

Report on Identification of Case Study Site:
Khemarak Phoumin Town, Koh Kong Province, Cambodia



Ngin Charith, Heng Naret, Thuon Try, Faculty of Development Studies, Royal University of Phnom Penh
Kim Nong, Ministry of Environment

Phnom Penh, June 2015

Table of Contents

Introduction	3
1. Clarity of climate issues.....	3
Location.....	Error! Bookmark not defined.
Resource stress exacerbated by climate change	4
Economic land concessions.....	4
Hydropower development.....	6
Natural disasters	6
Climate data availability.....	7
2. Rapid urbanization	8
Physical spread of the city.....	8
Population growth rate.....	8
3. Regional connection.....	10
Regional investment	11
Government support to economic development	12
Infrastructure development.....	12
Development and conservation.....	13
4. Background information availability	14
5. History of engagement.....	14
6. Accessibility and affordability	16
7. Local interest and political buy-in	16
8. Replicability and transferability of knowledge or lessons.....	17
9. Conclusion.....	17
10. References.....	17

List of Figures

Figure 1: Economic land concessions and hydropower development	5
Figure 2: Commune index vulnerable to climate change in coastal provinces	6
Figure 3: Areas of coastal zones being inundated by sea level rise	7
Figure 4: (i) Population density in coastal provinces, (ii) Population projection by 2030	9
Figure 5: Employment classification in coastal provinces.....	9
Figure 6: Regional communication connection.....	10
Figure 7: Current connection of coastal provinces	11
Figure 8: Regional investment.....	12
Figure 9: Land use and management planning	13
Figure 10: Coastal master plan for development and conservation	14

Koh Kong covers an area of 10,045.58 km². It is bordered by Preah Sihanouk and Kampong Speu provinces to the East, Sihanouk beach to the West and South, Pursat province to the North. It is administratively divided into six districts and one municipality, 26 communes, three sangkats and 116 villages.

The population in 2010 was 123,832 people, with females comprising 49.7% of the total population. The population density is 12 people per square kilometer. Agriculture is a major economic sector of the province; 63.65% of population is agricultural workers. Large populations were observed in Srae Ambel, Smach Mean Chey, and Botum Sakor districts (20,000 to 40,000). Small populations were found in Thmor Bang, Koh Kong, and Kiri Sakor districts (6,000 to 9,000).

Low economic development means that most people are unable to purchase goods and services for their minimum daily needs. The poverty rate is a percentage of the population living below a poverty line. The average provincial poverty rate was significantly reduced from 34.7% in 2005 to 25.1% in 2010 with a reduction rate of 1.9% per year. It would be a result of central and local government in poverty reduction programs aiming to improve living conditions of rural communities. The existing 2010 poverty rate was high in Kiri Sakor, Thma Bang, Kaoh Kong, and Botum Sakor districts (31 to 29%); average in Srae Ambel, Kampong Seila, and Mondol Seima districts (25 to 21%); and low in Smach Meanchey (8.4%).

Resource stress exacerbated by climate change

Cambodia's coastal areas contain a diverse and biologically important range of natural habitats including rivers, forests, mangroves, estuaries, beaches, and coral reefs. Coral reefs have been found in a number of locations (Bauld 2005) accommodating 34 known species of hard coral and 14 species of soft coral (MoE/Danida 2002). The coral reefs are generally in poor health, with low species diversity, dominated by massive forms (Nelson 1999). Mangrove forests and mudflats are found throughout the coastal zone. They support both endangered/vulnerable wildlife and species of commercial/livelihood importance on which many communities living within the area are dependent. Around 435 species of fish have been identified in Cambodia's marine waters.

Coastal natural resources face a number of pressures. Overfishing by commercial vessels in recent years for example may have decreased (PEMSEA 2015). Over exploitation of forest resources and mangrove ecosystem will lead to increased rates of erosion and sedimentation of rivers and estuaries in coastal areas. This will affect sea grass beds and coral reefs, essential to fish stocks and habitats. Over the period of 1993 to 2002, forest and mangrove resources in coastal areas declined significantly reaching about 270,000 ha and 12,000 ha or about 1.73% and 1.76% per year respectively. The rapid loss of forest cover and mangrove occurred mainly in Kampot and Sihanoukville. If this loss continues, the attractiveness of coastal areas for tourism and recreation and other economic opportunities will also decline. Sewage, garbage, and chemical pollution are also of concern (Danida 1999). Sea level rise as a result of climate change will aggravate the damage caused by the unsustainable management of the coastal zone.

There are two economic developments placing high pressure on forest and biodiversity in Koh Kong province: (i) economic land concessions; and (ii) hydropower development.

Economic land concessions

Economic land concessions (ELC) in Koh Kong province were mainly concentrated in Botum Sakor National Park. The park has an area of 175,478 ha with forest cover of 134,921 ha (according to Landsat image 2006). The forest

cover was about 77%. The ELC would be about 100,000 ha resulting in the area of national park of about 75,000 to 80,000 ha.

High economic development in Koh Kong would be from economic land concession in Botum Sakor National Park. It would be in Chrouy Pras commune (Koh Kong district); Preaek Khsach, Phnhi Meas, Kao Sdach communes (Kiri Sokor district); and Ta Nuon, Thma Sa, and Andoung Toek communes (Botum Sakor district). Developments from economic land concession would not only happen on allocated land but also support infrastructure such as access roads crossing remaining national park to make habitat further fragmented and reduce connectivity to the Southern Cardamoms.

According to experts monitoring and evaluating elephant distribution in Cambodia from 1998 to 2011 in a report by Fauna and Flora International, there are four key areas with significant elephant sighting recorded: Koh Kong, Mondulkiri, Ratanakiri, and Preaek Vihear provinces. The protected forests of the Central Cardamoms, Southern Cardamoms, and Botum Sakor National Park are three key areas that elephant recorded.

If economic development in this area is not limited to existing economic land concession, the Government could maintain proper biodiversity corridors connecting Botum Sakor National Park with the Southern Cardamoms. It is suggested that provincial planners would consider limiting economic developments in Cardamoms and biodiversity corridors between the Central Cardamoms, Southern Cardamoms, and Phnom Samkor Wildlife Sanctuary. Economic activities should be concentrated along Sre Ambel and Botum Sakor coastal districts to balance economic development and conservation targets.

Figure 1: Economic land concessions and hydropower development (Source: Adopted from Asian Development Bank, 2012)



Hydropower development

Hydropower plants in Koh Kong would also be under high pressure from economic development. The pressure would come from two plants under construction and five more under development in Thma Bang and Koh Kong districts.

Pressure from hydropower development can be significantly minimized with the proper preparation of hydropower plants in association with good environmental impact assessments and monitoring processes during construction of the system to ensure that forest area clearance for reservoirs and roads is minimized and resettlement plans for current residents are good in terms of compensation and income rehabilitation.

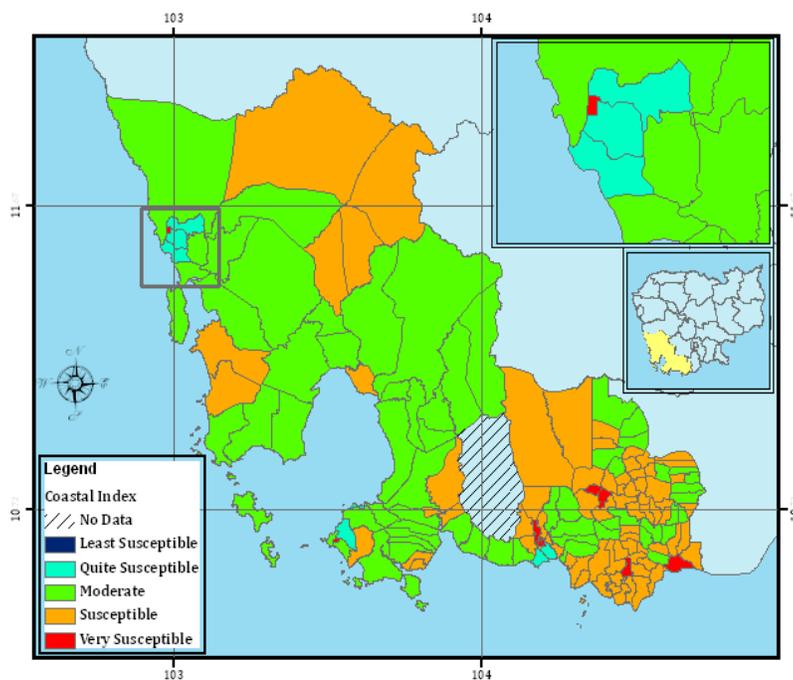
Natural disasters

Flooding is a common climate-related problem in coastal areas. In Kampot transport by roads and bridges is hampered by floods particularly during the wet season, and this has economic consequences (MoE and Danida 2002a). In Kep municipality, floods occasionally occur along slightly hilly areas on lower land (plains) and create problems in some rice growing areas. Many families have moved out of these areas due to low agricultural productivity. In Koh Kong, areas affected by flood are found in the center of the province close to the border of Koh Kong and Sihanoukville and are mostly in the lower parts of slightly hilly areas. **Drought** commonly occurs in the dry season.

Strong winds often occur in the fall and cause problems for farmers by hitting rice yields. In the rainy season, strong winds come from the west or from the sea and can cause storms lasting up to seven days. During strong winds and storms waves can reach 2 to 3.5 meters in height rendering travel by sea difficult.

The risk of exposure to high sea waves is also quite high. At this wind speed, sea waves can reach six meters in height. Fishermen are advised not to fish under these conditions.

Figure 2: Commune index vulnerable to climate change in coastal provinces (Source: Adopted from Ministry of Environment [2010] draft report on Second National Communication on the United Nations Framework Convention on Climate Change)



Climate data availability

Analysis of the impact of sea level rise on coastal areas suggests that a total area of about 25,000 ha will be permanently inundated by a sea level rise of one meter, increasing to 38,000 ha at a sea level rise of two meters.

Table 1: Total areas of the coastal zones being inundated permanently by sea level rise

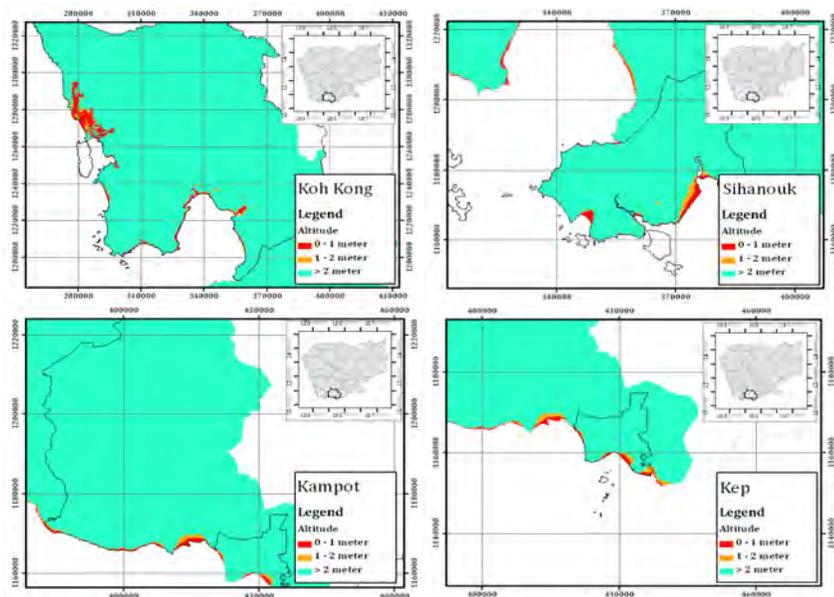
No	Land Cover*	Sea Level Rise	
		1 m	2 m
1	Mangrove	11,832	18,495
2	Wetlands	10,509	12,477
3	Grassland/Shrubs	1,288	3,669
4	Crop Lands	629	2,209
5	Other Lands	384	866
6	Forest Lands	289	370
7	Settlements	220	436
	Grand Total	25,151	38,523

* Based on land use cover data of 2006 corrected by land use/cover map of 1997, adopted from MOE (2010)

The table above shows the total area of the coastal zone being inundated permanently due to one and two meter sea level rise. Of the 25,000 ha, about 81% of the inundated area is situated in Koh Kong Province and 11% in Krong Preah Sihanouk Province.

Around 26 communes in Koh Kong Province will be affected by the impact of sea level rise, while in the Krong Preah Sihanouk, Kampot, and Kong Kraeb Provinces about 17, 25 and five communes respectively will be impacted. The locations of the coastal zone that would be inundated are presented in the figure below.

Figure 3: Areas of coastal zones being inundated by sea level rise (Source: Adopted from Ministry of Environment [2010] draft report on Second National Communication on the United Nation Framework Convention on Climate Change)



2. Rapid urbanization

Physical spread of the city

The Ministry of the Environment and Danish International Development Agency (2002) have developed a long-term plan for infrastructure development in the coastal areas. However, this plan did not take climate change into consideration. The proposed sustainable land use may not be effective under changing climate. Long-life infrastructure development that requires high investment should be redesigned with climate change in mind. In areas where the likelihood of strong wind and sea level rise is quite high, a new climate proof building code may need to be introduced. Planting windbreakers in some agricultural areas may also be necessary to reduce the negative impact of strong winds on annual crops.

The analysis has shown that communities in the Koh Kong province are currently facing climate related problems, and that these vulnerabilities need to be incorporated into the design and planning of adaptation plans in coastal areas.

Further study to improve the current analysis is required using RCM models and a more refined resolution of the topographic map (contours with 20 centimeter intervals) with a wider scope (e.g. salt water intrusion, coastal erosion by extreme waves as a result of increasing wind speed and sea level rise under changing climate, mangrove rehabilitation for buffer zone etc.).

Recent road construction has the potential to open up the Southern Cardamoms to land encroachers and illegal traders. Road No 48 divides the Southern Cardamoms into two parts and fragments the connection between the Southern Cardamoms and Botum Sakor National Park. It creates negative impacts on forest and biodiversity but with existing forest management of provincial departments, these impacts are under control and monitored.

Population growth rate

The Ministry of the Environment and Danish International Development Agency (2002) define "Urban Area" as an area with many buildings and 10,000 people or more in the time when the population census is conducted. Another definition could be that "Urban Area" is an area where at least 60% of population, aged 10 and older, is involved in non-agricultural activities and at least 30% of families use modern toilets. An area cannot be defined as an urban or rural area only based on population. Therefore, it should be noted that there are a majority of districts expected to become "Urban Areas" where a number of communities already exist.

The Cambodian coastal provinces' populations are projected to increase significantly with almost one million (960,480) in 2008 to 1,459,510 in 2030. This projection by the national committee for coastal zone management and development is a bit unrealistic given the low density and less development and economic activities in 2008 compared with current trends.

For Koh Kong, the population has increased from 132,106 in 1998 to 198,539 in 2005 (Ministry of the Environment and Danida 2002) and in 2010 it was 123,832 people of which 61,507 or 49.7% were female. Population density is 12 people per square kilometer. Agriculture is a major economic sector in the province where 63.65% of the population is farmers. About 29% of the population works in the service sector, and almost 7% in the industrial sector.

Figure 4: (i) Population density in coastal provinces, (ii) Population projection by 2030

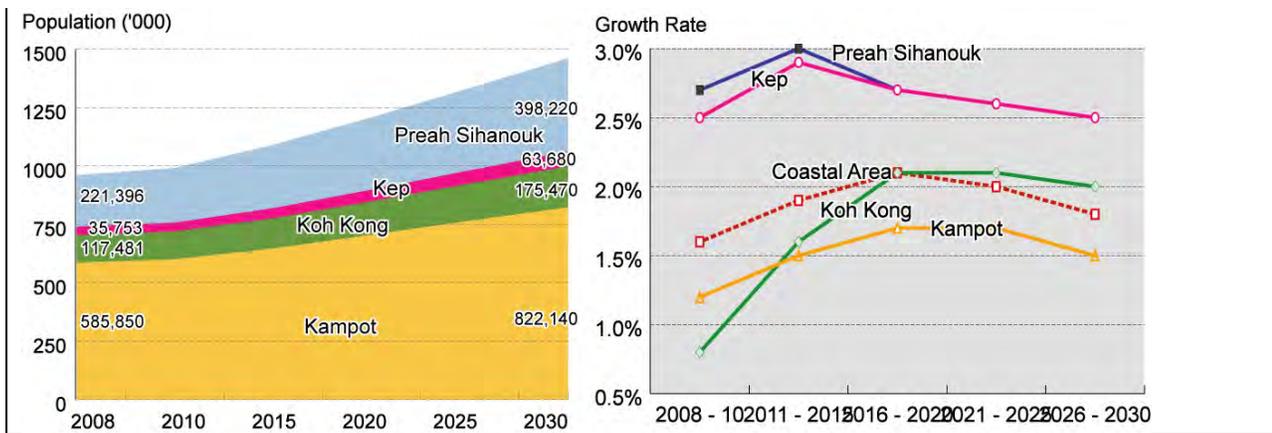
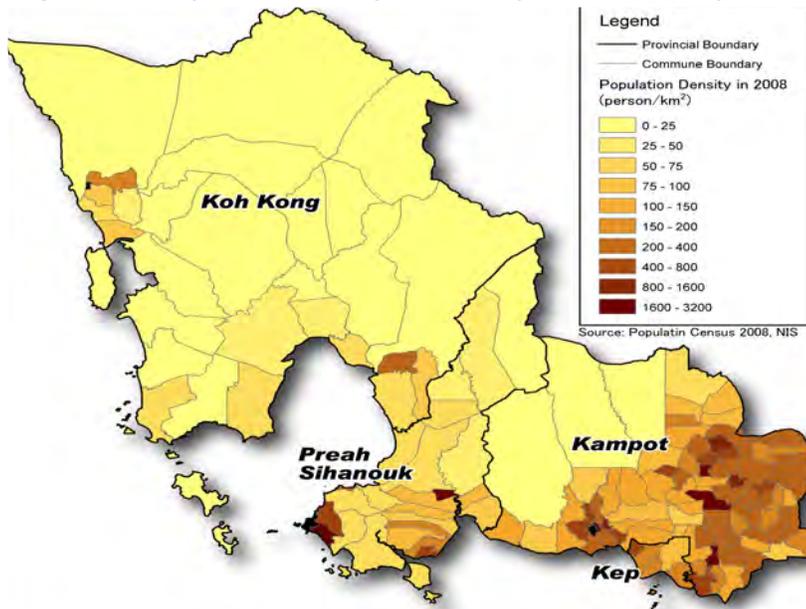
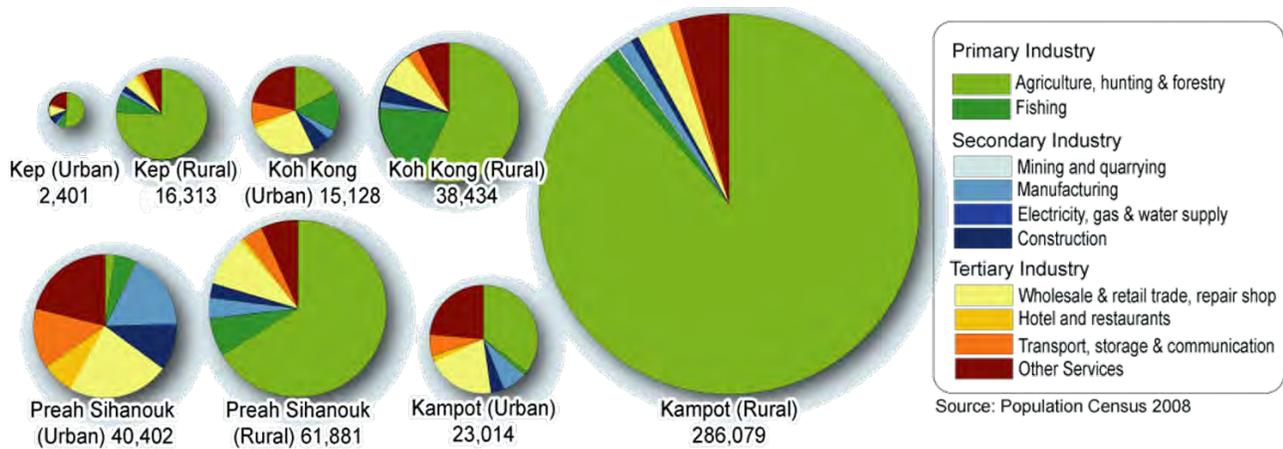


Figure 5: Employment classification in coastal provinces



3. Regional connection

The coastal provinces have been seen as a strategic location of growth poles given their wealth of natural resources, lower population density, accessibility for cross border trade as well as locations for corridor town development and for accessibility to marine trade and natural resources for livelihoods, the environment, and ecosystem services conservation (Sothirith 2013).

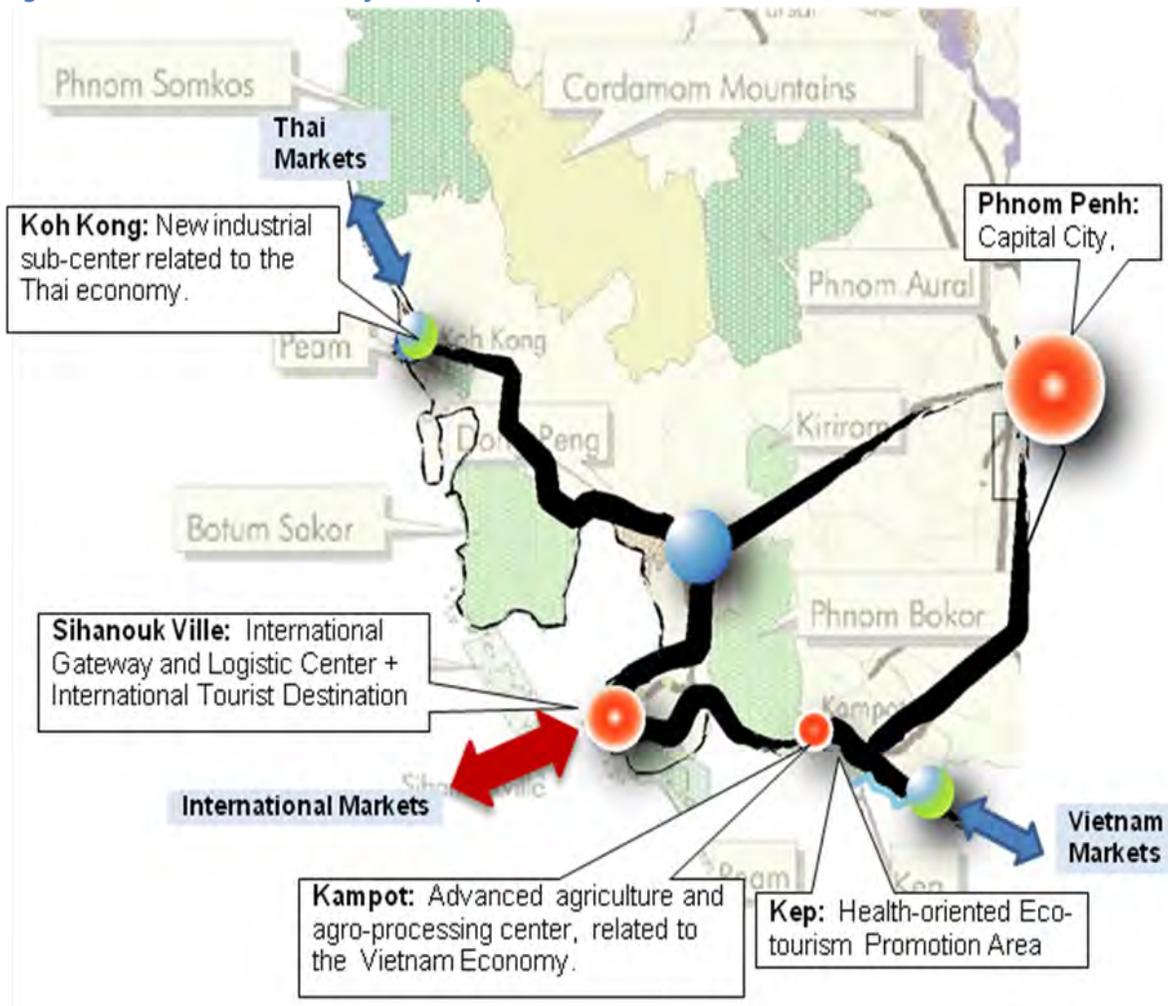
Figure 6: Regional communication connection



Koh Kong province shares a border with Thailand at Cham Yeum. In 2010, about 46,000 people crossed the border and 50% were international people. The border gate would be a favorable location for road tourism from Thailand to Koh Kong.

The development of hotels, guesthouses, restaurants, recreational sites, etc. has noticeably increased to meet the demands of tourism. However, there have been limitations on reception, guides who can speak foreign languages, local transportation, restaurants, and the price of services and food.

Figure 7: Current connection of coastal provinces

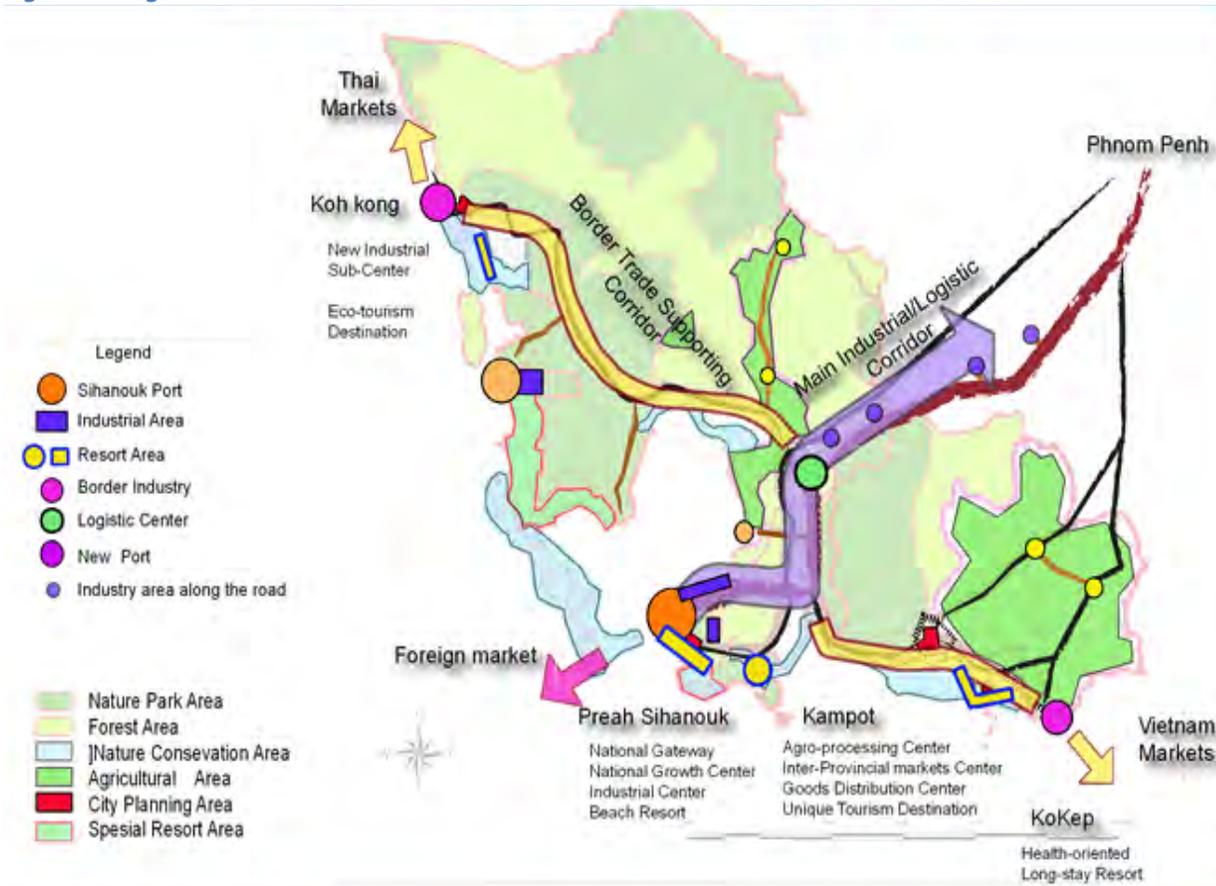


Regional investment

There are three strategic objectives for Koh Kong province envisioned by the National Committee for Coastal Zone Management and Development:

- Special economic zone and industrialized zone connecting the area to Thailand.
- World class eco-tourism development
- Oil and gasoline exploration

Figure 8: Regional investment



Currently, outstanding investment include a Special Economic Zone, clean water supply and electricity from Thailand, car spare part installment industry by South Korean investors, and special town and resort investment by Chinese investors (Union Development Group) over land areas of 38,000 ha with capital of US\$3.5 billion.

Government support to economic development

Most of the tourist and recreation sites are located in the coastal areas. There are some natural and/or ecosystem tourist sites located in the Central Cardamoms, the Southern Cardamoms, Peam Krasop, Botum Sakor, and Dong Peng.

According to the Koh Kong Tourist Department’s future tourism development plan, there would be 20 proposed sites developed or rehabilitated between 2011 and 2013 (eight in Mondul Seima district, seven in Koh Kong district, four in Smach Meanchey district, and one in Thmar Bang district). Minimum infrastructure at natural/ecosystem tourist sites would have insignificant negative impacts on forest, landscape, and biodiversity.

Infrastructure development

Roads: Renovation and maintenance of National Road 48; establishment of cross border transportation for goods and services exchange.

Clean water: Construct a reservoir that can supply the whole city.

Drainage system: Drainage renovation to regulate polluted water in the city’s core zone.

Development and conservation

The national spatial plan for coastal provinces has strongly advocated for land use planning and management, and a balance between development, conservation, and ecology.

Figure 9: Land use and management planning

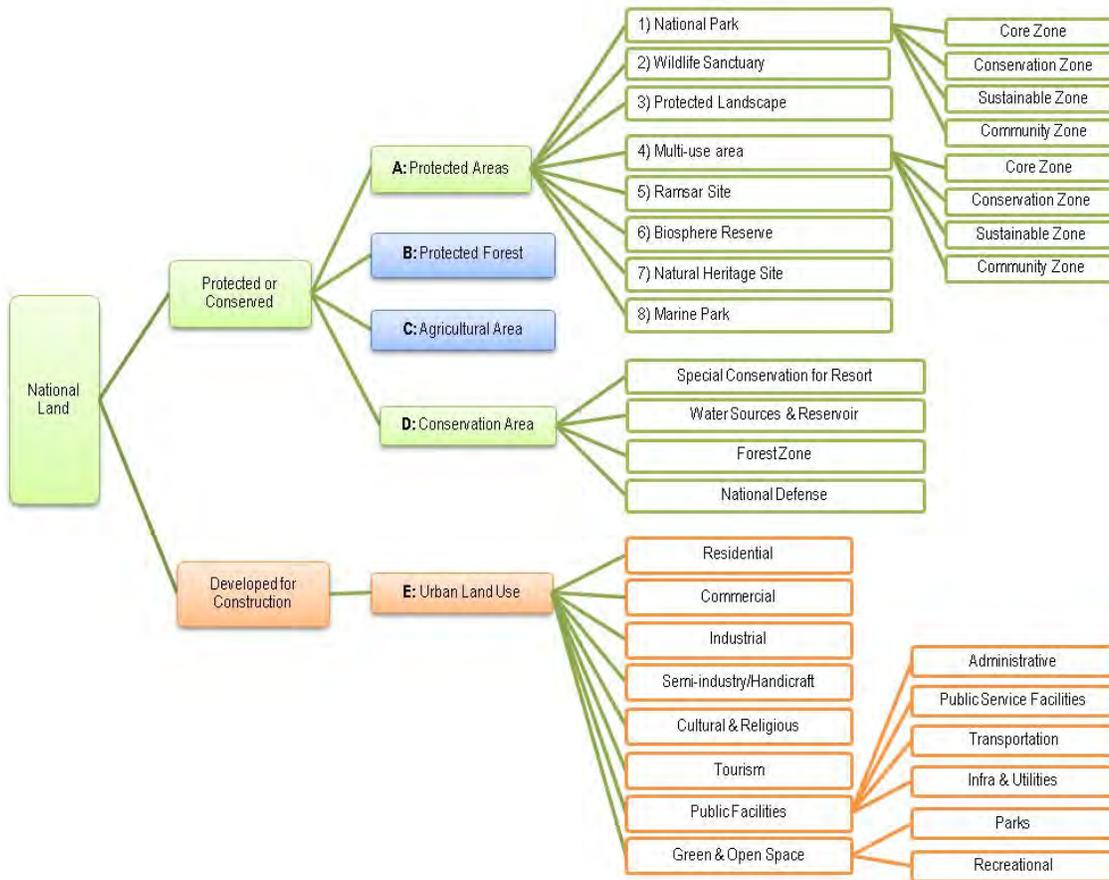
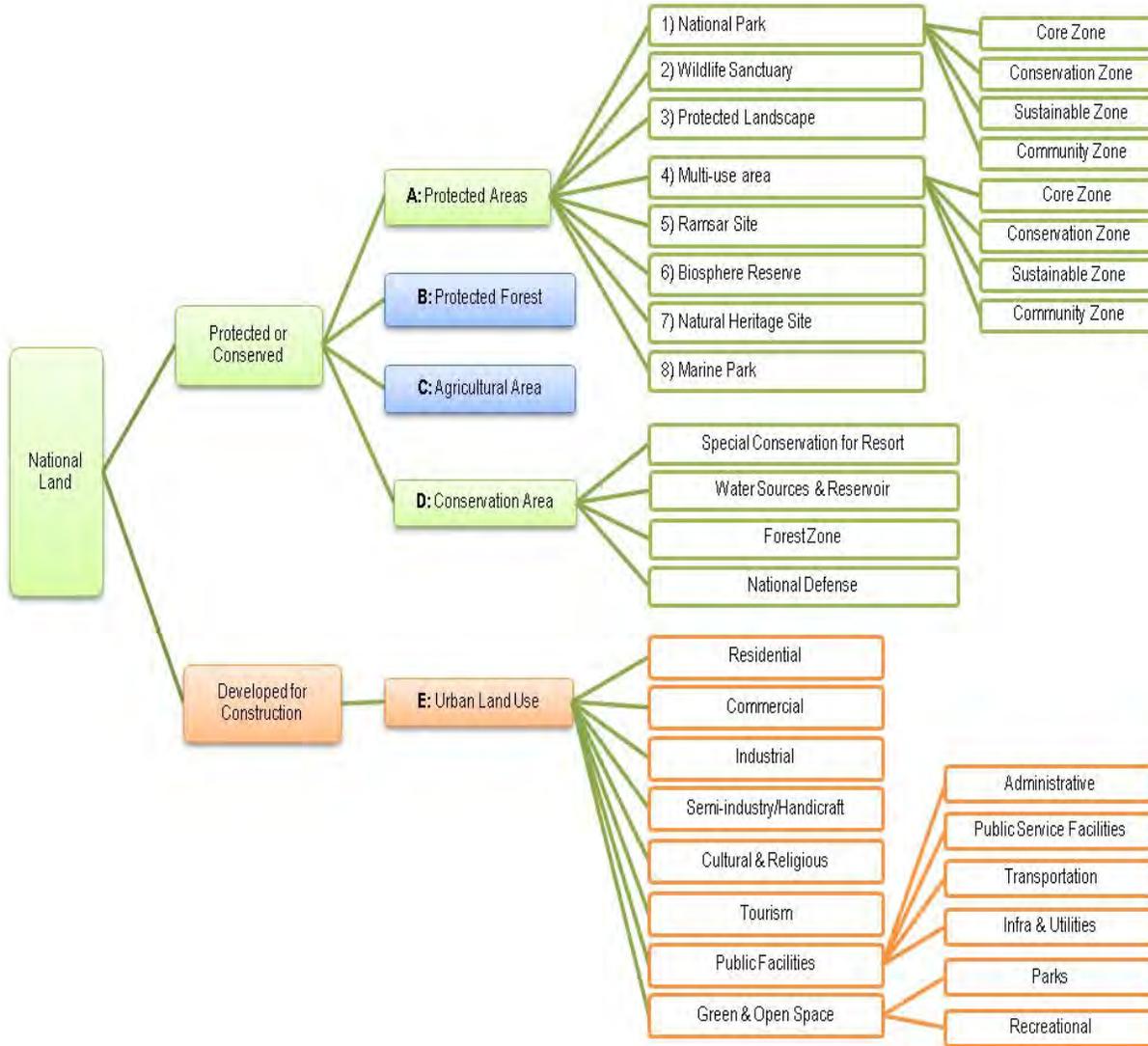


Figure 10: Coastal master plan for development and conservation



4. Background information availability

Historical information about urbanization is not readily available.

5. History of engagement

- Former project supported by International Development Research Center IDRC on Participatory Management of Mangrove Resource¹, Ministry of Environment (MOE).
- Coastal Zone Development Project has been active over the last 10 years.

¹ Now called PMCR (Participatory Management of Costal Resource)

- National committee for coastal zone management through the Ministry of Land Management, Urban Planning and Construction, Ministry of Environment, and Ministry of Tourism.
- International Union for Conservation of Nature working on two communes: Peam Krasaop and Tuol Korky on climate change vulnerability assessment and proposed adaptation.
- The Ministry of Environment, Cambodian Climate Change Alliance and United Nation for Environment Program (2010) have a pilot project on Coastal Adaptation and Resilience Planning component that covers all coastal provinces, in particular Sihanouk and Koh Kong Province Authorities, provincial departments and district offices. The Provincial authority has a mandate to improve local people’s livelihoods, maintain security, health care, and sustainable development. The provincial governor and relevant provincial departments recognize that Koh Kong is a province where seawater floods affect agricultural land. Problems of inundation and salt intrusion have been experienced, with e.g. 5,000 ha of rice damaged last year. Climate change projections in this province estimate a rise in sea level of 0.5 meters to one meter in the next 50 years, based on which nearly half of the Koh Kong town would be inundated.
- Koh Kong authorities are very concerned about climate change issues and are seeking funds for adaptation and mitigation. Koh Kong provincial authorities are very interested in the coastal adaptation component and look forward for its prompt implementation through active participation of the local government.
- Peam Krasaop Communities, Koh Kong Province. According to the most recent information, the number of families is 1,883, with a total population of 9,152 residents. Almost 95% of villagers living in Peam Krasaop undertake fishing as their main livelihood source. Following government efforts to stop mangrove destruction in the sanctuary, many of the local people changed occupations to raise chickens and ducks, harvest crabs and snails, fishing, small-scale business, hunting, small speed boat operation, repairing boat and fishing gear, thatch weaving, fish processing, and repairing houses. There is a consensus that current community poverty levels contribute significantly to the decline of natural resources in Peam Krasaop.

The table below is the summary of project inputs and overall cost.

Outputs	Costs (USD)
Output 1: Methodology for designing and implementing adaptation measures developed and adopted by the Government	336,500
Output 2: Development and use of indicators for monitoring climate change impacts in the coastal zone	294,000
Output 3: Vulnerability and risk assessments produced for coastal communities, ecosystems, and infrastructure	592,000
Output 4: Vulnerability maps produced for planning purposes	172,000
Output 5: Institutional capacity for identifying adaptation solutions based on different climate change scenarios developed	282,000
Output 6: Improved climate change knowledge integrated into land use and coastal development plans	232,000
Output 7: Increased resilience of coastal communities and coastal ecosystem buffers to climate change and improved livelihoods	1,636,000
Project Management, Monitoring and Evaluation, Review	541,500
Procurement and Equipment	339,000
Total direct costs	4,425,000

6. Accessibility and affordability

- Good road connection from Phnom Penh.
- Diverse transportations; it can be reached by regular buses or taxi.
- Accommodation options are also diverse.
- The current deputy director of the provincial administration was the former head of the provincial department of Environment in Koh Kong and used to work with the Pilot Program for Climate Resilience project and knows many people from the International Development Research Center program in Cambodia. He supports the project in Koh Kong.

7. Local interest and political buy-in

The National Committee for Coastal Zone Management and Development (MLMUC) was formally re-established in 2013. The Ministry of Land Management, Urbanization, and Construction is promoting spatial planning, land use planning, and master place development of town and city developments. This means that they do need more technical capacity to support staff at the national and the sub-national levels.

This action links to a current royal decree on the establishment of a national committee on coastal management and development. It is honorably chaired by the Prime Minister of Cambodia with interministerial members as well as sub-national authorities of the four coastal provinces.

It is also linked to the National Adaptation Program of Action (NAPA) approved by a council of ministers (Ministry of the Environment 2006), specifically focusing on coastal vulnerability and adaptation to climate change.

The first strategic development plan (2015-2019) of the Khemarak Phumin town was developed in line with provincial development planning. However, there is more needed in terms of capacity development for town development planners and local authority engagement in conducting vulnerability studies, zoning, and engaging in adaptation planning.



The current land use plan for the town (as shown in the map above as adopted from Mr. Sao Sithuon's presentation on town master plan during the launching of UCRSEA projected in Koh Kong, dated 25 May 2015) is based on a development vision until 2030. The vision includes poverty reduction and the development of all sectors. The current population of this newly established town is estimated at 27,015 (13,819 females), with a population density of 270 people per square kilometer. This is higher than the national average. About 1,500 people are non-permanent residents and 500 are in-migrants.

8. Replicability and transferability of knowledge or lessons

- Similar in certain aspects to other cities in the region, in particular those in coastal provinces.
- To be able to generalize beyond specific cases which are in line with the government's coastal management master plan: "Enhance the effective implementation of Cambodia's coastal zones management and development through the Circular on Coastal Zones Management and Development, and to push for adoption and implementation of integrated strategy for developing Cambodia's coastal zones and Preah Sihanouk Master Plan aiming to sustainably maintain the prestige of the most beautiful beach in the world and the green environmental zones of the Cambodian Sea."
- Capacity development for the government and sub-national levels related to climate change vulnerability assessment, urban development planning, and so on.

9. Conclusion

In sum, Khemarak Phumin of Koh Kong province represents a coastal zone town that fits the UCRSEA project selection criteria. The recent developments in the town have centered on the issues of climate change, urbanization, regionalization, and poverty reduction. As a result of national and regional growth, it has encountered rapid economic and population growth and regionalization. Therefore, it is worth examining how it deals with the soaring economic activity in the context of climate change, and what this entails in terms of poverty reduction in the town.

The current literature seems to focus on the separate issues of climate change, urbanization, regionalization and economic development in coastal zones and Koh Kong province. It is thus critical to investigate how Koh Kong province and its Khemarak Phumin town can enhance its resilience and sustainability in the rising interplay of these issues. This is significant since the town is under swift development in parallel with the increasing degradation of climatic and natural resources. This study will complement and contribute to the existing endeavors of the local government and development partners working in the area.

10. References

- Asian Development Bank (2012) *Rapid Macroeconomic Assessment and Development Pressures in BCI Province: Koh Kong Province*. Greater Mekong Sub-Region Core Environment Program (CEP) and Biodiversity Conservation Corridors Initiative (BCI). Asian Development Bank: Manila.
- Department of Environment (2015) *Climate Change Impact and Adaptation Planning*. A presentation during UCRSEA dissemination workshop (Khmer version): Koh Kong province.
- Provincial Office of Investment and International Cooperation (2015) *Potential of Economic Development and ASEAN Economy Community Integration Readiness in Koh Kong*. A presentation during Urban Climate Resilience in Southeast Asia Partnership dissemination workshop (Khmer version): Koh Kong province.
- Koh Kong Provincial Office (2015) *Five Year Strategic Development 2015-2019 for Khemarak Phumin City* (Khmer version). Koh Kong Provincial Office: Koh Kong.
- Koh Kong Provincial Office (2011a) *Five Year Strategic Development 2010-2015 for Koh Kong Province* (Khmer version). Koh Kong Provincial Office: Koh Kong.
- Koh Kong Provincial Office (2011b) *The Rolling Three-year Investment Plan 2011-2013 for Koh Kong Province* (Khmer version). Koh Kong provincial office: Koh Kong.
- Ministry of the Environment (2010) (Draft) *Second National Communication to the United Nation Framework Convention on Climate Change*. Ministry of the Environment: Phnom Penh.

- Ministry of the Environment and Asian Development Bank (2011) *Cambodia 2006-2010: National Environmental Performance Assessment (EPA) Report*. Prepared by the Ministry of the Environment, Cambodia and Asian Development Bank – Environment Operations Center in collaboration with the United Nations Environment Programme Regional Resource Center for Asia and the Pacific. Asian Development Bank: Manila.
- Ministry of the Environment and Danish Hydraulic Institute (2010) *Coastal Adaptation and Resilience Planning Component*. A project being funded by the Cambodia Climate Change Alliance and the United Nations Environment Programme. Ministry of the Environment: Phnom Penh.
- Ministry of the Environment (2005) *Vulnerability and Adaptation to Climate Hazards and to Climate Change: A Survey of Rural Cambodian Households*. Ministry of the Environment: Phnom Penh.
- Ministry of the Environment (2002) *Physical Framework Plan for Koh Kong Province: Environmental Management in the Coastal Zone-Cambodia*. Prepared by Koh Kong Working Group, Ministry of the Environment: Phnom Penh.
- Ministry of Land Management, Urban Planning, and Construction (2013) *Progress Report and Action Plan for National Committee for Urban Planning and Construction* (Khmer version). Ministry of Land Management, Urban Planning, and Construction: Phnom Penh.
- National Committee for Sub-National Democratic Development, Ministry of Interior (2009) *Koh Kong Data Book 2009*. National Committee for Sub-National Democratic Development, Ministry of Interior: Phnom Penh.
- PEMSEA (Partnerships in Environmental Management for the Seas of East Asia) (2015). *Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)*. PEMSEA, Quezon City, Philippines. Updated 2015.
- Royal Government of Cambodia (2013). *Cambodia Climate Change Strategic Plan 2014-2023*. Ministry of the Environment: Phnom Penh.
- Sinthoun, S. (2015) *Current Status of Khemarak Phu Min Town Development Planning* (Khmer version). A presentation during Urban Climate Resilience in Southeast Asia Partnership dissemination workshop: Koh Kong.
- Sothirith, S. (2013) *Coastal Provinces Urbanization in Cambodia* (Khmer version). A presentation at training courses on Climate Change Action Plan in Coastal Urbanization. National Committee for Coastal Management and Development of Cambodia, Ministry of Land Management and Urban Planning and Construction: Phnom Penh.