86	89	0	0	0		Internal Accessibility											
48	Drainage Culverts	Metres	94	0	0	0	96				0	90	102	102	150		65	100	125	130	170			466	347	570	568	612	0	0		Internal Accessibility											
49	Road Access (dist of village centre to nearest road)	Km																					0.4	0.4	0.4	0.4	0.4	0.4	0.4	14.9	15.5	External Accessibility											
50	Distance to nearest primary school	Km	1.33	1.33	1.33	1.33	1.33	1.33	1.33	0.75	0.75	0.75	0.75	0.75	0.68	0.68	0.25	0.25	0.25	0.25	0.13	0.13	0.73	0.73	0.73	0.73	0.73	0.73	0.66	0.66	0.00	External Accessibility											
51	Distance to Market	Km	16	16	16	16	16				11.5	11.5	11.5	11.5	11.5		19	19	19	19	19		14.42	14.42	14.42	14.42	14.42	14.42	14.42	0.00	0.00		External Accessibility										
52	Distance to Health Centre	Km		8.33	8.33	8.33	8.33	8.33	8.33	2.63	2.63	2.63	2.63																														

			Commune Peam Krasaob												Commune Tuol Kokir												TOTAL ALL Communes												Measure
No	Item	Unit	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012									
1	Population	Number	1352	1351	1360	1313	1318	1322		933	1466	1196	1174	1199	1161		2285	2817	2556	2487	2517	2483										Relative Growth: Attractiveness							
2	Families	Number	305	306	301	282	277	292		207	272	276	246	241	265		512	578	577	528	518	557										Family Size							
3	Female Headed Families	Number	51	56	20	23	23	30		27	28	28	31	27	19		78	84	48	54	50	49										Vulnerability							
4	Population at working age (18 - 60)	Persons		708	718	726	800				651	646	702	687				1359	1364	1428	1428	1487										Attractiveness of Area							
5	Migration: Permanent In	Families	18	18	2	4	1			3	10	11	5	2			21	28	13	9	3	0										Attractiveness of Area							
6	Migration: Permanent Out	Families	7	7	6	2	6			3	0	2	2	2			10	7	8	4	8	0										Attractiveness of Area							
7	Migrants going out for work	Persons			61	52	49	35			81	106	83	167				142	158	132	202											Vulnerability							
8	Of which Female	Persons			30	29	26	10			38	64	49	91				68	93	75	101											Attractiveness of Area							
9	Migration: Temporary In	Families	6	6	3	12	12			17	33	27	12	5			23	39	30	24	17	0										Vulnerability							
10	Vulnerable Elderly No Guardian	Persons	1	1	3	3	2	1		0	2	1	0	4	2		1	3	4	3	6	3										Historical Disasters							
11	Victims of Natural Disasters	Families	0	0	38	0	0	18		0	0	0	0	0	0		0	38	0	0	0	18										Vulnerability							
12	Vulnerable Disabled	Persons	2	3	8	8	9	19		0	1	2	0	2	5		2	4	10	8	11	24										Changes in activities							
13	Main Occupations: Rice	Families		1	2	2	42				91	98	108	164				92	100	110	206											Changes in activities							
14	Main Occupations: Fish	Families		217	103	96	383				49	46	30	108				266	149	126	491											Changes in activities							
15	Main Occupations: Non-Agriculture	Families		16	23	24	124				20	16	15	34				36	39	39	158											Changes in activities							
16	Main Occupations: Other Agriculture	Families		67	154	155					116	86	88									0										Changes in activities							
17	Wet Rice Yields	Tons/Ha	0	0	0	2	1	2		1.5	1.5	1.5	1.5	1.6	1.58		1.5	1.5	1.5	3.5	2.6	3.58										Attractiveness of Rice							
18	Rice Area	Hectare	1	1	0	4	10	10		124	125	124	124	152.5	152.5		125	126	124	128	162.5	162.5										Attractiveness of Rice							
19	Rice Area irrigated in dry season	% used	0	0	0	0	60	NA		81	79	81	83	97	NA		81.0	79.0	81.0	83.0	157.0	AN										Attractiveness of Rice							
20	Access to Irrigation System	Hectare		0	0	0	0	0			0	0	0	31				0	0	0	31	0										Attractiveness of Rice							
	Farming	Families																														Land Tenure							
	Farming	Families		0	0	0	0	0			0	33	31	33				0	33	31	33											Land Tenure							
21	Own Rice Land < 1 ha.	Farming Families			0	0	0	0														64										Land Tenure							
	Own No Rice Land	Farming Families			0	0	0	0																								Land Tenure							
22	Potable Wells (Pump, mixed, ring)	Number	0	0	0	0	0	0		5	8	8	7	12	5		5	8	8	7	12	5										Attractiveness of Rice							
23	Rice Mills (small, medium & large)	Number	0	0	20	20	216	221			130	78	76	83				342	285	292	304											Water based economy							
24	Total Motor Boats	Number		212	207	216	221				130	78	76	83																			Attractiveness of Fish/Prawn						
25	Raising Fish	Families	0	0	11	30	14	11		1	3	4	2	2	9		1	3	15	32	16	20										Attractiveness of Fish/Prawn							
26	Of which in Pond (others in cage)	Families	0	0	5	0	0	1		1	3	4	2	2	0		1	3	9	2	2	0											Attractiveness of Fish/Prawn						
27	Fish Ponds	Number	0	0	5	0	0	0		1	4	5	2	9			1	4	10	2	9	0											Attractiveness of Fish/Prawn						
28	Raising Shrimp/Prawn	Families	0	0	0	0	0	0		1	6	3	1	4			1	6	3	1	4	0											Attractiveness of Fish/Prawn						
29	Shrimp/Prawn Ponds	Hectare	0	0	0	0	0	0		1	9	9	2	7			1	9	9	2	7	0											Attractiveness of Fish/Prawn						
30	Shrimp/Prawn Ponds	Number	0	0	0	0	0	0		1	5	5	1	4			1	5	5	1	4	0											Attractiveness of Fish/Prawn						
31	Housing: Total	Number		295	262	249	273			274	235	232	243				569	497	481	516													Changes in Housing Quality						
32	Housing: Thatched Roof	Number		95	50	12	13			109	79	77	49				204	129	89	62													Changes in Housing Quality						
33	Housing: with electricity	Number		122	106	108	150			9	2	1	32				131	108	109	182													Changes in Housing Quality						
34	Living on Public Land	Families	52	52	0	0	0	0		1	12	11	2	0	4		53	64	11	2	0	4											Land Tenure						
35	Battery Charging	Places	2	2	2	1	1			0	0	1	0	1			2	2	3	1	2	0											Changes in Housing Quality						
36	Potable Wells (Pump, mixed, ring)	Number	28	28	30	16	16	25		18	18	20	42	42	98		46	46	50	58	58	123											Water supply conditions						
37	Of which unusable dry season	Number	0	0	12	6	6			3	3	3	0	0			3	3	15	6	6	0											Water supply conditions						
38	Wells (pump, mix, ring) need repair	Number	0	0	6	6	4			2	2	2	4	7	6		2	2	10	13	10	0											Water supply conditions						
39	Unprotected dug wells	Number	0	0	0	0	0	25		63	101	100	63	63	90		63	101	100	63	63	115											Water supply conditions						
40	Of which unusable dry season	Number	0	0	0	0	0	0		2	7	8	7	5			2	7	8	7	5	0											Water supply conditions						
41	Source > 150 m from home	Families		106	131	126					74	5	0				180	136	126	0													Water supply conditions						
	Dry season safe water (pump, mixed well)	Families																														Water supply conditions							
42		Families		100	141	174				137	31	10					237	172	184	0													Water supply conditions						
43	Dry season unsafe (ring, dug, pond, river)	Families		201	141	103				139	215	231					340	356	334	0													Water supply conditions						
44	Roads Non-Earth	Metres	2565	2565	1336	5259	4695		1356	14836	15836	15836	15836	15871			3921	17401	18401	17172	21095	20566											Internal Accessibility						
45	Roads Earth	Metres	11620	11620	10400	3170	14060	4900	0	5116	4633	4633	6633	3942			11620	16736	14773	7803	20693	8842											Internal Accessibility						
46	Bridges	Number	4	4	3	5	5		2	12	2	2	2	2			6	16	5	7	7	0											Internal Accessibility						
47	Bridges	Metres	305	305	39	795	1025		80	210	78	78	78				385	515	117	873	1103	0											Internal Accessibility						
48	Drainage Culverts	Metres	30	30	42	23	105		9	168	176	176	176				39	198	218	199	281	0											Internal Accessibility						
49	Road Access	Km	0.5	0.5	0.5	0.4	0.4		1	1	1	0.63	0.88				0.3	0.3	0.3	0.2	0.2	0											External Accessibility						
50	Distance to nearest primary school	Km	0.55	0.55	0.55	0.4	0.4	0.4	1.25	1.25	1.25	1.25	1.63	1.63			0.9	0.9	0.9	1.0	1.0	2.03											External Accessibility						
51	Distance to Market	Km	6.5	6.5	6.5	6.5	8		19.5	19.5	19.5	19.5	19.5	19.5			13.0	13.0	13.0	13.0	13.8	0												External Accessibility					
52	Distance to Health Centre	Km	6.5	6.5	6.5	6.5	7	10.5	7.5	19.5	21	22																											

Note 1): Figures from 2011 onwards are for persons not families

Annex 2: Data from IDPoor Surveys (2004 – 12)

