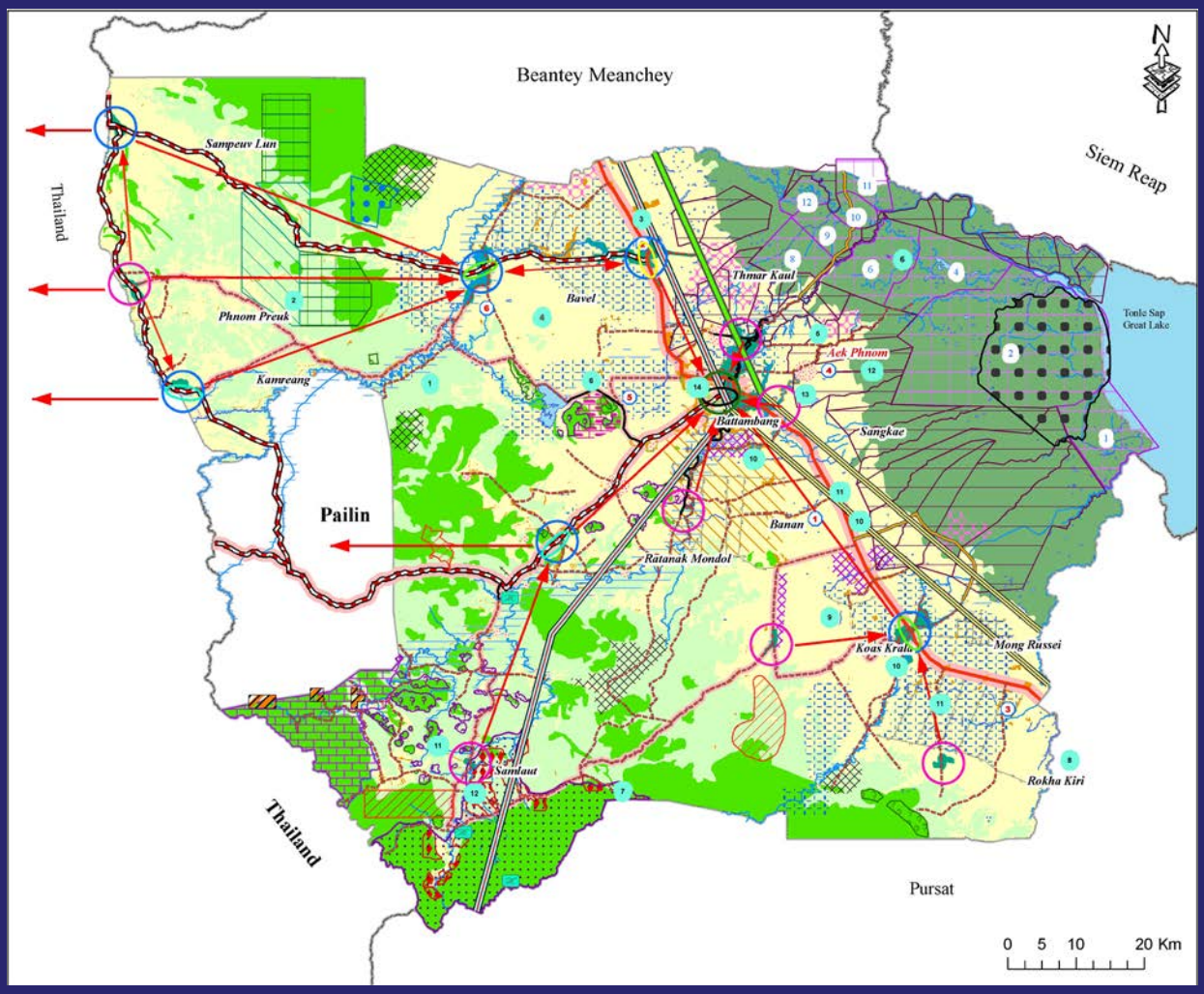
Provincial Spatial Planning Handbook

Spatial Planning Series No. 2



Ministry of Land Management, Urban Planning and Construction
General Department of Land Management

June 2016

Provincial Spatial Planning Handbook

Spatial Planning Series No. 2

Ministry of Land Management, Urban Planning and Construction
General Department of Land Management

June 2016

This Handbook is dedicated to the late

Dr. Franz-Volker Müller
born August 3, 1950
deceased March 22, 2015

for his outstanding support to land management and land rights recognition in Cambodia.

កិច្ចសហប្រតិបត្តិការ
អាល្លឺម៉ង់
DEUTSCHE ZUSAMMENARBEIT

Supported by GIZ Land Rights Programme II

Foreword

The Kingdom of Cambodia is home to an increasing population of more than 15 million people. Whereas a majority of the population live mainly from agriculture, the relation of our society to our land has changed considerably in the recent past. The urban population increases relatively faster than the population in rural areas, which strengthens the challenges of job creation, provision of public services and the construction of a Cambodian urban identity.

Transport infrastructures have quickly improved, accessing and connecting not only the capital but many areas throughout the country, fueling economic growth and creating a polycentric web of urban centers. Dynamic domestic and cross-border migration flows challenge local and national governance and transform the relations of people and land-based resources. While we recognize that past development has affected our forest and other natural resources, we strive to preserve the environment that we all depend upon and maintain it according to the principles of sustainable watershed management.

The many uses and functions of land are governed by different ministries and addressed in sector policies and plans. To strike a balance between the often competing uses and functions and to provide for a sustainable territorial development is the purpose of spatial planning. Therefore the Royal Government of Cambodia through the Council of Ministers approved the National Policy on Spatial Planning (April 08, 2011) and mandated the National Committee for Land Management and Urban Planning (NCLMUP) - with the MLMUPC as its secretariat - as the lead agency to implement spatial planning in Cambodia.

Whereas NCLMUP and the respective sub-national committees are established, it is clear that existing experiences on spatial planning are still limited in the country. It is for this very reason that the MLMUPC embarked on the formulation of sub-national spatial planning handbooks that provide an overall direction, specific procedures as well as practical knowledge and advice based on spatial planning processes that have been piloted across the country in cooperation with GIZ.

These handbooks form a common basis for planners to follow, draw and exchange upon. They are a considerable contribution to an enabling framework for participatory spatial planning and thus for the sustainable territorial development of Cambodia's future.

Senior Minister

Minister of Land Management, Urban Planning and Construction, and
Chairman of the National Committee for Land Management and Urban Planning

Preface

Spatial Planning is at its infancy in Cambodia but is now embedded in a comprehensive legal and policy framework that envisions that the country's entire territory shall be used, organized, developed and protected by integrative, strategic territorial planning and the harmonization of regionally significant instruments and measures.

Competent authorities that take initiative, arrange, coordinate, and approve Spatial Planning are at work at four administrative levels: National/Regional, Capital/Provincial, Municipal/District/Khan and the Commune/Sangkat Levels. At sub-national level, Spatial Planning agencies are articulated to the unified administration as envisaged by the D&D Policy and based on the Laws on Administrative Management of Capital, Provinces, Municipalities, Districts, Khans, and the Law on Administrative Management of Communes/Sangkats.

Based on a number of relevant Sub-decrees, the National Committee for Land Management and Urban Planning has developed planning procedures that include the overall scope and the desired content of each sub-national spatial plan. This series of spatial planning handbook shall inform and complement the official procedures approved at Ministry level. It is conceived as a reference document easy to consult and to provide quick orientation concerning the spatial planning processes. It is a further step towards guiding and enabling sub-national actors to formulate spatial plans.

H.E. Dr. Pen Sophal

Secretary of State, Ministry of Land Management Urban Planning and Construction, and Secretary-General of the National Committee for land management and Urban Planning

TABLE OF CONTENTS

List of Figures

List of Tables

List of Maps

LIST OF ACRONYMS

CDP	Commune Development Plan
CDC	Council for Development of Cambodia
CEMAT	European Conference of Ministers responsible for Spatial/Regional Planning
CMDP	Community Managed Development Partners (NGO)
CLUP	Commune Land Use Plan
CWG	Core Working Group (under Municipal Working Group for Urban Planning)
D&D	Democratic Development (previously Decentralization and De- concentration)
DCLMUP	District Committee for Land Management and Urban Planning
DED	Deutscher Entwicklungsdienst (German Development Service)
DLUMP	District Land Use Master Plan
DP	Detailed Plan
DSDP	District Strategic Development Plan
GDP	Gross Development Product
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit mbH
ISIC	International Standard Industrial Classification of All Economic Activities
LMUP	Land Management and Urban Planning
LMUP-C	Land Management and Urban Planning Committee
LMUP-WG	Land Management and Urban Planning Working Group
LUMP	Land Use Master Plan
LRP II	Land Rights Program II (by GIZ)
LUP	Land Use Plan
M&E	Monitoring and Evaluation
MCLMUP	Municipal Committee for Land Management and Urban Planning
MIP	Municipal Investment Program
MLMUPC	Ministry of Land Management, Urban Planning and Construction
MLUMP	Municipal Land Use Master Plan
MoI	Ministry of Interior
MoP	Ministry of Planning
MPLUP	Master Plan and Land Use Plan
MRC	Mekong River Commission
MSDP	Municipal Strategic Development Plan
MSLWG	Municipal State Land Working Group
NCDD	National Committee for Sub-National Democratic Development
NCLMUP	National Committee for Land Management and Urban Planning
NGO	Non-Governmental Organization
NIS	National Institute of Statistics
NSDP	National Strategic Development Plan
OD	Operational District
PCLMUP	Provincial Committee for Land Management and Urban Planning
PDLMUPC	Provincial Department of Land Management, Urban Planning and Construction
PES	Payment for Environmental Service
PIP	Public Investment Program
PPPS	Policies, programs, plans and strategies
PSLMC	Provincial State Land Management Committee
PSP	Provincial Spatial Plan

PWG	Provincial [Land Management and Urban Planning] Working Group
RGC	Royal Government of Cambodia
RUPP	Royal University of Phnom Penh
SWOT	Strengths, Weaknesses, Opportunities and Threats
SEIA	Social and Environmental Impact Assessment
SNEC	Supreme National Economic Council
SWOT	Strengths, Weaknesses, Opportunities and Threats
VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
WWF	World Wide Fund for Nature

Overview: The Provincial Spatial Plan

Type of plan

The provincial spatial plan (PSP) is a spatial development framework based on a vision. It provides strategic directions for the spatial development of the province:

- The vision outlines the long-term aspired territorial developments
- The strategy is linking the aspired territorial developments with the means proposed to achieve them

Role and Function

Within the Cambodian planning system,

- the PSP aims to spatially substantiate national level spatially relevant policies, programs, plans and strategies (PPPS), to guide the local level spatial planning and to integrate the two with each other ("vertical integration");
- it coordinates and integrates provincial sector PPPS with each other and with the aims of spatial planning itself ("horizontal integration"); and it further informs the formulation of the provincial 5-year development plan and the corresponding rolling investment plan.

Scope and Content

The PSP aims to determine the envisaged future spatial structure of the province, and assigns corresponding functions to the different areas of the provincial territory. Therefore,

- it reviews and considers the characteristics of the province within the region;
- it identifies and analyses existing spatial structures and patterns of spatial development;
- it formulates the desired overarching spatial structure of settlements and infrastructure, open space and areas with particular functions, as well as their interrelation, based upon the local need and potential and in compliance with national directions (PPPS);
- it designates functions for the different urban and rural areas and formulates corresponding measures promoting sustainable development;
- it provides direction, orientation and restrictions to the subsequent Land Use Master Planning of districts and municipalities within the province; and
- it provides reference to mid-term development planning and investment programming of the province.

Themes addressed in a PSP include

- the envisaged development of the overarching settlement structure within the province, constituted basically by a hierarchy of settlements (high- to low-order centres with specific linkages to their rural surroundings) endowed with social and technical infrastructure and facilities, and by development corridors connecting the centres or development poles;
- the envisaged open space and landscape structure, particularly for the provision of habitat and protection of ecosystems (such as forests and watersheds), agriculture and extractive industries, designation of areas for flood control, tourism and recreation;
- the suitable routes for corridors and sites for transport and supply infrastructure, ensuring the circulation and mobility of people and goods needed for economic development and access to social infrastructure, whilst avoiding or mitigating the fragmentation of ecosystems;
- areas with particular functions, e.g. areas suitable for social or economic land concessions, special economic zones, etc., while ensuring the mitigation of impacts on conflicting land uses (e.g. residential, environmental);

Measures to secure the envisaged spatial development include the prioritization and restriction of uses and functions for certain areas, or the assessment of alternative development options for sites and routes regarding their environmental and social impacts.

Time horizon	at least 20 years
Scale	1:250,000 to 1:100,000

Planning Process

The planning procedure to design a provincial spatial plan is a sequence of six main steps that take action over the course of approximately 2 years (Figure 1). This is an indicative time-frame, assuming a smooth and un-interrupted process, which requires sufficient capacities and resources. If capacity development measures have to accompany the process, the time needed for the planning would correspondingly increase.

Steps	Tasks	Timing
Step 1 - Preparation and launch of the Provincial Spatial Planning process	Task 1.1 Introduction of spatial planning to provincial authorities	1 month
	Task 1.2 Establish the provincial spatial planning agencies	
	Task 1.3 Enable the spatial planning agencies	
	Task 1.4 Identification and gathering of stakeholders	
Step 2 - Situation analysis (diagnosis)	Task 2.1 Data collection and database management	9 months
	Task 2.2 Data analysis and maps production	
	Task 2.3 District level verification, updating and analysis workshops	
	Task 2.4 Institutional analysis on provincial level	
	Task 2.5 Analysis of the current spatial structure of the provincial territory	
Step 3 - Envision the future	Task 3.1 Identification future development scenarios	2 months
	Task 3.2 Elaborate vision and long term development goals	
Step 4 – Spatial development strategies	Task 4.1 Spatial development strategies	6 months
	Task 4.2 Align sector strategies and update sector plans	
	Task 4.3 Internal consultation with provincial authorities	
Step 5 – Implementation Monitoring, Evaluation and Plan Updating	Task 5.1 Implementation and monitoring	1 month
	Task 5.2 Evaluation, updating and harmonization of planning instruments	
Step 6 – Finalization of the planning process	Task 6.1 Final public consultation of all stakeholders	5 months
	Task 6.2 Preparation of the final technical report	
	Task 6.3 Public display and endorsement of the Spatial Plan by the Provincial Council	
	Task 6.4 Approval by National Spatial and Urban Planning Committee	

Figure 1 Planning steps for a Provincial Spatial Planning process

Step 1 Preparation and launch of the Provincial Spatial Planning Process

Overall objectives

- Creation of understanding and ownership for the spatial planning process
- Identification and involvement of all relevant stakeholders
- Clarification of roles and responsibilities
- Establishment of operational spatial planning agencies

Task 1.1 Introduction of spatial planning to provincial authorities

Overview

During a first discussion at provincial level ("small kick-off", Annex 1), the main provincial authorities are introduced to the objectives and scope of the provincial spatial planning and discuss potentials, challenges and requirements for conducting spatial planning in their province.

Who is involved?

- Initiation
  - Provincial Council
  - MLMUPC (Backstopping)
  - PDLMUPCC
  - PCLMUP (Facilitation)
- Participants
  - Provincial council and board of governors
  - Provincial technical line departments
  - Representative(s) from other province where spatial planning was successfully conducted

Activities / methodology

- Conduct a meeting with provincial authorities to introduce the spatial planning approach (PowerPoint, flipcharts…). This presentation should clearly explain the overall objectives and approach of spatial planning and the added value that spatial planning brings to the existing planning processes.
- A resource person (MLMUPC or external) should be invited to present a case study of spatial planning conducted in other provinces.
- Facilitate a discussion on the potentials, challenges and requirements for conducting spatial planning in the province and the overall scope of such a plan.
- Encourage active participation of all participants (allow sufficient time for debate).
- Agree on the next steps (1.2 – 1.4) with a tentative time schedule and responsibilities.

Desired outputs

- Provincial authorities understand the objectives and overall procedure of spatial planning and express commitment and ownership for the process.
- Provincial council gives a green light to pursue the process.

- Agreed list of next steps with indicated responsibilities and tentative time schedule.

Task 1.2 Establish the provincial spatial planning agencies

Overview

A Provincial Committee for Land Management and Urban Planning (PCLMUP) chaired by the Provincial Governor shall initiate and coordinate the planning process. Each line department will be represented in this committee. The PCLMUP shall be assisted by a secretariat (hereafter "provincial working group" (PWG), which is headed by a deputy director of the provincial department of land management, urban planning, construction and cadastre (PDLMUPCC) and is as well composed of representatives from provincial hall, concerned departments and organizations. The provincial council shall decide on the actual composition of the PLUMPC and approve as well the composition of the PWG. (See further Sub-Decree 77, RGC, 2013, in particular Article 03)

The PWG is assigned to design and implement the spatial planning process: collection and analysis of all necessary data, maintenance of a spatial planning database, and design of maps, elaboration of future spatial planning options and drafting of the spatial planning technical report. It is important that the function of spatial planning as an integrative mechanism is reflected in a cross-sector composition of the PWG. Ideally, the members of the working group are technical staff from the different technical line departments represented in the committee. Optionally, the working group can include members from non-state organizations (private sector, NGOs, etc.). If the PWG is not technically involved in the planning process, a core working group needs to be assigned to carry out this task.

Who is involved?

- Initiation
  - Provincial Council
  - PDLMUPCCC
  - PCLMUP
- Participants
  - Provincial board of governors
  - Provincial technical line departments

Activities / methodology

- The assignment of the PWG should go along with assigning roles and responsibilities of the PWG as well as identifying a work plan. The PWG will need an office provided by the provincial administration, ideally located at the PDLMUPCC. This office needs to be equipped with the relevant IT and other office facilities.
- Hint: If properly prepared, this task can be integrated in the small kick-off workshop (Task 1.1) already, as relevant authorities are present there and reassembling them once more will be time-consuming.

Desired outputs

- The provincial spatial planning agencies (PCLMUP and PWG) are officially established:
  - The provincial council assigns a PCLMUP based on the provisions of Article 03 of Sub-Decree 77.
  - The provincial council approves the assignment of a cross-sector PWG to carry out the technical spatial planning tasks.

- Sufficiently equipped office space is identified and provided for the PWG.

Task 1.3 Enable the spatial planning agencies

Overview

How long the planning process will take as well as the quality of the process and the eventual plan, depend to a high degree on the capacity of the concerned spatial planning agencies. A team-building workshop with all members of the PCLMUP and the PWG is a good opportunity to explain in detail the scope and procedures of the provincial spatial planning process and to assess the existing and required capacities in the PWG to carry it out. This includes a discussion and agreement on the roles and tasks of each member.

Who is involved?

- Participants
  - PCLMUP & PWG
  - Trainer(s) (MLMUPC or external)

Activities / methodology

Possibly in connection with an initial team building workshop for the PWG:

- Deliver a detailed introductory training on provincial spatial planning.
- Facilitate a discussion on roles and responsibilities as well as on modes of work.
- Conduct an assessment of existing skills and capacity needs among the members of the PWG, to support the identification of roles and responsibilities as well as for required capacity development.
- A code of conduct should be agreed, detailing the roles and responsibilities and the working schedule, based also on the capacity assessment.
- The workshop should be used to develop or scrutinize existing work and budget plans, at least for the remainder of the year.
- Hint: One possibility to foster the effectiveness of this task would be to visit a province which already formulated a PSP and to involve their experiences also with regard to the work arrangements, planning and budgeting.

Desired outputs

- Improved understanding of scope and procedure of provincial spatial planning, as well as of the roles and tasks of the PWG.
- A work plan is elaborated and agreed by all team members, including roles and tasks of the members of the PWG (code of conduct).
- Based on the identified roles and needs, a capacity development curriculum is developed for the different members of the PWG.
- Based on this training curriculum, training resources (resources person, support budget, etc.) are to be identified.
- Annual work and budget plans are elaborated and/or scrutinized.

Task 1.4 Identification and gathering of stakeholders

Overview

Once the provincial spatial planning agencies are in place, the different actors with a stake in the planning process or its implementation are identified and brought together in a meeting ("large kick-off"). The objectives and scope of the provincial spatial planning will be presented to them and their roles and necessary contributions will be discussed. An initial gathering is organized to discuss the expectations of stakeholders regarding the spatial planning process and the key spatial development issues to be addressed. Further stakeholders could be proposed within this meeting.

Who is involved?

- Initiation
  - Provincial Council
  - PCLMUP & PWG
- Participants
  - All stakeholders (Table 1)

Activities / methodology

- Facilitate a discussion among PWG or PCLMUP to identify all relevant provincial spatial planning stakeholders, such as those of relevance to the process as well as those instrumental for or concerned by its implementation (Table 1 presents a non-exhaustive list of institutions).

Table 1 List of potential stakeholders in provincial spatial planning

Sector		Stakeholders
State institutions		Provincial unified administration Provincial line departments District administrations (council and/or board of governor) Provincial association of commune councils Natural disaster management committee State land management committee Watershed management committee
Non-State Actors	Private sector	Chamber of commerce Representation of 'large' enterprises (or federation if any) Representation of small and medium enterprises (or federation if any) Influential land owners or developers
	NGOs	Provincial coordination body of local NGOs International NGOs (e.g. concerned with climate change, rural livelihoods, environment etc.)
	Bi- and multilateral cooperation projects/programs	Programs/Projects with relevant activities in the province
	Education	Universities
	Civil society	Religion, youth/women associations, indigenous peoples associations and other representatives of other population groups concerned by provincial spatial planning
	Press	Association and individual journalist (Radio, TV and newspapers)

- Organize a workshop with a presentation to introduce the overall objectives, approach of spatial planning and the expected contributions from different stakeholders. External resource person can present a case study of spatial planning conducted in other provinces.
- Facilitate group work discussions (brainstorming) to discuss expectations of stakeholder towards the process, their readiness to contribute and the main spatial development issues to be addressed.
- Announce the spatial planning process, scope and objectives through different media (radio, TV and newspaper).
- Keep in mind to maintain and update the list of stakeholders in the PWG throughout the planning process. It can be helpful to draft a comprehensive stakeholder map.
- Hint: The large kick-off workshop can be utilized for starting or at least setting the stage for the data collection (Step 2, Task 2.1). This will require providing some additional information in this regard together with the invitation to the stakeholders, best facilitated by preparing and sending a standardized form in which to indicate the existing data of the stakeholder, its type (or format), last update, contact details for further clarification as well as other required information. This form would be collected during the kick-off and time should be allocated to discuss this in general as well as next steps to follow.

Desired outputs

- Relevant stakeholders are identified for provincial spatial planning (stakeholder map).
- Stakeholders are aware of and understand the general spatial planning process.
- Clear commitments from different stakeholders to engage in the process are identified.
- Key priority issues to be addressed in the provincial spatial plan are mapped out.

Step 2 Situation analysis (diagnosis)

Overall objectives

- Collection and verification of secondary data, complemented where necessary with primary data to be surveyed
- Establishment of a unified provincial spatial database
- Identification and analysis of existing spatial structure and patterns of spatial development of the provincial territory
- Systematic review of strengths and weaknesses of all spatially relevant sectors and issues as well as discussion of related needs, potentials, options and threats
- Compilation of a summary of spatial information, facts and figures on the current situation of the provincial territory, as a basis for subsequent analysis

Task 2.1 Data collection and database management

Overview

The process starts with a compilation of all existing data relevant to provincial spatial planning collected from different sectors, compiled, verified and consolidated in a multi-sector spatial planning database. It is particularly important to mobilize all provincial line departments at this stage. It is important to understand that this task is not yet about planning areas or sectors, it just provides the key information and understanding of the current situation. It forms the basis for an integrated analysis and subsequently the planning described in step 4.

Who is involved?

- Initiation and implementation
  - PWG
  - Database/GIS expert
  - Trainer(s) (MLMUPC or external)
- People consulted
  - Stakeholders (Table 1)

Activities / methodology

- Identify a clear spatial database structure based on thematic main and sub-categories (Table 2). It is important to take this task seriously, as it is a foundation for the entire planning process.
- Structure the data collection and database management according to a data requirement list that provides an overview of the data needed for the provincial spatial planning (Annex 2).
- Conduct a preliminary compilation of secondary data by using open access data repository (identified in Annex 2).
- In order to capture data that might not be retrieved in the open access repositories, initiate a complementary process of data collection with each provincial technical line department and relevant non-state actors (see Hint for Task 1.4). Each member of the working group should be responsible for data collection within his/her own institution. It is highly recommended collecting time-series data to allow for trends analysis.

Table 2 Overall structure of the Spatial Planning Database System

Main Category	Sub-category
Administration	Boundaries and administrative centres
Biophysical Environment	Topography Climate Hydrology (Water Resources) Geology Soil Ecology and Environmental Risks
Population & Settlements	Demography Structure of settlements (rural and urban)
Land Use and Land Tenure	Forest cover and management Protected areas Agriculture Fisheries Built-up areas Quarry Tenure
Physical Infrastructures	Transport (roads, rail, air, water) Energy Waste management Water management (dykes, dams, irrigations...)
Social and cultural services	Health Education Heritage (archaeological, architectural)
Economy	Economic Development Employment Commerce and Trade Agriculture Industries Tourism and Recreation

- Integrate all data in a structured spatial planning database system, so all data can be represented on a map. This integration requires specific data manipulations depending on the format of data to be entered into the database (Figure 2). Geo-data are data with specific geo-referenced attributes so that they can be represented and combined (layered) with others on a map. In addition to these geo-data, there are a number of data relevant to spatial planning which do not necessarily have spatial attributes.

  Types of data:

  - Geo-data exist as vector with features represented as point, line or polygon
  - Geo-data exist also as raster in which the features are represented in a grid of pixels
  - Maps that are available only on hard copy documents can be scanned and integrated by geo-referencing in a geographic information system
  - Statistics available for specific administrative units (commune, district) can be linked/joined to existing administrative geo-data and then be represented
  - Secondary GPS survey data with coordinate of X-Y data can be entered in the system and use to generate geo-data

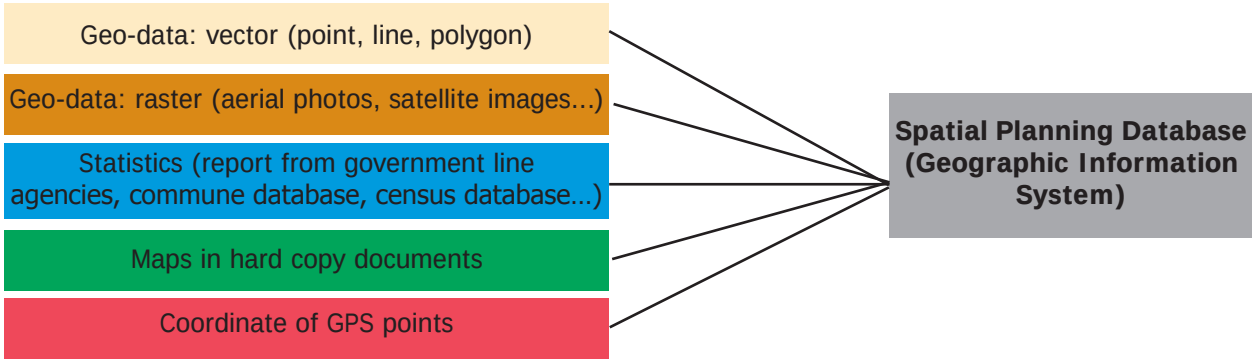


Figure 2 Integration of relevant spatial planning data into a spatial planning database

- While checking quality, consistency and completeness of all data, ensure that the coordinate system is similar for all data of the spatial database (projection and datum). In this perspective, it is recommended using the following coordinate system for all spatial data: Ellipsoid: Everest 1831, Projection: UTM, Horizontal Datum: wgs84.
- For each data in the database, a clear meta-database file has to be created based on standardized rules with complete description of data (sector, detail, type, update, source, etc.) (Figure 3)

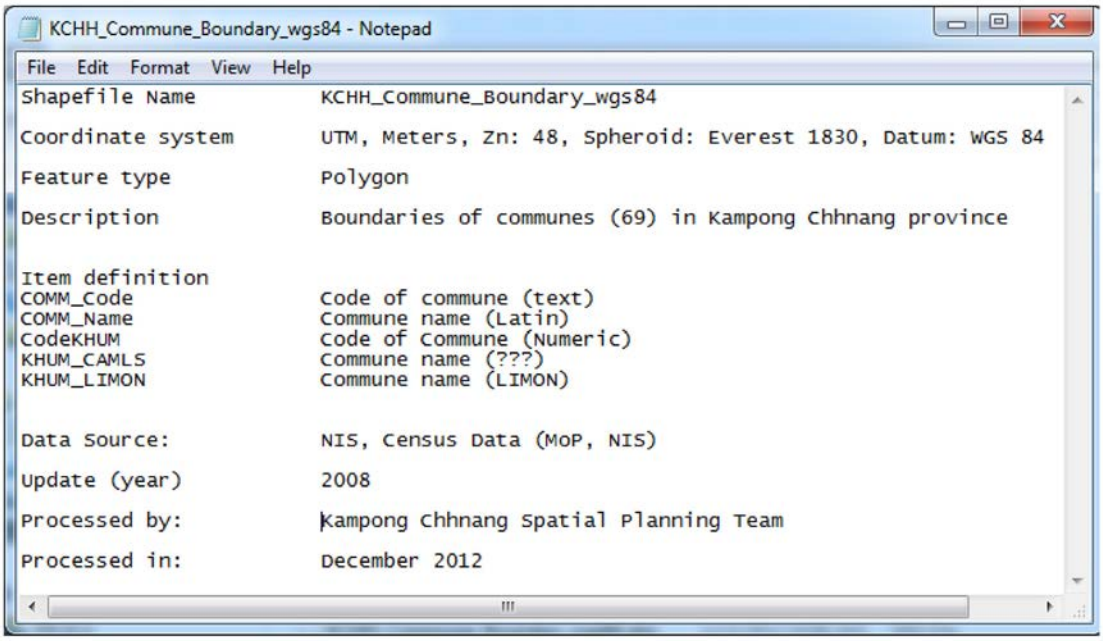


Figure 3 Screen shot in the spatial planning database and meta-database file

Desired outputs

- A computerized spatial database with a clear structure and meta-database, which includes all data relevant for the spatial planning process.

Task 2.2 Data analysis and maps production

Overview

At this stage, data will be analysed to understand the current spatial structure (existing situation or static analysis) and patterns of spatial development (identification of trends or dynamic analysis) relevant to later on draw conclusions for the future spatial development of the province. This basically means to understand the relevance of different sectors (e.g. tourism or agriculture) for the different areas of the province and vice versa. It has to be decided which areas of the province are of particular relevance to different sectors or even more generally to the economy or the environment. Sector and thematic maps are prepared to support these analyses and represent the results with geographic attributes. These maps will be key resource documents in further planning tasks. While not the most difficult task of the planning process, finalizing a complete data analysis is a major task and should be well planned and sufficient work time allocated. Each map should have a scale ranging from 1:250,000 to 1:100,000 and should be printed on a paper size that allows representing that scale (A0, A1 or other depending on the aerial size of the province).

Who is involved?

- Participants
  - PWG
  - Database/GIS expert

Activities / methodology

- Organize data analysis sessions on all relevant sectors and themes (see below), in which the PWG should check accuracy, completeness and relevance of the information, but most importantly try to understand and document respective spatial patterns. This requires sufficient skill within the PWG to conduct spatial analysis and to interpret produced maps. It will be necessary to involve responsible line departments or other stakeholders on particular topics of their expertise. Some information will be sufficiently analysed in a 'static' way (at a given time), other information will require a 'dynamic' (over time) analyses, basically concluding on the change of comparable data over certain time periods.
- An overview of all the required spatial and non-spatial data and the corresponding sources for accessing them is attached in Annex 2. It is recommended to always have this list ready at hand throughout this task.
- In a parallel process, organize mapping sessions (assisted by GIS) to represent the results of data analysis spatially or to conduct spatial analysis. There is considerable back and forth movement between data analyses and mapping.
- To enable the working group in this rather complex task, a number of key points and questions are proposed that need to be addressed during the analysis phase. Specific examples from spatial planning processes in Battambang, Kampong Chhnang and Takeo are provided as illustrations.
- Short thematic reports should be formulated, comprising the respective map, an explanation of the displayed information as well as an initial conclusion (based on internal discussion and interpretation of the map).
- Hint: Spatial analysis and map and data interpretation can't be sufficiently understood from a theoretical point of view, they require quite some practical experience. Where such robust experience is not available in the PWG, external trainers or advisors should be involved to provide respective trainings and/or facilitate this process.

Desired Output

- A complete set of all relevant sector and thematic maps is produced. The list of maps that are required is given in Annex 3. Outline Structure of the Provincial Spatial Plan.
- Each map is accompanied by a short text that describes and explains the main information presented on the maps and their relevance to the spatial structure and development of the province.
- In the section below, necessary and optional data/outputs are mentioned to distinguish those which are essential to conduct the planning process from those which rather have a supportive character.

A) Administration

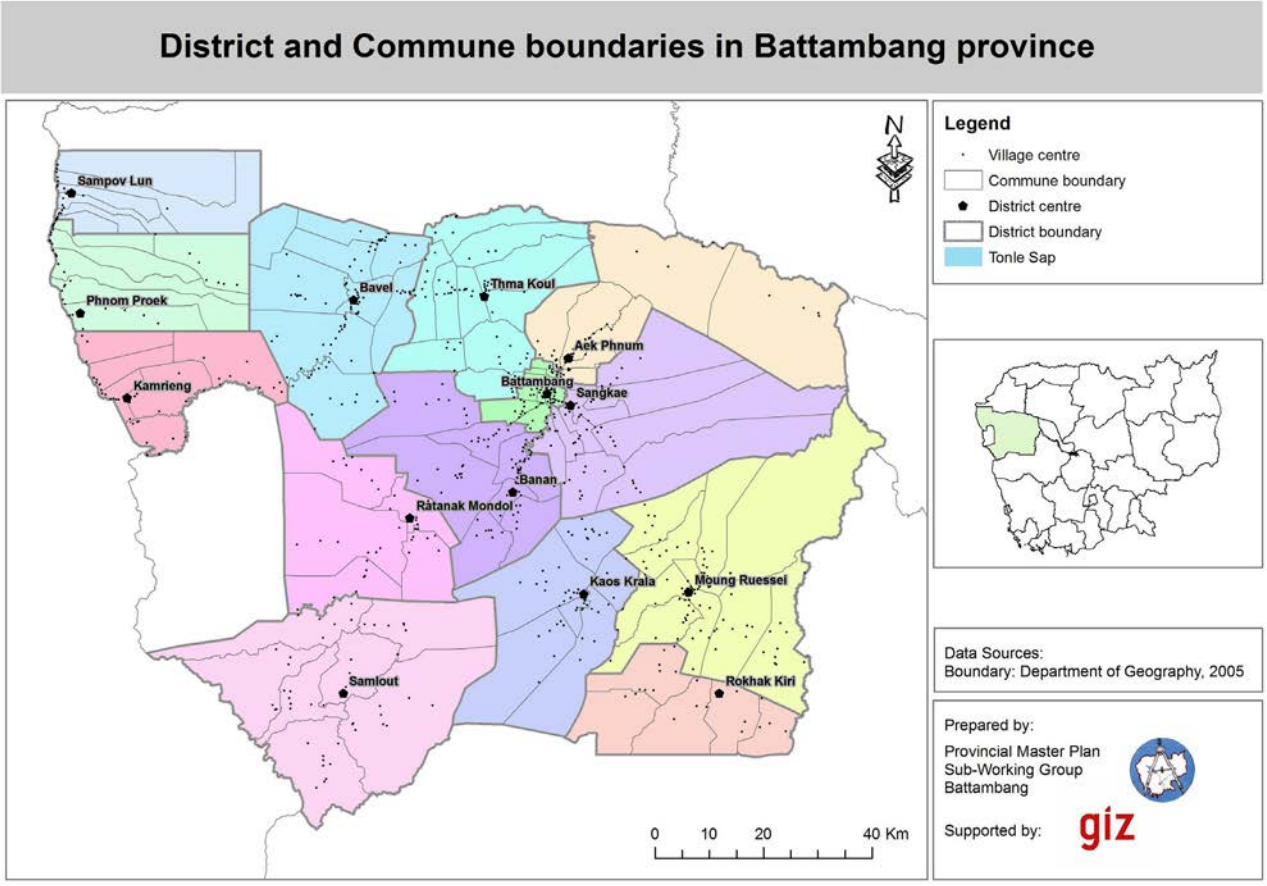
Relevance: Clear data and information about the internal administrative divisions in the province (district/municipality, commune/sangkat and villages) is needed to determine the administrative jurisdiction responsible for planning measures. Furthermore, many of the analyses in this chapter require comparison of data within different local administrative levels.

Data required

Necessary	Optional
Provincial boundaries	Potential or alternative future boundaries, administrative consolidations or subdivisions
Number, names, code and boundaries of districts, communes and villages	
Names and locations of provincial, district, commune and village centres	
Boundary issues, if any	

Analysis and outputs

- Check updates available at provincial level and check any discrepancies with national dataset from MoP (e.g. census database). In Cambodia, boundaries are regularly discussed and modified, so it is important that the PWG keeps a close eye on any updates.
- Agree on spelling of names and English transliteration if needed.
- Specify and map the internal boundaries of districts pertaining to the province.
- Identify where unclear commune/district boundaries lead to unresolved conflicts. Discuss how these conflicts are managed and how a resolution could be supported.
- In some instances, while the present boundaries are clear, there is indicative information for future changes of boundaries. This might be limited to redefined boundaries, or even include subdivision or consolidation of current administrative territories, affecting also the number of administrative centres. This is a considerable challenge for the spatial planning process: How to plan for areas which might only be in the future part of the planning territory or by which mandate? Why plan for areas, which will soon no longer be part of the planning territory? And how to deal with the uncertainty of this change to come or not? The PWG needs to discuss this thoroughly and to think about implications and alternatives for the planning process. These should be presented to the PCLMUP to seek a decision for the territory to be planned. Guidance of the NCLMUP, as the approving body, should be sought if provincial or district/municipal boundaries are affected.



Map 1 Name and location of the different administrative units in Battambang Province

B) Biophysical Environment

Relevance: The biophysical characteristics of an area influence the range of suitable uses and functions of its land. Maintaining live- and livelihood-supporting functions of the biophysical environment is a key aspect in ensuring the sustainability of the provincial land management.

Climate

The characterization of climate is important because - in association with topography and soil - it determines the agro-ecological potential of an area. Climate determines the water cycle, influences the availability of water in the ecosystems and conditions the productivity and the agricultural development. Moreover, in a context of growing climate-change uncertainty and environmental change, climate has become a central concern for planners and decision-makers. Climate change is perceptible mostly in the transformation of the water cycle and occurs through natural disaster (e.g. drought, flood, storm), which are very likely to become more intense and frequent in the future (IPCC, 2013).

Data required

Necessary

Monthly rainfall and temperature data

Optional

Daily rainfall and temperature data
Long-term rainfall and temperature data
Multi-site rainfall and temperature data

Info-Box		
Weather	**Climate**	**Climate Change**
Weather reflects short-term conditions of the atmosphere (temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure)	Climate is how the atmosphere "behaves" over relatively long periods of time.	Climate change refer to changes in long-term averages of daily weather (usually involving comparisons between periods of three decades)

Analysis and outputs

Compile updated monthly temperature and rainfall precipitation (available at both provincial and national level in the Ministry of Water Resources and Meteorology (see Annex 2). Both datasets can be easily combined in a so-called 'ombrothermic' diagram (Figure 4), which depicts the variation of monthly average temperature and total precipitation for a selected place. Simple and free software to generate these kind of diagrams are available online (see for instance http://www.becyhome.de/news_eng.htm). Provided that precipitation scale equals 2 times the temperature scale (see diagram below), the diagram allows identifying drought-prone periods (when the precipitation value is lower than temperature curve). This information is important to consider for planning agriculture development measures in subsequently developed District Land Use Master Plans.

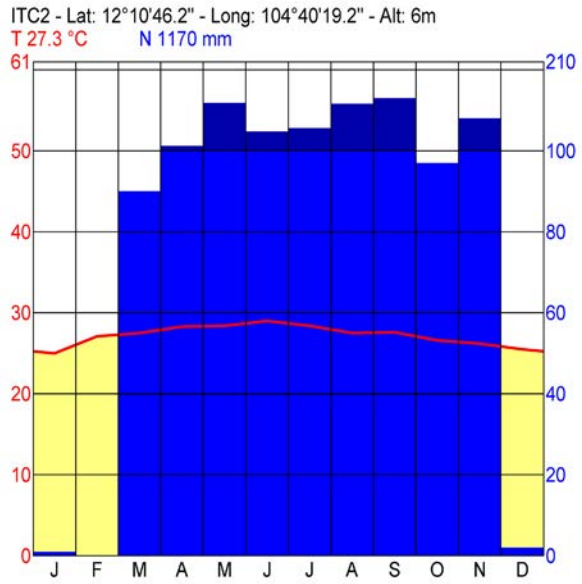
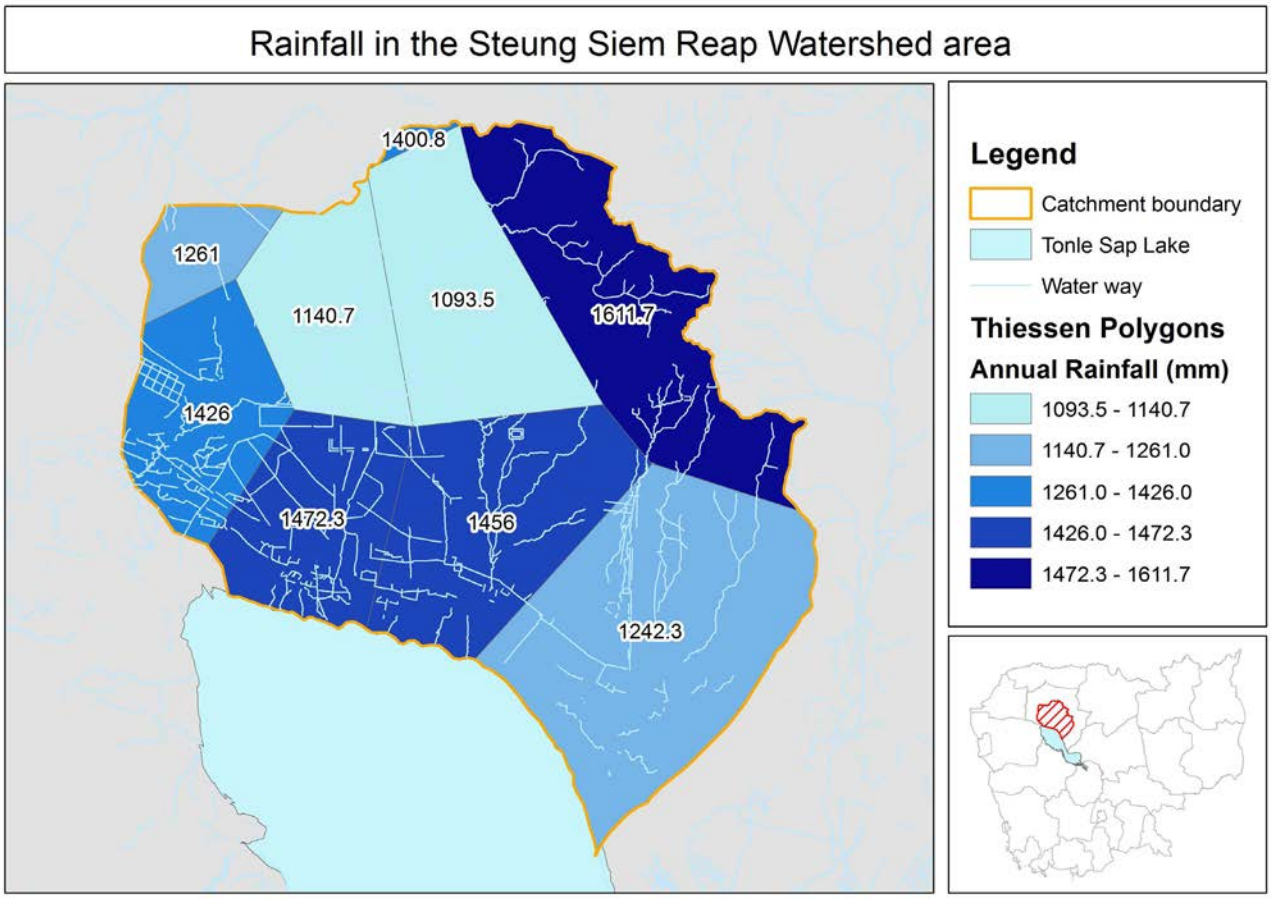


Figure 4 Ombrothermic diagram for a station located in Kampong Chhnang - yellow areas indicate months with potential drought

Optional

- Depending on the availability of data the PWG could further engage into spatially more detailed and time-series analysis:
  - If rainfall data are available for several stations in the same province, so called Thiessen polygons can be defined to differentiate areas having different rainfall patterns (Map 2).
  - If climate data have been recorded over a longer time period, one can engage in time series climate data analysis, which is important to identify possible changes in rainfall or temperature. Subsequent DLUMP planning would particularly benefit from being informed about how the monthly distribution of rain has changed over the years as it determines crop calendars and cultivation periods (Figure 5).
  - If daily records of temperature or rainfall are available, the analysis of extreme weather events (rainfall or temperature) can be conducted by computing climate change indices

(http://etccdi.pacificclimate.org/indices.shtml) and analysing their trend (Figure 6).



Map 2 Thiessen Polygons of rainfall area in Siem Reap River watershed

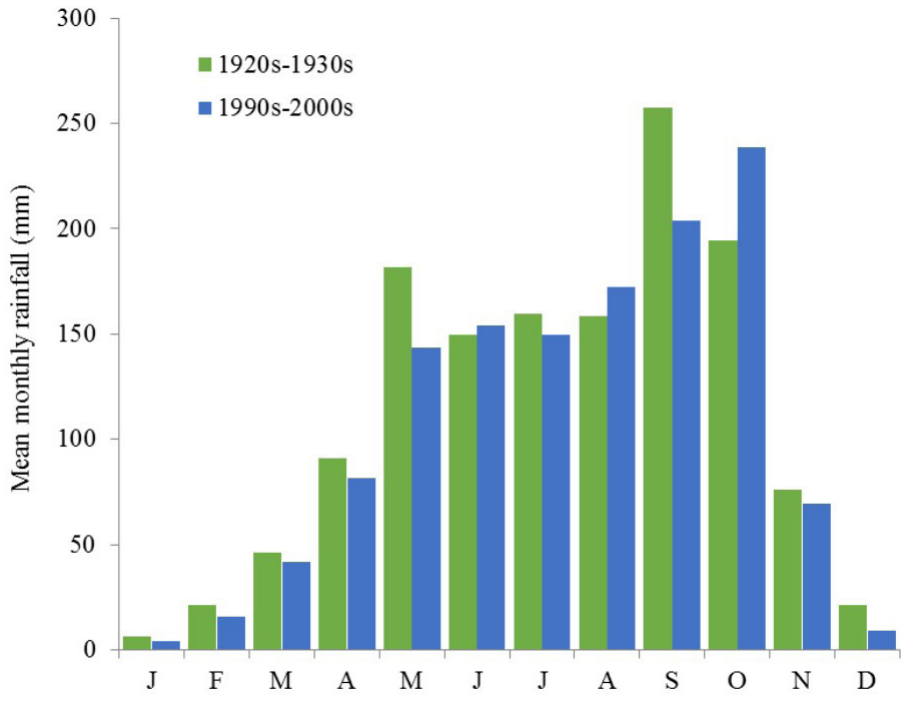


Figure 5 Change in rainfall distribution (Battambang station) between 1920-1930 and 1990-2000 showing a clear change in rainfall distribution between 1920-1930 and the 1990-2000 decades.

Indices	Trends 1981-2012	Month of Occurrence (mode)
Wdays>1mm =Annual Count of wet days when precipitation >1mm	Increase	September (n=500)
PRCTOT =Annual Total Precipitation on wet days (rainfall > 1mm)	Increase	N-A
SDII =Simple Precipitation Intensification Index = PRCTOT/Nb Wet days (rainfall>1mm)	Decrease	N-A
Max. CWD>1mm =Annual Number of consecutive Wet Day (when rainfall > 1mm)	Decrease	Sep (n=10)
Max CDD<1mm =Annual Number of consecutive Dry Days (when rainfall<1mm)	Decrease	N-A
Rx1day Rx1Day =Annual Maximum 1 day precipitation	Decrease	October (13)
Rx5days Rx5D =Annual maximum consecutive 5-day precipitation	Increase	October (12)
R20mm =Annual Count of days when Rainfall>20mm	Increase	October (124)
R25mm =Annual Count of days when Rainfall>25mm	Increase	October (89)
R50mm =Annual Count of days when Rainfall>50mm	Increase	October (32)

Figure 6 Extreme rainfall analysis (Battambang Station) between 1981 and 2012 showing that extreme precipitation, indicated with most relevant indices, tend to increase and to occur predominantly in October

Topography

Detailed information about terrain and surfaces is essential for the planning and of any major infrastructure or reclamation project. Topography also influences soil types, the shape of river catchment areas and the location of built-up structure and open-space areas.

Data required

Necessary

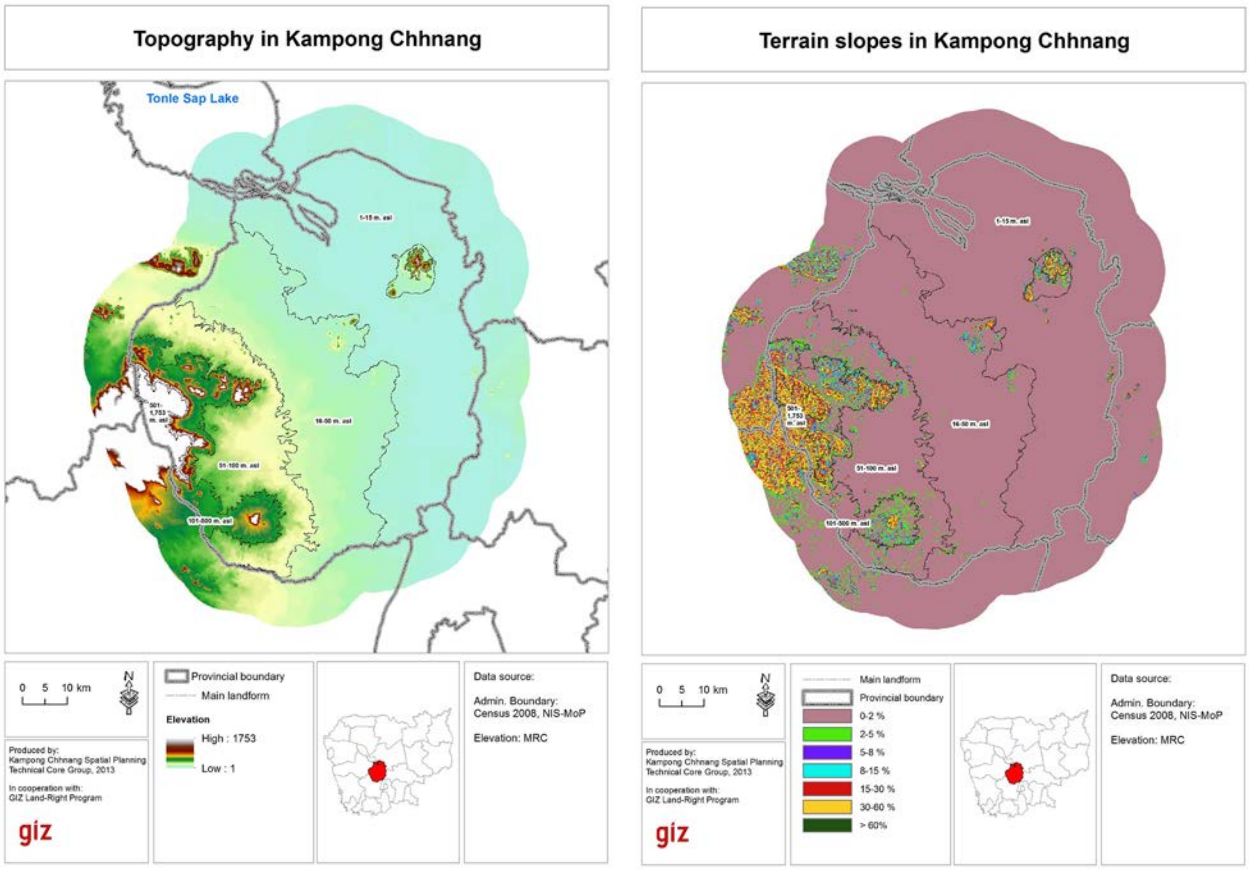
Contour lines (vector)
Digital elevation model (raster)
Slope (raster)

Optional

Hill shade (raster)

Analysis and outputs

- Compute maps showing topography information (elevation and/or slope)
- Generalize this information and identify landforms where relief and slope present relatively uniform patterns
- Identify areas with steep escarpments where soil erosion is potentially a problem
- Identify flat lowland where flood is potentially a problem



Map 3 Topography in Kampong Chhnang – elevation above sea level (left) and slope (right)

Geology and Soils

Geology analyses the solid earth and rocks that soils are made from. Soil is the medium of plant growth and thus of imperative relevance for agriculture; it is inextricably linked to the water cycle and an important habitat. Overall evaluation of soil characteristics throughout the province informs the identification of the type of agriculture development measures that can be envisaged.

Required data

Necessary

Soil fertility data

Optional

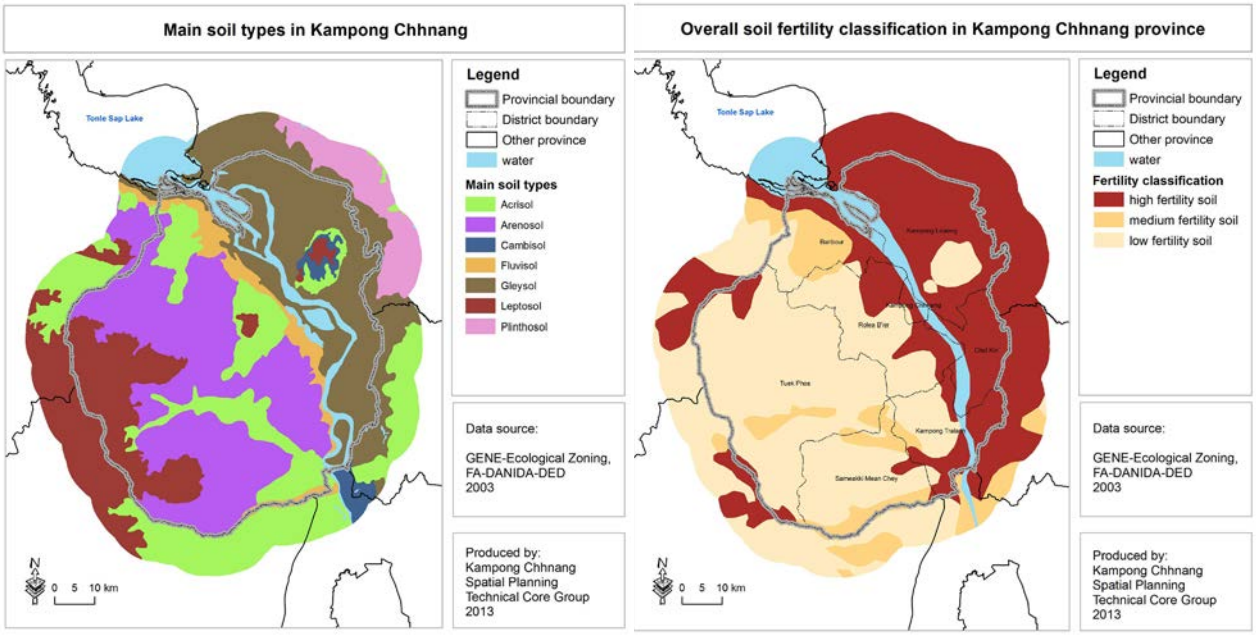
more specific information about soil types based on internationally recognized classification such as FAO (Annex 2)

Analysis and outputs

- Soil type identification and analysis can be a very complex exercise, but simplified soil information is available. Map and assess the overall soil fertility in the province.
- Identify soils that should be preserved for agriculture or forestry.

Optional

- Identify and describe the main soils types: understand their main hydrological, physical and chemical characteristics as well as their aptitude for specific types of agricultural land use.



Map 4 Distribution of main soil type (left) and their overall fertility (right) in Kampong Chhnang province

Hydrology (Water Resources)

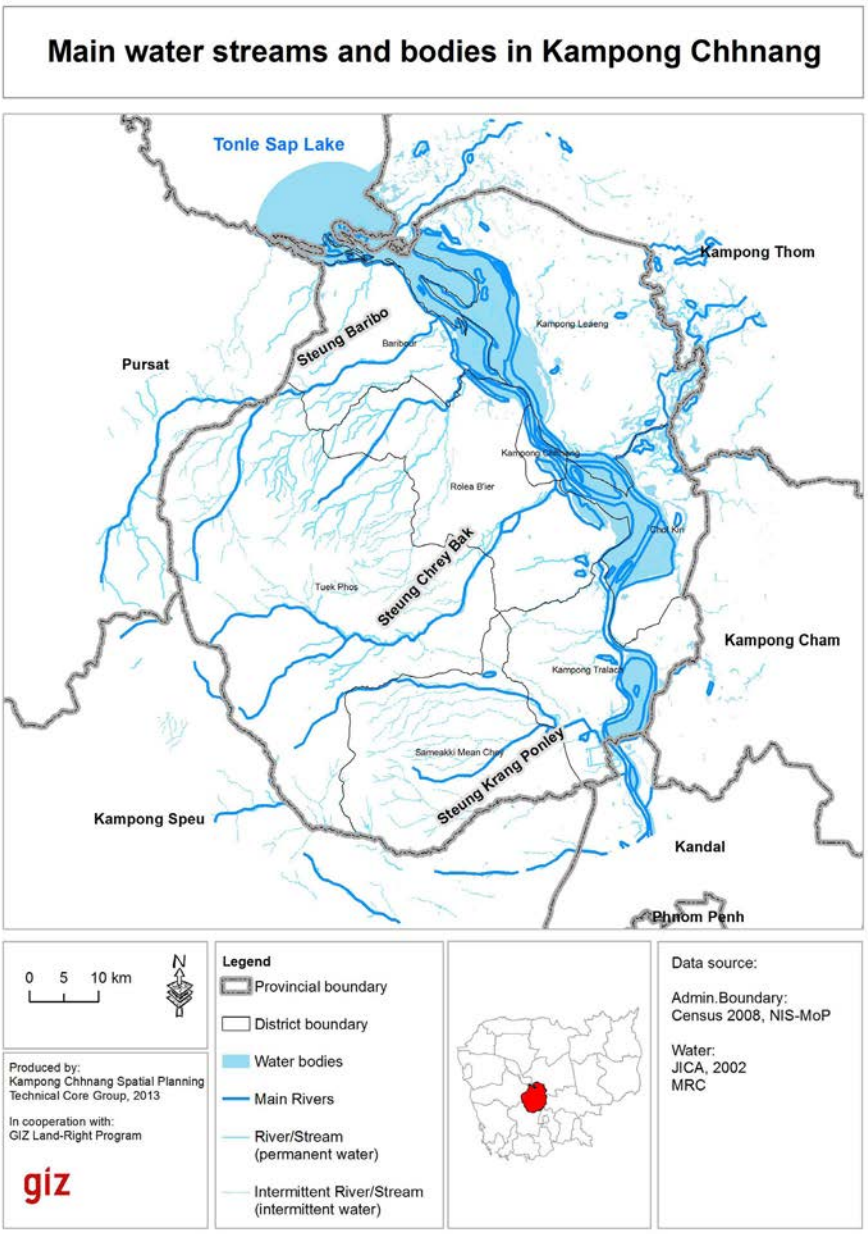
Water resources management is a primary concern in all provinces of Cambodia. Access and use of water is essential to support life, the development of agriculture and ensure the transport of people and goods. Water is a resource in movement so the analysis shall focus on both the elements of stock and the flow of resources between these stocks.

Data required

Necessary	Optional
Flowing waters (main rivers, streams, canals), still waters (wetlands, lakes and ponds)	Water level and discharge for main rivers

Analysis and outputs

- Identify, map and describe the main water streams and bodies and the water status during rainy and dry season.
- Identify the main sources of water for human consumption and for agriculture (from spring/well, ponds/lake, river/stream).



Map 5 Main water resources in Kampong Chhnang

Ecology and Environmental Risks

Ecology analyses the interactions between organisms and their environment, often focused on ecosystems, which represent the spatial spheres of these interactions. Their boundaries are not easy to determine, and different ecosystems, such as watersheds, forests or wetlands, often overlap. Ecosystems have many functions and provide various services, many of which are essential for human life and activities. Vice versa, human activities influence the functionality of ecosystems, and thus the availability of the respective services. Understanding ecosystems and managing them sustainably, for example through avoiding degradation or pollution of watersheds or fragmentation of habitats, is therefore at the core of successful land management. In Cambodia various projects have generated information on ecosystems and ecological diversity, but comprehensive information is limited and varies from province to province. An opportunistic approach is recommended, based on the available information in the respective province.

Furthermore, natural disasters such as droughts or floods may immensely affect human livelihoods. Cambodia has a long record of natural disaster (Centre for Research on the Epidemiology of Disasters, 2011), but their occurrence is likely to increase in the future in the context of climate change. Information about natural disaster is essential to target efforts of mitigation and adapta-

tion. The PSP should in this regard only be the starting point for a disaster risk reduction plan to be developed by the Provincial Natural Disaster Management Committee.

Data required

Necessary	Optional
Boundaries of watershed ecosystems (by MRC)	Data on ecosystems and natural resources (InVEST tool by RUPP and WWF)
Areas with (potential and actual) risk of significant water pollution	Secondary data available on flood in the central Tonle Sap area.
GENE-ecological zoning (by FA / Cambodia Tree Seed Project, 2003)	
Flood and drought prone areas	

Info-Box

GENE-ecological zoning	InVEST Tool
The Cambodian tree seed project is a very good reference to comprehend the ecological diversity (mostly flora). The concept developed by this team is that of 'gene-ecological zoning', which differentiates areas with uniform ecological conditions that produces distinctive phenotypic genetic characteristics within trees species (Cambodia Tree Seed Project, 2003). The concept and the approach are operational for environmental assessment as it provides a simple and cost-effective tool to organize and prioritize action plans for the conservation of important timber-tree species.	"InVEST enables decision makers to assess quantified trade-offs associated with alternative management choices and to identify areas where investment in natural capital can enhance human development and conservation." (http://www.naturalcapitalproject.org/invest/) The RUPP in cooperation with WWF has conducted extensive data gathering and analysis with regard to ecosystems, natural resources and biodiversity through application of the InVEST tool. Where available, this is providing very informative data and maps, allowing for identifying areas with particular relevance for protecting the functioning of ecosystems and services.

Analysis and outputs

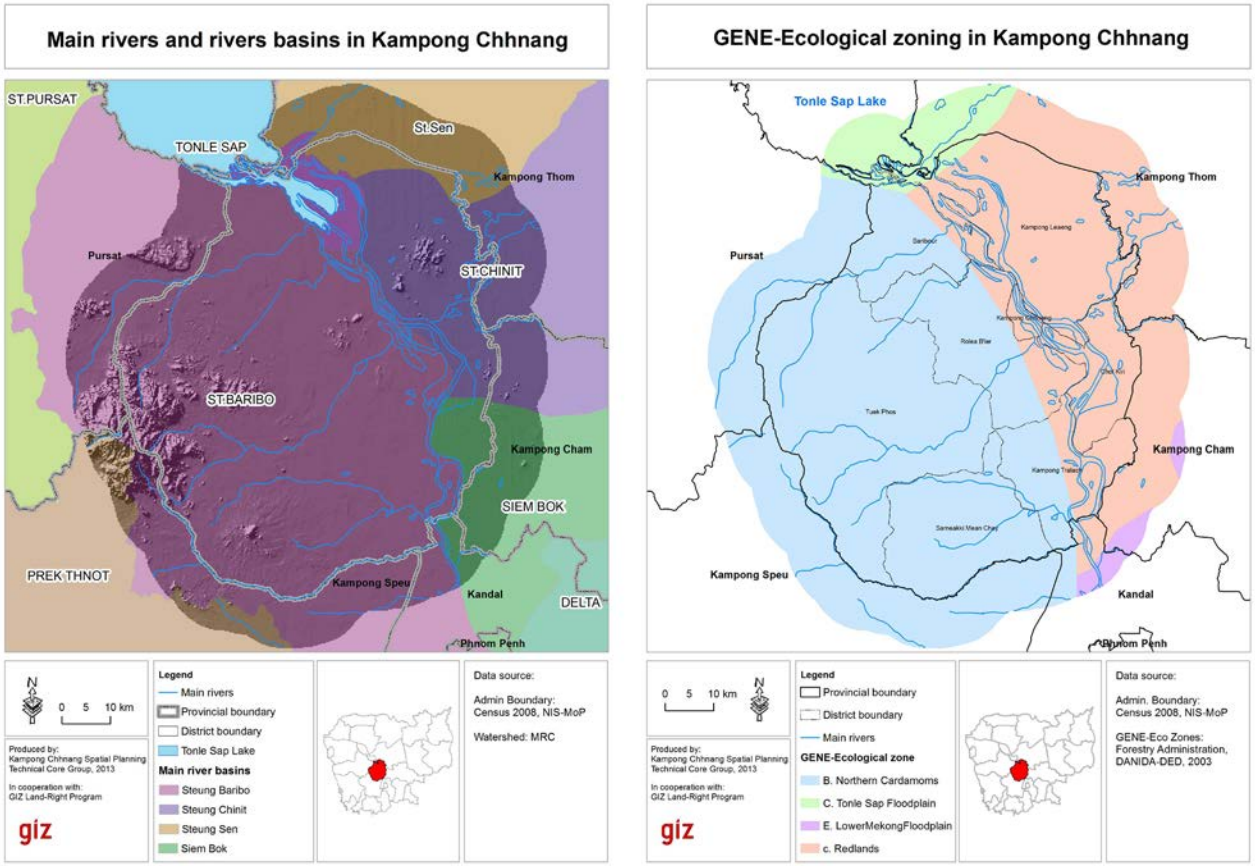
- Compile and map available relevant information on ecosystems, such as watersheds, and ecological diversity and corresponding threats:
  - The MRC has mapped watershed catchment areas. "Understanding watershed structure and natural processes is crucial to grasping how human activities can degrade or improve the condition of a watershed, including its water quality, its fish and wildlife, its forests and other vegetation, and the quality of community life for people who live there. Knowing these watershed structural and functional characteristics and how people can affect them sets the stage for effective watershed management" (O'Keefe, Elliott, & Naiman, Sine Die).
  - Information on zones with distinguished ecological diversity are available from the Cambodia Tree See Project (through FA). Map the different Gene-Ecological zones in the province.
  - Understand the importance and relevance of ecosystems and natural resources, identify areas of particular importance for ecosystem functioning.
  - Get a sense of the potential up-stream / down-stream water management issues within watershed ecosystems.
  - Identify (actual and potential) sources of pollution for ecosystems, in particular for watersheds, due to settlements, industries, mining activities etc.
- Compile and map areas prone to natural disasters, such as drought and flooding:
  - Map areas exposed to flood
  - Understand the characteristics of flood that hits the province (duration of flooding, type

of land use affected: agricultural, settlement, infrastructures, industries etc.)

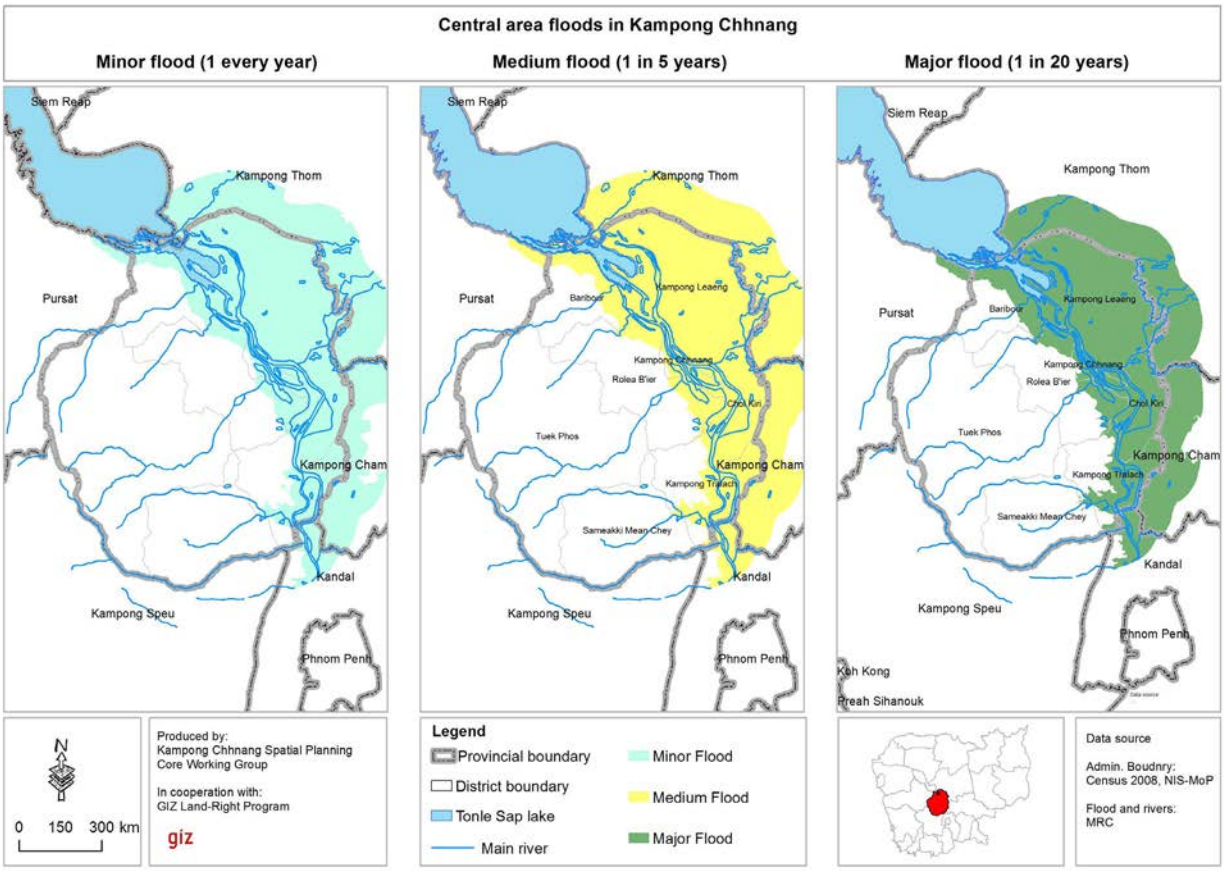
- Get a sense of the differences of flooded area between a minor, medium and major flood
- Map areas prone to drought
- Understand the characteristics of droughts (duration of drought, impact on agriculture, etc.)
- Understand how drought and flood have evolved over time, e.g. in the context of climate change.

Optional

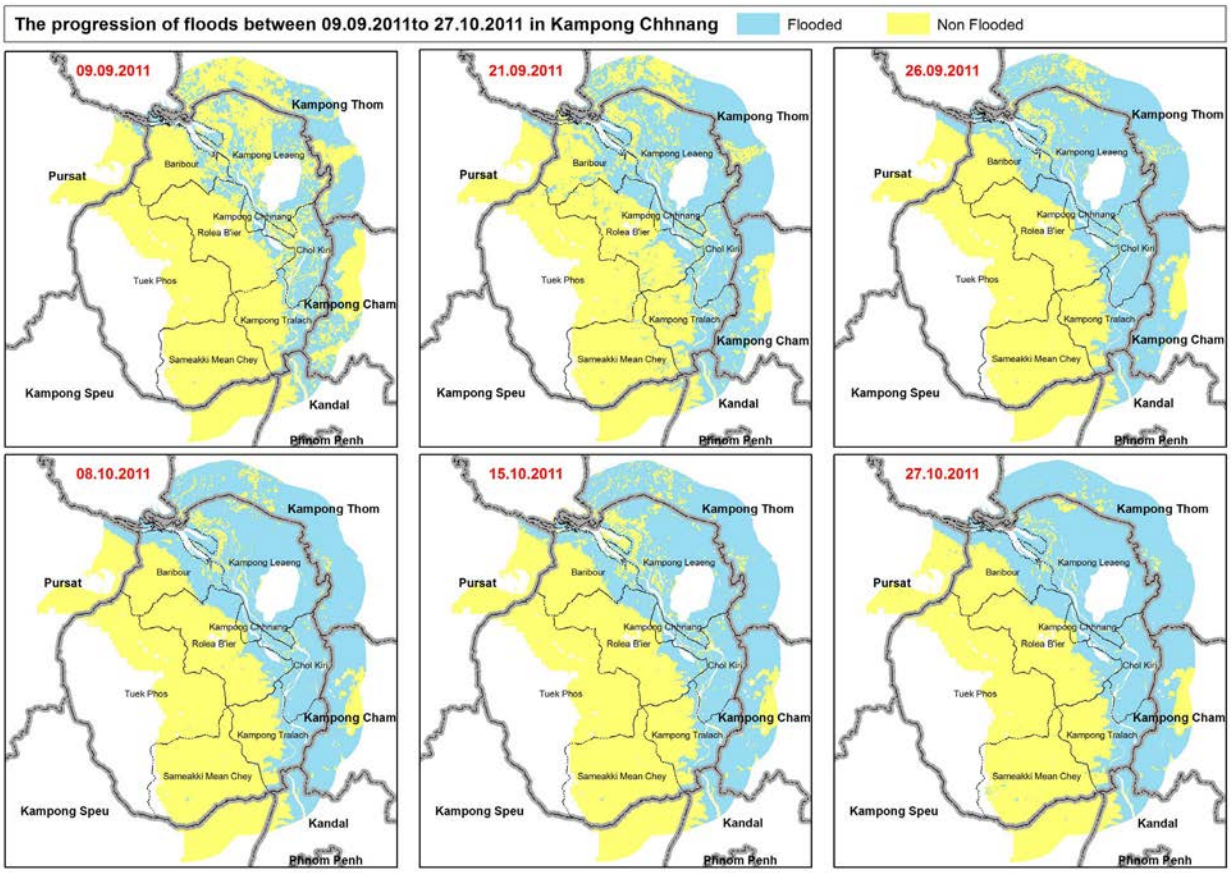
Detailed analysis and mapping of flood revealing the progression of flood front over time, based on time-series data for the central area Tonle Sap flood plain (using RADAR technology). This information is useful to understand the extent of the flood area under different scenarios (minor, medium or major flood) as well as the progression of a flood front.



Map 6 Ecosystems in Kampong Chhnang: Watershed Areas (left) and GENE-Ecological zones (right)



Map 7 Flooded area in Kampong Chhnang, under three levels of magnitude



Map 8 Progression of the 2011 flood in Kampong Chhnang

C) Land use and land tenure

Relevance: In the context of a provincial spatial plan, information about land use and land tenure are central as the plan aims to find a balance between the envisaged open space structure, particularly for the provision of habitat and protection of ecosystems/watersheds, agriculture and extractive industries with the settlement/urban structures and the infrastructure connecting them.

Land use refers to the utilization of land resources by people. It involves the management and modification of natural environment into built-up environment such as fields, pastures, and settlements.

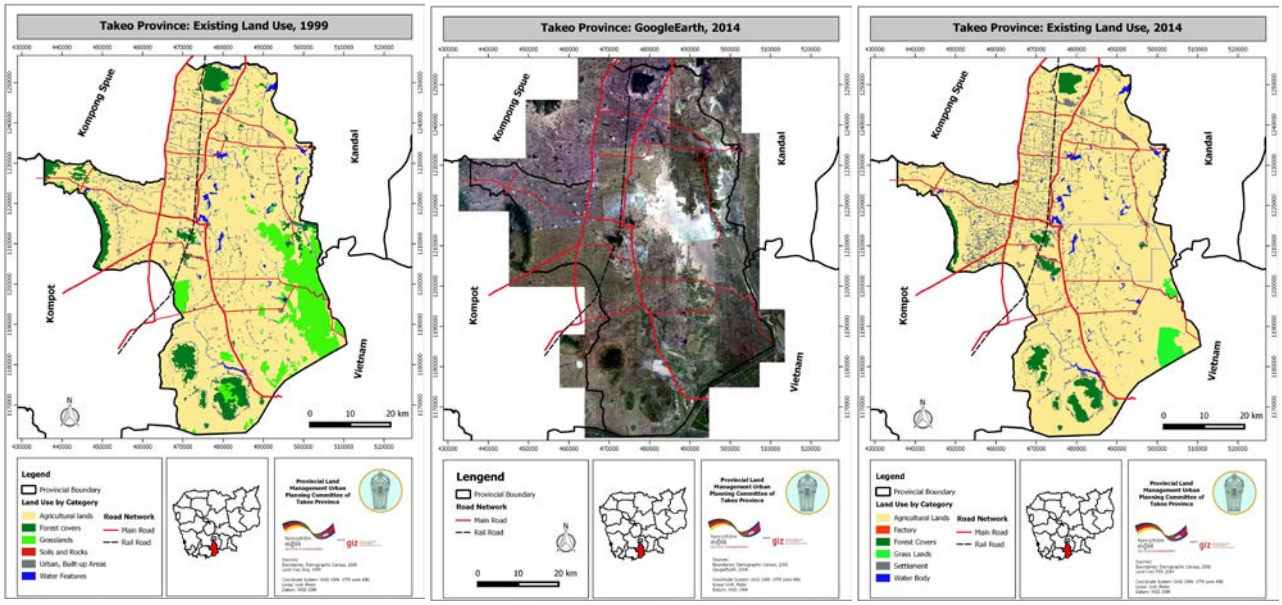
Tenure arrangements include land access rules and their formalizations, including registered private or communal land, state land concessions (social and economic or mining purposes), protected areas, as well as co-management entitlements (community forestry, community fisheries and community use zones in protected area).

Land use/land cover update

In order to establish good reference maps describing the land use in the province, it is necessary to conduct a first updating process of the data available. The 1999 land use coverage of very good quality (the so-called JICA data set) that exists for the entire country is now well outdated, and according to the secondary data available, the PWG needs to initiate a first land use update process.

Use existing secondary data for this update. The interpretation of aerial photos or satellites images into land use categories will certainly help generating land use layers with high spatial resolution. There are many types of satellite imagery (of different resolution and price) available to conduct it. The PWG could also check the availability of free aerial photo through the "Google Earth" portal, at the Department of Geography or via the USGS portal, which provides all archived Landsat scenes at no charge to any users (see Annex 2).

Expertise in remote sensing is necessary to interpret satellite images in order to obtain a meaningful land use classification, but simple digitization of data 'on the screen' is a much easier task to perform. In addition to a computer-based classification of satellite imagery, field surveys assisted with GPS can complement the updating process when specific geographic features need to be recorded and mapped. This first land use update provides a preliminary indication about land use changes.



Map 9 Land Use updating process in Takeo: 1999 Land Use Map (left); Updated Google Earth image (middle) and Updated 2014 Land Use Map (right)

Forest cover and management

Forests stabilize water flows within watersheds and are sources of timber and non-timber products that are important for rural livelihoods. Forests provides fuel wood that is usually the main source of energetic supply for rural and some urban households and construction wood (e.g. fencing material). Forests also offer protection for spirits and in ethnic minority regions parts of forest are allocated as burial sites. Forest resources play an important role in climate change mitigation and forestry is a relevant economic sector in some provinces.

Data required

Necessary

Updated forest cover
Forest concessions (if any)
Protection forests (if any)
Community forestry (if any)
Forest plantations (if any)
Payment for Ecosystem Services schemes (if any)
REDD+ schemes (if any)

Optional

Fauna: main animal species
Floristic description of forest

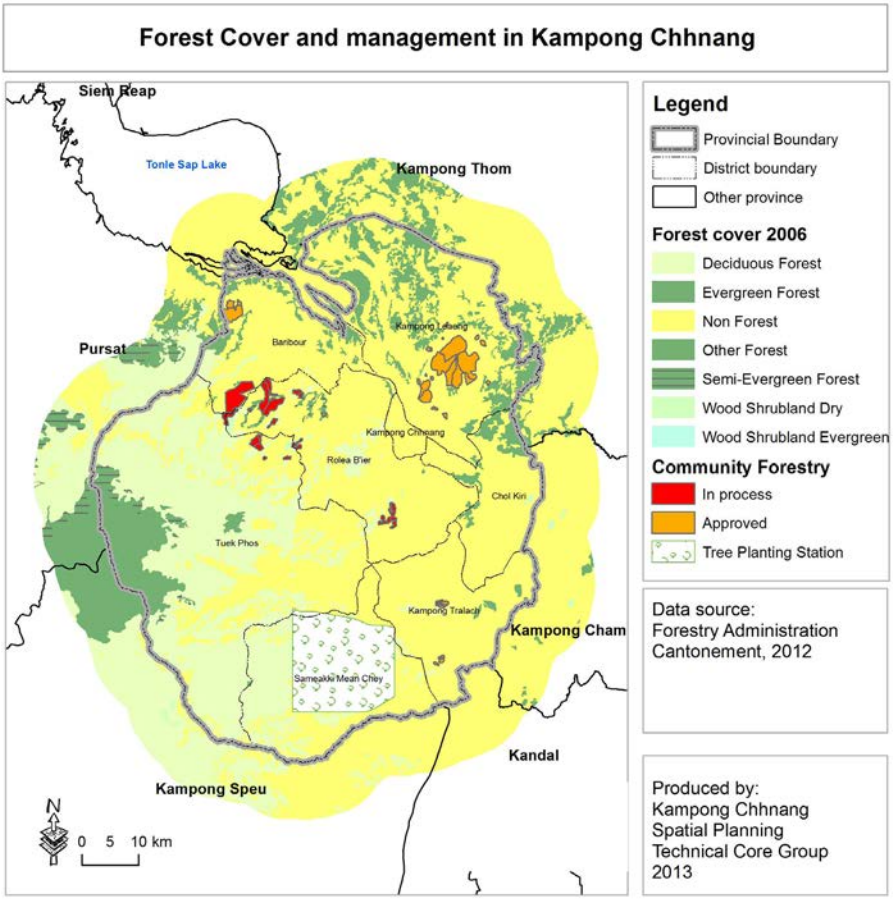
Analysis and output

- Map and describe the forest cover (area size and density, degree of fragmentation).
- Map and analyse the current location and management of :
  - protected forests,
  - community forestry schemes,
  - REDD+ schemes,
  - forest under PES schemes,
  - forest concessions,
  - tree plantations and nurseries,
  - other forms of forest management practices.

- For all forms above discuss and document strengths and weaknesses as well as potentials for further extension or allocation.

Optional

- Description of main forest resources types, biodiversity, fauna & flora, main species, etc.



Map 10 Existing forest cover and the different types of forest management across Kampong Chhnang province

Fisheries Management

Fisheries play a crucial role in the lives of Cambodians and in the country's economic growth as well as in the environmental protection, conservation of biodiversity, good governance and poverty alleviation (Fisheries Administration, 2011b). Fisheries consist of freshwater fish capture, marine fishing and aquaculture. A recent study by Inland Fisheries Research and Development Institute (IFReDI) (2013) found that the second largest food source after rice is aquatic resources (i.e. fish and other aquatic animals such as crabs, molluscs and frogs), at a 63 kg/person/year, representing 76% of the total animal protein intake of Cambodian people. Given the significance of fisheries for Cambodians, it is essential to ensure a sustainable management of the fishery resources.

Data required

Necessary

Fishing grounds (freshwater fish capture, marine area and aquaculture)

Community fisheries

Fisheries conservation area

Optional

Fish catch

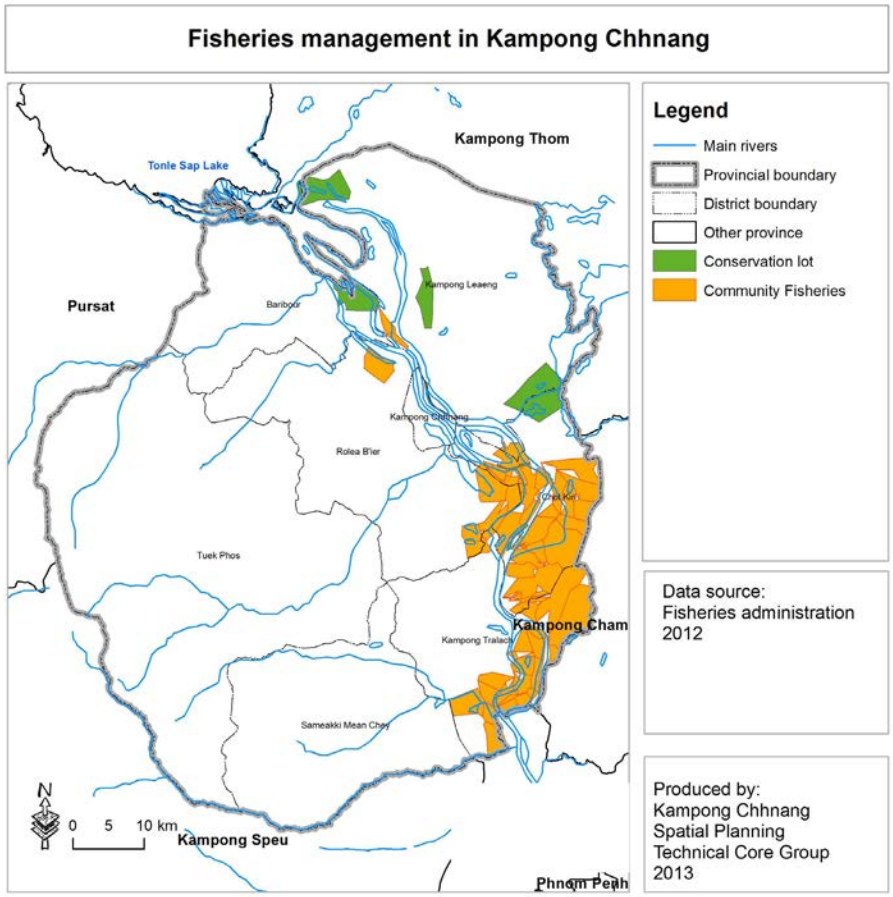
Description of fishing grounds ecology: fish and other aquatic animals inventories

Analysis and outputs

- Map and describe main fishery grounds (area size, types of fisheries resources).
- Map and describe the location and status of community fisheries schemes, analyse strengths and weaknesses as well as the need or potential for further development.
- Map and describe the location of the fisheries conservation areas left after removal of fishing lots, analyse strengths and weaknesses as well as need or potential for further development.

Optional

- Describe main fisheries resources types, biodiversity, fauna & flora, main species, fish stock, etc.



Map 11 Location of the existing fishing grounds and the different types of fisheries management across Kampong Chhnang province

Protected area management (flora and fauna conservation)

Protected areas are established under the jurisdiction of the Ministry of Environment (MoE) to ensure protection of the environment, land, forests, wetlands and coastal areas. They are reserved for wildlife protection, to ensure stability of watersheds and to protect nature and scenic views with scientific, educational and entertainment significance. While sustainable management of land and natural resources must not be confined to protected areas, there targeted management makes them a key instrument in sustainable territorial development.

Data required

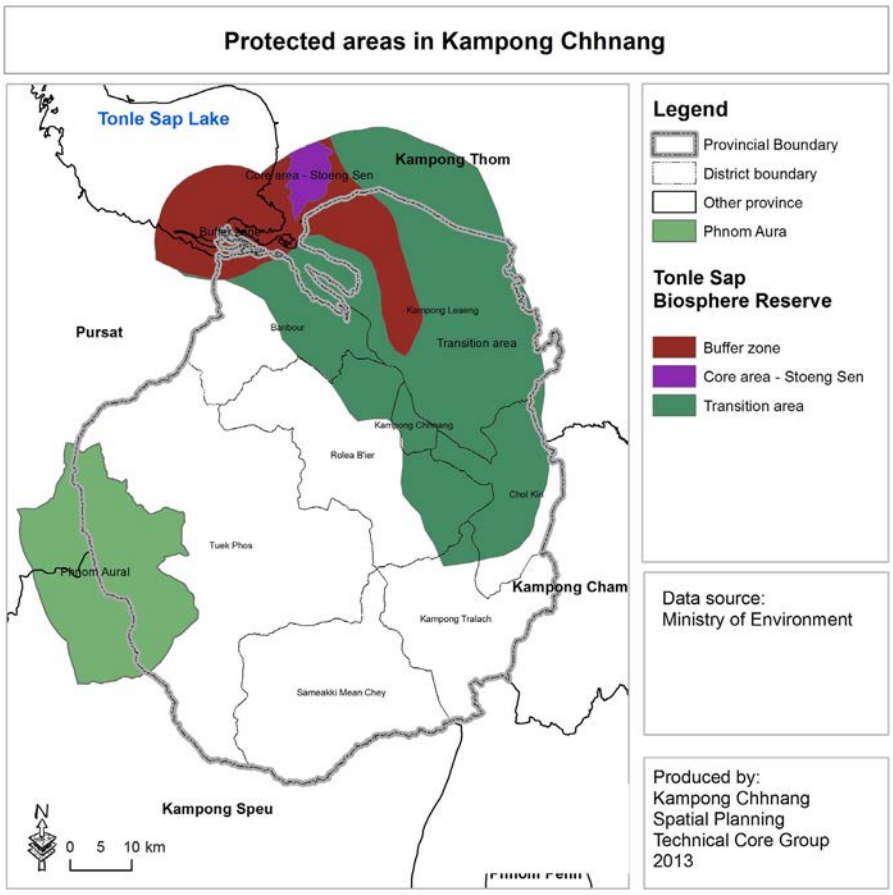
Necessary	Optional
Location of protected areas and major functions Internal zoning (if any)	Description of the ecology and biodiversity in these protected areas

Analysis and outputs

- Map the location and type of protected areas (national parks, wildlife sanctuaries, protected landscapes, multiple use areas, Ramsar sites, biosphere reserves, natural heritage sites, marine parks)
- Analyse the effectiveness of resource protection, main issues affecting their management and the counter-measures taken.
- Map and analyse the zoning of protected areas under the management of the Ministry of Environment:
  - Core zone
  - Conservation zone
  - Sustainable use zone
  - Community zone
- Discuss the needs and potentials for further improvement of protected areas management.

Optional

- Description of main forest or fisheries resources types within protected areas: biodiversity-fauna & flora, main species, bio-diversity, etc.



Map 12 Existing protected areas across Kampong Chhnang province

Agriculture

Agriculture is of paramount importance and one of the most dominant land uses in Cambodia. It contributes significantly to the GDP and provides employment to a large majority of the population. Agricultural production needs to address the food security of a growing population, address the diversification of food demand and generate export income. Also, much of Cambodia's forest areas have been converted for agricultural purposes, while sub-urban agricultural areas have become part of extended residential areas.

Agriculture is a central element in integrated spatial planning in basically every province. While the more detailed agricultural sector strategies have to be developed and spatially integrated at the district level, the PSP will have to determine the trajectory of future land use change regarding the competing functions and uses of the open landscapes of the province.

Data required

Necessary

Cultivated areas and yield of main crops, clearly differentiated between rice, annual non-rice crops and perennial crops

Areas of agricultural product storage and processing

Optional

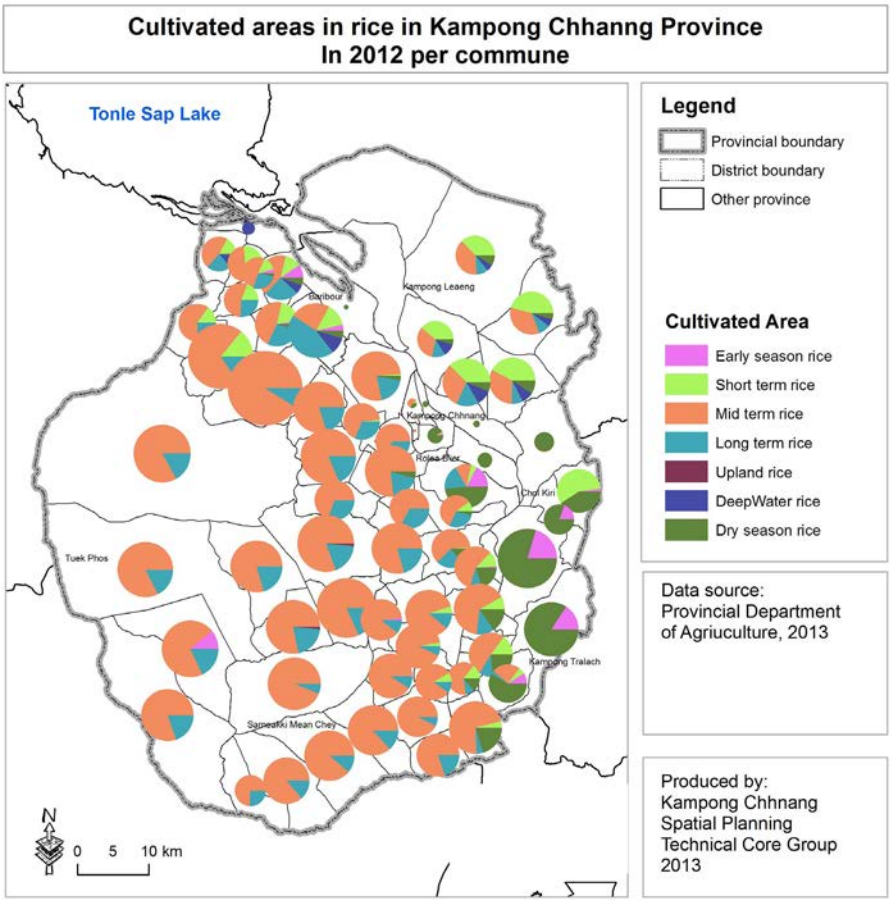
Description of cropping and livestock systems, including technical indicators such as costs of production, profitability, etc.

Analysis and outputs

- Compute and map the cultivated areas and analyse the distribution of crops across the province (in relation with variables of bio-physical environment).
- In regions with indigenous people, it is important to identify swidden agriculture land use systems, which usually co-exist in a mosaic with permanent agriculture land use patterns. It is also important to include all land tenure arrangements of indigenous people, whether already formalized by communal title or not. On a provincial scale, a general indication in this regard might be sufficient, but a detailed mapping would have to be done at the district and commune planning levels.
- Map areas with relatively low/high levels of agricultural intensification or diversification; identify agro-industrial areas in economic land concessions or as part of large landholdings.

Optional

- Characterize and analyse the different rice and non-rice cropping systems:
  - Seasonal calendar (dry & rainy seasons)
  - Average yields for rice and non-rice production
  - Production constraints (land, water, labour, technology, access to inputs…)
  - Commercialization constraints (access to market, cost-price, sale price…)



Map 13 Importance of cultivated area size (by commune) in 2012 across Kampong Chhnang province

Land tenure

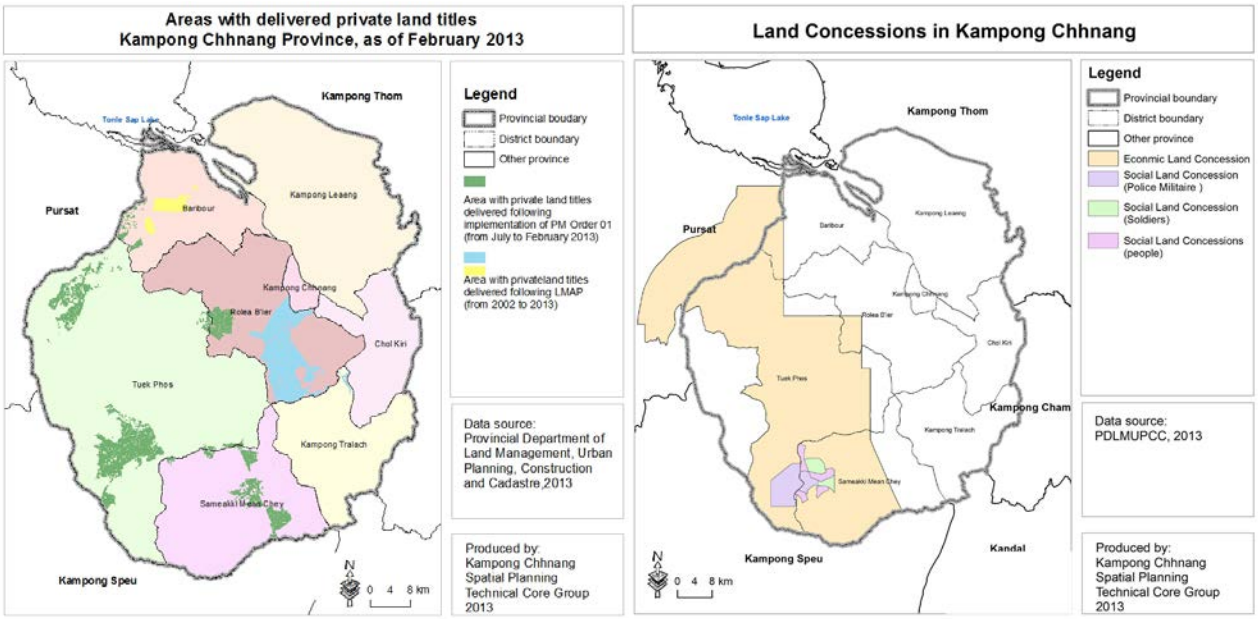
The potential and challenges of the use of agricultural, forest and fishery resources is closely linked with tenure arrangements, and has therefore gained immense international attention through the Voluntary Guidelines for the Responsible Governance of the Tenure of Land, Forest and Fishery Resources (VGGT). For example, household-based agricultural activities are central in the development of the country, but co-exist with other forms of production with different operational scales (e.g. through economic land concessions or social land concessions). A detailed review of these different tenure arrangements is necessary in order to address tenure related issues of land use and to adequately address private sector actors in the development of strategies.

Data required

Necessary	Optional
Areas addressed by land titling campaigns (sporadic or systematic registration and Order 01)	Secondary data about land transactions and land access and prevalence of landlessness
Economic land concession areas	
Social land concession areas	
Areas with communal land titles	
Large landholdings that are informal or not yet registered	

Analysis and outputs

- Map and describe the areas where private land titles have been delivered (by sporadic or systematic land registration or during the “Order 01” implementation).
- Map and describe the areas where communal land titles have been delivered (indigenous people’s communities).
- Map and analyse the areas and management of economic land concessions, including strengths and weaknesses. It is also important to review any existing environmental, economic and social impacts of these operations. If these documents are not available, it is recommended to produce them
    - ELC with national agreement
    - Other concessions granted by sub-national government to smaller enterprises
- Map and analyse the areas and status of different types of social land concessions (strengths and weaknesses):
    - Poor households
    - Soldiers
    - Military Police
- Examine areas with open and latent conflicts between households and companies as it relates to land claim overlaps/encroachment or other types of conflicts. It is advisable to attempt mediation during the planning process, as the conflict will usually have implications on effective management of the area.
- Identify large areas with overlapping tenure claims, such as large economic land concessions, settlers encroaching on state land and/or informal settlements and discuss potential implications and solutions, keeping in mind social, economic and environmental concerns.



Map 14 Location of the areas where private land titles have been delivered in Kampong Chhnang province (left) and the economic and three types of social land concessions areas in Kampong Chhnang province (right)

Quarry and mining areas

Another land use category to consider are areas with mining operations (sand, stones, soil, gold etc.). Usually, mining operations are made under a concession agreement between the state and a company, but can also occur through informal agreements.

- Map areas with mining operations and the type of supporting agreements.
- Analyse the local environmental, economic and social implications of these operations.

D) Population and Settlements

Relevance: Spatial planning aims to improve livelihoods and well-being of people through sustainable territorial development of the province. So in order to propose meaningful and relevant spatial planning measures, the planners need to acquire a fine-tuned knowledge of the provincial population. Central to this is a demographic analysis about trends and current situation and a corresponding description of the settlement patterns.

Demography

Demographic data such as population size, distribution and dynamics is essential to assess the needs of the population in relation with education and health facilities, physical infrastructures, employment and overall economic development. As all land use activities are based on the relation of the people to land, it is further relevant for understanding their land related activities, such as settlement behaviour or conversions from one land use type to another.

Data required

Necessary	Optional
Time-series population record by commune and by age groups	Specific demographic data, such as fertility and mortality rates, etc.
Extent of in- and out-migration by district	

Analysis and outputs

There are reliable demographic datasets available, which allow conducting longitudinal and disaggregated demographic analysis (at district or even commune levels). Longitudinal analysis is important to get a sense of demographic dynamics in the province.

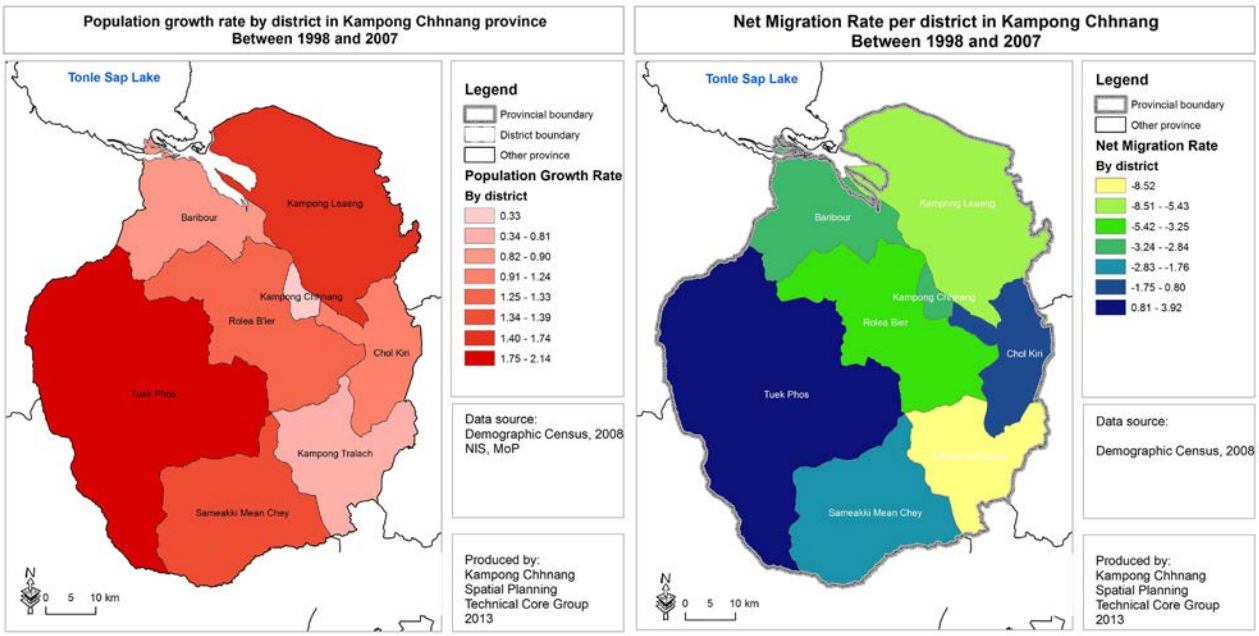
- As some kind of "demographic base map", visualize the current population size by communes.
- Compute, map and interpret the "demographic growth rate" (r) given by:

$$r = \frac{Ln\,(P_t) - Ln\,(Po)}{t}$$

  - Where, P0 is the population at the base year, Pt is the population at the year 't' and 't' is the number of years between P0 and Pt. The demographic growth rate gives the percentage of increase of the population over a certain period of time. It is useful to compare this demographic growth rate between districts, so to identify different demographic dynamics within the province.
- Compute, map and interpret the "district net migration rate" given by:

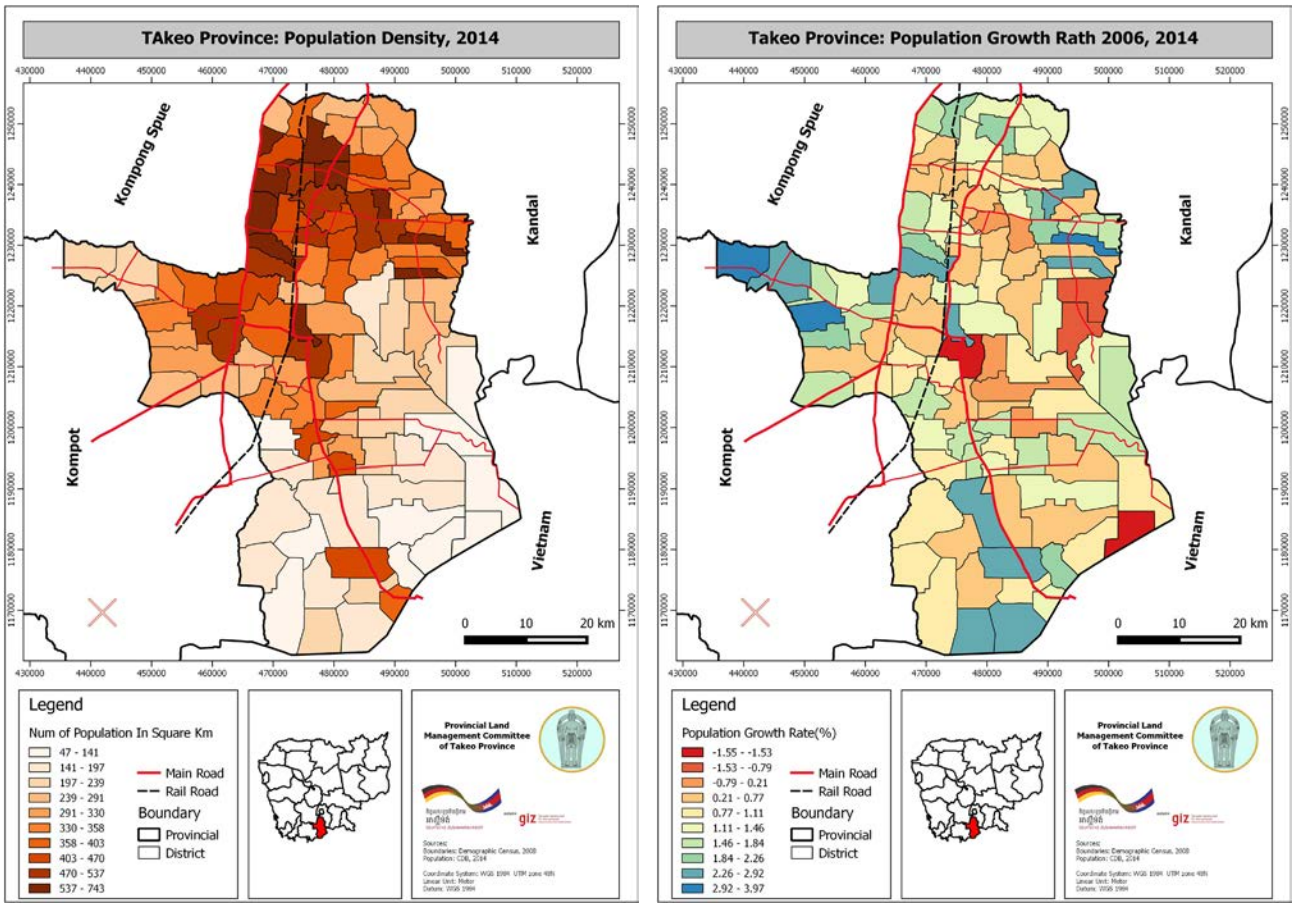
$$Net\ Migration\ Rate = \frac{Nb\ Immigrants - Nb\ Emigrants}{Total\ Population\ in\ district} \text{ x } 1000$$

  - A positive value of "net migration rate" signifies that more people have entered the district than people who have left during a specific time period, while a negative value means more people leaving than entering the district during the same period of time. It provides useful information about the migratory dynamics of population into and from the district. It is a good indicator of the economic dynamism of the districts.



Map 15 Population growth rate by district for the period 1998-2008 in Kampong Chhnang (left) and the net migration rate by district in the same province over the same period of time

- Compute, map and interpret the population density: $Pop.Density = \frac{Nb\ People\ in\ area}{Area\ Size}$
  - Information about population density allows us to identify areas in the province with relatively high or low demographic pressure on land, and to discuss consequences for land demand and use.



Map 16 Population density (left) and growth rate (right) by commune in Takeo (2006-2014)

- Compute and interpret the "age pyramid" of the provincial population (Figure 7). The age-group pyramid gives information about the relative importance of age classes amongst the population.

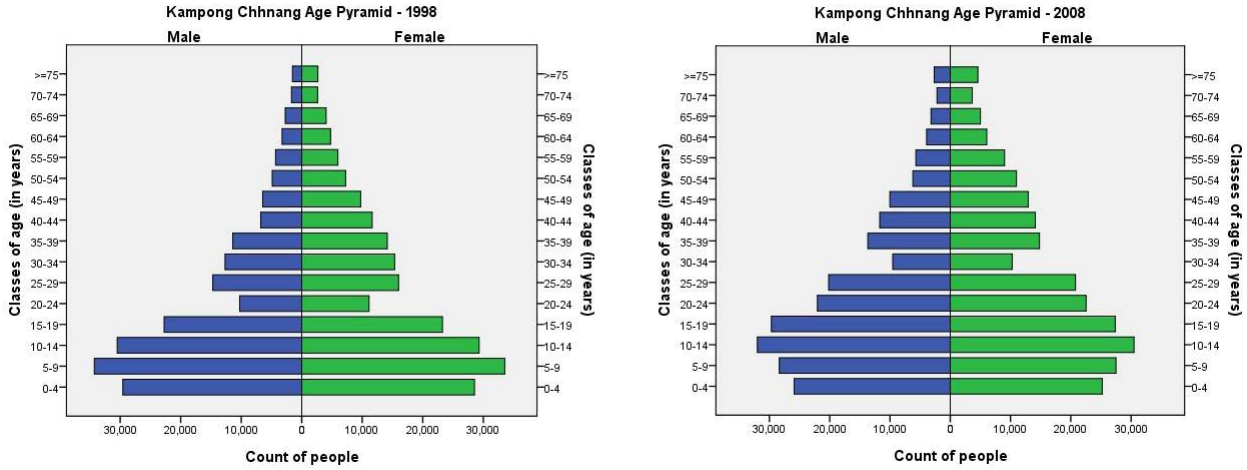


Figure 7 Age pyramid of Kampong Chhnang province population in 1998 (left) and in 2008 (right)

Optional

- Describe evolution of fertility rate and mortality rate.

Rural and urban settlements

A land use category, which was not yet explicitly addressed under C) Land Use and Land Tenure, are the "built-up areas". Probably more than any other land use type, settlements are linked with demographic development. A scrutiny of the historical evolution and of the existing location of settlements provides a spatial expression of the demographic analysis conducted earlier. While on a district and commune level population migration, growth and density are already known, it needs to be understood how this translates into settlement patterns. Do urban areas extend into the agricultural surroundings or rather get denser? Do smaller settlements merge? Do new settlements arise along new roads or do new rural settlements form despite conflicting tenure claims (such as concessions)? Obviously the level of detail a PSP can reach in this regard is limited, but not understanding major settlement trends would inevitably cripple later attempts to outline a desired future settlement structure.

Data required

Necessary	Optional
Time series location of settlement areas	More detailed information about urban structure
Classification of urban areas based on NIS criteria	

Analysis and outputs

- Map and describe rural and urban settlement areas and their distribution across the province. Identify the urban areas (district centres and others) according to the criteria set by the National Institute of Statistics (NIS):
  - population density exceeding 200 per km2,
  - percentage of the male employment in agriculture below 50% and
  - total population of the commune exceeding 2,000 (National Institute of Statistics, 2012).

- Map and describe general changes in settlement patterns. This can be indicated through rural and urban growth points, areas with new settlements, particularly along new roads and in the uplands. More accurate urban growth analysis should take place at the municipality/district planning level.

E) Social services provision

Relevance: Social infrastructure typically includes assets that accommodate social services, such as education, health, but also cultural and sport facilities. In the perspective of a provincial plan, it is particularly important to consider education and health facilities in view of improving their accessibility by the population. Both public and private health and education facilities exist in Cambodia and both should be taken into account for planning purposes. This analysis subsequently feeds into a determination of which urban centres are to provide which types of social services to their residents and rural surrounding areas in order to minimize access issues for the population and inefficiency of facilities for the state.

Health

Ministry of Health classifies geographical areas according to a hierarchical system that takes into account the number of people. This classification substantially differs from the usual administrative hierarchy (province, district, commune, villages) and the PWG should take this into account. According to the Ministry of Health classification, districts are aggregated in operational districts (OD); each OD covers a population of 100,000-200,000 and comprises 10-20 Health centres (each covering a population of about 10,000) and a referral hospital. The increasing number of private health facilities should also be taken into account.

Data required

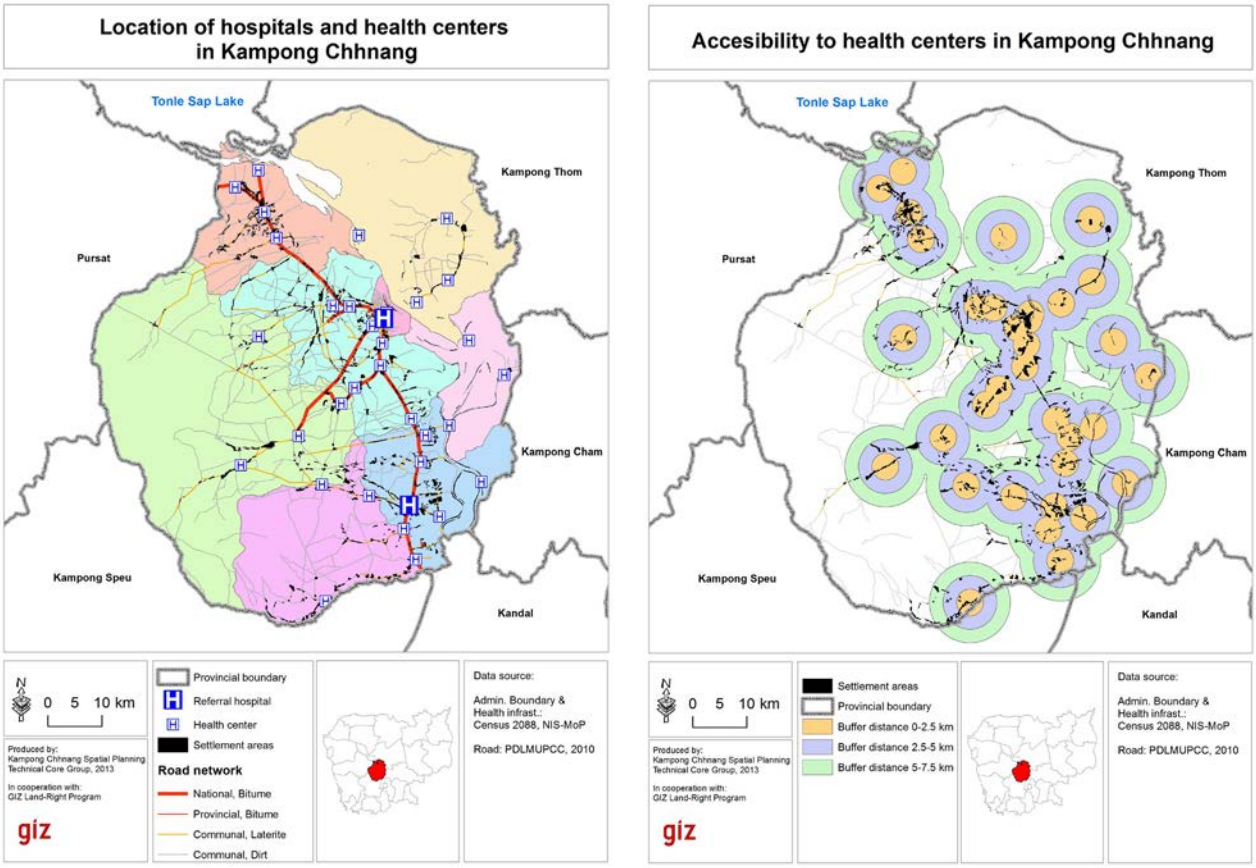
Necessary	Optional
Boundaries of operational districts (OD)	Characteristics of health services
Different types of health infrastructures: referral hospital, private clinics, health specialists, operational district health centres, public health centres and health posts	

Analysis and outputs

- Map the location of different types of health facilities.
- Discuss the accessibility of services for the population in all areas of the province. Keep in mind that different facilities address different quantities of people and area sizes.

Optional

- Characterize each health infrastructure with information about type (public / private) and capacity.



Map 17 Location of the different health facilities (left) and accessibility to health centres in Kampong Chhnang province (right)

Education

For education facilities in principal the same applies as for health facilities, only that there is no comparable system of operational districts. While obviously the quality of services is of major relevance, the PSP will focus on aspects of accessibility.

Data required

Necessary

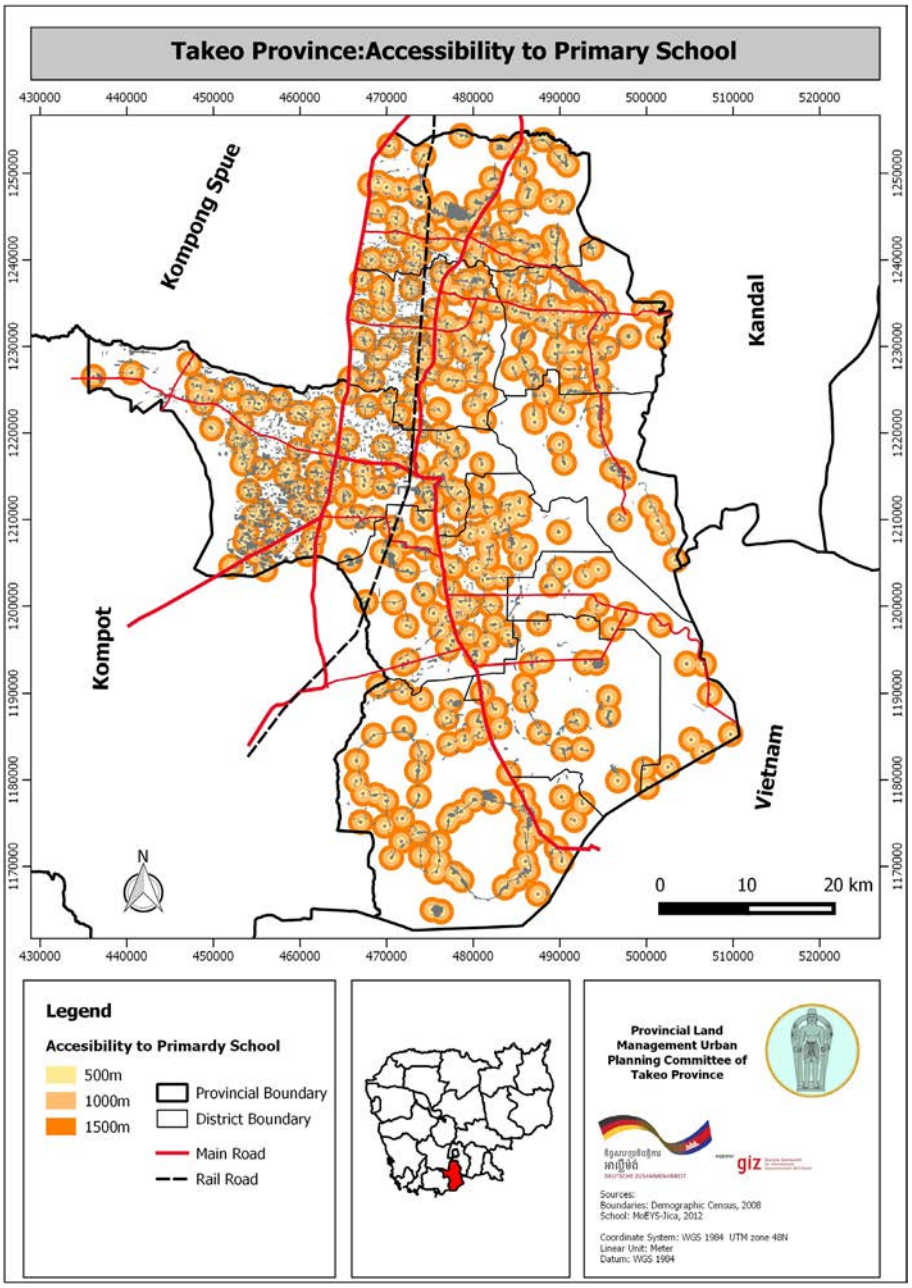
Location of education facilities by type

Optional

Characteristics of school such as enrolment rates, number of teachers, etc.

Analysis and outputs

- Map the location of different types of education facilities (kindergarten, primary, secondary and high school, university, vocational training centres, other education centres).
- Perform a basic accessibility analysis to identify settlement areas in the province with accessibility issues. It must be kept in mind that different educational facilities address different quantities of population and also surrounding areas of different extent.



Map 18 Accessibility to primary schools in Takeo province

Optional

- Characterize each school with information about type (public / private), capacity and the current enrolment.

F) Physical Infrastructures

Relevance: Physical infrastructures are the structural elements that provide the framework to support all economic, service and leisure activities of the province. Together with the settlement patterns and central places system, physical infrastructures are central in determining the spatial structure of the province. They are classified in 4 categories according to their function: transport, water management, energy and waste management.

Transport infrastructures

Transport infrastructures aim to facilitate mobility and accessibility within and across the province, which makes them key in economic development. Safety in transport is a relevant concern in Cambodia, where accidents are frequent and often severe. In spatial terms transport infrastructure forms corridors, which may have social and environmental impacts (e.g. settlers affected by road extensions or agricultural production and ecosystems fragmented and degraded by new access roads). The task of PSP is to consider such implications by integrating the various functions of space and identifying different alternative options for future routes.

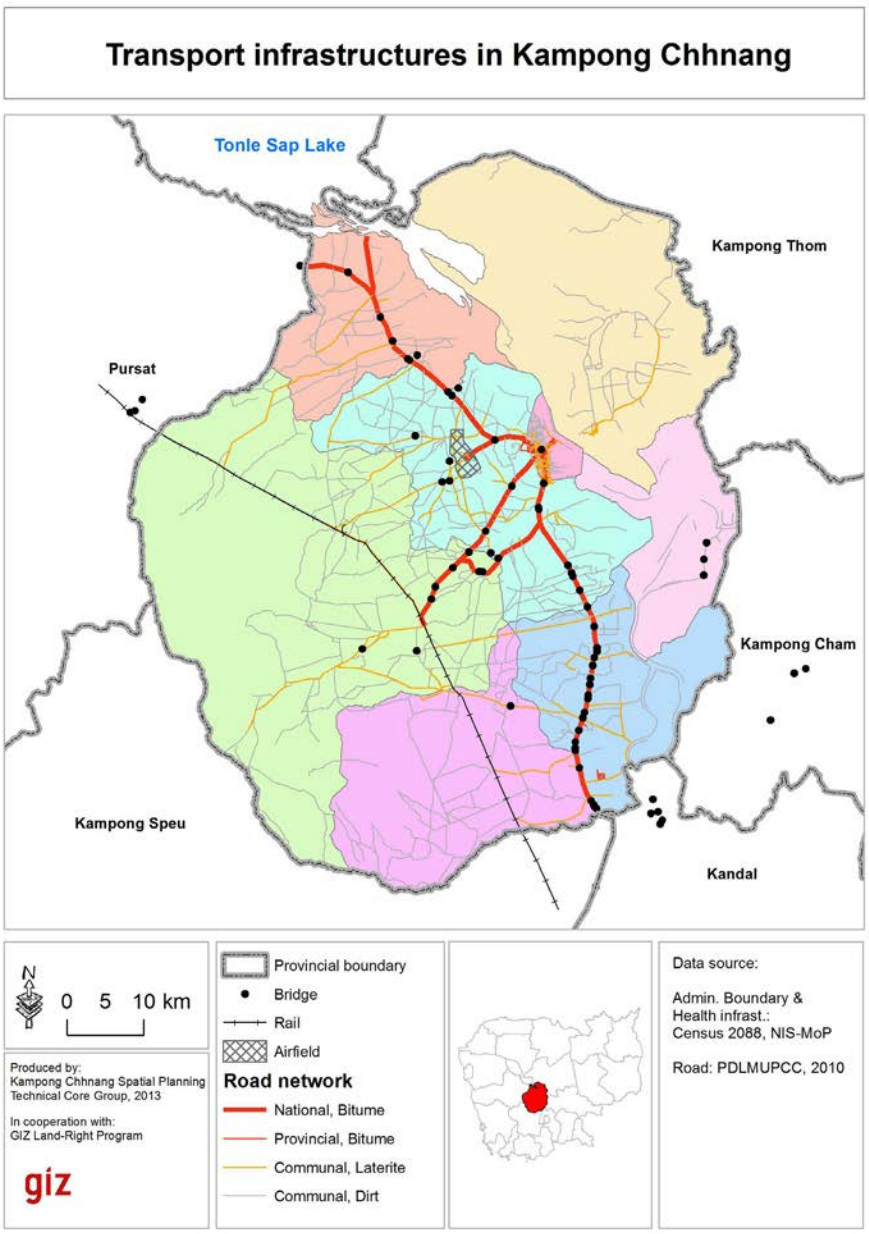
Transport infrastructures include roads, railways and related facilities, navigable waterways, airports/airfields as well as communication infrastructure, such as post offices. Throughout Cambodia, the road network is obviously the most important form of transport, but waterways offer important alternatives in areas with low accessibility by road. Railways also offer important alternatives to roads transport. Most railways are now being rehabilitated in Cambodia and new railways are being constructed. Airfields exist in many cities throughout the country, but are usually not operational. Scenarios for conversion of airfields and identification of alternative sites for airfields need to be discussed.

Data required

Necessary	Optional
Locations of roads, railways, waterways and of main transport stations	Qualitative aspects of transport infrastructure (travel time/traffic congestion, safety/accident hotspots) of provincial relevance

Analysis and outputs

- Map the accurate location of current and planned transport infrastructure, include checking railway rehabilitation projects, airfields and navigable water ways.
- Identify the level of roads in the hierarchy: National-Provincial-Communal.
- Determine road surface quality (bitumen, laterite, dirt) and get information about practicability of any transport route in the rainy season.
- Identify the areas in the province with low accessibility due to low endowment in transport infrastructures (cross-check with location of settlements, particularly new settlements areas).
- Identify and map the important transport 'stations' areas in the provinces (e.g. bus stations compound, harbour, railway station) and analyse the different challenges faced in the management of these transport hubs. Pay particular attention to the multi-modal transport platforms, which are areas where different types of transport infrastructures intersect (e.g. harbour coupled with bus station).



Map 19 Transport infrastructure networks in Kampong Chhnang province

Optional

- Check road number/name (if any).
- Map the areas in the province where roads are subject to degradation due to flooding.

[Agricultural] Water management infrastructures

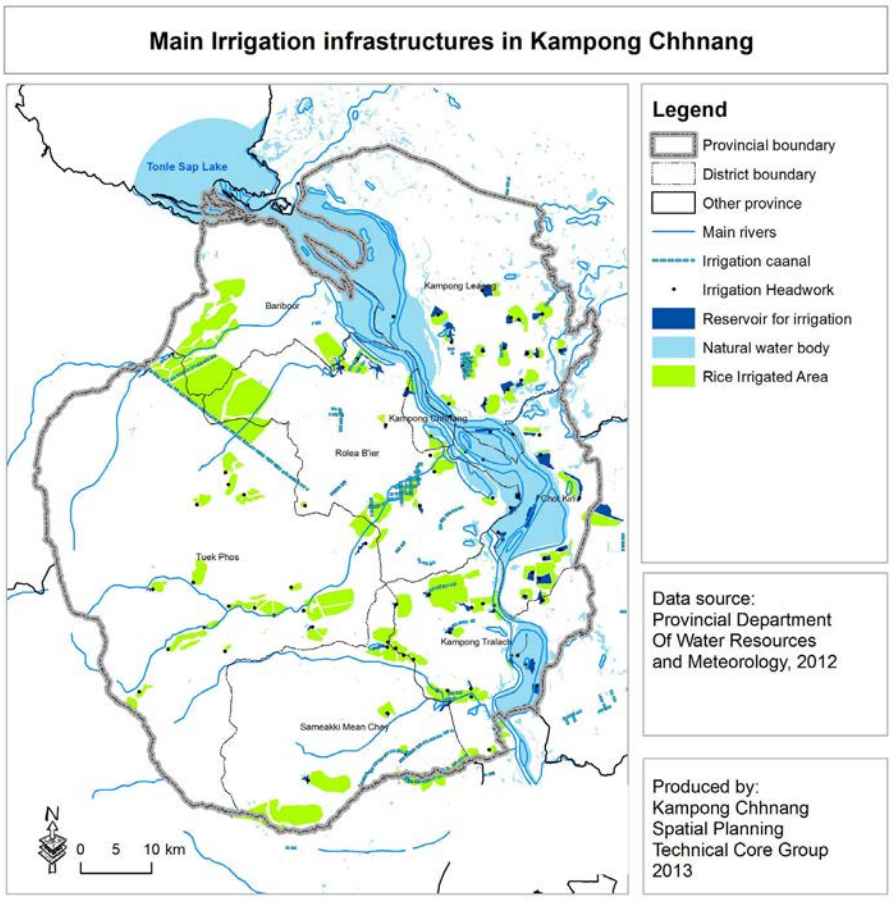
Water management infrastructures, also referred to as irrigation infrastructures, are crucial to support the development of agriculture. We differentiate between small/household-scale irrigation schemes (pumping water from a reservoir) and the irrigation schemes which benefit a group of households pertaining to a village or even group of village or commune. In the perspective of a provincial spatial plan, only the second type of irrigation infrastructure should be considered. These irrigation schemes involve quite important infrastructures including a stabilized source of water (river or reservoir), a physical headwork (gate) that regulates the transfer of water from the reservoir to the irrigated command perimeter through a nested system of canals.

Data required

Necessary	Optional
Location of main irrigation schemes with information about water source, main canal, headwork and command perimeter	The detailed location and description of secondary and tertiary canals that brings water to the plot

Analysis and outputs

- Map the location of the main irrigation schemes including water reservoirs, headwork and command perimeter (agricultural area size that benefit from the water).
- Characterize each irrigation scheme by water source (from river, reservoir …).
- Discuss the potentials of locations for further development of main water management infrastructures.
- Map and describe location, type and status of the main flood control and protection infrastructure (dams, levees).
- Discuss the needs for further development of flood control infrastructures, based on previously identified areas prone to flooding and "critical infrastructure" based therein (such as hospitals and similar facilities as well as roads accessing them or with major connecting function in the province).



Map 20 Location of the different irrigation schemes in Kampong Chhnang province

Optional

- Establish a more detailed map on irrigation schemes, showing the complete hierarchy of canals and analysing how the different schemes can be enhanced.

Energy infrastructures and supply

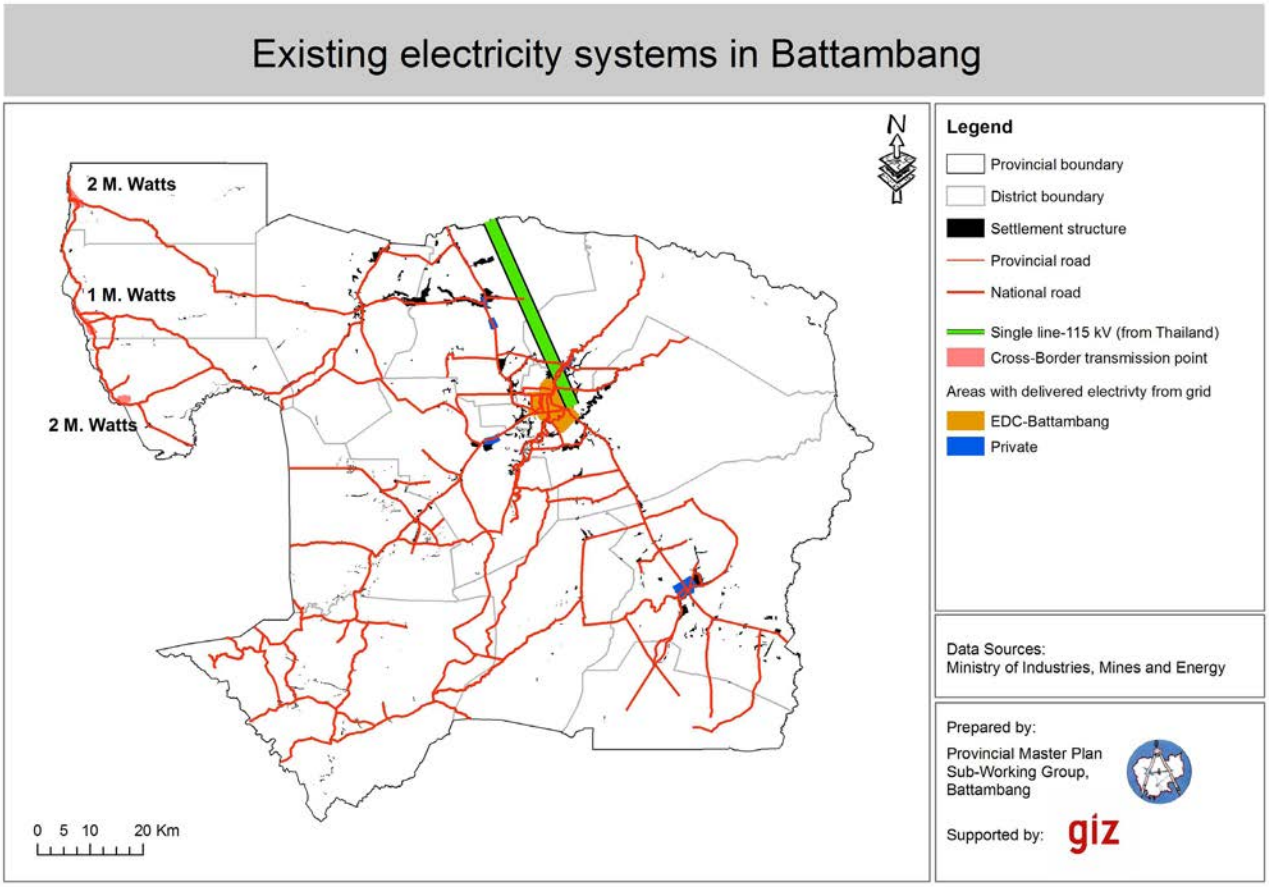
The provision of energy, particularly in rural areas, is a key factor in the rehabilitation and development of Cambodia, especially for the improvement of living standards, for agricultural and for small/medium/large scale industrial development in the province. While accessibility to such local level energy supply needs is to be addressed on lower planning levels, the connection of the province to transmission lines and locations of major energy supplying facilities within the province (such as power plants or hydro-power dams) have to be clarified in order to inform the lower level planning processes.

Data required

Necessary	Optional
Location and capacity of transmission lines	Areas with electricity
Location of energy producing facilities	Analysis and outputs

Analysis and outputs

- Identify the location and importance of the different current and planned sources of electric supply in the province (transmission lines, power plants, hydro-power dams).
- Discuss the needs and potentials for further development of energy infrastructures on the provincial level. Where supply gaps are identified and locations for power plants or dams are identified, consider potential social and environmental impacts and keep in mind that construction would require thorough SEIAs.



Map 21 Location of the existing electricity network in Battambang

Optional

- For each type of source of electricity, identify the area and population with access.
- Identify the area without access to electricity and discuss the challenges of energetic supply in these areas (type, origin, problems if any).

G) Provincial Economic Profile

Relevance: Spatial planning aims eventually at improving peoples' livelihoods so an analysis of the spatial patterns of the provincial economy is an essential task. It is important to examine the economy through different angles so as to understand the factors that both promote and impede economic development.

Economic development and structure

A general analysis of the provincial economy starts with its GDP and with the GDP per capita to understand the economic status of the province. It is furthermore important to understand which sectors are of relevance in the province, guiding the subsequent economic sector analysis.

Data required

Necessary	Optional
provincial GDP and GDP per capita	Time-series data of provincial and districts GDP, GDP per capita and by sector
provincial GDP and productivity by sector	
GDP per capita for district level	
District GDP and productivity by sector	

Analysis and outputs

- Discuss and describe the major economic characteristics of the province, in relation to its role in the bigger Cambodian picture, to the surrounding provinces and particularly with regard to the different economic sectors. Identify the relevance of the different sectors, to determine where to engage in a more detailed analysis.
- Visualize the GDP and productivity by sector. Discuss whether there is an added value in mapping the information, or if rather a diagram will be sufficient.

Optional

- To get a better understanding of the economic trends, one can gather and analyse respective time series data.

Employment

The employment pattern of the population is a very important dimension of the economy to be understood by the planners, as it points out the relevance of economic opportunities and development for the local population. Sectors providing considerable local employment (opportunities) are particular levers for strategies addressing rural development and rural-urban migration. National databases on employment are not very up-to-date, but there are a few datasets that deserve attention, notably the census database. The information on employment in the census database is classified according to the widely recognized employment classification by the UN Statistics division (http://unstats.un.org/unsd/cr/registry/).

Data required

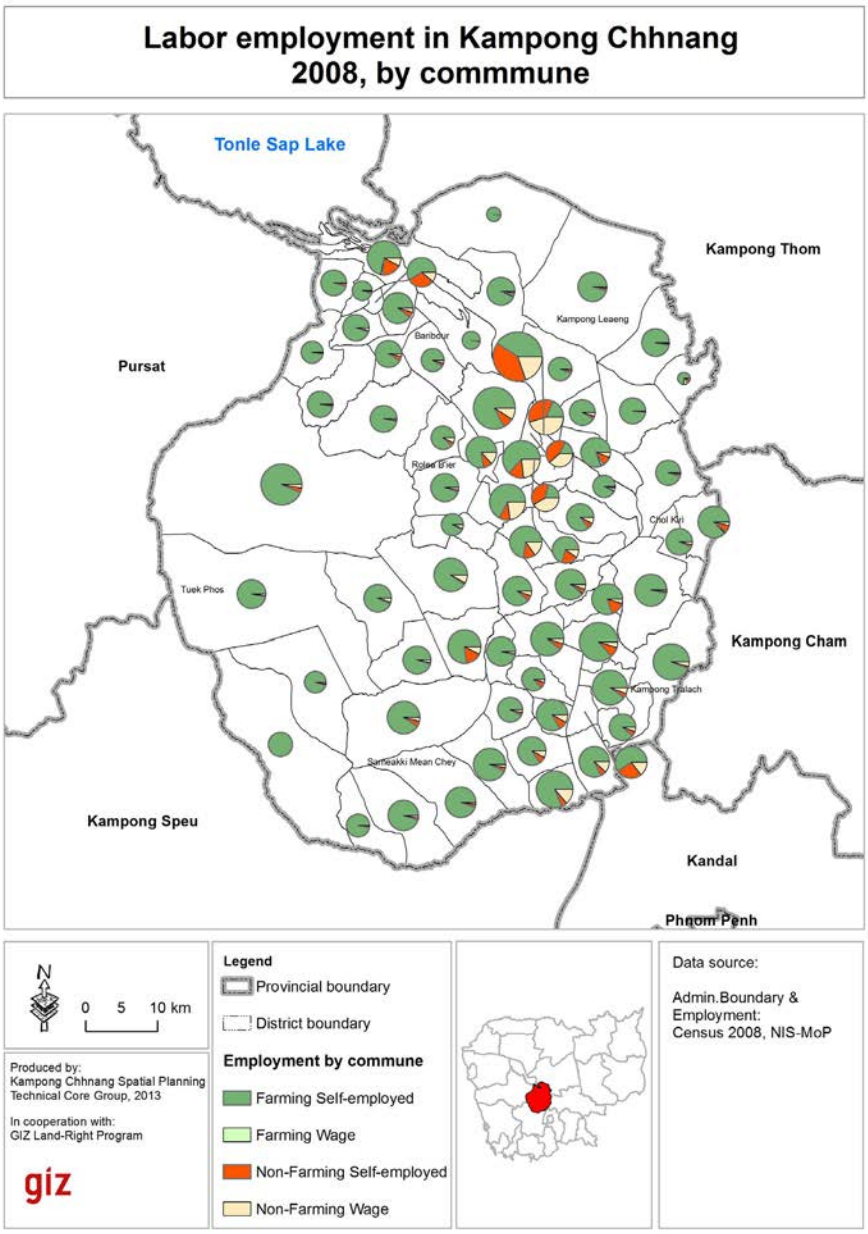
Necessary	Optional
Overall employment profile of each district comprising the province	Household income, poverty data

Analysis and outputs

- Assess the distribution of active population according to main labour occupation and employment status. Map and describe the spatial distribution of these main occupation sectors across the province. Compare and decide, based on the potential conclusions, whether mapping communal or district based employment opportunities is more significant.
- Discuss the dynamics of job creation within the province: the sector which generates self-employment, those which recruit labour or which are in decline.
- Discuss the mobility of people associated with their job.
- Discuss the drivers of job migration within/outside the province (or country).

Optional

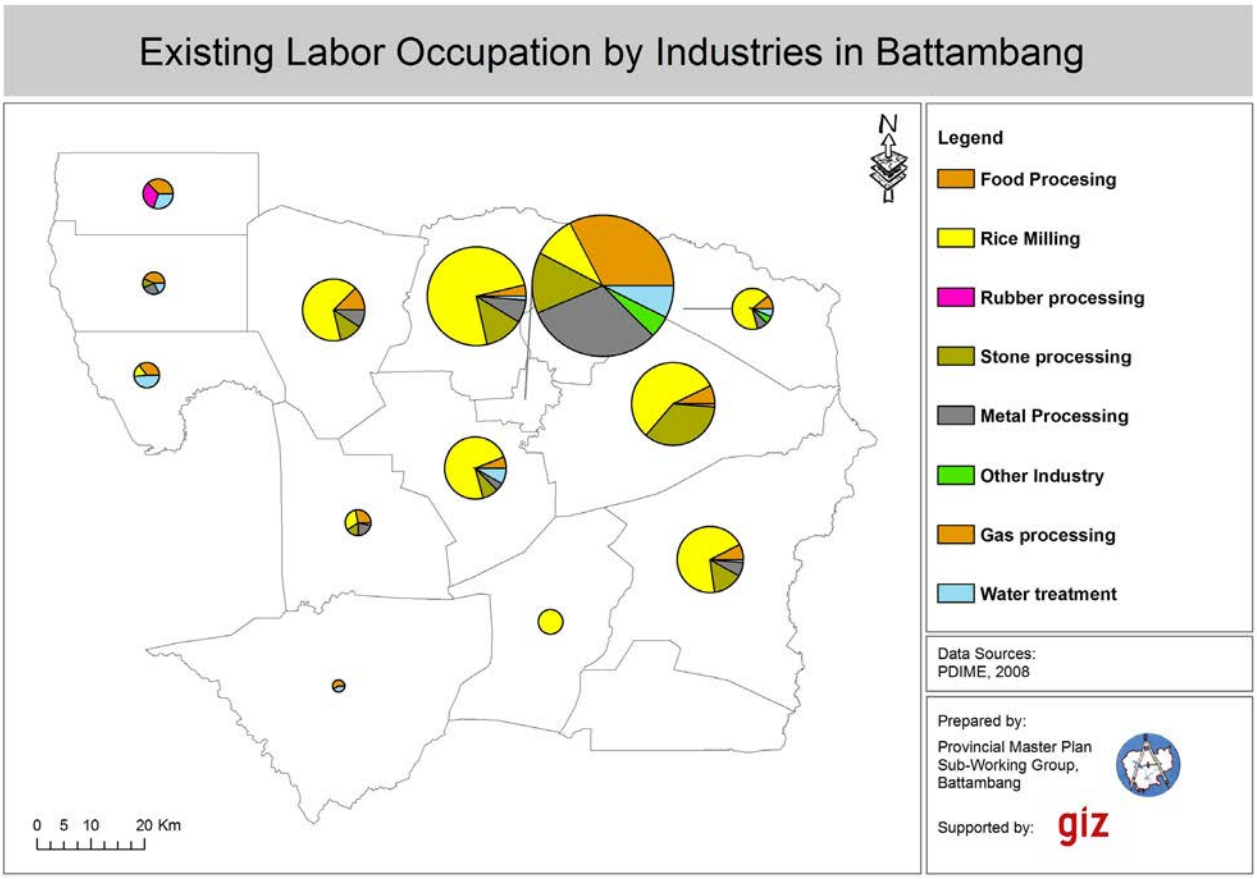
- Data on household income and poverty incidence can complement the information on employability. They add to an overall overview on the local economy from the perspective of its population.



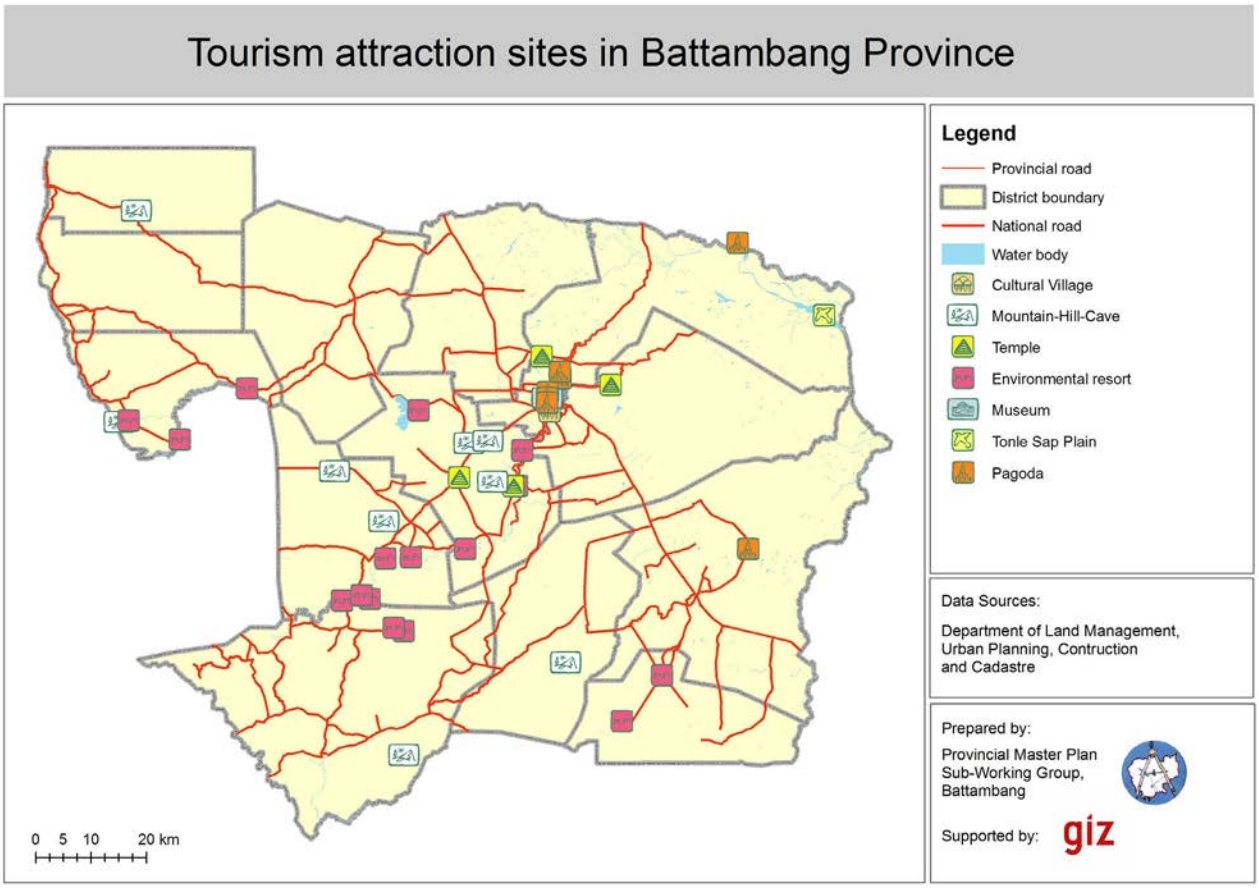
Map 22 Distribution and importance of labour occupation (by key sector and by commune) across Kampong Chhnang province

Selected economic sectors

Depending on the relevance of the different sectors, they should be analysed more in detail, particularly to understand spatial factors benefitting or hampering respective productivity. The agriculture sector will be of imperative importance in most provinces, at least in terms of occupation, and has been addressed already in the land use chapter. Other relevant sectors will usually comprise commerce and trade, industries (an example given in Map 23), as well as tourism and recreation (an example given in Map 24). They should be analysed in light of their economic productivity, contribution to employment opportunities, their spatial requirements and distribution of the respective facilities, enabling and hampering factors and potential (positive and negative) impacts (particularly for the industrial sector).



Map 23 Distribution and importance of labour occupation (by industries and by district) across Battambang province



Map 24 Location of main tourist attractions in Battambang province

Special Economic zones

Special Economic Zones (SEZ) are areas designated for promoting economic development. As their location and accessibility will affect their attractiveness for investors, the identification of suitable areas should be integrated in spatial planning processes. This would also address mitigating the risks of generating conflict with overlapping tenure claims. At this point analysis is focused mostly on the current situation of SEZs in the province.

Data required

Necessary	Optional
Location of special economic zone (if any)	Development plan of the special economic zone (if any)

Analysis and outputs

- Map and describe SEZs in the province. Assess the various production processes and services offered at these SEZs and their relevance and importance for the development of the province.
- Discuss the effectiveness of the SEZ and which factors, particularly spatial, are enabling or hampering it.
- Discuss spatial needs and means of improving the effectiveness of the SEZ.
- Discuss potential negative impacts of the SEZ in the province.

Optional

- Analyse the status and management of these SEZs (strengths and weaknesses).
- Discuss needs and potentials for further SEZs in the province, keeping in mind potential social and environmental impacts.

Task 2.3 District level verification, updating and analysis workshops

Overview

This task is focused on the consultation with the district level, to bring in their knowledge on spatial data and territorial developments within their jurisdiction. Various data of three thematic focal topics, namely (1) land use, (2) social services accessibility and (3) economic structure, are verified with the stakeholders at district level and updated or corrected where out of date or inaccurate data has been used. This cross-checking exercise contributes to the reliability of information used for the development of the provincial spatial plan.

The workshops further aim to identify relevant changes (trends) in the spatial patterns of the three focal topics and to discuss drivers and consequences of that change, as well as the institutional capacities at district level to address the identified drivers and consequences.

Most rural districts in Cambodia will have to pay particular attention to the analysis of land use change and management, as it represents their key resource. An analysis of the road infrastructure at this stage is recommendable, to inform the economic structure analysis, but also to support the analysis of social services accessibility. However, time and costs required increase with the scope of the workshop (e.g. by about one day for the road infrastructure analysis).

Who is involved?

- Initiation and implementation
  - PWG
  - Database/GIS expert
- People consulted
  - District authorities (Governor's Office and Council)
  - District line offices
  - Commune chiefs
  - Other district stakeholders (associations, NGOs, etc.)

Activities / methodology

- Organize one workshop in each district with key district stakeholders from State and non-State institutions and possibly commune council representatives. Thoroughly consider involving also other district stakeholders, e.g. representatives of indigenous communities, food producers, entrepreneurs and other relevant formal and informal tenure holders in the district (including private sector and civil society).
- Conduct a process that combines the spatial interpretation of an aerial photo/satellite image/ relevant map with the knowledge provided by the district stakeholders, because they have a good sense of what the local land management issues are.
- Roughly, the analysis of each thematic topic follows a similar approach:
  - Presentation of the existing secondary data displayed on maps (e.g. current land use map).
  - Verification and updating of information on the maps.
  - Identification of units/zones on aerial photos (e.g. land use units).
  - Identification of relevant changes (e.g. land use change) and management issues.
  - Discussion of drivers and consequences, as well as of district capacities to address these drivers and consequences.
- The quality and completeness of all resulting documents are discussed within the PWG before the district data will be aggregated at the provincial level in a later step.
- **Hint:** The described activities are time consuming and require very good preparation and

facilitation. Land use update and road network update, would inform the discussions on the economic structure and social service provision and therefore be addressed first. Probably at least three days have to be calculated for this overall task (1 day each for land use update and analysis and road network update and analysis, half a day each for economic structure and social service analysis). To save time it is reasonable to consider clustering adjacent districts in one workshop, which would also allow for mutual learning and exchange of ideas in terms of cross-district issues and potentials. However, district stakeholders need to be open to this approach and clustered workshops also further increase the challenges of facilitation.

A) Land Use

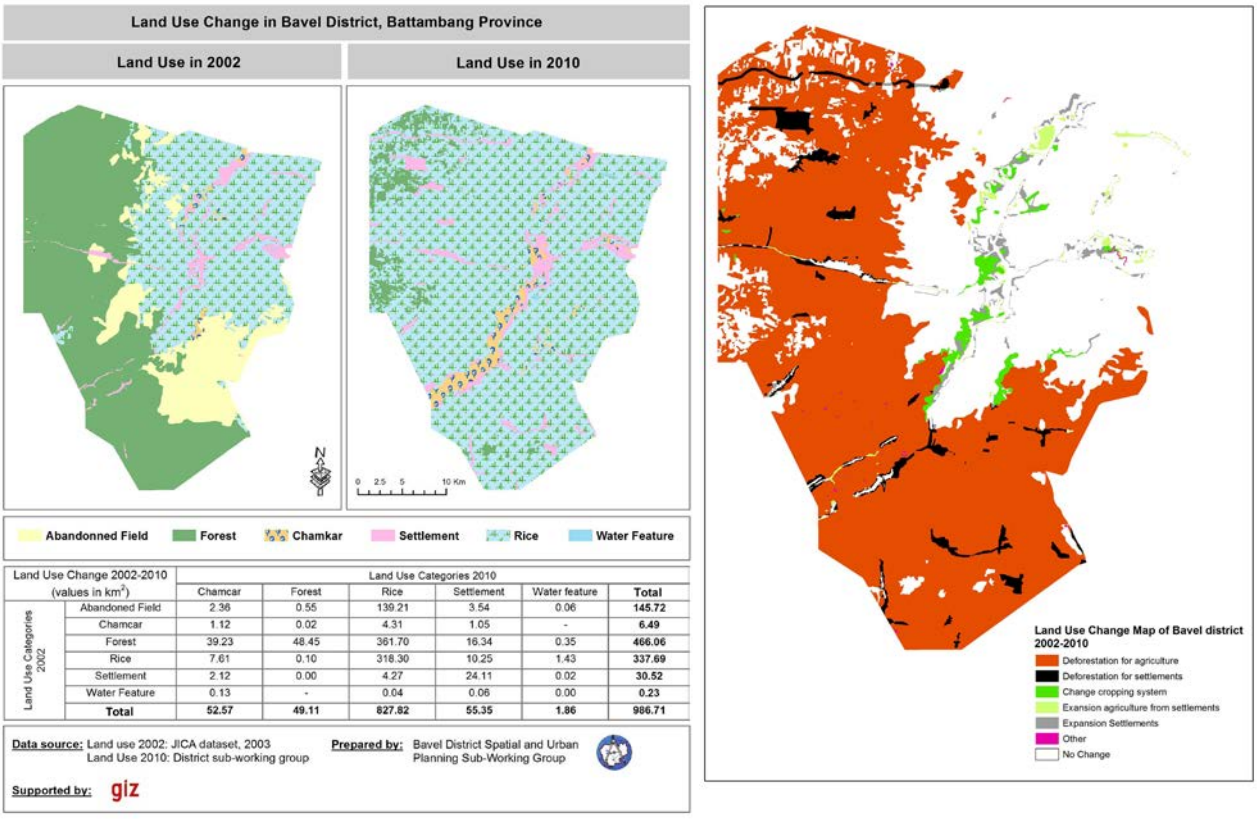
1. **Presentation of land use update to district stakeholders** - During the district workshop, the land use map (with the update available then) is presented and discussed with the stakeholders.
2. **Verification and further land use updating** - Each participant (sector) is invited to peruse the land use map for proper orientation and understanding. Each participant is then invited to provide update information about the current situation of the land use. This discussion must be prepared in advance and the targeted information should be well identified beforehand. To document the discussion, it is recommended to overlay the map with plastic transparencies on which the participants can draw with markers.
3. **Identification of land use zones/units** - Based on the updating discussion, the stakeholders identify different land use zones/units. These are areas which can be attributed generally to broad but distinct land use patterns, such as for instance settlements, flooded areas, forests, forest-agriculture mosaics, agriculture rice, agriculture chamcar, etc..
4. **Second land use update and land use change analysis** - The identification and update of the current land use situation during the district workshops will provide the PWG with district-level land use information for different years. These time-series land use information allows the PWG to engage in a land use change analysis (Map 25). This activity will be crucial for the identification of effective strategies for land management in the later steps of the PSP process.

Firstly, review and identify all important types of land use changes in the district, such as:

- Deforestation, degradation of forest cover,
- Expansion of agricultural area, intensification of agricultural production,
- Creation of new settlements/areas, expansion of urban areas,
- Creation/expansion of industries,
- Change in availability/quality of water
- Change in land tenure arrangements

Secondly, once the different types of land use changes are identified, it is important to analyse the relevant land use changes with the district stakeholders. Drivers and consequences of these changes need to be identified and debated and documented carefully (Table 3).

As the last activity, the district stakeholders shall discuss about the capacity of the district institutions to deal with the drivers and consequences of the relevant changes (strengths and weaknesses of the district institutions). Topics revolve around the policy guidance they receive from their line ministries, the resources they have (or do not have) to address the consequences of land use change or mitigate their causes and the coordination of their efforts with those from other district line offices.



Map 25 Land Use in Bavel District 2002 – 2010 (left) and land use changes between 2002 and 2010 (right)

Table 3 Documentation of land use change (referring to land use change map above - Bavel district, Battambang)

Type of land use change	Drivers of land use change	Consequence / Impacts		Capacity of the district institutions to deal with changes
		Positive	Negative	
Deforestation for agriculture	Proximate cause: immigration and illegal logging Underlying cause: poverty in lowland area force migration to upland + post-conflict land management by military	New agricultural development area, expansion of livelihood opportunities	Access to NTFP, modification of water flows in streams, Lack of tenure security, (Public State land according to 2001 Land Law)	Much of the issues are beyond control from district authorities Forestry administration involved in forest protection with community forestry and forest rehabilitation warrants, but this has limited impact. District authorities are involved in identification of potential area for Social Land Concessions. Land conflict resolution is a daily activity at cadastral administration office.

B) Social service accessibility and identification of services provision areas

The district workshops should furthermore serve to present, verify and update the spatial information related to social service accessibility. Consultation should include the responsible district line offices, district and commune chiefs.

1. **Presentation of social service accessibility** – The different social services mapped during task 2.2 are presented and the scope of service provision of each type within the district is discussed.
2. **Verification and update of social service accessibility** – Locations of social service provision in the district are checked and updated if necessary. Known planned improvements or new social infrastructure are to be identified.
3. **Identification of service provision areas** – Social services are located in urban settlements, but the service provision is not only for the residents of that area, but, depending on the type of service, also for a certain rural surrounding area. For health services, this is specifically addressed through operational districts (OD), which have been explained in the previous task. The district stakeholders should discuss, identify and map which parts of the district and the population is served by which urban centre. Two levels of hierarchy should be distinguished, one for basic services (such as health centres, primary schools) and one for enhanced services (such as Health OD Centres, different secondary schools), the latter covering a larger service provision area than the first. Higher level services will be addressed later at provincial level only. At the end of this exercise, for all settlements in the district it should be clear to which service provision areas (basic and enhanced) they belong and what is the corresponding urban centre, where the service should be provided.
4. **Analysis of service provision** – Discuss and document accessibility, capacity and management issues for each identified service provision area, as well as the capacity of district institutions to address the identified issues.

C) Economic structure and update of road infrastructure

The district workshops should be further used to present, verify, update and analyse information relevant to the economy of the province and district. This does not refer to the resource intensive agriculture, forestry and fisheries, but to the economic hubs and corridors, through which industries, commerce, trade and tourism are operating.

1. **Presentation of economic structure** – Present the economic role of the district in the province, the main economic and employment sectors and the locations or areas of relevance for the district and provincial economy (such as centres with markets, offices, etc., SEZ, ELC or mining areas).
2. **Verification and update of economic structure** – Invite the participants to peruse the maps indicating the locations and areas of economic facilities and areas in the district. Each participant is asked to update the maps on any relevant development, such as new or extended SEZ/ELC and locations of relevant facilities.
3. **Identification of economic hubs and corridors** – Existing development poles (such as urban settlements with important economic functions, SEZs or other economically relevant agglomerations) including potential growth points are identified and mapped in spatial terms as hubs and classified according to their function (such as industrial, tourism, commerce and trade, agriculture – or also more focused than this). The main networks and bundles of physical infrastructure which link these hubs and make them operational are in spatial terms identified and mapped as corridors, which should only be classified if reasonable.
4. **Analysis of economic structure** - Discuss and document economic potential and enabling and hampering factors of the identified hubs and corridors, as well as the capacity of district institutions to address the identified potential and issues.

The analysis of the economic corridors is strongly supported by the update and analysis of the road infrastructure, described below. Also accessibility issues for social services can be better understood based on an update and analysis of the road infrastructure. An additional discussion of other existing transport means (airports, railways) depends on the local relevance and can likely be sufficiently addressed at the provincial level.

Participants for the update and analysis of the road infrastructure should include village chiefs, commune chiefs, and representatives of district offices of rural development (responsible for commune roads & districts roads) and public works and transportation. The village and commune chiefs usually have sketchy / hand drawn maps of their territory that can be utilized and help them in the workshop. The PWG needs to bring the existing road network map and satellite imagery per commune, as well as plastic cover for the maps and permanent markers.

1. Introduction to the objectives of the meeting and explanation of the methodology
2. Participants will be split into groups according to their commune (ideally one member of the working group is assigned to assist one group)
3. Verification of existing road infrastructure (add missing roads, cross out non-existing roads) and draw already known projected roads / extensions and their approximate course
4. Identification of type and surface (national, provincial, district, commune / paved, laterite, dirt road) and present condition
5. Classification of road types (according to Sub-Decree 42 or own tailored classification system)
6. Identification of areas with accessibility issues
7. Prioritization of future road network extensions and maintenance based on the classification and anticipated future demand as perceived by village and commune chiefs

Desired outputs

- An updated computerized spatial database is designed.
- The maps and analyses carried out earlier are updated.
- Land use zones/units and land use changes are identified for each district and a land use change map is produced for each district. An analysis of the interactions of land use change driving forces and consequences is conducted and documented, including the institutional analysis of district stakeholders to deal with land use change and management issues.
- Optionally, a road network update and analysis, including classification and identification of types and surfaces, as well as of accessibility and management issues.
- Social service provision areas are identified and mapped for each district. An analysis of social service accessibility, capacity and management of respective facilities, is conducted and documented, including the institutional analysis of district stakeholders to address identified accessibility, capacity or management issues.
- Economic hubs and corridors have been identified and mapped for each district. An analysis of the potentials and issues concerning the economic structure is conducted and documented, including the institutional analysis of district stakeholders to address the identified potentials and issues.

Task 2.4 Institutional analysis based on SWOT at provincial level

Overview

The previous task had identified relevant spatial issues regarding land use change and management, social service accessibility and economic structure, and analysed related causes, consequences and district level capabilities to address them. This is complemented now by an analysis at the provincial level, in order to understand which PPPS are already in place and which provincial capacities exist, addressing the relevant identified spatial issues. This step serves several particular objectives: (1) it contributes to the vertical and sector integration of PPPS in provincial spatial planning; (2) by linking relevant spatial issues with existing provincial capacities, it informs the later development of strategies serving efficiency, effectiveness and feasibility of implementation.

Who is involved?

- Initiation and implementation
  - PWG
  - Database/GIS expert
- People consulted
  - Provincial line department
  - Any other provincial stakeholders (associations, NGOs, etc.)

Activities / methodology

- The PWG shall conduct a SWOT analysis regarding relevant identified spatial issues, based on provincial capacities and the related sector PPPS. When roles and responsibilities of different stakeholders coincide or overlap, it is important to address coordination issues. Depending on the number of stakeholders (potentially large), the analysis may be conducted in a series of one-on-one meetings allowing for in-depth and contradictory discussions. The scope of required meetings is mainly influenced by the number of spatial issues considered to be relevant for the provincial spatial planning.
- The SWOT discussions must be well prepared and structured: Prepare a complete overview of the relevant spatial issues and which provincial actors will have a stake in them. Further, take a close look at the relevant policy documents beforehand, particularly:
  - Provincial 5-year development plan and 3-year rolling investment plan
  - National Strategic Development Plan
  - Sector policies of line ministries relevant to the stakeholders and the identified spatial issues
- The session could be structured following a “classic” SWOT analysis. An introduction to the SWOT tool might be necessary. It is useful to use maps as resource documents, while facilitating the discussion. It can be structured into two main parts:

Info-Box
SWOT Tool
Strengths are attributes, which are helpful to achieve the objective. Strengths are assets, which can include such things like: know–how, motivation, skills, support, information, infrastructure... Strengths also help to exploit potentials and opportunities.
Weaknesses are attributes, which are harmful to achieve the objective. Weaknesses can include such things as: limited know–how, insufficient skills and techniques, poor information base about opportunities, differing management and planning, limited experience. Weakness hampers the effective exploitation of the existing or future opportunities.
Opportunities are external conditions, which can be helpful to achieve objectives in the future. Opportunities can be described as areas where one may enjoy a competitive advantage over others. Opportunities and to some extend potentials need to be exploited, we need to make use of it.
Threats/Challenges are external conditions, which can hamper a performance in the future. Threats should not necessarily be seen only from the negative side. A threat can also be a challenge.

- **The here and now** (strengths and weaknesses)
  - What the stakeholder is proud of and doing well?
  - What are the main assets for the stakeholder?
  - What is the stakeholder doing not so well?
  - What are the main constraints faced by the stakeholder?

- **The what might be** (opportunities and threats)
  - What are the strategic objectives of the stakeholders in the province with regard to the relevant spatial issues?
  - How does the stakeholder plan to reach these strategic objectives?
  - What are the factors that can support the stakeholders in reaching these objectives?
  - What are factors or challenges that can support the stakeholders in reaching these objectives?

The results from the various one-on-one meetings will then be brought together, likely following the structure of the identified relevant spatial issues and concerned stakeholders. The PWG should have a concluding discussion on this basis, which needs to be documented for the technical report.

Desired outputs

- Summary of key findings and conclusions from the conducted SWOT analyses about challenges and potentials (state and non-state actors) in dealing with relevant spatial issues.

Task 2.5 Analysis of the current spatial structure of the provincial territory

Overview

The analysis of the current spatial structure of the provincial territory is the concluding step of the situation analysis. At this point, much time has been invested in creating a comprehensive spatial database with consistent, updated and verified detailed information. This rich information basis has been analysed with regard to spatial patterns, issues and trends of development, including the factors which influence them and the capacities of institutions to address them. At many points, cross-sector considerations have already been touched upon.

In this task, the various data and information available is integrated in an abstract picture of the provincial territory, composed of key messages which summarize the current spatial framework of the province, and which form the baseline for a later-on to be developed envisaged spatial structure of the province in the future and corresponding strategies. The current spatial structure is composed of three different spatial themes and perspectives:

- Land use systems, which have an area focus and distinguish the various landscapes based on their functions and uses and the dynamics affecting them.
- Urban centres system, which focuses on locations and defines classes of urban centres and surrounding areas, based on the provision of social services for the population.
- Economic structure, which focuses on the location of hubs and routes of corridors relevant to the provincial economic.

The information displayed on the maps is very abstract, and therefore not easy to interpret without further information. The information contained is however relatively complex. Therefore the three maps on the above topics need to be clearly and thoroughly explained. These are the key messages of the situation analysis.

Who is involved?

- Implementation
  - PWG
  - Database/GIS expert
- Endorsement
  - Provincial council
  - PCLMUP

Activities / methodology

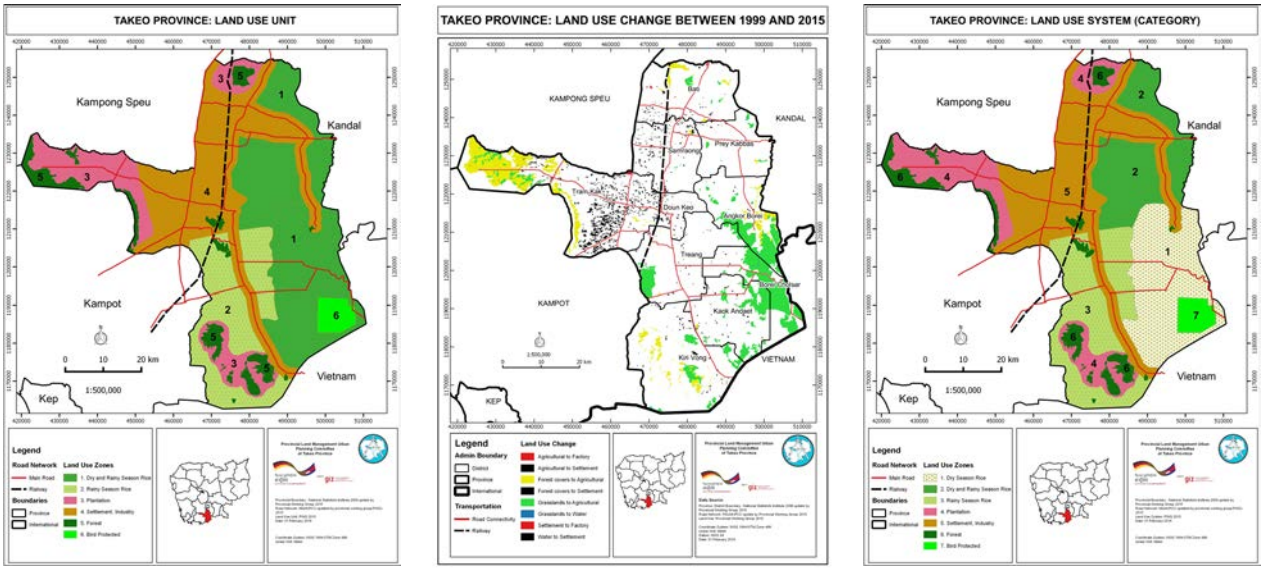
- Structure and organize the analysis of the current spatial structure of the provincial territory along the three main themes:
  - Land use systems,
  - Urban centres system,
  - Economic structure.
- Organize one working session of 1 or 2 days on each topic below.

A) Identification and analysis of land use systems

The current landscape functions and patterns of land use of the provincial territory are categorised and visualised through the land use systems approach. A land use system is an area where the main land use features, its management and the dynamics of land use change are similar. The advantage of using this approach is that not only land use and land cover are reviewed, but also the dynamics of human-environment interactions. The aim of this approach is to identify the current patterns, functions and management of the provincial landscape, and to inform the later

identification of aspired landscape functions and corresponding strategies.

- The land use systems are based upon (1) the land use zones/units and (2) the land use change maps developed for each district earlier. They need to be generalised and consolidated for the whole province. This generalisation is best conducted and facilitated through GIS and starts with just putting together the district information on land use units and land use changes in two respective provincial maps.
- To generalise and consolidate the diverse land use units and changes across districts, the PWG needs to identify a classification system. There are different possible approaches and support by an external facilitator is highly recommended. A relatively simple way is to create a matrix based on the outputs of the various district workshops (task 2.3), with (X) all main current land use types identified in the matrix head/first row and with (Y) all different land use change types identified in the first column. By intersection of them, the different land use systems are identified in a facilitated discussion (e.g. in the Map 26 showing the development stages towards the land use systems map in Takeo province, the main land use unit 1 is lowland agriculture. This area is in the south characterized by considerable conversion of grasslands to agriculture; therefore a separate land use system "new rice plain" is identified and mapped in the area where the land use change has been taking place.)
- **Hint:** Alternatively, a slightly more sophisticated approach would match the main land use types with "management regimes", which would combine observed land use changes with a range of observed management regimes (examples being unused/wild, sustainably used or extensively managed, degraded, intensively used, developed/complete conversion). This would strengthen the ecological aspect and likely have an effect on the sustainability message of the land use systems.



Map 26 Identification of land use system in Takeo province (land use unit – left; land use change – middle and land use system – right)

- For each of these land use systems that has been identified and mapped, the PWG needs to identify the main land management issues or dynamics that affects them. This exercise is obviously based on the already available results created during the district workshops, but also on other information generated through the planning process.
- The land use systems analysis is completed with a facilitated discussion on the linkages between identified issues, and their causes and effects for each identified land use system. This mainly serves the understanding of the PWG for the interrelation of management and functioning of the different areas, which is a relevant precondition for the later identification of spatial development strategies across sectors and departments. The discussion should be visualized and documented.

- **Hint:** This analysis of relations of issues, causes and consequences is one of the more difficult undertakings of the planning process. Any PWG, that has not previously conducted such an analysis, should seek the support of experienced external facilitators.

B) Classification and analysis of urban centres

Health and education sector policies are to determine what type of service or facility has to be accessible to how many people and in what distance. Therefore service provision locations need to be linked to settlement patterns. One possible approach is the concept of urban centres. This determines where to provide such services based on a classification of urban centres, which shall provide different levels of services depending on their class. The assumption being that different facilities require different quantities of users to utilize their capacity and run efficiently. Correspondingly, urban centres would be classified depending on which set of facilities they maintain and which services they provide to a certain population. This would form the basis for identifying a desired provincial urban centres classification addressing identified access issues. Rural areas are for economic reasons barely an option and will usually be limited to some technical infrastructure, such as electricity and water supply. Their residents are to travel to the next centre, to access respective services.

There is currently no policy guidance on classification of services according to a hierarchy of urban centres. Table 4 below lists the facilities identified during provincial spatial planning in Battambang, which should be checked and possibly amended to local conditions in other provinces.

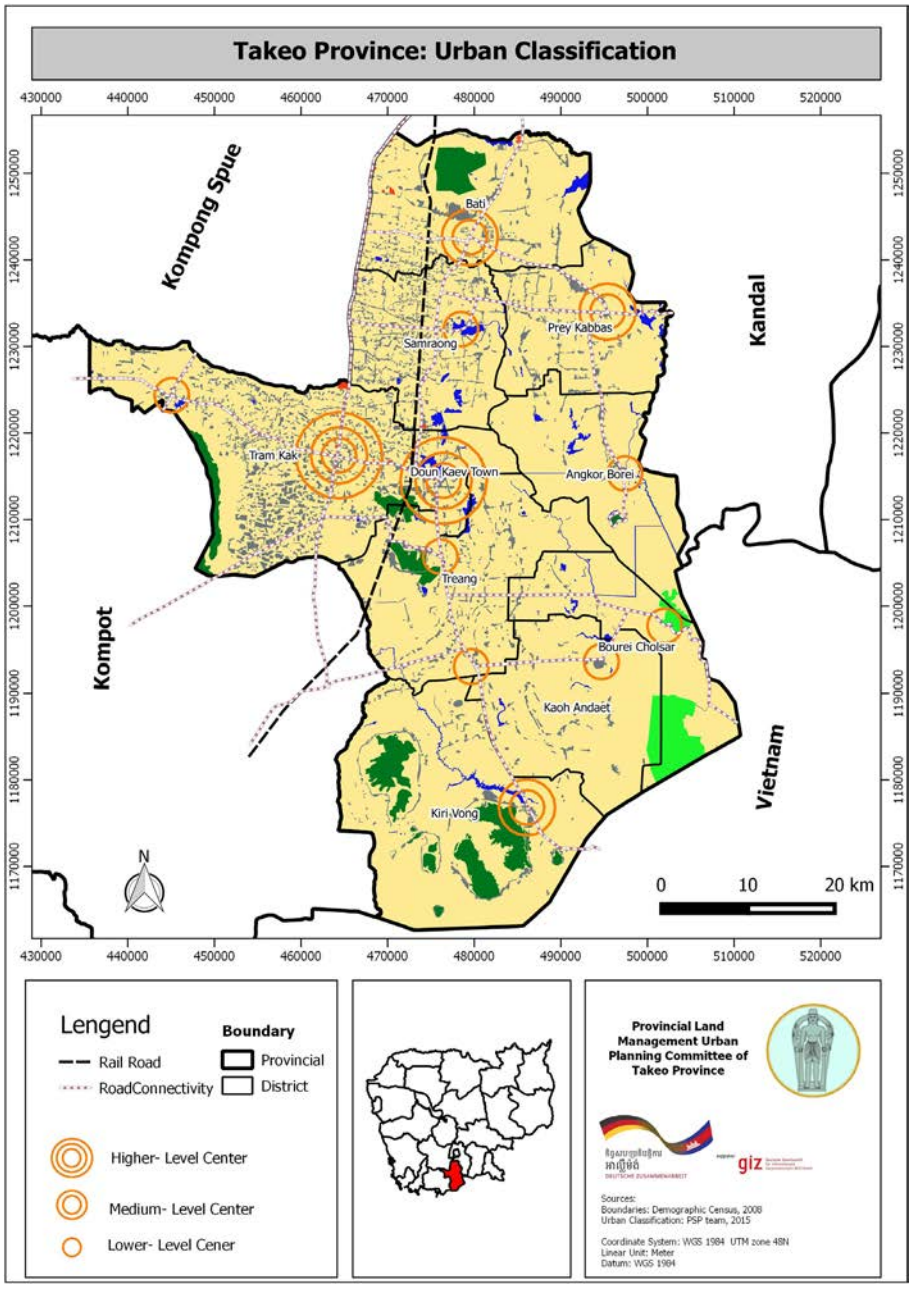
Table 4 Classification of urban centres in Battambang province

Lower-level centre	Medium-level centre	Higher-level centre
Facilities in lower-level centres: • Health centre • Medical practice • Primary and secondary education • Post office • Commune administrative centre • Place for cultural events • Offer of meals/eating places • Food and staple goods markets	Facilities in medium-level centres (in addition to those in lower-level centres): • Health Operational District Centre • Place for sport events • Branches of banks and Microfinance institutes • More than one secondary education institution • Several eating places	Facilities in higher-level centres (in addition to those in medium-level centres): • Hospital (+ private clinics) • Health specialists • Higher education • Market place for clothes, electronic and construction materials • District administration headquarters • Accommodation on several levels • Regular offer of cultural and sporting events • Many eating places
	Medium-level centres also have to serve as gateways to other places of importance or as hubs by connecting at least two roads of provincial importance	Higher-level centres also have to be connected to at least one road of national importance, and the minimum distance to a same-level centre or to the provincial capital has to be at least 20 km.

- Similar to the process for the land use systems, the results from the district workshops first need to be aggregated at provincial level. The urban centres and their surrounding service provision areas need to be integrated in two provincial scale maps, one covering the basic services, and one covering enhanced services (which should have correspondingly less centres but larger provision areas), to ease discussion on the accessibility by the surrounding areas.
- The PWG needs to discuss both draft maps, redefine the areas where necessary and consoli-

date the information where district boundaries had narrowed the view, so that a consistent system emerges. This process should be facilitated by GIS specialists.

- The PWG should then engage in the development of a desired but realistic classification of services following a three level hierarchy from upper-level, medium-level to lower-level. At this stage health and education facilities should be complemented with other relevant facilities for the population such as for administration, cultural purposes, markets, hotels, restaurants etc.
- Subsequently the two draft maps are integrated and the upper-level classification is added (see Map 27 for the different urban centres in Takeo).



Map 27 Classification of urban centres in Takeo province

- For each upper, middle and lower level centre the PWG should check and document the current service provision and identify issues of accessibility or capacity. Most centres will rather naturally fall into a certain level, without providing all services foreseen for that centre class. As the final map shall realistically reflect the availability of services, this should be documented

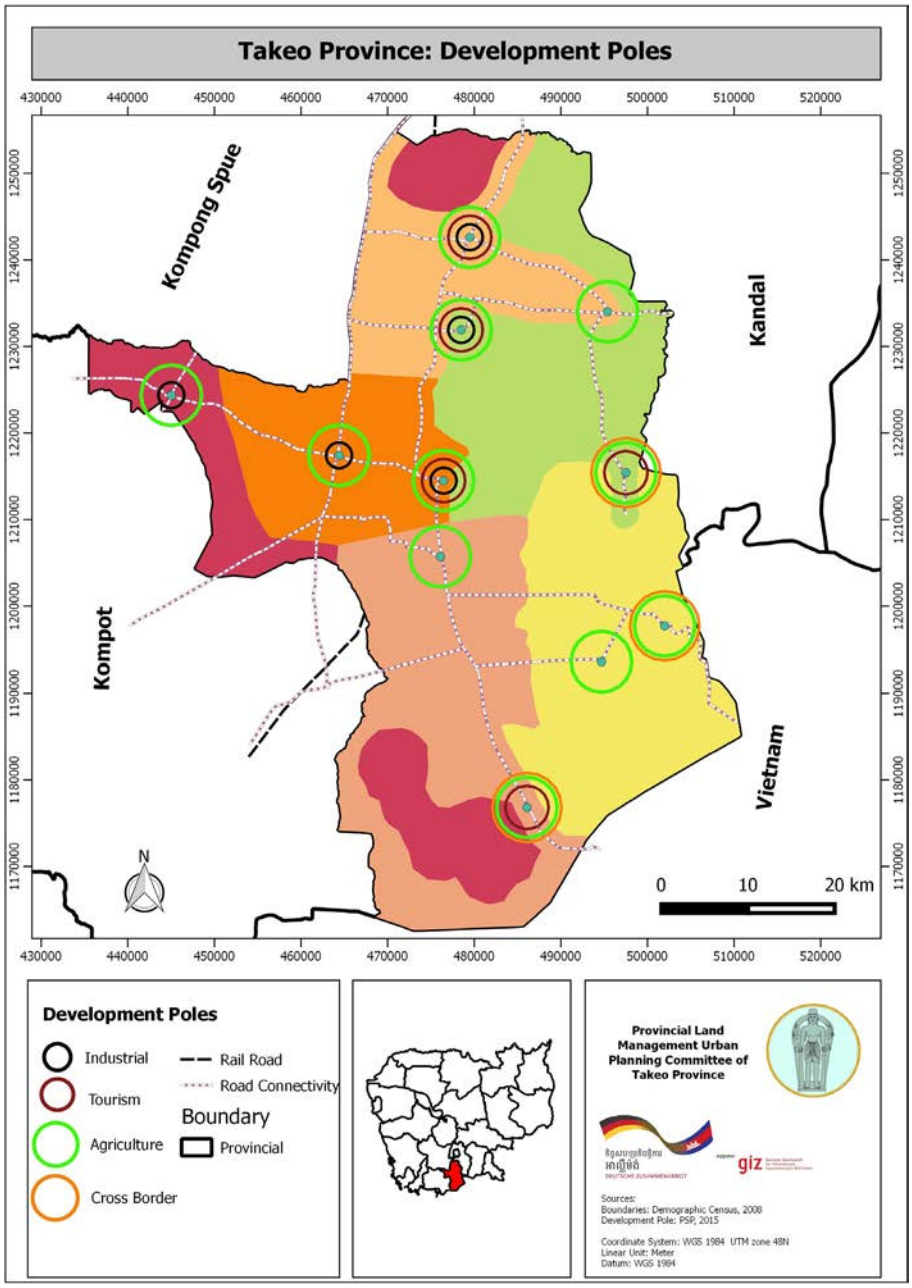
and where several services are missing also be indicated on the map (e.g. lower level centre with some medium level functions). Consider also the sharing of functions of neighbouring centres.

- Finally, the PWG should discuss and document the overall current service provision and relations of identified accessibility, capacity and other issues, as well as their causes and effects.
- **Hint:** Keep in mind potential upper and medium level centres in the region.

C) Identification and analysis of provincial economic structure

The current economic structure aims to inform about the location of hubs and routes of corridors relevant for the economic development of the province. As for the two previous components of the spatial structure of the province, this builds on the sector data which has been updated, consolidated and analysed during the district workshops.

- Aggregate the results from the district workshops at provincial level. Review the classification of hubs assigned during the district workshops. Each hub needs to be identified, located on the map and characterized based on economic relevance and labour hiring capacity (see Map 28 for an example from Takeo province). Examples for a classification could be:
  - Industrial development hub
    - Primary industrial development hub with large industries
    - Secondary industrial development hub with high density of small and medium enterprises
  - Agricultural development hub
    - Storage/warehouse facilities, agro-processing plants
    - Examine the existing rural-urban linkages in term of production to consumption, production to market, etc.
  - Cross-border development hub
    - Identify key cross-border infrastructure (trade, commerce, etc.)
    - Characterized by the existing [or lack of] services for development
  - Tourism hub
    - Identify key tourism infrastructure
    - Characterized by the existing [or lack of] services for development



Map 28 Localization of main development poles in Takeo province

- Systematically review and document the issues of the different hubs, the identified causes and potentials, their relation to the transport network and the interrelation with other hubs. As for the previous activities, this is based on the findings of the different district workshops. Further examine the synergies between the hubs, with particular emphasis on the transport networks (corridors) which connect them.

Desired outputs

- Maps and analysis of current land use systems, urban centres classification and economic structure are produced.
- The most significant issues and their influencing factors are analysed and documented for each land use system, each urban centre as well as the different economic hubs and corridors.
- These three thematic analyses are presented and discussed with the PCLMUP.

Step 3 Envision the future

Overall objectives

- Identification of relevant development scenarios to anticipate future constraints and potentials for territorial development
- Formulation of an overarching vision for the development of the province
- Formulation of long-term goals, which form a consistent ensemble with the vision

Task 3.1 Identify future development scenarios

Overview

Spatial plans, particularly on provincial level, are long-term plans. The planning measures are based on different factors. Firstly, on the current needs and potentials, which have been analysed in step 2. Secondly, they seek to support the implementation of governmental policies, which constitute desirable developments from national, sector or provincial perspective. Thirdly, planning is a strategic instrument in the sense that it addresses anticipated developments before they actually happen. To get a sense of such anticipated developments is the role of scenarios.

Potential ways to generate scenarios:

- A way to look at the future is to take stock of the past. It is possible to identify trends from long and recent history and understand why it happened the way it did. On that basis, we can make educated guesses on how this trend may evolve in the future. This technique is used for demographic projections but can easily be used for urbanization patterns, deforestation, future agricultural development, etc. The results of the land use change analysis (tasks 2.3 and 2.5) and the institutional (SWOT) analysis of task 2.4 are instrumental in this discussion. They should be brought back as 'food-for-thought' in this discussion so to predict how the changes identified and analysed are likely to be at play in the future.
- Another way to anticipate the future is to rely on (inter)national scientific studies. There are many predictions made by scientists that should be taken into account when making a spatial plan. Climate change is an example on which the scientific world reached consensus and which will have an impact on the use and management of land. Climate change occurs mostly through a modification in the water cycle, so future information about climate can be derived from past natural disaster such as flood, drought or storm. Key questions to be answered are: what would happen if the extreme flood and drought events we have identified in the past will become more frequent in the future? How do we get prepared to address them?
- In a similar sense, there are also scenario generation tools available, which are based on programmed models, such as the scenario generator of the InVEST instrument (http://www.naturalcapitalproject.org/invest/). It offers a relatively simple method of generating scenarios based on user-defined principles of where land changes could occur and the possible extent of these changes. It can be used to create alternate futures, thus fostering the understanding of interlinked decision on land uses. The RUPP has tested and applied this tool in the context of Mondulkiri province.
- It is also useful to find precedents in other places of the country or the world. The development of cities, regions are often similar to other cities or regions in other parts of the country of the world. Learning from other places that are a few stages further in the development can help in avoiding planning mistakes. An example is economic growth; more people with more money will result in more car use, which has an impact on the spatial development of the city.

Who is involved?

- Implementation
  - PWG

Activities / methodology

- To identify and discuss these future trends, scenario analysis can be conducted on a number of different themes:
  - The demographic growth scenario is imperative to spatial planning, as land use is shaped through the relation of land and the population.
  - Land use change scenarios are almost equally relevant. Past trends can to some extent be extrapolated into the future to understand trends of urbanization, deforestation and other forms of land use change. Existing trends can inform well, which land use change scenarios might be of relevance.
  - How different land use developments would affect each other (such as roads extension and forest cover, settlement development and climate change impacts) can be visualized through comparative, model-based scenarios.
  - Economic development scenarios can be of exploratory character, based on international experience of how certain developments (e.g. alternative routes connecting economic hubs) will take effect.
  - Climate change comprises cross-cutting themes, which actually have to be kept in mind in almost all considerations and anticipations of future change. Where increased drought impacts agricultural productivity, demographic projections have to consider potential outmigration of affected farmers. Where see levels rise and flooding events increase in extent or frequency, settlement patterns are affected. To be able to include such considerations, climate change information is needed and vulnerability analyses should be carried out by specialized organisations.
- Different scenario analyses require different efforts. For the compulsory demographic growth scenario, one or two working days should be allocated.
- Some of the proposed scenarios will exceed the capacity of the PWG. Particularly model-based scenario generation and climate change vulnerability assessments and their implications will require additional expertise. If such expertise can't be provided through the MLMUPC, external support is required.

A) Demographic growth scenario

The elaboration of demographic projections aims to estimate what the total population of the province will be in a certain year. This exercise is based on the past demographic growth and actual population density of the different districts in the province. It should ideally take into account the expected natural growth and migratory balance of the population of each district.

- If possible, compile all necessary demographic indicators available for each district. This information about past demographic growth should differentiate between natural growth (fertility, mortality and life expectancy) and migratory balance (in-migration versus out-migration).
- Based on the past demographic growth rate calculated earlier, the working group envisages several future growth scenarios based on both of these rates (slightly lower, similar or slightly higher) (Figure 8). It is important to consider here the provincial demographic projection proposed by the NIS (National Institute of Statistics, 2010).

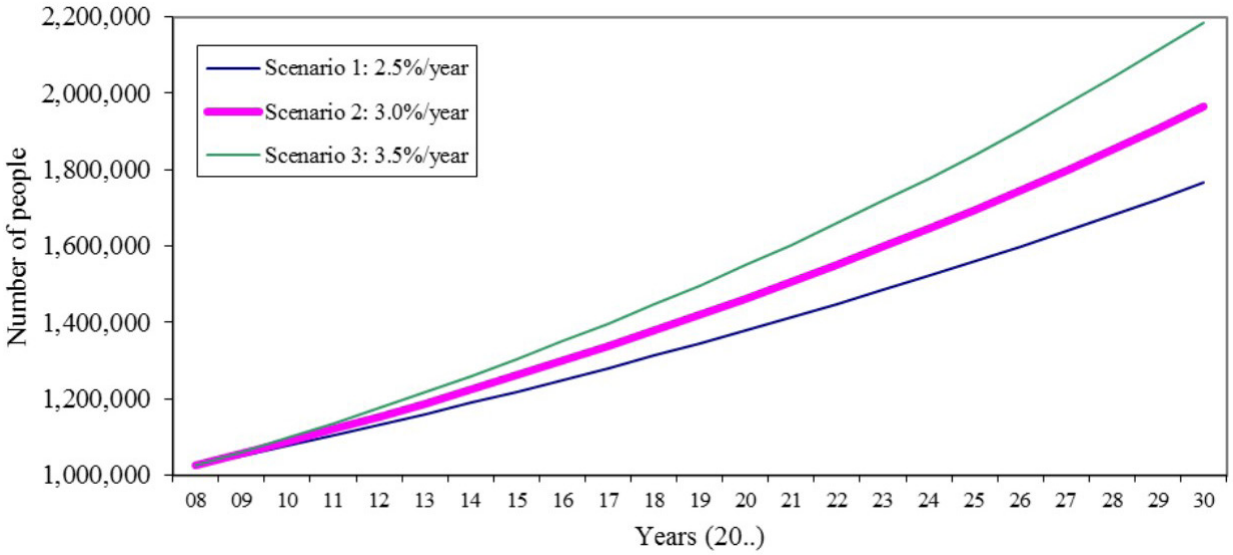


Figure 8 Provincial demographic increase scenario, Battambang 2008-2030, based on a demographic growth rate of 3.10%/year between 1998 and 2008

- In order to pick the most realistic scenario, demographic projection needs to be conducted for each district in the province, according to i) its specific demographic growth rate, ii) the actual district population density and iii) its potential of economic development (Table 5).
- If a climate change vulnerability analysis is available, potential effects on the demographic projection should be discussed in the PWG.

Table 5 District demographic growth scenario, Battambang 2008-2030

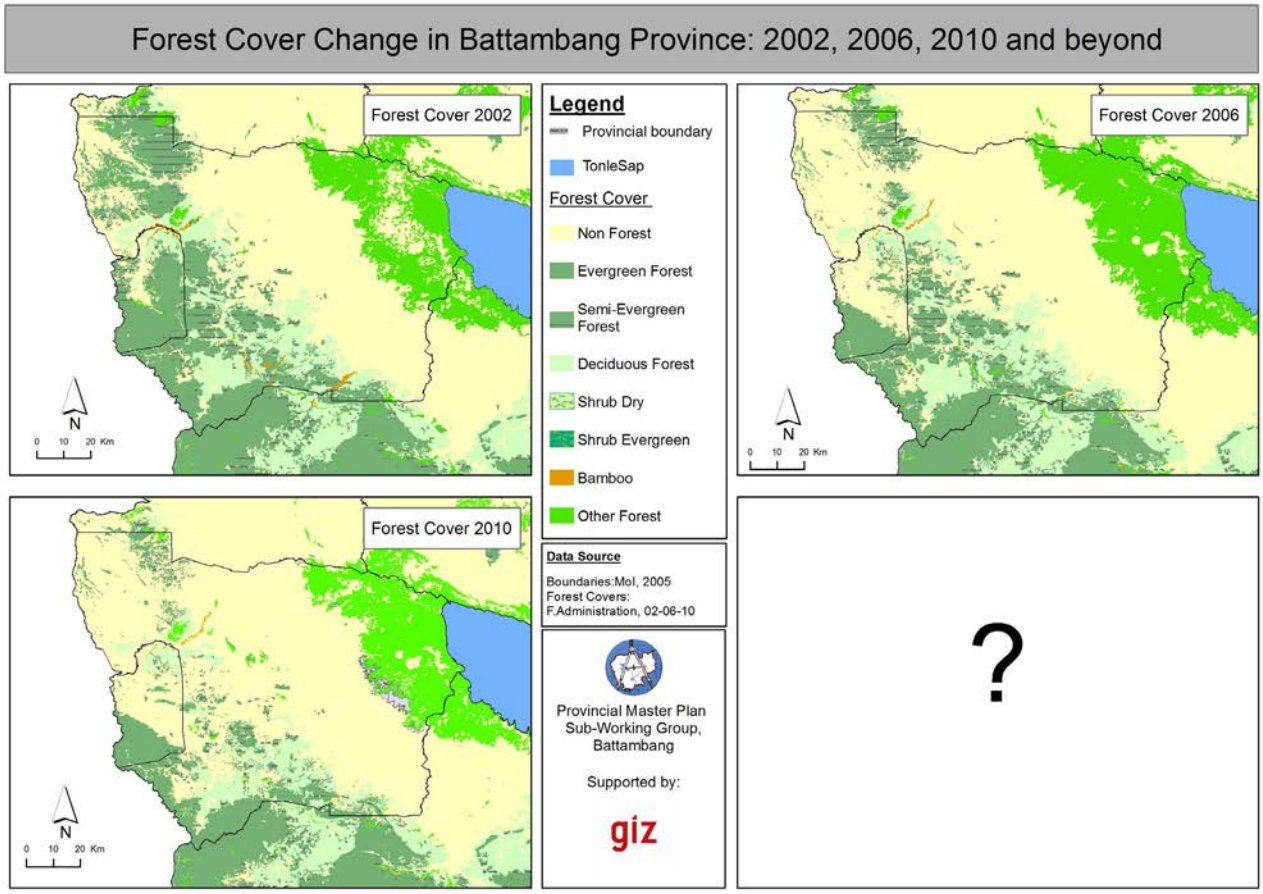
	Past Demographic Growth			Demographic Projections	
	Total population in 2000	Total population in 2007	Growth rate per district 2000-2007	Growth rate per district (%/year)	Projected population 2030
Banan	83,631	94,039	1.75	1.75	140,152
Thmar Koul	114,351	116,718	0.35	1	146,734
Battambang	137,949	136,203	-0.12	1.8	205,298
Bavel	92,035	95,847	2.75	2.5	169,133
Aek Phnom	66,494	72,992	1.06	1	91,763
Mong Russei	144,071	153,396	1.59	2	241,890
Rattanak Mondol	31,154	39,409	5.13	4	97,132
Sangkae	108,281	115,564	1.22	1.2	152,046
Samlaut	21,810	32,266	4.86	5	99,106
Sampeuv Lun	16,318	21,397	5.89	5	65,721
Phnom Preuk	12,434	51,450	19.01	5	158,030
Kamreang	25,906	42,992	17.87	5	132,051
Koas Krala	25,476	26,623	0.74	3	52,543
Total	**879,910**	**998,896**			**1,917,480**

The overall provincial demographic projections are compared with all specific district demographic scenarios. Eventually, the 3% per year increase provincial demographic growth rate scenario was selected in this example.

B) Land use change scenarios

As a result of the steps 2.2 to 2.5, land use change information is available for district and provincial level, including knowledge on the drivers of that change. Based on both, there is sufficient indication on which trends should be projected into the future and under which conditions. In the example below from Battambang, the observed reduction of forest cover in favour of agricultural extension was further examined through a land use change scenario.

- Map the evolution of the cover change (time-series maps) in line with the development/ expansion of the agricultural areas and discuss the possible consequences associated with different evolution scenarios:
  - Discuss the likelihood of agrarian expansion (future demand for land) considering the demographic growth scenario.
  - Discuss the importance of forest conservation and the possible environmental and social consequences according to different deforestation/reforestation scenarios.
  - Discuss different balance scenarios that would ensure the development of agriculture and the safeguard of forest resources for sustainable watershed management.



Map 29 Evolution of forest cover and agrarian expansion in Battambang

- A common approach would be to compare a “business as usual” scenario, in this case the projection of the past rate of forest to agriculture conversion, with alternative development scenarios based on certain assumptions, which in this case could be a “conservation” scenario or the proposed “balanced” scenario. Often national policies, such as the spatial planning policy, will provide orientation on which of the scenarios is preferable.

- Another example is the settlement pattern development scenario. Important trends of settlement expansions to be considered are linearization of settlements along the primary and secondary transport networks, expansion of settlement structure following lowland to upland migration routes and extension of existing settlement structure in urban areas. According to different development scenario (as above), discuss the consequences and the kind of issues that will need to be addressed in terms of provision of physical and social infrastructures and in terms of job creation.
- **Hint:** These simple land use change scenarios should not only be pursued for relevant observed land use changes, they can also be adjusted for anticipated land use changes, such as in terms of important planned development projects (new roads, dams, settlements, concessions etc.). While no trend can be projected there, implications can be discussed (as there is sufficient in-country experience) and different scenarios envisaged.

C) Climate change scenarios and vulnerability

Cambodia is highly vulnerable to climate change, because a large proportion of its population is dependent on climate-sensitive livelihood sectors such as rain-fed agriculture and fisheries. In Cambodia, climate change occurs through the intensification of the water cycle which results in an increased likelihood of extreme weather events (floods, storms, droughts, etc.). Vulnerability of specific sectors, systems or areas to these changes depends on their exposure to the risks, their sensitivity (the degree to which they are impacted) and their adaptive capacity. Vulnerability assessments can range from very simple assessments, mainly aiming at awareness and a general understanding, to very complex exercises. What is possible and reasonable for the PSP is mainly depending on the available capacities and expertise.

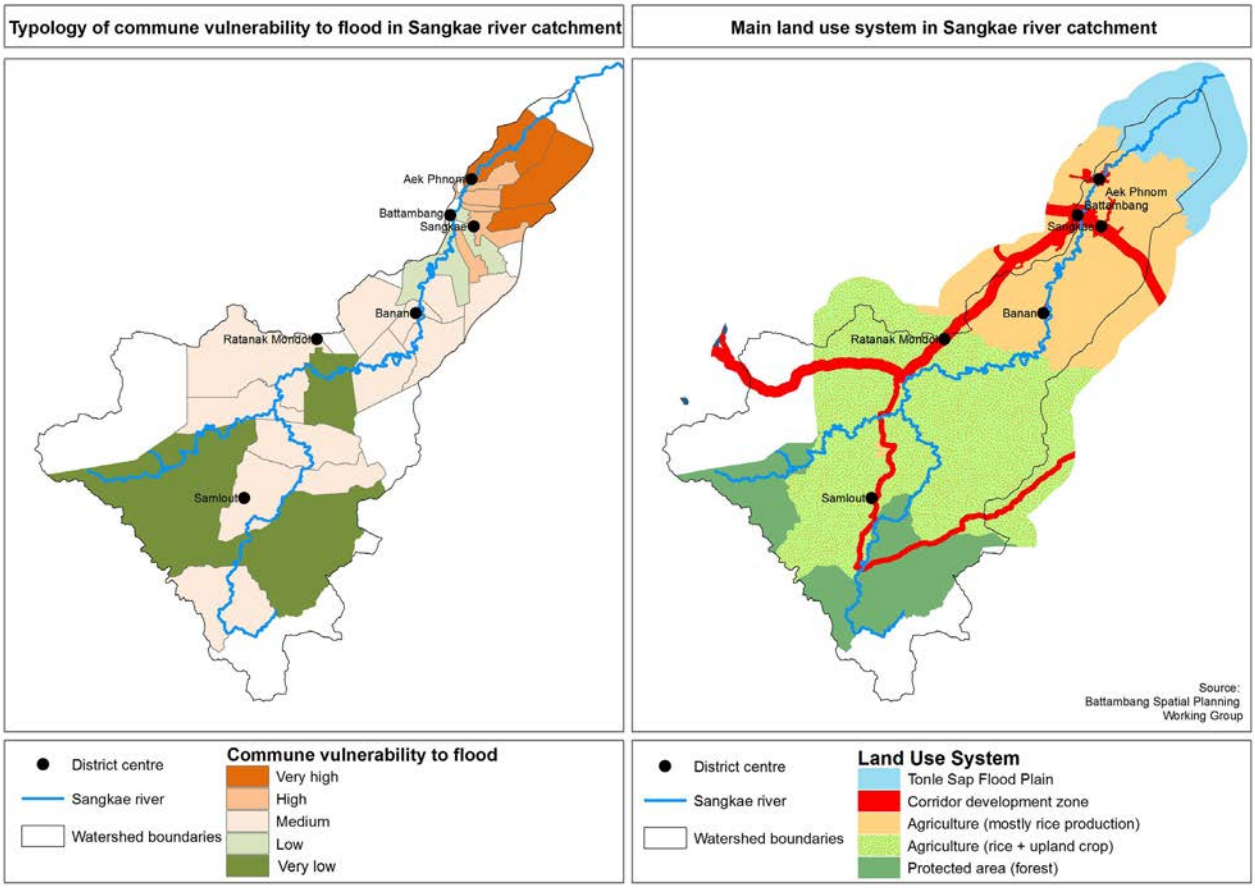
Info-Box

Vulnerability is defined as the "degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes" (McCarthy, Canziani, Leary, Dokken, & White, 2001). In this definition key parameters of vulnerability are the stress to which a system is exposed, its sensitivity and its adaptive capacity.

Exposure	Sensitivity	Adaptive Capacity
The exposure relates to the nature and degree to which a system undergoes environmental or socio-political stress. The characteristics of these stresses include their magnitude, frequency, duration and the area size of the hazard.	Sensitivity is the degree to which a region or community can be affected, negatively or positively, by changes (in climate).	Adaptive capacity is a system's ability to adjust to climate change and variability, to moderate potential damage, to take advantage of opportunities or to cope with consequences.

- On a provincial scale, the PWG should identify if there are relevant climate change data available for the region. A general vulnerability analysis, covering the various land uses and assets, would rather be a task for the scale of a municipal respectively district land use master plan. On the provincial level a quick and rather abstract assessment of the vulnerability of the different land use systems to different anticipated climate change effects might however be an interesting exercise, and if only to sensitize the PWG for the matter:
  - For each land use system, identify the major assets and resources.
  - Quantify their exposure to anticipated extreme weather events, e.g. on a scale from 1 to 10.
  - Quantify their sensitivity, e.g. on a scale from 1 to 10.
  - Quantify their adaptive capacity, e.g. on a scale from 1 to 10.

  - Calculate vulnerability of each land use system to the different events, document reasons of vulnerability.
  - Discuss potential adaptation measures.
- Scientists and development practitioners have developed and tested a number of different ways to understand and measure vulnerability. In Battambang, a group of researchers working in collaboration with the PWG has developed a method to analyse the vulnerability of agricultural production to flood. The research looked at vulnerability at three levels: watershed, commune and household. At the commune level, it established a map of different levels of vulnerability which can be interpreted according to the agro-ecological diversity across the watershed.



Map 30 Vulnerability of agricultural production to flood (by commune)

It goes beyond the scope of this handbook to examine these methods further and the reader can refer to specialized literature, for instance (Doch, Diepart, & Heng, 2015).

Desired outputs

- A documented discussion on what different demographic scenarios imply.
- A documented discussion on different scenarios of land use change.
- A documented discussion on climate change trends and scenarios about the impacts of climate change along with a description of area-based vulnerabilities to specific extreme weather events.

Task 3.2 Elaborate vision and long term development goals

Overview

Spatial planning is a strategic instrument of territorial development; its main focus is to find the best ways on how to get from the current situation towards a desired future situation. While previous tasks have identified the current spatial structure of the province and allowed an understanding of potential and anticipated future constraints and potentials for territorial development, this task is to carve out and describe the future desired by the provincial stakeholders.

The two key elements of this desired future, an overarching vision of future development and a set of long term development goals, form a consistent ensemble. Piloting of spatial planning processes in Cambodia has repeatedly raised the question, on which to formulate first, the higher vision or its components, the long-term goals. Conclusion suggests that both ways are possible. However, a for-and-back between the formulations of both elements is practically inevitable, as they shall be complementary.

The role of the vision is more of a guiding principle, providing a central idea for the provincial territorial development. The long term goals, while very broad, address the most important directions for the provincial territorial development. They shall not overlap, but also be comprehensive in a way that all major concerns identified through situation analysis and scenario development are covered. As they pave the way for the subsequent elaboration of spatial development strategies, their formulation should reflect both, stakeholder priorities and technical requirements. Facilitation is the major challenge of this task.

Who is involved?

- Initiation
  - PWG
- Participants
  - All stakeholders (Table1)
- Endorsement
  - Provincial council
  - PCLMUP

Activities / methodology

- This task requires thorough preparation by the PWG for a large stakeholder workshop and likely subsequent revision work, eventually seeking endorsement by the PCLMUP and the provincial council.
- The stakeholders will need to understand by means of presentation and discussion:
  - The relevance of this task in the planning process.
  - The current spatial structure of the province with its three components and their main messages. Selected maps and information from tasks 2.2 and 2.3 can support this presentation.
  - Potential and anticipated scenarios of future territorial development.
  - The role of vision and long term goals, and the principles applying to their formulation.
  - The approach to formulation and their involvement.
- Principles for the formulation of long term goals are basically set, though not explicitly marked, in the national spatial planning policy. The “Objectives” (3.2) of the policy and more it’s so called “Strategies” (particularly 4.1, 4.3 to 4.7) provide a range of policy orientations, with which the goals (and subsequent objectives and activities) need to comply. The PWG should have a robust knowledge of these key policy formulations to guide the discussion accordingly.
- The approach to the formulation is based on a facilitated discussion, which can start with

something similar to a SWOT analysis to lay the foundation for the subsequent discussion of ideas for desired developments in the province. It further involves the use of a matrix (a logical framework), which distinguishes different categories for the proposals raised by the stakeholders (long term goals, strategic objectives, main or even sub-activities). Stakeholders will find it difficult to propose on the "right level of detail", the matrix ensures that no ideas are lost, overlaps are avoided and relations are clear. Ideas for the vision could be collected in anonymous form through cards which are handed out at the start, collected at half time, and discussed at the end of the workshop. Participants will by then have a sense of the scope of developments favoured among them all and have a feel which (combination) of the proposed visions best brings this all together in a catchy phrase.

- Active but structured involvement of the stakeholders on this abstract topic poses a major challenge to the facilitator(s). The PWG should discuss creative ways of facilitation and moderation in preparation for this workshop. This should particularly include how to steer the discussion to themes and sectors overlooked so far, without shutting down ongoing debate. Prior communication of such issues will be part of the strategy.
- After the workshop, the PWG will have to scrutinize the matrix, eliminating overlaps or wrong assignments (activity as objective etc.), checking for missing links and inconsistencies as well as carry out overall consolidation of the matrix.
- The resulting vision and long term goals should be endorsed by the PCLMUP and the provincial council, in order to have a clear mandate for the elaboration of the spatial development strategies. An example of long term goals and their explanation from Battambang is shown below the desired outputs.

Desired outputs

- Comprehensive long term development goals are elaborated in line with results of the situation analysis and future development scenarios. The long term goals are complemented by an overarching vision for future territorial development.
- These long term development goals are explained and briefly documented.
- A log-frame matrix is developed which contains besides the long term goals already first ideas for strategic objectives and main activities.

Example: The five-long term development goals of Battambang

Region for Sustainable Production of High Quality Agricultural Products

Battambang will be reinforced in its leading position as producer of high quality and diversified agricultural products in the north-western region and in Cambodia. The high agricultural potential of the province will be utilized to increase the rice supply through rice intensification techniques, which will contribute to food security efforts in the region and across the country as a whole. On the other hand, chamkar agriculture (annual and perennial crops) will be strengthened to feed local, regional and national markets with a diversified range of agro-products. To ensure long term and sustained agricultural growth, the production sites will be spatially integrated in the territory following the principles of sustainable watershed management.

Region of Transformation and Trade for Agricultural Products

Battambang will be a regional centre for the collection, trade and processing of agricultural products and for contributing to the promotion of the "Battambang Product" label known across the country. The post-production efforts will create added value along agricultural product commodity chains, which will create jobs and stimulate local entrepreneurship. Synchronized with the agricultural production efforts, it will promote Battambang-driven rural development.

Region of Tourism Promoted by Notable Historical, Cultural and Natural Characteristics

Battambang province will be a major tourism centre in Cambodia. Tourism will be promoted on the basis of its uniqueness: its history, cultural identity and natural assets. The archaeological and architectural heritage of the province will be conserved and developed in a sustainable way. Religious places that attract visitors such as pagodas or spiritual forests will be protected in urban and rural communities for their cultural significance. Eco-tourism that is respectful of the natural environment will become a key driver to promoting the protection of natural resources.

Region for Good Governance and Human Resources Development

Battambang province will be a reference model in governance. Decentralization and de-concentration reforms will take place in a transparent, fair, democratic and legal framework, requiring multi-stakeholder participation: community-based organizations, government agencies, civil society, the private sector and the general public. Innovative private-public regional management partnerships will be established and rural communities, in all their diversity, will be recognized central actors of rural development.

Region with Harmonious Integration between the Economy, Culture and Nature

Battambang will be a model region of well-balanced territorial development between built-up areas so they harmoniously integrate into an open space system. The structure and functioning of the territory will provide opportunities for economic development and easy access to social infrastructures through good axes of transportation. The diversified eco-system will be protected as functioning in all regions of the province. The sustainable development of the economy will have the protection of the people's cultural identity as its core value and in all areas of the province.

Step 4 Spatial development strategies

Overall objectives

- Completion of the matrix of goals, objectives and activities
- Formulation and mapping of provincial spatial development strategies addressing future land use patterns, future provision of services and future economic structure
- Alignment of sector strategies with the provincial spatial development strategies and update of sector plans
- Endorsement of the spatial development strategies, including the retroaction on sector plans

Task 4.1 Spatial development strategies

Overview

Spatial development strategies are the means by which the PSP aims to achieve its long term goals, based on the current spatial structure of the province. These means are integrative in nature as they are the result of a balancing process between different sector interests and demands. The major questions of this equation are universally known - production versus protection, rural versus urban, climate versus everything - to mention only the most eye-catching ones. The point of spatial planning is to turn the “versus” into a (as much as possible) balanced “with”, which is referred to as integrated planning.

At the time this handbook is formulated, only one provincial spatial plan has reached elaboration beyond step 4, and it did so a couple of years ago, before respective guidelines were outlined. As a consequence, the methodology explained under this step goes further than the respective piloted PSP. Examples from that PSP are nonetheless valuable and included below. The major difference is that in the example a range of strategies was displayed in a range of maps, while the suggested methodology integrates the various spatial strategies in three maps and complementary explanations.

Who is involved?

- Initiation
  - PWG
- Endorsement
  - PCLMUP

Activities / methodology

- In a first step, the PWG needs to complement the log-frame matrix of goals, objectives and activities resulting from the stakeholder workshop on the vision and long term goals. This more or less logically results from the many results of the situation analysis and the defined goals, but it is an arduous process.
- The PWG should already indicate for each and every result expected in the matrix, which component of the future spatial structure is addressed or affected by it (land use, urban centres or economy).
- The PWG needs to present the complete matrix and it’s components to the PCLMUP to seek their advice and endorsement. This cannot be achieved in a short meeting, but rather in a 1 or 2 day internal workshop.

- From there starts the actual planning. For each of the three components of the envisaged spatial structure of the province, spatial analysis is the key instrument to identify the spatial strategies to integrate the various objectives (and activities) in the respective future set-up. For the different components, different strategies result, which are further explained below. The PWG needs to discuss and document the reasons for the spatial dimensions of strategies and potential alternatives.
- As a synthesis, the different spatial development strategies are integrated on a map that shows their spatial relations and mutual influences

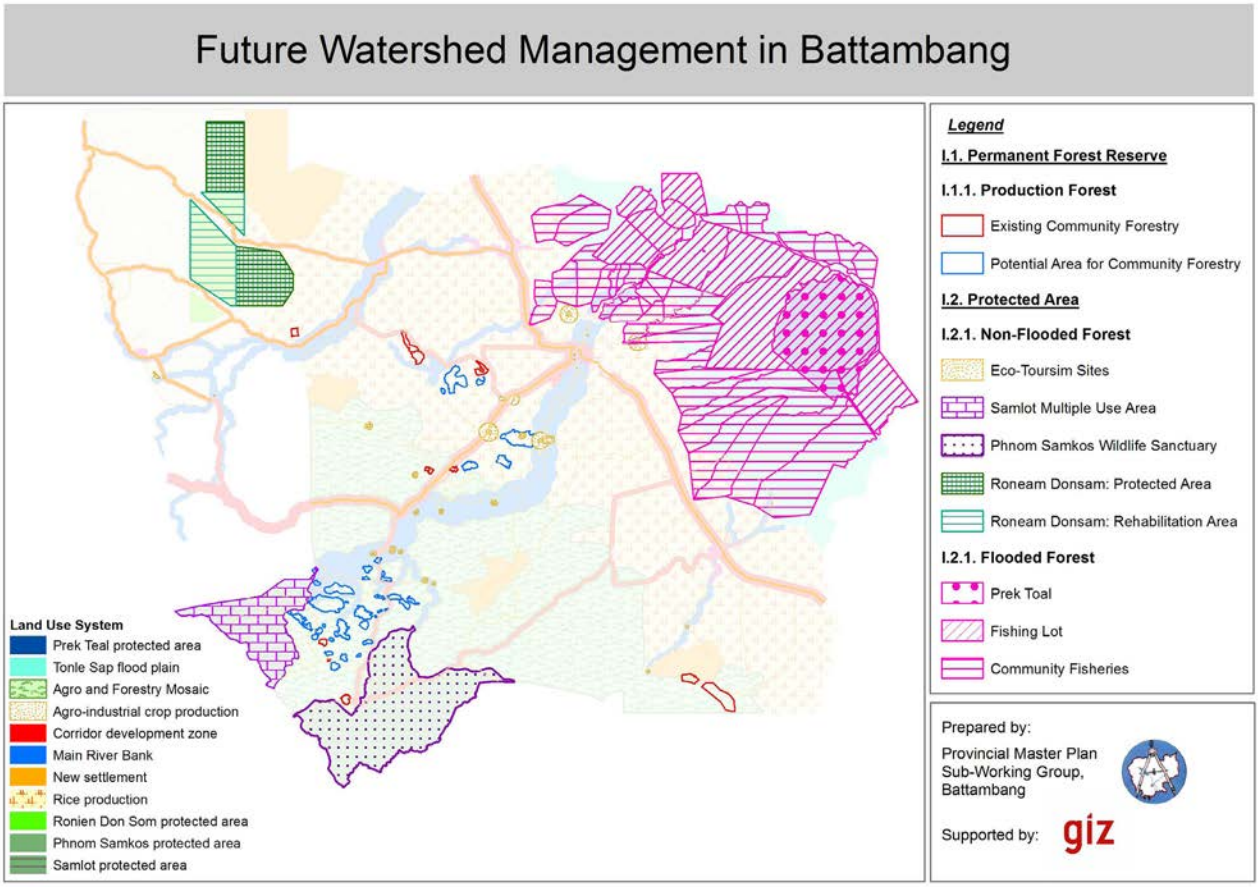
A) Future Land Use and Landscape Functions

- The future land use and landscape functions map is based on and developed from the current land use system map by integrating the strategies addressing the various objectives identified, based on spatial analysis.
- The spatial means of the PSP with regard to land use and landscape functions pertain to prioritization, promotion and restriction of functions and uses for certain areas, which means:
- Prioritization defines an area in favour of a certain use or function, other uses are allowed if they do not conflict with the prioritized one (e.g. community fisheries).
- Promotion defines an area, in which a certain use or function should be supported, (e.g. irrigation schemes for agriculture).
- Restriction defines an area in which basically only one function or use is allowed, such as protected areas.
- The spatial means are used to promote the various production oriented uses (agriculture, forestry, fisheries) with the provision of habitat and nature conservation, local recreation areas, but also to foresee areas for flood control and for the extraction of mineral resources.

Examples from the Battambang Provincial Spatial Planning:

Objective: Sustainable Watershed Management

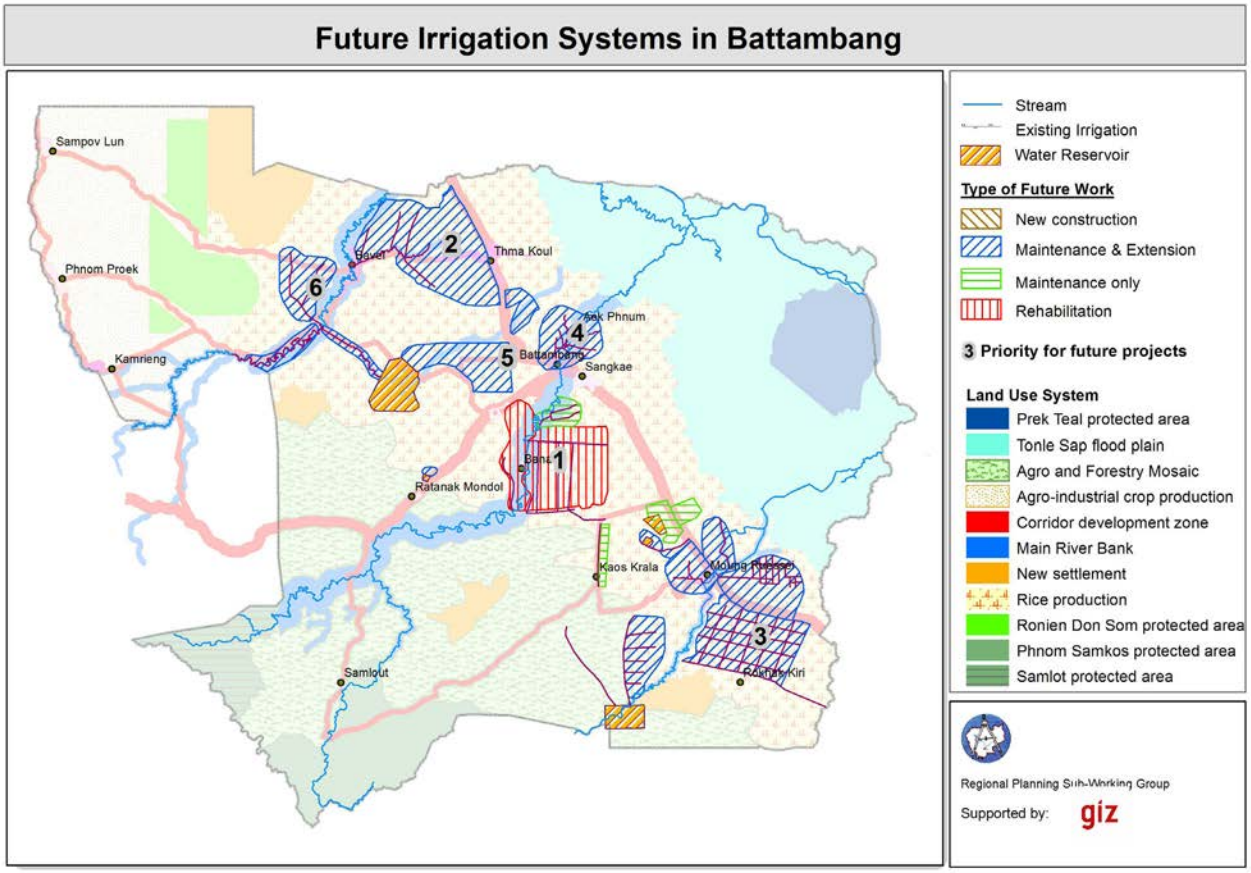
Activity: Identify and enforce forest tenure arrangement for conservation (protected areas) and production (community forestry and community fisheries)



Map 31 Localization of future watershed management measures in Battambang

Explanation: The map in Battambang identified protected areas as well as community forests, however the distinction between existing and future areas is not visualized, which makes it difficult to understand the action needed. Also, through the limited focus on one objective it is hard to analyse relations to other land use and strategies.

Activity: Improvement of irrigation schemes for rice intensification



Map 32 Locations of future irrigation developments in Battambang

Explanation: In this example locations for future irrigation systems are identified to support rice intensification (so functionally promoting a use). The actual extension areas are marked.

- Both examples showcase the approach well, but should be integrated in one map together with the respective other strategies regarding land use and landscape functions. In case the map is overloaded with strategies, the PWG should review whether implementation of all those strategies is realistic in terms of available resources and whether strategies are addressed on the right level (or rather belong by area size and relevance into a district plan).
- The final map(s) should be accompanied by a list with explanations of all the integrated strategies, the objectives they are supporting and the reasons for their spatial definition.

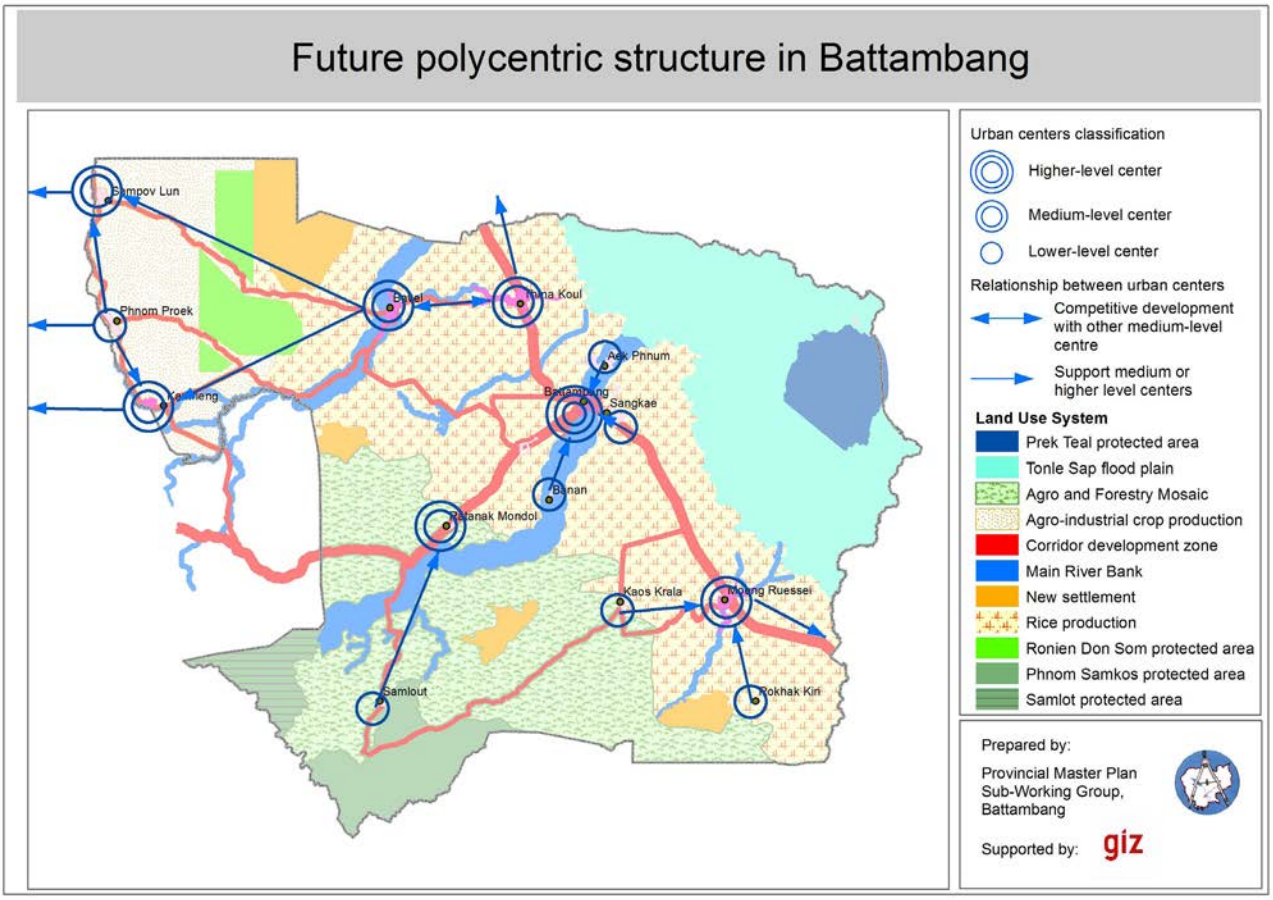
B) Future Urban Centres and Service Provision

- The future urban centres and service provision map is based on and developed from the current urban centres classification map by integrating the strategies addressing the various objectives identified.
- The spatial means of the PSP with regard to urban centres and service accessibility refer to the classification into higher/upper, medium and low centres, which have been explained earlier, and their defined rural surrounding service provision areas. By assigning the classification, the plan has sector implications on which services are to be provided to close potential gaps. The table in the example from Battambang provides further orientation.
- The spatial means are used to improve social and other service provision not just for the respective centres, but also for an identified rural surrounding area.

Example from the Battambang Provincial Spatial Planning:

Objective: Enable balanced territorial development in the province

Activity: Development of urban centre following a polycentric structure with hierarchy of centres



Map 33 Future polycentric structure of urban centres in Battambang

Explanation: The polycentric structure map from Battambang is a good example for an envisaged future urban centres classification, including higher, medium and lower level centres as well as with relations between the centres.

This map is accompanied by Table 6 that states for all centres the current and future functions to be provided and the current and future centre level (list has been shortened to a selection for this handbook):

Table 6 Existing and future functions of urban centres in Battambang

District centres	Existing level	Existing functions	Future level	Specific future functions
Battambang	Higher-level	Centre of Commerce and Services Centre of Agricultural Product Processing and Trade Centre of Education and Knowledge Centre of Heritage, Culture and Tourism	Higher-level	Centre of Commerce and Services Centre of Agricultural Product Processing and Trade Centre of Education and Knowledge Centre of Heritage, Culture and Tourism
Auk Phnom	Lower-level	Support Battambang in its functions Centre for fish processing	Lower-level	Support Battambang in its functions Centre for fish processing Centre of Eco-tourism Agricultural product storage and pre-trade processing
Banan	Lower-level	Support Battambang in its functions (accommodation)	Lower-level	Support Battambang in its functions (accommodation) Agricultural product storage before processing in Battambang or Rattanak Mondol Centre of Eco-Tourism
Samlaut	Lower-level	Support Rattanak Mondol in its functions	Lower-level	Support Ratanak Mondol in it agro-processing function Centre of ecotourism Agricultural product storage before processing in Rattanak Mondol, Battambang or Thailand
Bavel	Medium-level	Gateway to Sisophon and Thailand Centre of agro-processing for rice	Medium-level	Transportation hub centre between National Road No. 5 and the Thai border area Centre of agro-processing for rice Support to cross border district in financial, banking, schooling
Kamreang	Medium-level	Main international gateway to Thailand Connected to Phnom Preuk, Sampeuv Lun and Pailin to create a border development corridor Centre for agro-processing (cassava) and storage before trade to Thailand or Phnom Penh	Medium-level	Main international gateway to Thailand Connected to Phnom Preuk, Sampeuv Lun and Pailin to create a border development corridor Centre for agro-processing (cassava) and storage before trade to Thailand or Phnom Penh
Sampeuv Lun	Medium-level	Secondary international gateway to Thailand Connected to Phnom Preuk, and Kamreang to create a border development corridor	Medium-level	Secondary international gateway to Thailand Connected to Phnom Preuk, and Kamreang to create a border development corridor Centre for agro-processing (cassava) and storage before trade to Thailand or Phnom Penh

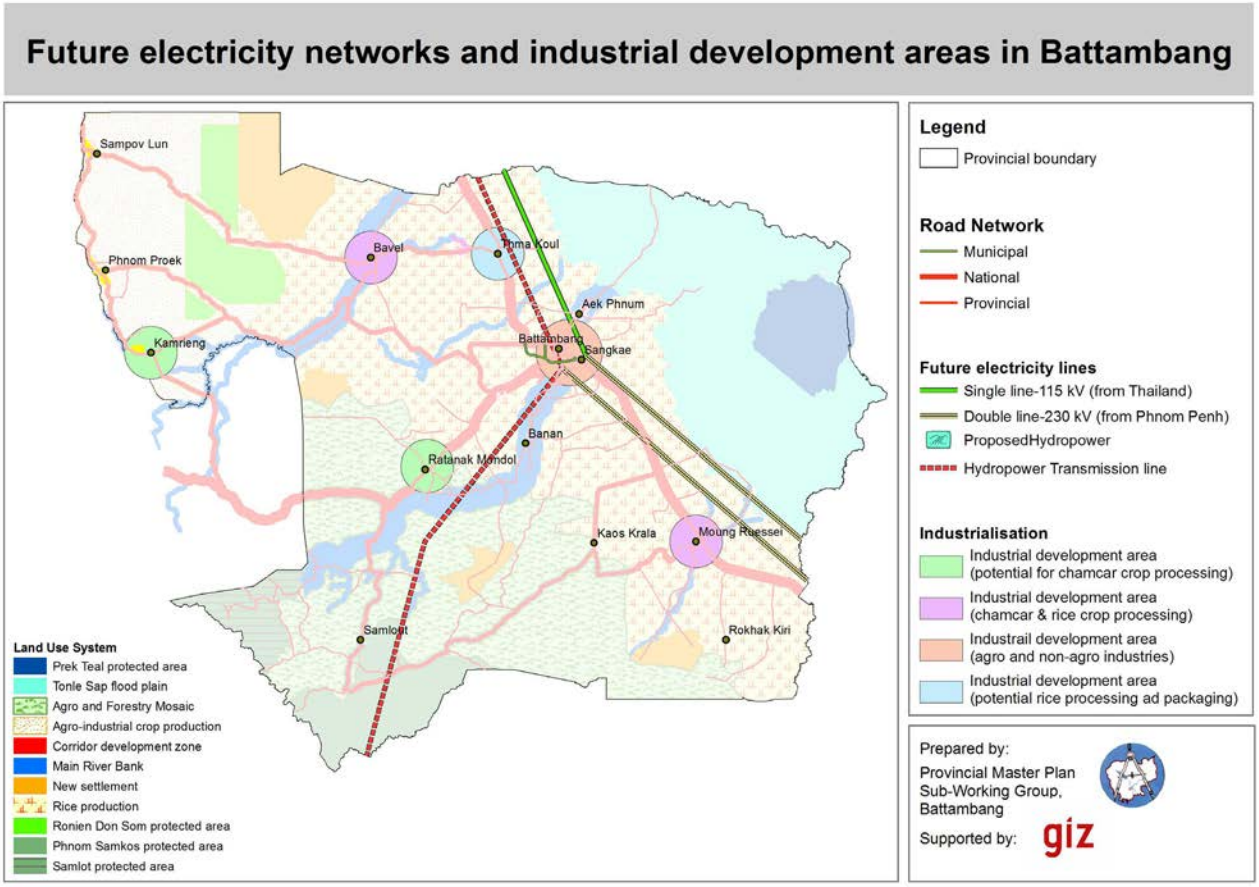
C) Future Economic Structure

- The future economic structure map is based on and developed from the current economic structure map by integrating the strategies addressing the various objectives identified, utilizing spatial analysis.
- The spatial means of the PSP with regard to the economic structure are the determination of locations of economic hubs and routes for economic corridors, which have been explained earlier. Spatial analysis is of particular relevance for location or site analysis as well as for analysis of alternative options for corridor routes, as both are highly relevant in terms of economic efficiency as well as regarding conflicts with other land uses.
- The spatial means are used to promote economic development, while avoiding or mitigating adverse impacts on other land uses and functions.

Example from the Battambang Provincial Spatial Planning:

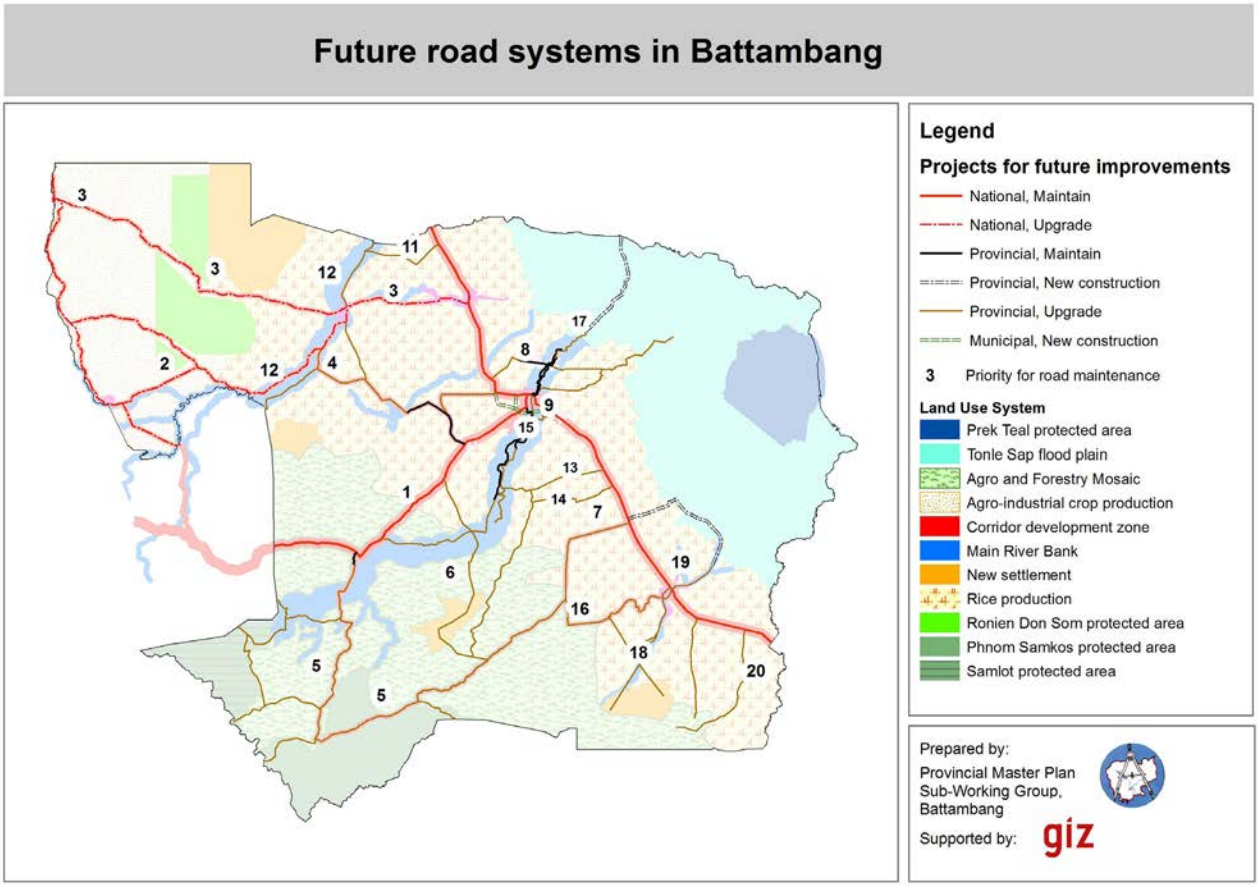
Objective: Promote inclusive [non-farm] economic development

Activity: Identification of future industrial development areas in Battambang in line with the supply of energy supply



Map 34 Future location of industrial areas in line with future electricity transmission and internal hydro-power lines and future land use systems

Activity: Improve road system network in Battambang



Map 35 Future provincial road system for Battambang with specific type of infrastructure work needed for different section of network (maintenance, rehabilitation, new construction, etc.)

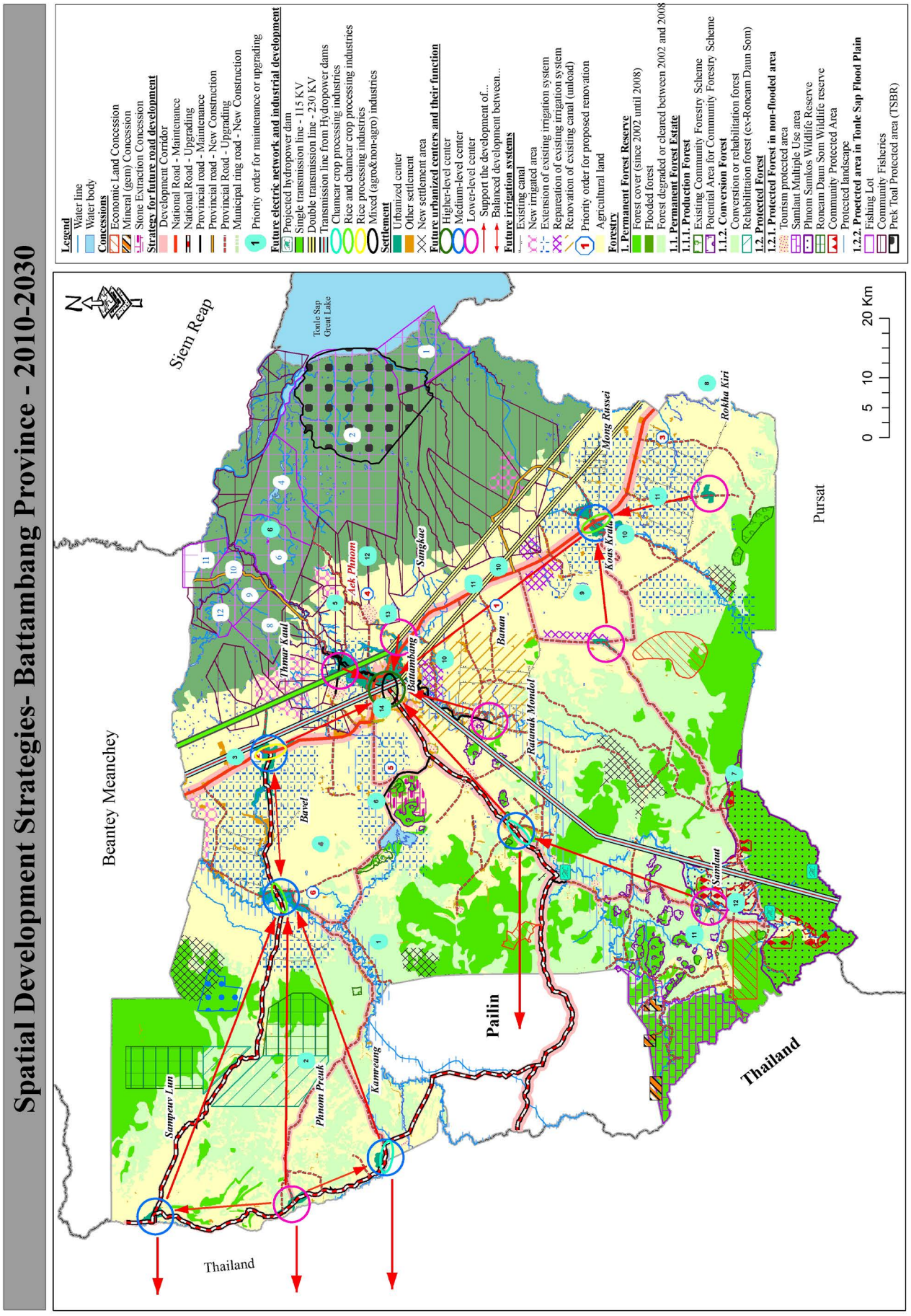
Explanation: Both maps above show aspects of the future economic structure, the first importantly identifies industrial development poles (hubs), and both maps entail elements of the network of economic corridors which link and support the economic hubs in the province. Planned roads are indicated in the second example as well as priorities for road maintenance.

The maps should rather include base maps with economic information per district. Also various other functions would have to be added for a comprehensive future economic structure map.

As in the previous two cases, the map should be complemented by additional textual information stating the strategies, the objectives addressed, and the reasons behind.

D) Integration of Spatial Development Strategies

As a synthesis, the different spatial development strategies are integrated on a map to elicit their spatial relations and mutual influences. This map help identify the possible synergies or contradictions and so guide further discussion between sectors.



Map 36 Integrated Spatial Development Strategies in Battambang

Desired outputs

- The log-frame matrix with goals, objectives and activities is completed in a comprehensive and consistent manner.
- Spatial development strategies are integrated in the maps on future land use and landscape functions, on future urban centres and service provision and on future economic structure as well explained in textual form, and endorsed by the PCLMUP.

Task 4.2 Align sector strategies and update sector plans

Overview

In order to realize the spatial development strategies, it is important to identify how each sector, individually and in cooperative efforts, will contribute to implementing them. This will most likely require adjusting certain sector plans in a sense of reversed integration – where the process started with integrating the various sector plans, the synergies and overlaps addressed in the PSP need now to be integrated in the sector plans. This process will considerably enhance the future implementation of the plan.

Who is involved?

- Initiation
  - PWG
- Participants
  - Line Departments
- Endorsement
  - PCLMUP

Activities / methodology

- Organize a workshop which starts with the presentation of the provincial spatial development strategies integrated in the three future development maps. Highlight implications for sector plans, such as:
  - alternative routes for planned road construction (to address different priorities for connectivity, mobility or accessibility or to mitigate social and environmental impacts)
  - alternative locations for economic hubs, zones or concessions (to increase efficiency or mitigate adverse impacts)
  - alternative areas for new irrigation schemes (to address inner-provincial cohesion or to avoid adverse effects on watersheds)
  - alternative areas for urban extension (to keep flood control areas free of development)
  - alternative priorities for social and other service facilities
  - inclusion of new roads, new protected areas, new social facilities.
- The above implications are discussed as well as existing or potential overlaps between sectors over the management of certain areas.
- Where conflicts arise, these should be solved on a case by case basis and in a solution oriented manner with all parties involved. Final arbitration, if needed, lies with the Provincial Governor, PCLMUP and line ministries, if necessary.
- Each sector then updates their respective plans and seeks approval from its line ministry.

Desired outputs

- Sector strategies are updated based on the implications of the PSP.
- Updated sector plans are approved by the competent authorities.

Task 4.3 Internal consultation with provincial authorities

Overview

The final draft of future development scenarios, vision and long term goals as well as the spatial development strategies are presented to PCLMUP and provincial council for discussion, amendment and endorsement. As implications of the PSP are at this point clear, this is an important moment to foster interest and support of the provincial authorities for later implementation and monitoring of the PSP.

Who is involved?

- Initiation
  - PWG
- Participant
  - Provincial council
  - PCLMUP

Activities / methodology

- A workshop is organized where results of scenario analysis, long term goals and spatial development strategies are presented to and discussed with provincial council and PCLMUP.
- Questions and suggestions of the provincial authorities are to be reflected by the PWG. Where amendments are suggested, their implications should be discussed and if agreed, the PWG undertakes required updates.

Desired outputs

- Provincial authorities agree on the results of the entire planning and appreciate the draft product.

Step 5 Implementation, Monitoring, Evaluation and Plan Updating

Overall objectives

- Responsibilities for implementation are clear and explained
- Linkages to Development and Investment Plans, other spatial plans and sector plans are clear and explained
- Monitoring of the implementation is clear and explained
- Updating process is determined, based on a harmonization with the planning cycle of the Development Planning

Task 5.1 Implementation and Monitoring

Overview

A PSP is implemented in various ways and by various stakeholders. The PSP itself does not bind the population of the province to any of its specifications; however it does bind the administration, and the different sector plans, which in return might very well have direct implications for the provincial population. It is important to clarify the role of all stakeholders in the implementation of the PSP and to have this knowledge securely anchored among the entire decision making ensemble of the province. It is essential to determine responsibilities as well as mechanisms of implementation and to seek endorsement of both by the Provincial Governors and the Provincial Council.

Who is involved?

- Initiation
  - PWG
- Participants
  - Board of Governors
  - Line Departments
  - PCLMUP
  - Provincial council

Activities / methodology

- Organize a workshop to present and discuss:
  - the mechanisms and responsibilities of implementation
  - the log-frame matrix containing goals, objectives and activities as well as the three future development maps with the corresponding spatial strategies
  - the purpose and principles of monitoring
- Determine the responsibilities for implementation, based on an understanding of how a spatial plan is implemented

The PSP is mostly taking effect indirectly, which means that the strategies foreseen in the PSP have to be integrated in

a) sector plans (see 4.2), if these are explicit spatial strategies (e.g. a different route for a new road, a new protected area to be designated) – the respective sector is in charge

b) development plans and investment plans, if the strategy requires development measures (e.g. a location is identified where a certain facility should be constructed or forest management requires a certain training) – the MoI / NCDD is in charge

c) lower level land use (master) plans, if the spatial strategy requires further spatial elaboration on a different scale (e.g. a general area is envisaged to host a social land concession, but the exact location is not defined) – the PCLMUP is in charge

Direct implementation of the PSP exists, such as where the regular mandates of administrative units are addressed, for example with regard to developing concepts or carrying out surveys or analysis.

Overall responsibility for implementing the PSP rests with the Provincial Council and the PCLMUP.

- Based on this understanding, facilitate a discussion seeking to complement the log-frame matrix with monitoring requirements, such as timeframe, responsibilities and indicators. Where integration into other plans is required, this should be clearly stated. For example the construction of new irrigation schemes might require more detailed studies (sector responsibility) on the one hand and actual construction (development and investment planning) on the other.
- The resulting matrix needs to clearly inform the PCLMUP on when and how to update the required information. It should furthermore provide a clear reference for development and investment planning, so that spatial strategies are complemented but respective development measures.
- As the provincial territorial development is within the authority of the provincial council, a reporting mechanism between PCLMUP and council based on the extended matrix needs to be discussed and agreed. For example the PCLMUP could be required to update the council on a quarterly basis during regular council meetings, which should be complemented by corresponding reports from line departments.
- The matrix should be endorsed by the competent authorities and will be part of the approved PSP.

Desired outputs

- A comprehensive matrix including all required actions resulting from the PSP is formulated, clearly indicating requirements for sector plans, development and investment planning as well as lower tier spatial planning, complemented with essential monitoring aspects such as timeframe and indicators. This matrix is endorsed by the Provincial Governor, provincial council, PCLMUP and line departments.
- A reporting mechanism on the monitoring of PSP implementation is agreed.

Task 5.2 Evaluation, updating and harmonization of planning instruments

Overview

According to the national spatial planning policy, the PSP needs to be updated every 5 years. Updating takes considerable time and needs to be planned well ahead. It should be based on an evaluation indicating whether and how the PSP is contributing to sustainable territorial development and be harmonized with the planning cycle of the 5 year development plans.

Who is involved?

- Initiation
  - PWG
- Participants

- Board of Governors
- Line Departments
- PCLMUP
- Provincial council

Activities / methodology

- For a first updating of the PSP, the alignment with the planning cycle of the 5 year development plan is more relevant, than inflexibly sticking to 5 years. The situation analysis, vision and goals should inform the development planning; the spatial development strategies need to be systematically complemented by measures foreseen in the DP. Therefore the PSP needs to be updated and approved, before the DP formulation starts. Synergies with the DP are immense and ease formulation, while the whole provincial planning framework becomes more efficient and effective.
- This harmonization process needs to be thought from the end:
  - Determine the starting date of the DP formulation process.
  - Calculate backwards, when the PSP updating process needs to start to be finished well in time before that DP starting date. While the PSP formulation takes roughly 2 years, it is recommended to include a small buffer of 3-6 months between estimated approval of the updated PSP and the start of the DP formulation process.
  - PSP updating should be informed by a prior evaluation, which diagnoses the success or functioning of the PSP as an instrument of sustainable territorial development. Lessons need to inform the updating process. Such evaluation needs to be prepared as well and will as well require sufficient time. Until further experiences suggest otherwise, blocking 6 months for this (preparation, evaluation, and conclusion) seems reasonable. This is the responsibility of the PCLMUP and will require their full involvement. External expertise is highly recommended.
- Harmonization with the DP might result in a very short term update need, where evaluation couldn't meaningfully provide lessons from implementation. Therefore it might be meaningful to aim for harmonizing with the second next DP formulation process, the next DP still using the current PSP as a reference.
- **Hint:** Tasks 5.1 and 5.2 address the same set of involved stakeholders and can be organized in one joint workshop day.

Step 6 Finalization of the planning process

Overall objectives

- Final public consultation process
- Completion of the technical report
- Endorsement of the PSP by the provincial council
- Approval by the National Land Management and Urban Planning Committee

Task 6.1 Final public consultation of all stakeholders

Overview

The public consultation workshop offers the possibility to the public to comment on the draft PSP. To ensure a wide participation, a large number of stakeholders should be invited to attend the final public consultation workshop (e.g. representatives from communes, private sector, farmer associations). The purpose is to gather feedback and comments and get a sense of how the general public might receive the plan. This allows the PWG to amend the draft into a more fine-tuned version, which is ready for public display in the sense that it represents the consent of all relevant stakeholders involved.

Who is involved?

- Coordination
  - PWG
- Participants
  - PCLMUP
  - Provincial council and Bureau of Governors
  - Provincial technical line departments
  - District administration (council or board of governor)
  - Private sector (chamber of commerce)
  - NGOs representatives
  - International development partner organizations
  - Representatives from major community based organizations in the province
- Endorsement
  - PCLMUP
  - Provincial council

Activities / methodology

- Circulate the draft PSP among the stakeholders to be involved, at least two weeks before consultation.
- Initiate the public consultation workshop with a short overview presentation of the planning process and its key outputs (situation analysis, scenarios, vision, goals and strategies for future territorial development).
- Initiate a discussion with all participants in order to receive feedback from all actors regarding all the elements of the spatial plan.
- The comments received during this workshop should be well documented and considered to prepare the final technical report of the provincial spatial plan.

Desired outputs

- The stakeholders are aware and understand the content of the PSP.
- The comments they have provided are integrated in the final draft of the PSP technical report.

Task 6.2 Preparation of final technical report

Overview

Based on the draft documents produced so far and the comments made during the final consultation workshop, the PWG will prepare a final technical report of the PSP.

Who is involved?

- Coordination
  - PWG
- Participants
  - PWG
  - PCLMUP
  - Provincial council and Bureau of Governors

Activities / methodology

- The responsibility for finalization of individual chapters should be assigned to individual team members based on their respective sector background and in collaboration with the respective sector line departments.
- The compilation of the chapters and a final crosscheck of all chapters should be by the PWG and the PCLMUP in a collaborative effort.

Desired outputs

- A complete and final technical report of the provincial plan is prepared. Annex 3 provides the outline of the Provincial Spatial Plan technical report.

Task 6.3 Public display and endorsement of the plan by the Provincial Council

Overview

The draft Provincial Spatial Plan technical report is put on public display during a period of 90 days at the provincial hall and each district hall in the province. The display allows for citizens, associations, NGOs to peruse it and formulate final critiques or suggestions. A particular important role of the PCLMUP and PWG is to properly document on how different inputs from the public display were reflected upon. This documentation needs to complement the technical report draft and be shared with provincial council and NCLMUP when seeking their endorsement, respectively approval. When this process is successfully finalized, the provincial council officially endorses the technical report of the provincial spatial plan.

Who is involved?

- Coordination
  - PWG

- Participants
  - PWG
  - PCLMUP

Activities / methodology

- Provincial Council should give its green light to start the public display.
- The PWG will prepare and put on public display A0 size maps showing all the spatial development strategies foreseen by the plan and a corresponding summarizing explanation in text form.
- The provincial and district authorities should observe a period of 90 days for public display to give an opportunity for the public to take stock of the plan, suggest modifications or provide recommendations.
- All suggestions should be addressed properly in a consensual process. The PWG should neutrally record all incoming suggestions, feedback and critics. It is reasonable to categorize and group them, in order to address them systematically and efficiently. The list of (grouped) feedback from the public display needs to be complemented with documentation on how the feedback was addressed (e.g. taken up, partly taken up, not taken up) and the reasons behind.
- An approval session with the provincial council is organized, in which the PSP is presented. This should build upon previous presentations and involvements of the council in the process and particularly focus on core issues which arose from the public display and how these were addressed. Keep in mind that it is possible for the council to demand changes or request further clarification, so that actual approval might require another meeting.

Figure 9 Final presentation of Battambang Provincial Spatial Plan to Provincial Council

Desired outputs of task 6.3

- The public display is observed over 90 days and all problems raised are addressed and properly documented.
- The Provincial Council has reviewed the technical report, has agreed on its content and forwarded to the national Spatial and Urban Planning Committee for final approval

Task 6.4 Approval by the National Committee for Land Management and Urban Planning

Overview

- The final technical report on the PSP is submitted to the NCLMUP for their perusal.
- A representative of the PCLMUP should deliver a presentation of the planning process and its key outputs (a revised version of the presentation developed for the final public consultation workshop). It should further cover which issues came up during public display and how these were addressed.
- The comments received during this presentation from the NCLMUP should be well documented and considered to amend the final technical report of the PSP.
- The NCLMUP approves the PSP and commences the process for having it enacted as a sub-decree.

Who is involved?

- Initiation
  - NCLMUP
- Participants
  - NCLMUP
  - Representative of the Provincial Council and Bureau of Governors
  - PCLMUP
  - PWG

Desired outputs

- Final approval of the PSP by the NCLMUP.
- PSP is enacted by sub-decree.

References

Cambodia Tree Seed Project. (2003). The gene-ecological zonation of Cambodia. Phnom Penh.

Centre for Research on the Epidemiology of Disasters. (2011). The International Disaster Database. Brussels: Université Catholique de Louvain - http://www.emdat.be/.

Doch, S., Diepart, J.-C., & Heng, C. (2015). A multi-scale flood vulnerability assessment of agricultural production in the context of environmental change: The case of the Sangkae River watershed, Battambang province. In J.-C. Diepart (Ed.), Learning for resilience: Insights from Cambodia's rural communities (pp. 19-49). Phnom Penh: The Learning Institute.

IPCC. (2013). Summary for Policymakers. In T. F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex & P. M. Midgley (Eds.), Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge - United Kingdom and New York - USA: Cambridge University Press.

McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (2001). Climate Change 2001: Impacts, Adaptation, and VulnerabilityContribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge - United Kingdom and New York - USA.: Cambridge University Press.

National Institute of Statistics. (2010). Report 12: Population projections of Cambodia. Phnom Penh.

National Institute of Statistics. (2012). Reclassification of Urban areas in Cambodia, 2011. Phnom Penh: Natioanl Institute of Statisctics and UNFPA.

O'Keefe, T. C., Elliott, S. R., & Naiman, R. J. (Sine Die). Introduction to Watershed Ecology. Watershed Academy Web. Distance Learning Modules on Watershed Management. Retrieved from http://www.epa.gov/watertrain

ANNEXES

Annex 1 Indications of workshops to be conducted during the spatial planning process

Task	Title	Objectives	Participants	Venue
Task 1.1	Kick-Off workshop with all stakeholders	Raise awareness about the spatial planning initiative Explain objectives and scope of the provincial spatial planning Discuss roles and expectations of all stakeholders	Provincial council and board of governors Provincial technical line departments District unified administrations Representatives from associations and NGOs International development partner organizations Representatives from major community based organizations in the province	Provincial Hall
Task 2.3	District spatial planning workshops	Data update Land use change analysis Review of sector strengths, problems, potential and strategies	Spatial and Urban Planning Working Group District technical line office District administration Commune councilors Representative of farmers associations Other relevant stakeholders	District Hall, in each district of the province
Task 4.2	Cross sector and sector strategies workshop	Present cross sector spatial development strategies to sector Identify and address conflictive issues between sector Identify how sector contribute to overall strategies	Spatial and Urban Planning Working Group Spatial and Urban Planning Committee Other members of provincial technical department Provincial Council Provincial board of governors	Provincial Hall
Task 6.1	Final public consultation workshop	Disseminate the content of the Provincial Spatial Plan Give opportunity to all stakeholder to provide additional comments and suggest revisions	Provincial council and board of governors Provincial technical line departments District unified administrations Commune councils Representatives from associations and NGOs International development partner organizations Representatives from major community based organizations in the province	Provincial Hall

Annex 2 List of spatial and non-spatial data required

Section	Topic	Data	Source	Update	Access online
Geography	Administration	Administrative boundaries (country, province, district and commune)	Department of Geography (Phnom Penh)	As available	
		Location of administrative center	Department of Geography (Phnom Penh)	As available	
Physical Environment	Topography	Contour lines	Ministry of Public Works and Transport (Jica Data Set)		
		Digital Elevation Model/hill shade	Mekong River Commission Interactive Atlas		
	Watershed	Watershed boundaries (catchment)	Mekong River Commission Interactive Atlas		
	Climate	Weather data (precipitation and temperature)	Provincial Department of Water Resources and Meteorology	As available	
	Hydrology	Water bodies	Ministry of Public Works and Transport (Jica Data Set)		
		Water streams	Ministry of Public Works and Transport (Jica Data Set)		
		Flood incidence (central area)	Mekong River Commission Interactive Atlas	1999	
	Geology	Rocks	Mekong River Commission Interactive Atlas		
			Ministry of Public Works and Transport (Jica Data Set)		
	Soil	Soil (with FAO classification)	Mekong River Commission Interactive Atlas		3
	Ecology	GENE-ecological Zoning	Forestry Administration/DANIDA/DED		3
Population & Settlement	Demography	Number of people, by sex and commune/district for several consecutive years	Demographic Census 1998 & 2008	1998 & 2008	1
			Commune database	2006-2011	2
		Number of immigrant and emigrant over a certain period of time	Demographic Census 2008	2008	1-3
		Population by age group	Demographic Census 2008	2008	1
			Commune database	2006-2011	2-3
	Settlement	Location and size of main settlement in rural areas	Ministry of Public Works and Transport (Jica Data Set)	1999	
		Location and size of main urban centers	Department of Land Management, urban Planning, Construction and cadastre	As available	
		Location and description of informal settlements in urban/rural areas	Provincial administration	As available	

Physical Infrastructures	Transport infrastructure	Location and type/status of road (level-surface-practicability)	Ministry of Public Works and Transport (Jica Data Set) - Provincial department of Public Works and Transport or PDLMUPCC	1999 for JICA dataset, as availble for other sources	
		Location and type of bridge			
		Location and status of rail way			
		Location and status of navigable way			
	Water management infrastructure	Location and status of main irrigation schemes (canal, gates, command areas)	Commune database	2006-2011	2
			Ministry of Public Works and Transport (Jica Data Set)	1999	
			Provincial Department of Water Resources and Meteorology	As available	
		Location and status of flood protection infrastructures (dams and levees)	Ministry of Public Works and Transport (Jica Data Set)	2006-2011	
			Provincial Department of Water Resources and Meteorology	As available	
	Energy infrastructures	Location and capacity of electric transmission line with origin of electricity	Open Development Cambodia	2011	3
			Provincial Department of Industries, Mines Energy	As available	
		Location and capacity of hydropower station and reservoirs	Open Development Cambodia	As available	3
			Provincial Department of Industries, Mines Energy	As available	
	Waste management infrastructure	Location and capacity of main dump fill site	Provincial Department of Environment	As available	
Social infrastructures	Education	Location of education center, number of students/ teachers, enrolment status, literacy rate	Provincial Department of Education, Youth and Sport		3
			Commune database	2006-2011	2
			Census geo-database, NIS-MoP	2008	
	Health	Location of health centers/ hospitals, number of students/teachers	Commune database	2006-2011	2
			Census geo-database, NIS-MoP	2008	
	Religion	Location and importance of main cults place (for main religion)	Provincial Department of Cults and Religion		
Land Use	Land cover	Location of different categories/types of land cover	Ministry of Public Works and Transport (Jica Data Set)	1999	
			Commune Land Use Map, produced by Ministry of Land Management, Urban Planning, based on JICA database	1999	
		Land cover raster	Google earth portal	As available	5
			Landsat	As available	6

Land Use	Built-up area	Classification of all urban areas and built-in infrastructure	Department of Land Management, urban Planning, Construction and cadastre		
	Agricultural production	Cultivated areas size for different crops n rainy and dry season			
		Yields for different crop	Provincial Department of Agriculture	As available	
		Cultivated area size per HH	Commune database	2006-2011	2
		Location and importance of animal raising activities			
	Private land titles	Area with delivered titles under the LMAP/LA-SSP program and under the order 01	Provincial Department of Land Management, Urban Planning, Construction and Cadastre	As available	
	Concessions	Location and status of social land concession	Provincial Department of Land Management, Urban Planning, Construction and Cadastre	As available	
		Location and status of economic land concession (national and sub-national levels)			
		Economic Land Concession	Open Development Cambodia	2011	3
			Ministry of Agriculture, Forestry and Fisheries	2011	4
			Provincial administration	2011	
	Forestry	Forest cover (1993-1997-2002-2006)	Forestry Administration (Cantonment)	1993-1997-2002-2006-2010	
		Community forestry	Forestry Administration (Cantonment)	As available	
			Open Development Cambodia	2011	3
		Location and capacity of tree planting (nursery)	Forestry Administration (Cantonment)	As available	
		Protected area (Conservation) area under management FA	Forestry Administration (Cantonment)	As available	
			Open Development Cambodia	2011	3
		Forest Concessions	Forestry Administration (Cantonment)	As available	
		Forest rehabilitation area	Forestry Administration (Cantonment)	As available	
	Protected area	Protected area under management MoE	Provincial Department of Environment	As available	
			Open Development Cambodia	2011	3
		CPA	Provincial Department of Environment	As available	
		Location of conservation area managed by MoE (TSBR)			

Land Use	Fisheries	Location and status of Community fisheries schemes	Fisheries Administration (Cantonment)	As available	
		Fishing out and conservation area	Fisheries Administration (Cantonment)	As available	
	Stone/Rocks	Location and type of stone/ gems extraction area			
		Area attributed as mineral concession	Provincial Department of Industries, Mines and Energy	As available	
			Provincial Department of Land Management, Urban Planning and Construction	As available	
			Open Development Cambodia	2011	3
Economy	Industries	Types, location and employment level of large, medium and small industries/enterprises	Provincial Department of Industries, Mines Energy	As available	
		Market places (location and types)	Provincial Department of Industries, Mines Energy	As available	
	Socio-economy	Employment status, poverty/wealth profile, income structure	Commune database	2006-2011	2
			Demographic Census 1998 & 2008	1998 & 2008	1
		Special Economic Zone	Open Development Cambodia	2011	3
		Type and importance of enterprises	Economic census 2011	2012	3
	Employment	Individual labor occupation of active population			
		Household main labor occupation			
		Job Migration			
	Poverty	ID Poor classification			
	Commerce	Location and type of main commerce			
	Trade	Type and value of imported and exported products			
	Tourism	Location and type of main tourist attraction	Provincial Department of Tourism	As available	

1 http://celade.cepal.org/khmnis/census/khm1998/

http://celade.cepal.org/khmnis/census/khm1998/

2 http://db.ncdd.gov.kh/

3 http://www.opendevelopmentcambodia.net

4 http://www.maff.gov.kh

5 http://www.google.com/earth/index.html

6 http://landsat.usgs.gov/products_data_at_no_charge.php

Annex 3 Outline structure for a Provincial Spatial Plan technical report

Chapter 1 Introduction

- Foreword
- Purpose
- Spatial planning institutions
- Spatial planning methodology

Chapter 2 Situation Analysis

Sector analysis	Maps required
Administration	Main administrative boundaries and centres of districts, commune and villages
Bio-physical environment	The characterization of climate in the province
	Topograpy (elevation and slope) with identification of main landforms
	Overall soil fertility (for agriculture)
	Main water ways and bodies
	River catchment boundaries
	GENE-ecological zoning
	Flood and drought patterns
Existing Land use and land tenure	Land Use change
	Current land use
	Forest cover and main arrangements for forest management
	Fishery resources and main arrangement for fisheries management
	Protected ares
	Areas with land titles issued
	Concessions map (ELC + SLC)
Population and settlement	Population density
	Population growth rate
	Net migration rate
	Settlements
Social infrastructures	Location and accessibility of health infrastructures
	Location and accessibility of education infrastructures
Physical infrastructures	Transport infrastructures
	[Agricultural] Water management infrastructures
	Energy infrastructures and supply
Economic structure	Distribution of employment by type
	Location of key economic development
	Special Economic Zones

Provincial Spatial Structure	Maps required
Land Use System identification and analysis	Land Use Systems
Classification and analysis of urban centers	Location of urban centers and surrounding areas (classified)

Economic structure and functions analysis	Localization of main development hubs and corridors	

Chapter 3 Long-term development goals and vision

- Future development scenarios
- Long terms development goals
- Development Vision

Chapter 4 Spatial Development Strategies

Spatial development strategies	Maps required
A. Future Land Use and Landscape Functions	Future land use and landscape functions map
B. Future Urban Centers and Service Provision	Future urban centres and service provision map
C. Future Economic Structure	Future economic structure map

Aligned sector strategies and updated sector plans

Chapter 5 Implementation, Monitoring and Evaluation

- Implementation matrix
- Monitoring, evaluation and plan updating

This series of handbooks is the result of a collaborative effort between Provincial / District / Municipal-based Spatial Planning working groups, Experts and Decision Makers at the Ministry of Land Management, Urban Planning and Construction and GIZ advisors.

The editorial team that coordinated the production of these handbooks consisted of: H.E. Dr. Pen Sophal. H.E. Dr. Meng Bunnarith, Walter Koditek, Jean-Christophe Diepart, Thomas Hänert and Florian Rock.