

# SPATIAL ANALYSIS REPORT

MARCH 2008



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## Spatial Analysis Report

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## ABBREVIATION/ACRONYM

### **Cambodia**

CDEC	Local Cambodian engineering firm
DIME	Department of Industry, Mines and Energy (Province)
EAC	Electricity Authority of Cambodia
EDC	Electricité du Cambodge
HC	Health Centre
HP	Health Post
JICA	Japan International Cooperation Agency
MIME	Ministry of Industry, Mines and Energy
MoEYS	Ministry of Education, Youth and Sport
MoH	Ministry of Health
MoP	Ministry of Planning, National Institute of Statistic
MPWT	Ministry of Public Works and Transport
OD	Operational district (administration office)
PPP	Public Private Partnership
REF	Rural Electrification Fund
RH	Referral Hospital
UoA	University of Agriculture, Department of Geographical System

### **Lao PDR**

DOE	Department of Energy/MEM
EDL	Electricité du Laos
MEM	Ministry of Energy and Mines
NUOL	National University of Laos
PDEM	Provincial Department of Energy and Mines
NGD	National Geographical Department, Office of Prime Minister
MoE	Ministry of Education
MoH	Ministry of Health
MIC	Ministry of Industry and Commerce

### **Commonly used**

DP	Development Pole
IPD	Indicator for Potential Development
HDI	Human Development Index
GIS	Geographical Information System
GPS	Global Position System

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## **Introduction**

This report focuses on the spatial analysis part of the rural electrification planning process undertaken by the CAP REDEO project, on the Cambodian province “Kampong Cham” and Lao province “Khammuon”, using the GIS-based aid decision tool GEOSIM.

Main results at the national and provincial level for both countries are summarized here, so that relevant stakeholders can approve them or make comments if needed. This report also provides a short explanation of the method used, to allow replication to other provinces.

The overall philosophy and key concepts are explained in the first chapter, while the identification of Development Poles will be presented in the second chapter. Ranking of Development Poles (prioritisation) will be found in the third chapter.

# 1 Maximising the impact of rural electrification on social and economic development

The main objective of our spatial analysis approach is to anticipate the impact of rural electrification projects on social and economic development, in order to maximise it at the planning stage. In other words, cost per kWh or number of connections achieved will no longer be the only criteria to identify promising projects, contrary to orthodox planning methods.

This novel approach is motivated by the following paradox: modern forms of energy such as electricity have in theory a significant potential for social and economic development and yet rural electrification projects until now have had very often a low impact on development according to many evaluation studies<sup>1</sup>.

## 1.1 Definition of “impact”

First of all, we are to define the concept of “impact” of rural electrification (on social and economic development). The concept used here is very different from the concept of direct results, which are for example the number of households and businesses benefiting from electricity, avoided costs in energy purchase etc.

Contrary to results, impact takes into account long lasting changes provoked by electrification, possibly interacting with changes in other sectors (typically health, education and economy), cf. Figure 1. For example, the impact of a rural electrification project on a target area where there are only households will be significantly lower than that of a project targeting villages with many productive activities, hospitals and schools, even if these factors are (supposedly) independent from the electrification project itself.

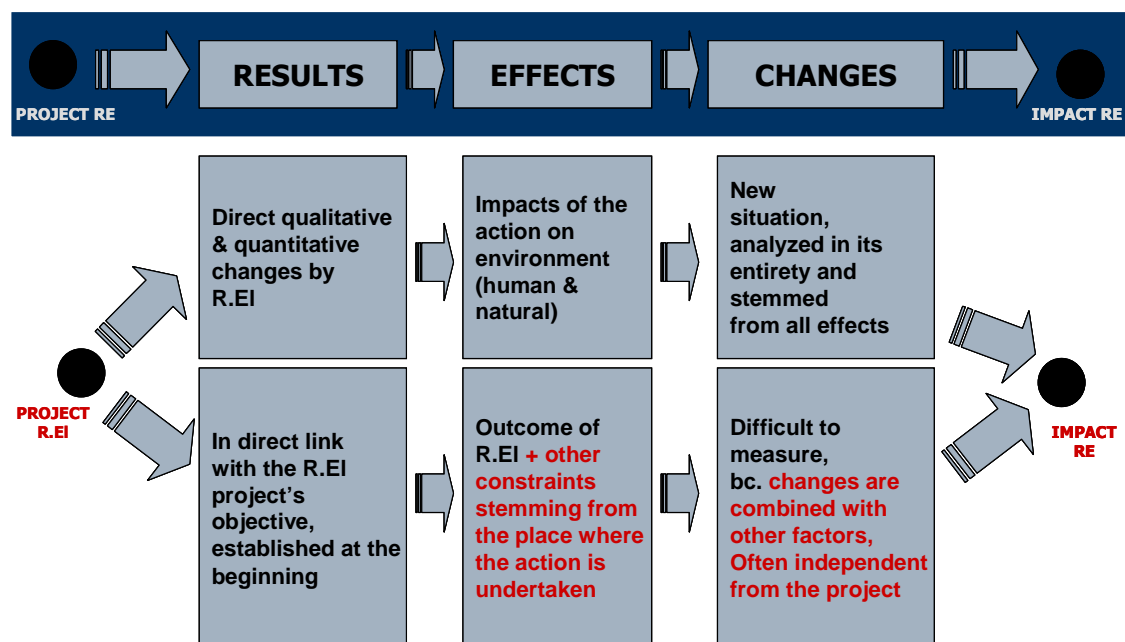


Figure 1 Results, effects and changes

## 1.2 Taking into account impact in the planning process

While impact of rural electrification can be taken into account at many different stages of the project development process, here we will focus on the following problem: how to maximize this potential impact at the very early stage of regional or even national planning.

<sup>1</sup> E.g. "Impact of solar photovoltaic systems on rural development: FAO study for rural electrification in the 21<sup>st</sup> century", B.V. Campen, D. Guidi, G. Best, Environment and Natural Resources Service (SDRN), November 1999, [www.fao.org](http://www.fao.org)

The CAP REDEO approach suggests to anticipate impact upstream of the planning process, as shown in Figure 2.

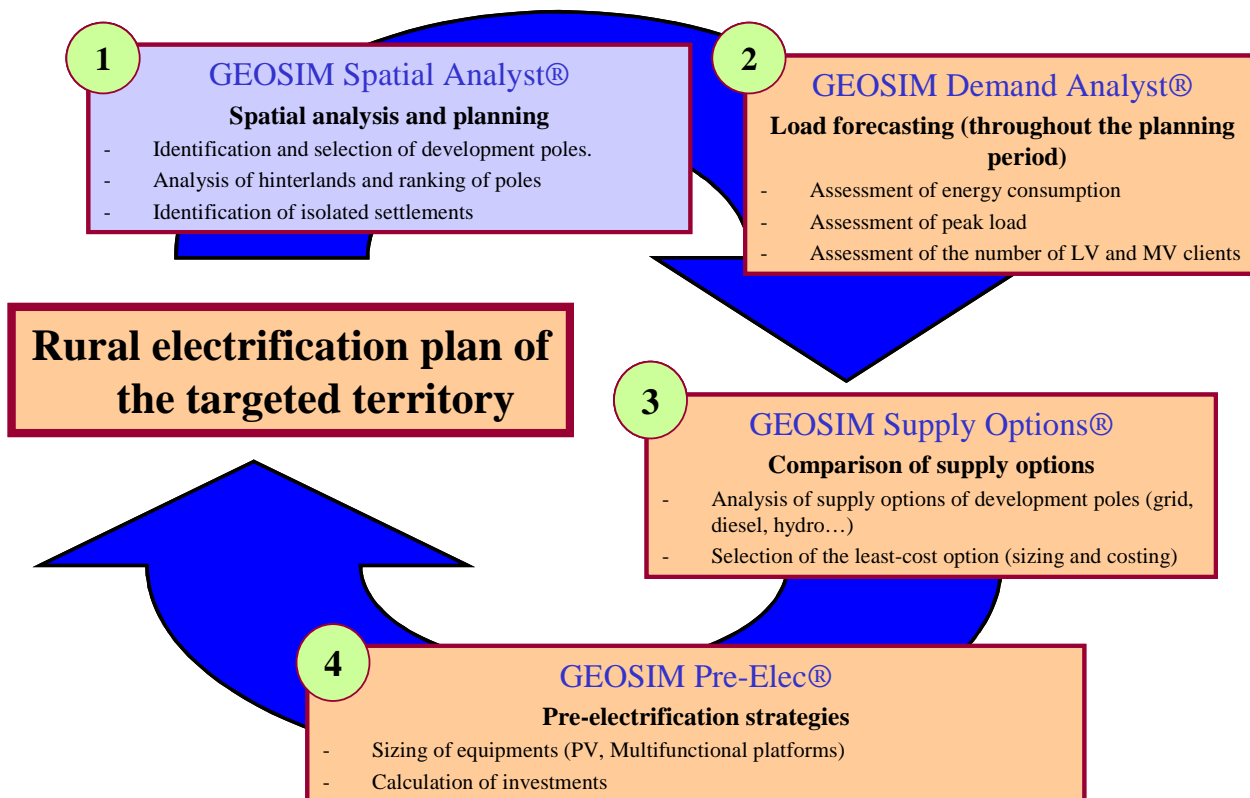


Figure 2 GEOSIM planning process

Spatial analysis will allow us to identify the most relevant places (settlements) to electrify and then rank (prioritize) them, according to their rated potential for development. More classical tools such as load forecasting and least-cost sizing of powerplants will then be used to optimise the projects technically, economically and financially, which will provide power to these high ranked settlements.

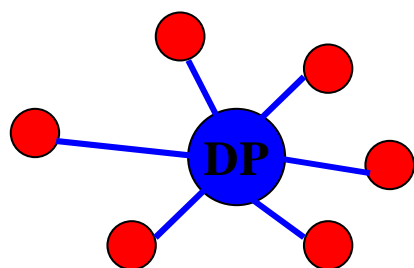


Figure 3 Minigrid from Development Pole

The rationale behind this is the following reasoning: rural electrification is usually not profitable, therefore it requires public subsidies which are available in very limited quantities, and these limited resources should be allocated to places with the highest potential for development, even if they are not necessarily the most profitable, nor administratively the most important. Naturally, once these places are identified, the planning model strives to find the cheapest solution to electrify them and possibly their nearby settlements, creating a minigrid (cf. figure on the left). Technical and economic aspects of electricity generation do not play a role in the choice of settlements to

electrify first.

These settlements with relatively more potential impact on the development of their surroundings (or **hinterland**) than other settlements of the area are called **Development Poles (DP)**. The methods to identify and rank these DPs is explained in the next chapters.

## 2 Identification of Development Poles

### 2.1 Method

The method used to identify DPs draws its inspiration from the Human Development Index (HDI) developed by the UNDP. The overall idea is to calculate a composite index, similar to the HDI, but for each settlement of the area (and not only at the macro scale). This index, called the Indicator for Potential Development (IPD), is calculated from multisector data<sup>2</sup> and ranges from 0 (no potential for development) to 1 (highest potential). Settlements with the highest IPD will be simply selected as DPs. The list of DPs can then be validated or changed manually by decision makers.

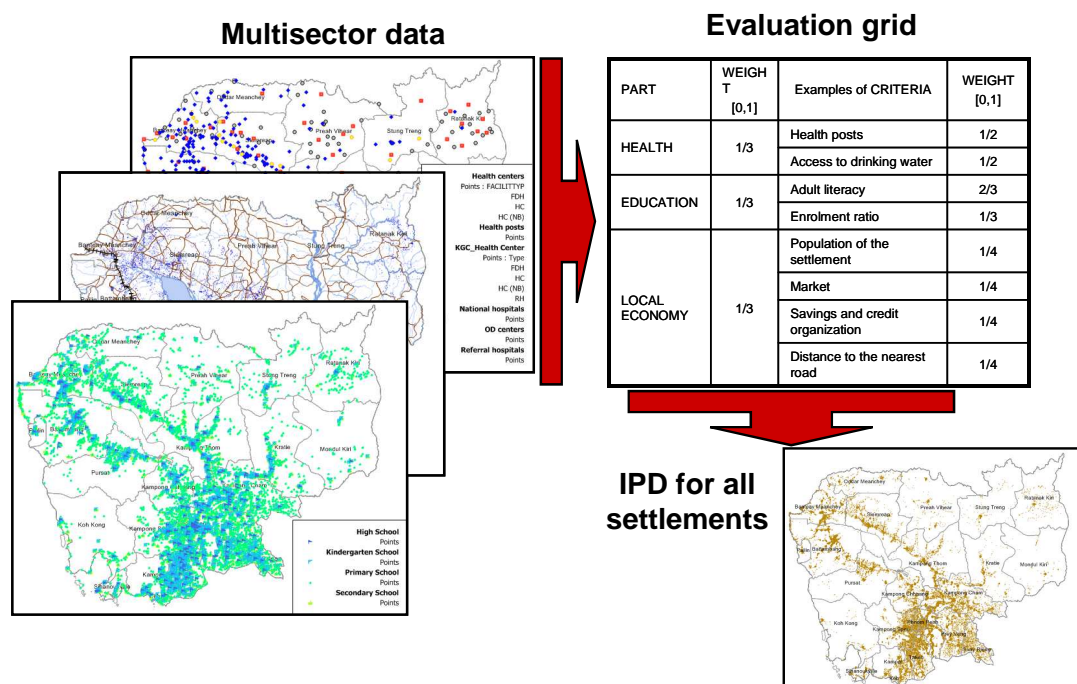


Figure 4 IPD calculation process

The evaluation grid of the HDI consists of 3 main components (health, education and economy), each subdivided in different criteria.

Likewise, IPD has an analytical grid featuring the same components (health, education and local economy), which will have an equal weight in the final result. The score for each component is calculated from a weighted set of criteria: not all criteria will have the same importance in the final result. The score for each criteria is itself defined by indicators (for example the score for the “Access to healthcare” criteria can be defined by the “Type of best hospital in settlement” indicator). Criteria, their weights and indicators must be established and accepted by the different planners and stakeholders<sup>3</sup>. Rules of thumb to define them are explained below.

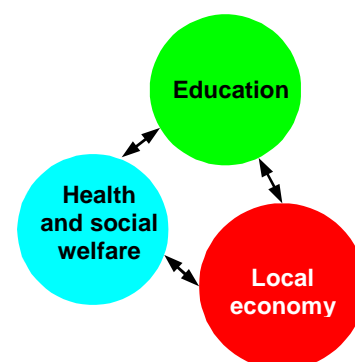


Figure 5 Components of IPD

Criteria must take into account the following constraints:

- The criteria must be a measure of the potential impact of the electrification of the settlement, on the development of the area comprising

<sup>2</sup> Data from different sectors such as health, education, economy, transport...

<sup>3</sup> Ministries of energy, regulation, health, education, transport, rural electrification agencies, electricity utilities...



this particular settlement and its “hinterland” (or surrounding area, see 3.1). That is to say, only aspects of development potentially benefiting directly or indirectly from electrification should be considered.

- Good quality data must be available throughout the studied area

This last point is critical, as the refinement of the analysis will depend on the data available and its quantity (see 2.2 for a list of the sources of data which have been used). In cases where data available at national and provincial levels are not the same, IPD analytical grids will have to be different from one context to another.

Weights are usually defined according to the following rules:

- Access to health is twice as important as access to water for the health component.
- Primary, Secondary and High school education are respectively two, three and four times as important as kindergarten education for the education component.
- Size of population is of the same importance than access to markets, roads and credit services for the local economy component.

And for indicators:

- The score returned by indicators ranges from 0 (no potential for development) to 1 (highest potential for development throughout the study area).
- Depending on available data, criteria concerning access to social and economic services are measured by one or two indicators: best type of service present in the settlement and/or the number of people benefiting from the service (students, patients, clients...). When both are available, they are given the same weight (importance) in the result.
- When intervals are involved (e.g. for the population criteria), interval boundaries are calculated so that a similar number of settlements will fall in each interval.

## **2.2 Data sources**

The GEOSIM spatial analysis model runs thanks to detailed multisector databases. These databases have to be georeferenced, that is to say each data on schools, health centres, markets etc. must be linked to villages with geographical coordinates (longitude and latitude). This allows us to perform advanced calculations on the spatial dynamics between different settlements (see 3.1). However, available databases are often not georeferenced, which poses a challenge to data collection. That is why in some cases, a comprehensive multisector database could not be established.

### **2.2.1 Cambodia**

At the national and provincial levels we used the following databases:

- Seila database, created by the Seila programme (financed by the World Bank). This is a socio-economic database at commune & village levels established in 2004 and featuring 105 attributes.
- Medicam database, on health care system in Cambodia in 2004. It covers facility type, personnel, village coverage...
- Education database with schools, number of students, classes...

We then completed our data for KampongCham province from different sources in consultation with concerned stakeholders (Ministries of Health, Education and Planning).

### **2.2.2 Lao PDR**

In the case of Lao PDR, multisector data with geographical coordinates was lacking at the national level (statistical department is in the process of updating the village list and putting

coordinates). Therefore we had only access to population and distance to road data for each village of the country.

Nevertheless, we were able to collect non georeferenced databases from provincial authorities in Khammuon (Ministries of Health, Education and Internal trade) and integrate them in our village database with geographical coordinates.

## 2.3 IPD analytical grids

Analytical grids which have been used in this study are presented below. The criteria used to calculate each component are shown, as well as their relative weights and the indicators used to give them a score between 0 and 1.

Provisional analytical grids have already been presented to stakeholders and discussed in national and provincial meetings<sup>4</sup>. Following these discussions and recent updates of the multisector databases, analytical grids have been adjusted (see ANNEX 1 and ANNEX 4).

### 2.3.1 Cambodia

The same analytical grid has been used at national and provincial levels.

Element	Criteria	weight	indicators	value
Health	Best hospital	2/3	Health Post (Non building)	0.1
			Health Center (Non Building) & Health Post	0.3
			Former District Hospital & Health Center	0.5
			Referral Hospital	0.8
			National Hospital	1
	Quality of access to water (best available in the village)	1/3	Piped water (>50 hh)	1
			Piped water (<50 hh)	0.7
			Well	0.6
			Other	0.2
			None	0
Education	Kindergarten students	1/8	1-49	0.2
			50-99	0.5
			100-149	0.8
			>=150	1
	Primary schools students	2/8	1-349	0.2
			350-599	0.5
			600-999	0.8
			>=1000	1
	Secondary schools students	3/8	1-299	0.2
			300-499	0.5
			500-699	0.8
			>=700	1
	High schools students	4/8	1-999	0.2
			1000-1799	0.5
			1800-2499	0.8
			>=2500	1

Table 1 IPD analytical grid for Cambodia (health and education components)

<sup>4</sup> Phnom Penh 01/10/07, Kampong Cham 28/09/07, Vientiane 11/10/07, Khammuon 05/10/07

Element	Criteria	weight	indicators	value
Local Economy	Population	2/8	1-699	0.1
			700-1399	0.5
			1400-2099	0.7
			>=2100	1
	Travel time to closest market (minutes)	2/8	0	1
			1-74	0.6
			75-149	0.4
			150-299	0.1
			>=300	0
	Distance to closest road (km)	1/8	0	1
			1-4	0.6
			5-9	0.2
			>=10	0
	Travel time to closest road (minutes)	1/8	0	1
			1-49	0.6
			50-99	0.4
100-199			0.1	
>=200			0	
Credit & saving points	2/8	ACLEDA PLC bank & Amret (micro-finance)	1	
		ACLEDA PLC bank	0.7	
		Amret (micro-finance)	0.5	
		No service	0	

Table 2 IPD analytical grid for Cambodia (local economy component)

### 2.3.2 Lao PDR

As explained above, multisector data with geographical coordinates was lacking at the national level. Therefore, we had to define two analytical grids: a simplified one at the national level (featuring only the local economy component) and a more complete one for Khammuon Province.

Element	criteria	weight	indicators	value
Local Economy	Population of the locality	2/3	0-299	0.2
			300-599	0.5
			600-1199	0.8
			>=1200	1
	Distance to road, m	1/3	0-499	1
			500-999	0.6
			1000-1999	0.2
			2000-19999	0.1
			>=20000	0

Table 3 IPD analytical grid for Lao PDR (national level)

Element	criteria	weight	indicators	value
<b>Health</b>	Best hospital	1	Provincial Hospital	1
			District Hospital	0.8
			Health Center Type A	0.6
			Health Center Type B	0.5
			Drug Kit Type A	0.3
			Drug Kit Type B	0.2
			No Hospital	0
<b>Education</b>	Kindergarten	2/12	Exists	1
			None	0
	Number of years covered by primary schools	2/12	1	0.2
			2	0.4
			3	0.6
			4	0.8
			5	1
	Primary schools students	2/12	1-29	0.2
			30-99	0.5
			100-199	0.8
			>=200	1
	Number of years covered by secondary schools	3/12	1	0.1
			2	0.2
			3	0.4
			4	0.6
			5	0.8
			6	1
	Secondary schools students	3/12	1-59	0.2
			60-199	0.5
			200-499	0.8
>=500			1	
<b>Local Economy</b>	Population of the locality	4/10	1-199	0.2
			200-349	0.5
			350-599	0.8
			>=600	1
	MARKET nearby	3/10	Permanent	1
			Half Permanent	0.7
			Rural Market	0.3
			International Check Point	0.6
			Traditional Check Point	0.3
			Planned	1
	Distance to road, m	3/10	0-149	1
			150-999	0.5
			>=1000	0.1

Table 4 IPD analytical grid for Lao PDR (provincial level)

## 2.4 Results – Pole selection

IPD has been calculated for each settlement at provincial and national levels in both countries, using the analytical grids mentioned above. The settlements with the highest IPD score in each case has been selected as DPs. The number of DPs has been chosen equal to 90 in all cases except for Lao PDR at national level (for reasons explained below), because it produced reasonable results.

Naturally planners are most welcome to suggest different figures at provincial levels (lists of DPs at national levels are given for illustration purposes, but won't be used further in our rural electrification plans for KampongCham and Khammuon).

The choice is a matter of spatial planning and depends on both financial resources available, because DPs are meant to be electrified eventually, and development policy (“centralised” vs. “decentralised”). It should be a compromise between the following constraints:

- There should be enough DPs to cover uniformly the study area and be able to reach, at least indirectly, very remote areas.
- There should not be too many DPs, so that available funds are sufficient to electrify all of them in the near future. Besides, too many DPs will result in some of them being very close to each other and they will compete for the same “hinterland”, thus lowering their potential impact on the development of their hinterland (see 3.1).

To help assess the level of “centralisation” (or “decentralisation”) for each study area, 3 ratios have been calculated:

- Number of inhabitants/Number of Poles
- Number of villages/Number of Poles
- Area/Number of Poles

### 2.4.1 Cambodia

90 DPs have been selected at national and provincial levels. The lists of DPs can be found in annexes 2 and 3, and maps are shown in Figure 6 and Figure 7 in the next chapter.

Zone	No of inhabitants	Inhabitants per DP	No of villages	Villages per DP	Area (km <sup>2</sup> )	km <sup>2</sup> per DP
Cambodia	12,9 M	<b>143 400</b>	13 860	<b>154</b>	180 000	<b>2000</b>
KampongCham	1,75 M	<b>19 500</b>	1 800	<b>20</b>	9 450	<b>105</b>

**Table 5 Ratios for the number of DPs**

Since the same number of DPs have been selected at national and provincial levels, obviously ratios are much higher at the national level. In other words, DPs at the national level are much larger than DPs at the provincial level. In fact, only 15 DPs at national level are located in KampongCham province.

### 2.4.2 Lao PDR

417 DPs have been selected at the national level and 90 in Khammuon province. The lists of DPs can be found in annexes 5 and, and maps are shown in Figure 10 and Figure 11 in the next chapter.

A rather large number of DPs had to be selected at the national level because large centres like Vientiane, Thakek and Champasak contain almost all higher ranked DPs, therefore large areas would have been extremely far from any DP if we had selected only 90 DPs. This is partly due to the administrative definition of villages: large cities are divided into many small villages in the database (the largest village has a population of around 4000 inhabitants).

Zone	No of inhabitants	Inhabitants per DP	No of villages	Villages per DP	Area (km <sup>2</sup> )	km <sup>2</sup> per DP
Lao PDR	4,17 M	<b>10 000</b>	11 676	<b>10</b>	230 000	<b>186</b>
Khammuon	0,36 M	<b>4 000</b>	900	<b>28</b>	16 700	<b>551</b>

Table 6 Ratios for the number of DPs

## 2.5 Recommendations

Results could be improved by adding missing data to the database in cases where few data is available, and of course by regularly updating the multisector data and revising the IPD analytical grid from time to time. For example, since small industries usually have a positive impact on local economy once electrified, including this criteria in IPD analytical grids might be of interest later on.

The list of villages should not be changed too often by statistical departments, because it implies that all multisector data related to villages must be updated and checked carefully.

## 3 Ranking of selected Development Poles

### 3.1 Method: inner potential and hinterland

A quick and easy way of ranking DPs would be to use again their IPD. However, IPD is only an estimate of the inner potential of the settlement on the development of its hinterland. Even if a DP has an IPD of 1 (the highest value), but is located in a very remote area for some reason, the electrification of this particular DP will benefit only to the people living inside it, and nobody will benefit indirectly from the electrification (for example electrified hospitals and schools), simply because it is too far from any other settlement.

That is why ranking of DPs is done using a sophisticated gravitational model<sup>5</sup> combining the IPD score and the distance of each DP to other settlements. The main outcome of this calculation is the estimated total population covered by a DP, i.e. the population potentially benefiting directly or indirectly from the electrification of the DP. DPs are then ranked by their population covered (higher population covered means higher priority). With this model, it happens very often that a DP with a slightly lower IPD has a very high priority of electrification simply because it is located in a very populated area.

Another interesting outcome of the calculation is the identification of “remote settlements”, located outside an “accessibility limit”. These are the settlements which are very far from all DPs and are thus suitable for pre-electrification strategies such as solar energy and multifunctional platforms. Please bear in mind however that the isolated status of settlements does not necessarily mean that they will not be electrified before the end of the planning period and vice versa: not all settlements inside the accessibility limit will be electrified. Isolated settlements will only have lower chances of being electrified by conventional means since priority is given to DPs, which are by nature far from these settlements and thus less likely to include them in their clusters.

### 3.2 Results

Ranks of DPs and their population covered are shown in the lists of annexes 2, 3, 5 and 6. In this chapter we will only show the graphical representation of hinterlands (areas under the influence of DPs) and isolated areas.

Stakeholders are again asked to comment or approve results at provincial level (results at national level are given for illustration purposes).

#### 3.2.1 Cambodia

The circles - or “iso-curves” - shown in Figure 6 and Figure 7 below are an abstract representation of the hinterlands of DPs. Inside these curves, the calculated probability of someone living in the area to be “attracted”<sup>6</sup> by this particular DP is above 50%. In other words, more than 50% of people living inside an iso-curve will benefit indirectly from the electrification of the related DP in terms of access to improved services. If many DPs are located close to each other, the competition between DPs is very strong (someone living in this area can easily chose between any of these DPs) and thus the probabilities are lower.

Likewise, maps shown in Figure 8 and Figure 9 provide an illustration of isolated areas. Settlements located outside the accessibility limit are deemed “remote” and are suitable for pre-electrification strategies.

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<sup>5</sup> The model, which will not be explained in detail here, is the “Huff” model with the attractivity parameter equal to the IPD.

<sup>6</sup> By “attracted”, we mean that if the villager needs a particular service (hospital, school, market etc.), he will preferably go to this DP, instead of other DPs.

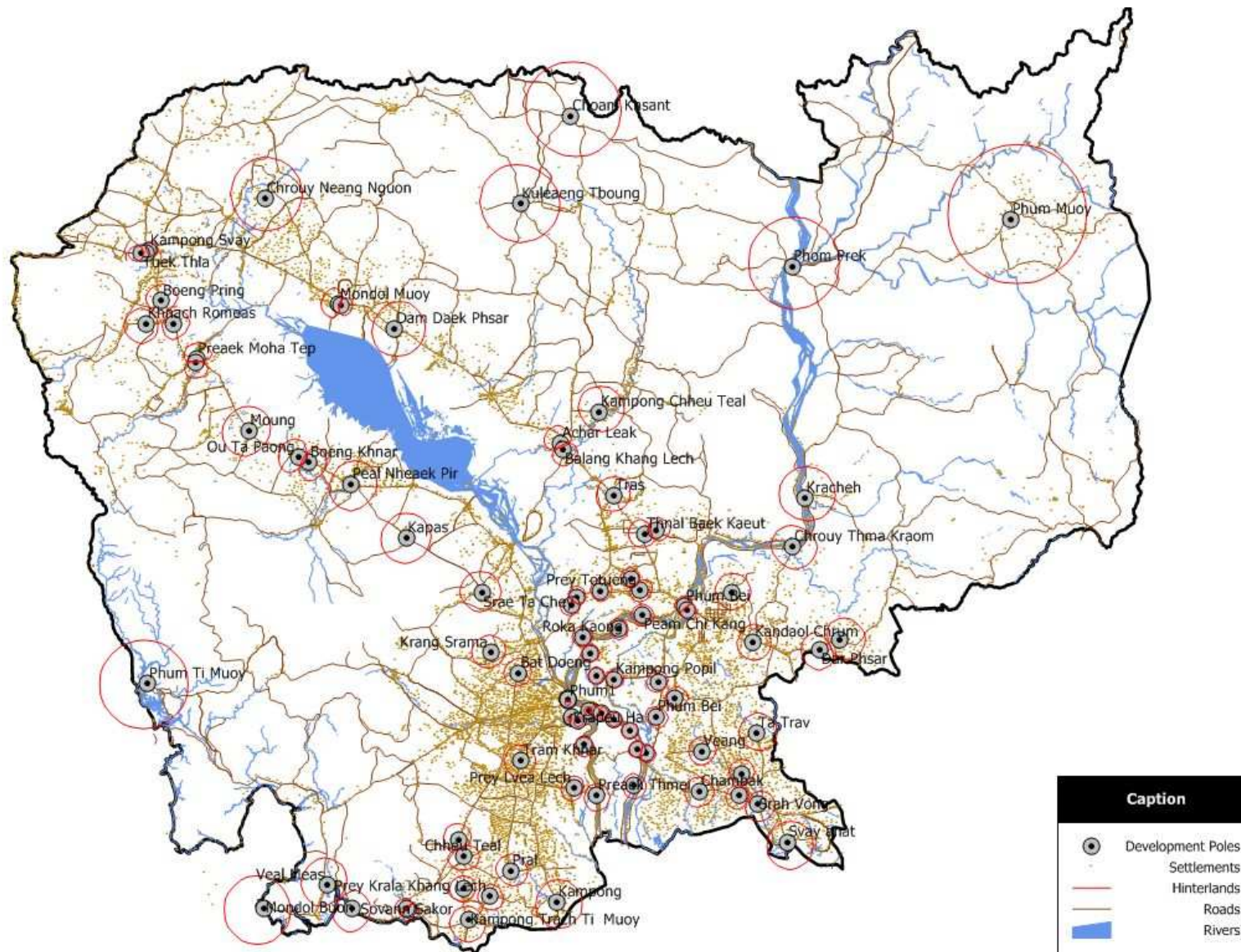


Figure 6 Hinterlands of Cambodia





Figure 7 Hinterlands of Kampong Cham

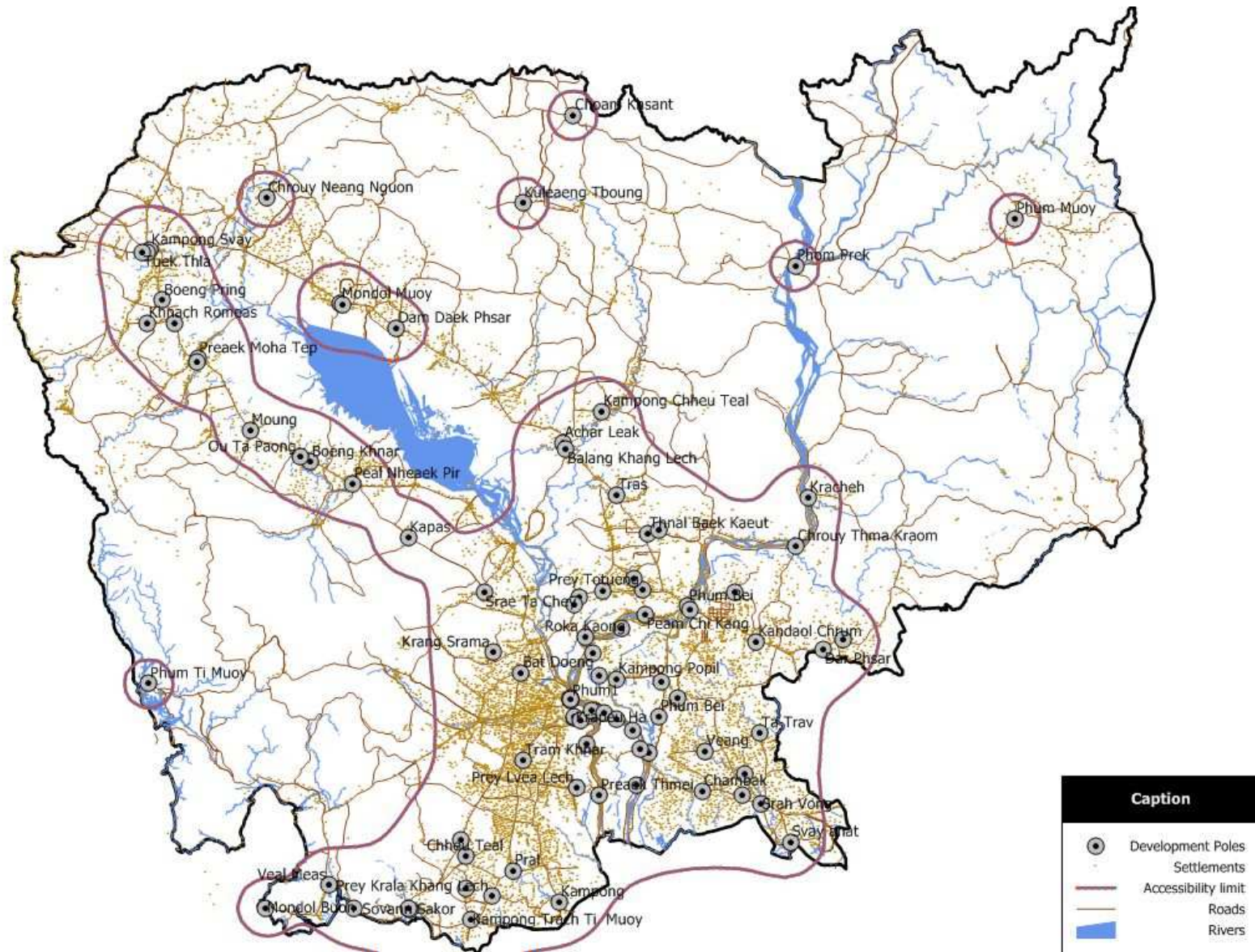


Figure 8 Isolated areas of Cambodia



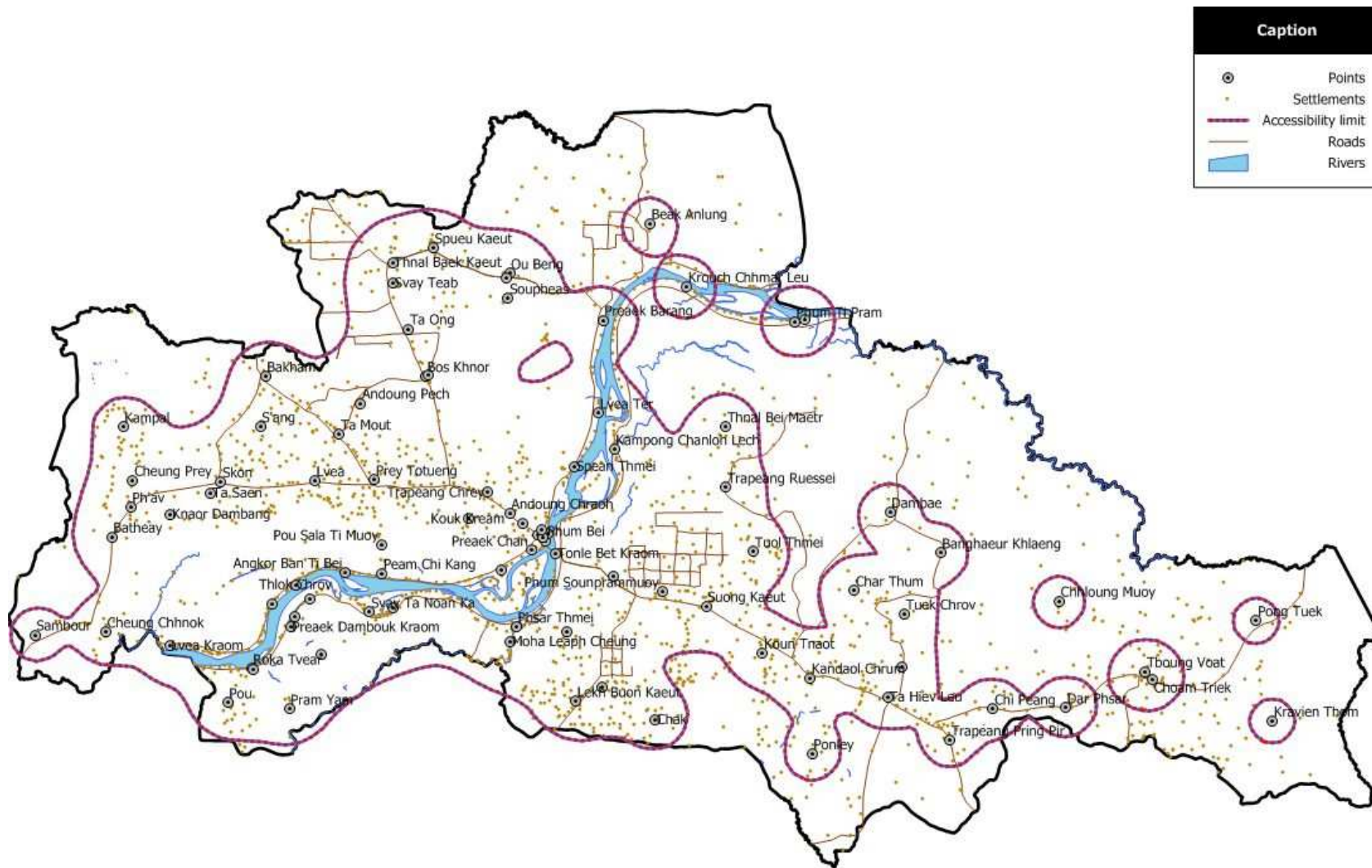


Figure 9 Isolated areas of Kampong Cham

### 3.2.2 Lao PDR

The circles - or “iso-curves” - shown in Figure 10 and Figure 11 below are an abstract representation of the hinterlands of DPs. Inside these curves, the calculated probability of someone living in the area to be “attracted”<sup>7</sup> by this particular DP is above 50%. In other words, more than 50% of people living inside an iso-curve will benefit indirectly from the electrification of the related DP. If many DPs are located close to each other, the competition between DPs is very strong (someone living in this area can easily chose between any of these DPs) and thus the probabilities are lower.

Likewise, maps shown in Figure 13 and **Error! Reference source not found.** provide an illustration of isolated areas. Settlements located outside the accessibility limit are deemed “remote” and are suitable for pre-electrification strategies.

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<sup>7</sup> By “attracted”, we mean that if the villager needs a particular service (hospital, school, market etc.), he will preferably go to this DP, instead of other DPs.

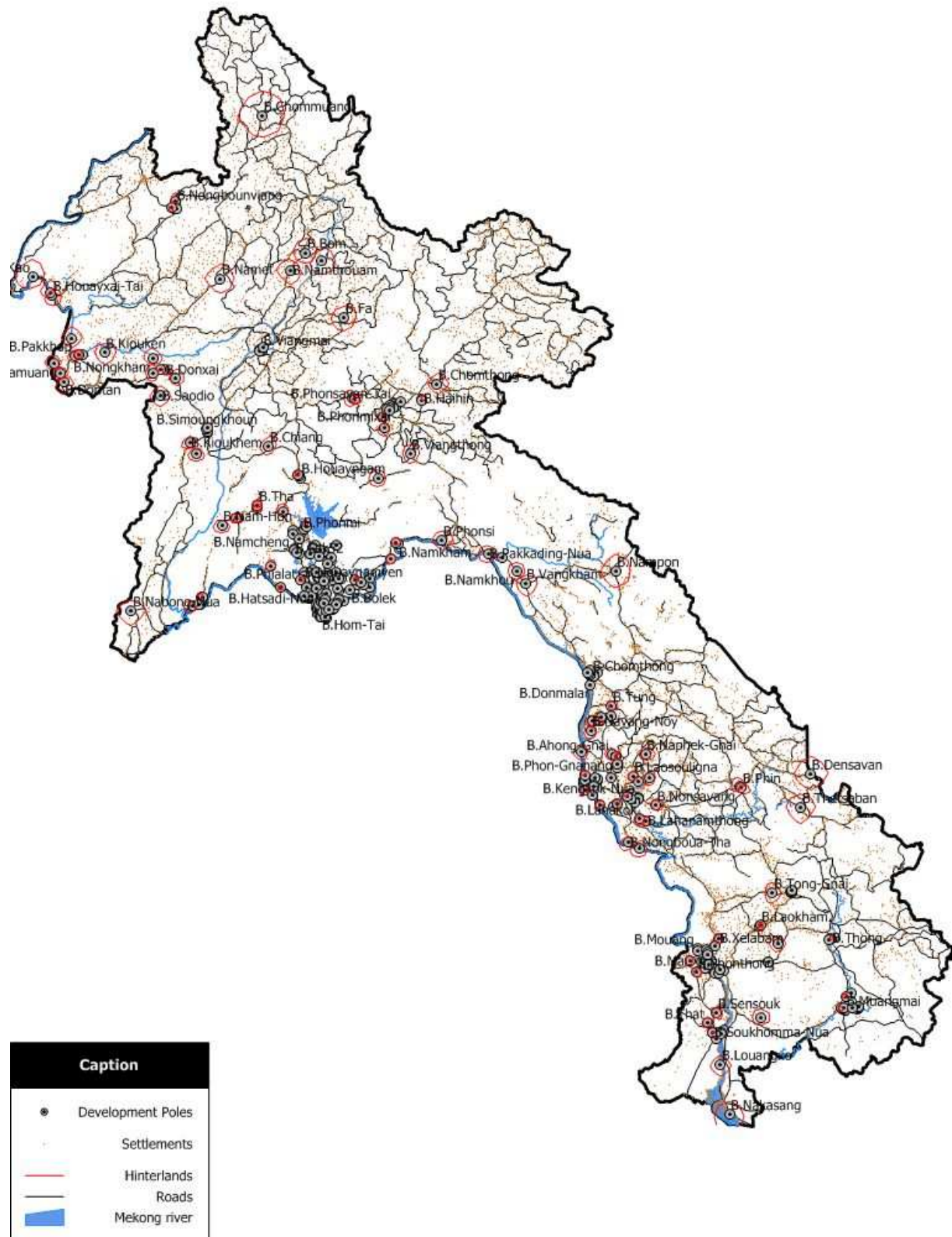


Figure 10 Hinterlands of Lao PDR











### 3.3 Recommendations and possible improvements

The gravitational model used here is based on the hypothesis that settlements are divided in two classes:

- Normal settlements
- Developments Poles, which are usually bigger

In cases where large centres of population are administratively divided into many smaller settlements (this is the case in both countries, especially in Lao PDR), DPs will be more difficult to identify because all social and economic infrastructures will be spread over several different settlements, resulting in a lower IPD for all of them. Ranking using the gravitational model will also be biased because several very close DPs, which actually belong to the same town or city, will share the population of their common hinterland and will thus have individually a small population covered, and a smaller ranking.

Administrative boundaries are a matter of spatial planning and will certainly not change only to comply with gravitational models, but in the future the GEOSIM model might include the possibility to merge, at least for calculation purposes, very close DPs.

The notion of distance from a DP to another settlement is another aspect of the model, which can be improved. The model is currently calculating this distance as a simple straight distance between the two locations, not taking into account obstacles nor roads. In very hilly areas such as Nakay in Khammuon Province, this method introduces a rather important bias. Again, this is a possible future improvement of the GEOSIM model.

## Conclusion

Lists of DPs and their ranking have been drafted at national and provincial level in Cambodia and Lao PDR. While the relevance of results can naturally be improved with more accurate and complete datasets, these lists are considered final for now and are submitted to stakeholders for their appraisal.

Nevertheless, it is our hope that this innovative approach has raised interest and will give birth to similar studies throughout Cambodia and Lao PDR. Technical staff has been specially trained in both countries to learn how to use the GEOSIM software and replicate as well as improve results in other provinces.

## **ANNEX 1 Changes made to the analytical grids for IPD in Cambodia**

The following changes have been made to the analytical grids:

- Health centres criteria have been merged into a unique criteria, which is the best type of hospital in the settlement. It fixes the following problem with the previous grid: if the settlement had a national or referral hospital but no lower class health centres, its score would have been lowered. Likewise, all criteria related to water access have been merged into a “best type of access to water” criteria. With these two types of criteria (health centres and water access), having the best type of infrastructure is more important than having many different types of infrastructures at once.
- Criteria relating to existence of different types of schools have been removed because they are already included implicitly in the “number of students” criteria (if the number of student in a school is 0, it means that there is no school in the village).
- All intervals of indicators have been slightly changed so that a similar number of settlements at the national level fall in each interval.

## **ANNEX 2 List of Development Poles in Cambodia (national level)**

DPs in the list are sorted by their “rank”: the lower the rank, the higher the priority. This rank is automatically generated by sorting the list by decreasing population covered (which takes into account both the IPD and the distance of the DP to other settlements). The user is allowed to manually change this automatically generated rank if he wishes to change the priorities.

In case the identification of a particular village with its name is not obvious, please refer to the GIS database

Area : **Cambodia**

<u>Rank</u>	<u>Settlements Name</u>	<u>IPD</u>	<u>Population</u>	<u>Population covered</u>
10	Phum1	0.68	766	366304
20	Phum1	0.58	877	341298
30	Phum3	0.58	2429	326943
40	Preaek Moha Tep	0.77	5990	271108
50	Tram Khnar	0.66	2284	238936
60	Kammeakkar	0.68	5516	227566
70	Mondol Muoy	0.67	2183	213173
80	Preaek Thmei	0.73	2290	199469
90	Krapeu Ha	0.66	5369	190337
100	Ta Khmau	0.66	7435	188997
110	Voat Bour	0.59	4723	187100
120	Preaek Run	0.72	3401	184499
130	Kampong Svay	0.61	6776	179491
140	Ou Ambel	0.66	5830	177888
150	Phum Bei	0.62	2498	177874
160	Peal Nheaek Pir	0.64	3842	175351
170	Prey Lvea Lech	0.60	1401	174605
180	Prey Totueng	0.82	3085	173396
190	Bat Doeng	0.66	1354	171588
200	Dam Daek Phsar	0.59	1840	171405
210	Chrouy Neang Nguon	0.62	1478	169158
220	Tuol Tnaot	0.82	4809	167400
230	Tuek Thla	0.66	4254	161919
240	Pral	0.65	2358	160845
250	Thnal Baek Kaeut	0.80	3844	158713
260	Trapeang Ruessei	0.66	4172	158344
270	Chambak	0.67	1738	154838
280	Peam Chi Kang	0.69	1124	154113
290	Chheu Teal	0.78	2905	152968
300	Kandaol Chrum	0.58	846	149662
310	Khnach Romeas	0.61	3192	146953
320	Kaoh Krabei	0.61	4557	146803
330	Roka Kaong	0.61	2190	145445
340	Boeng Pring	0.62	5043	145382
350	Moung	0.58	1782	145208
360	Tonle Bet Kraom	0.58	1380	144764
370	Kampong	0.77	5049	143851
380	Krang Srama	0.63	1637	140563
390	Veang	0.60	1449	140550
400	Preah Prasab	0.61	3162	140177
410	Paoy Yong	0.59	2563	139482
420	Phum Bei	0.70	2118	135520
430	Tras	0.57	3481	135054
440	Kracheh	0.65	2208	133536
450	Srah Vong	0.61	1576	132097
460	Achar Leak	0.63	1962	131639

470	Preaek Thum	0.61	4480	130115
480	Ta Trav	0.71	2447	129524
490	Skon	0.60	2555	127557
500	Balang Khang Lech	0.63	2199	127457
510	Preaek Dambouk Kraom	0.57	1565	127339
520	Kampong Trach Ti Muoy	0.70	5318	127293
530	Dei Edth Kaoh Phos	0.67	4077	126193
540	Kampong Popil	0.64	1324	124899
550	Doun Sar	0.60	854	124880
560	Peam Kaoh	0.62	1906	124446
570	Ta Mout	0.57	1101	122816
580	Spueu Kaeut	0.61	3138	122232
590	Ph'av	0.60	4237	122228
600	Chrouy Thma Kraom	0.61	1679	121545
610	Srae Ta Chey	0.61	3455	121312
620	Pou Chentam	0.58	2557	121001
630	Prey Pnov	0.61	6174	120722
640	Vihear Suork Cheung	0.59	2272	119414
650	Prey Krala Khang Lech	0.61	1835	118600
660	Preaek Dach	0.57	2565	118479
670	Boeng Khnar	0.60	2191	117819
680	Trapeang Veang	0.61	3010	116735
690	Batheay	0.62	3475	115559
700	Kokir Thum	0.63	2997	115345
710	Svay Kngao	0.57	627	115241
720	Ou Ta Paong	0.61	1682	109793
730	Chrouy Dang	0.62	3481	108647
740	Kandal Leu	0.59	4116	108284
750	Mondol Buon	0.62	2876	105201
760	Thum Thmei	0.63	1636	105002
770	Tboung Voat	0.59	1452	103944
780	Phum Muoy	0.72	6881	103733
790	Kampong Chheu Teal	0.57	2157	99180
800	Svay anat	0.61	1415	95520
810	Dar Phsar	0.58	1596	94732
820	Sovann Sakor	0.63	4126	91914
830	Kampong Bay Khang	0.61	2627	91201
840	Phom Prek	0.60	4687	78797
850	Veal Meas	0.65	3552	78611
860	Kapas	0.57	1850	77360
870	Kuleaeng Tboung	0.59	2207	65728
880	Phum Ti Muoy	0.59	2546	59084
890	Trapeang Ropov	0.58	3185	49542
900	Choam Khsant	0.60	2559	42174

Total number of poles :	<b>90</b>
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### **ANNEX 3 List of Development Poles in Cambodia (Kampong Cham)**

DPs in the list are sorted by their “rank”: the lower the rank, the higher the priority. This rank is automatically generated by sorting the list by decreasing population covered (which takes into account both the IPD and the distance of the DP to other settlements). The user is allowed to manually change this automatically generated rank if he wishes to change the priorities.

In case the identification of a particular village with its name is not obvious, please refer to the GIS database.

Area : **Kampong Cham**

<u>Rank</u>	<u>Settlements Name</u>	<u>IPD</u>	<u>Population</u>	<u>Population covered</u>
10	Prey Totueng	0.82	3101	40790
20	Suong Kaeut	0.43	2857	33706
30	Trapeang Ruessei	0.66	4519	29373
40	Lekh Buon Kaeut	0.56	1141	28733
50	Tboung Voat	0.59	1411	28428
60	Spueu Kaeut	0.61	3110	28293
70	Krouch Chhmar Leu	0.48	1120	28266
80	Kandaol Chrum	0.60	849	27443
90	Thnal Baek Kaeut	0.78	3204	27254
100	Preaek Barang	0.43	1068	26247
110	Phum Sounprammuoy	0.45	818	25761
120	Trapeang Pring Pir	0.45	1560	24841
130	Phsar Thmei	0.56	1747	24143
140	Dar Phsar	0.56	1232	23819
150	Ta Mout	0.53	1132	23816
160	Peam Chi Kang	0.69	1053	23601
170	Skon	0.60	2493	23339
180	Kampal	0.50	1883	23069
190	Tuol Thmei	0.43	1223	22684
200	Ta Hiev Leu	0.43	700	22332
210	Koun Tnaot	0.41	989	22140
220	Lvea	0.50	1097	22061
230	Ph'av	0.60	4273	21450
240	Lvea Ter	0.46	1240	21394
250	Phum Ti Pram	0.47	1665	21306
260	Thnal Bei Maetr	0.48	3010	21299
270	Choam Triek	0.43	1194	21043
280	Phum Ti Bei	0.46	1774	21008
290	Cheung Chhnok	0.54	2783	20718
300	Phum Bei	0.54	2759	20554
310	Tuek Chrov	0.45	1486	20036
320	Chi Peang	0.48	1972	19964
330	Ta Saen	0.55	2552	19852
340	Roka Tvear	0.54	2495	19459
350	Bos Khnor	0.54	3565	19391
360	Moha Leaph Cheung	0.44	903	19349
370	Bakham	0.51	272	19332
380	Phum Dabpram	0.52	966	19310
390	Svay Ta Noan Ka	0.48	725	19147
400	Phum Prampir	0.50	935	19091
410	Chak	0.45	1894	18919
420	Ou Beng	0.52	4286	18744
430	Kampong Chanloh Lech	0.42	906	18588
440	Tonle Bet Kraom	0.58	1492	18418
450	Spean Thmei	0.47	689	18377
460	Char Thum	0.42	680	18282



470	Lvea Kraom	0.52	1202	18140
480	Srae Siem	0.47	2072	18010
490	Pou	0.49	3497	17954
500	Srae Spey	0.47	1964	17908
510	S'ang	0.42	571	17763
520	Dambang Daek	0.44	1307	17632
530	Batheay	0.62	3490	17625
540	Preaek Chan	0.50	1206	17619
550	Beak Anlung	0.46	2528	17593
560	Preaek Dambouk Kraom	0.57	1569	17511
570	Dambae	0.51	1972	17308
580	Thmei Kandal	0.46	909	17243
590	Chhloung Muoy	0.44	958	17159
600	Andoung Chraoh	0.52	2173	17145
610	Preaek Pou Kraom	0.49	1136	17144
620	Angkor Ban Ti Bei	0.41	1588	17120
630	Andoung Pech	0.46	726	17114
640	Thlok Chrov	0.48	1723	17106
650	Preaek Ta Nong Pir	0.42	756	16976
660	Phum Prammuoy	0.45	3789	16927
670	Ponley	0.45	1173	16911
680	Cheung Prey	0.47	2006	16447
690	Svay Teab	0.44	2825	16374
700	Veal Mlu	0.41	1428	16191
710	Phum Buon	0.42	1505	16018
720	Trapeang Chrey	0.44	885	15904
730	Soupheas	0.51	1662	15817
740	Phum Dabbuon	0.43	871	15670
750	Kouk Kream	0.47	738	15591
760	Bos Pou	0.44	2149	15516
770	Knaor Dambang	0.45	1678	15422
780	Svay Kandal	0.41	1645	15104
790	Dab Meakkakra	0.42	3210	15010
800	Pou Sala Ti Muoy	0.42	940	14142
810	Ampil Leu	0.42	3814	14093
820	Ampil	0.44	2071	13937
830	Pong Tuek	0.44	2211	13209
840	Banghaeur Khlaeng	0.46	2280	13108
850	Khchau Ti Bei	0.42	1239	12957
860	Ta Ong	0.44	3347	12704
870	Banteay	0.43	2679	12490
880	Kravien Thom	0.44	1035	11549
890	Pram Yam	0.45	1939	11377
900	Sambour	0.45	4581	9322

Total number of poles :	<b>90</b>
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## **ANNEX 4 Changes made to the analytical grids for IPD in Lao PDR**

The following changes have been made to the analytical grid of Khammuon:

- Health centres criteria have been merged into a unique criteria, which is the best type of hospital in the settlement. It fixes the following problem with the previous grid: if the settlement had a national or referral hospital but no lower class health centres, its score would have been lowered. Having the best type of health centre is indeed more important than having many different types of health centres at once.
- “Number of villages covered by hospital” criteria has been removed because we had the data only for health centres type B and not for other types of hospitals.
- Following suggestions from stakeholders, we added the “kindergarten” criteria, as well as the “number of years covered by schools” for primary and secondary schools. These schools do not always teach for all the years, for example a primary school can teach only the first 3 years and then children are forced to go to another (remote) school for the remaining 3 years. In this case the potential impact on development is of course lower than the impact of schools offering full courses.
- All intervals of indicators have been slightly changed so that a similar number of settlements at the national level fall in each interval.

Stakeholders also recommended to take into account the following criteria, which have already been used by planners to select high potential settlements in the past:

- Drug kits type C (smaller than type A and B). This could not be added because of the very large amount of these drug kits, and no list available in electronic format. Besides, it may not be a very crucial criteria to identify high potential settlements, since these kits exist in many villages.
- Drinking water supply (two types), toilets, village funds and type of access to road. While these are indeed important criteria, we could not have access to data for Khammuon. But they may be added in the future if data with geographical coordinates becomes available (the GEOSIM software can be configured to add many more criteria).

## **ANNEX 5 List of Development Poles in Lao PDR (national level)**

DPs in the list are sorted by their “rank”: the lower the rank, the higher the priority. This rank is automatically generated by sorting the list by decreasing population covered (which takes into account both the IPD and the distance of the DP to other settlements). The user is allowed to manually change this automatically generated rank if he wishes to change the priorities.

In case the identification of a particular village with its name is not obvious, please refer to the GIS database.

Due to the very simplified analytical grid for IPD in Lao PDR, all selected DPs at the national level have the same IPD value (0.33).

Area : **Lao PDR**

<u>Rank</u>	<u>Settlements Name</u>	<u>IPD</u>	<u>Population</u>	<u>Population covered</u>
10	B.Nakasang	0.33	1649	34061
20	B.Bom	0.33	1411	31778
30	B.Chomthong	0.33	2335	30481
40	B.Namthouam	0.33	1479	29792
50	B.Chommuang	0.33	1322	29353
60	B.Nongkhiao	0.33	1685	28792
70	B.Viangmai	0.33	1332	26413
80	B.Fa	0.33	1314	26108
90	B.Muangnga	0.33	1561	25313
100	B.Sangkalok	0.33	1226	24770
110	B.Phabat	0.33	1316	24255
120	B.Thatlouang	0.33	1608	24194
130	B.Phanlouang	0.33	1285	23921
140	B.Naphek-Gnai	0.33	1646	22688
150	B.Tong-Gnai	0.33	1851	22235
160	B.Namet	0.33	1267	22061
170	B.Laokham	0.33	1559	21527
180	B.Nonkham	0.33	1413	21311
190	B.Nonsavang	0.33	1358	20853
200	B.Pasomxai	0.33	1608	20780
210	B.Louangxo	0.33	1321	20670
220	B.Nongbounviang	0.33	1413	19785
230	B.Phin	0.33	1315	19601
240	B.Sensouk	0.33	1271	19559
250	B.Nampon	0.33	1241	19558
260	B.Viangngeun	0.33	1301	19326
270	B.Kiouken	0.33	1555	18997
280	B.Navang-Noy	0.33	1203	18894
290	B.Laosouligna	0.33	1913	18819
300	B.Louang	0.33	1549	18510
310	B.Xelabam	0.33	1244	18305
320	B.Lahanamthong	0.33	1210	18108
330	B.Phonmouang	0.33	1463	18029
340	B.Nakhokpho	0.33	1798	17933
350	B.Lak2	0.33	1858	17911
360	B.Nalek	0.33	2211	17826
370	B.Poung	0.33	1214	17559
380	B.Phonsi	0.33	1708	17421
390	B.Phonkeo	0.33	1578	17257
400	B.Laikatha	0.33	1239	17201
410	B.Phak-Itou	0.33	1504	16921
420	B.Thetsaban	0.33	1647	16880
430	B.Namngen	0.33	1870	16849
440	B.Lahakok	0.33	1338	16363
450	B.Nongboua-Tha	0.33	1944	16336
460	B.Ton-Hen	0.33	1319	16075

470	B.Setkhot	0.33	1453	15855
480	B.Hatkhamhiang	0.33	1200	15770
490	B.Kengkok-Nua	0.33	1363	15688
500	B.Haihin	0.33	1309	15661
510	B.Donxai	0.33	1324	15624
520	B.Houayxai-Tai	0.33	1249	15536
530	B.Tung	0.33	1248	15401
540	B.Phouleng-Kang	0.33	1400	15364
550	B.Kengkok-Kang	0.33	1750	15146
560	B.Nongkham	0.33	1254	15018
570	B.Champa	0.33	1357	14981
580	B.Nakhou	0.33	1406	14913
590	B.Phakeo	0.33	1309	14885
600	B.Khonkeo	0.33	1277	14851
610	B.Kengkok-Dong	0.33	1675	14830
620	B.Khouaxe	0.33	1233	14811
630	B.Nam-Hon	0.33	1428	14809
640	B.Phonsavan-Tai	0.33	3625	14486
650	B.Vangkham	0.33	1204	14341
660	B.Theun	0.33	1322	14153
670	B.Densavan	0.33	1391	14136
680	B.Kadan	0.33	1665	14009
690	B.Thapaxoum	0.33	1245	13959
700	B.Xiangkong	0.33	1257	13949
710	B.Phonngam	0.33	2153	13624
720	B.Thong	0.33	1441	13623
730	B.Phonthong	0.33	1408	13614
740	B.Vatlouang	0.33	2042	13539
750	B.Ahong-Gnai	0.33	1301	13529
760	B.Dong	0.33	1721	13526
770	B.Bak	0.33	1652	13475
780	B.Mouangkhai-Tai	0.33	1448	13470
790	B.Nateuy-Nua	0.33	1246	13442
800	B.Gnon	0.33	1922	13441
810	B.Phon-Gnanang	0.33	1445	13374
820	B.Chomthong	0.33	1226	13363
830	B.Laongoua	0.33	1367	13361
840	B.Phonmixai	0.33	2418	13354
850	B.Sanamxai	0.33	1225	13320
860	B.Namouk	0.33	1296	13301
870	B.Phai	0.33	1860	13250
880	B.Donmalai	0.33	1515	13231
890	B.Paksong	0.33	1225	13226
900	B.Khambon	0.33	1791	13176
910	B.Somsanouk	0.33	1238	13155
920	B.Vatlouang	0.33	1316	13112
930	B.Khok-Nua	0.33	1602	13090
940	B.Nabong	0.33	1445	13088
950	B.Phonsa-At	0.33	1219	12927
960	B.Ngoy	0.33	1981	12893

970	B.Phonphim	0.33	1557	12874
980	B.Somsa-At	0.33	1667	12839
990	B.Ton-Tai	0.33	1365	12834
1,000	B.Namngam	0.33	2352	12833
1,010	B.Mouang	0.33	1349	12814
1,020	B.Nongkham-Het	0.33	1453	12766
1,030	B.Solo-Gnai	0.33	1285	12741
1,040	B.Saman	0.33	1471	12711
1,050	B.Phia-Mai	0.33	1658	12687
1,060	B.Dongmakfai	0.33	1309	12664
1,070	B.Pakkhop	0.33	1619	12629
1,080	B.Pakkading-Nua	0.33	1647	12626
1,090	B.Chiang	0.33	1237	12568
1,100	B.Phonhong	0.33	1424	12548
1,110	B.Mokmeuy	0.33	1326	12525
1,120	B.Phonsitha	0.33	1329	12520
1,130	B.Phonthong	0.33	1333	12474
1,140	B.Thakhek-Nua	0.33	2041	12417
1,150	B.Houay-Nangli	0.33	1287	12401
1,160	B.Soukhomma-Nua	0.33	1736	12307
1,170	B.Maivangmakxeo	0.33	1248	12298
1,180	B.Nongboua-Noy	0.33	1252	12286
1,190	B.Viangthong	0.33	1219	12277
1,200	B.Soukhomma-Tai	0.33	1623	12273
1,210	B.Simoungkhoun	0.33	1431	12243
1,220	B.Simuang	0.33	1679	12228
1,230	B.Phapoun	0.33	1396	12205
1,240	B.Keng	0.33	1330	12189
1,250	B.Boung	0.33	1561	12144
1,260	B.Nakeo	0.33	1805	12130
1,270	B.Kioukhem	0.33	1225	12102
1,280	B.Mai	0.33	1570	12030
1,290	B.Houaykeng	0.33	1619	11993
1,300	B.Hai	0.33	1454	11971
1,310	B.Nongtang	0.33	1445	11966
1,320	B.Mang	0.33	1445	11935
1,330	B.Don-Mai	0.33	1320	11915
1,340	B.Thensaban	0.33	1402	11912
1,350	B.Natha	0.33	1679	11878
1,360	B.That	0.33	1434	11749
1,370	B.Namkhou	0.33	1539	11705
1,380	B.Boungkeo	0.33	1515	11695
1,390	B.Saodio	0.33	1260	11677
1,400	B.Viangthong	0.33	1226	11605
1,410	B.Nalouam	0.33	1962	11587
1,420	B.Phonmi	0.33	2290	11384
1,430	B.Thahin-Nua	0.33	1960	11384
1,440	B.Saphay-Nua	0.33	1209	11318
1,450	B.Houayngam	0.33	1225	11262
1,460	B.Nalak	0.33	1522	11238

1,470	B.Nabong-Nua	0.33	1271	11186
1,480	B.Khankeung	0.33	1401	11139
1,490	B.Khouataphan	0.33	2318	11091
1,500	B.Phounmouang	0.33	1248	11084
1,510	B.Phonbok	0.33	1255	11074
1,520	B.Pakxe	0.33	1633	11047
1,530	B.Phonsi	0.33	2189	10977
1,540	B.Nalong	0.33	1773	10914
1,550	B.Phonsa-At	0.33	1554	10910
1,560	B.Phongngam	0.33	1732	10853
1,570	B.Ke	0.33	1677	10834
1,580	B.Sang-Namman	0.33	1214	10812
1,590	B.Thong	0.33	1268	10805
1,600	B.Houaymak	0.33	1456	10798
1,610	B.Xok-Am-Nouay	0.33	1990	10794
1,620	B.Sangthiang	0.33	2036	10758
1,630	B.Sangvilai	0.33	1281	10711
1,640	B.Viangsxainalouang	0.33	1624	10701
1,650	B.Phonkoug	0.33	1778	10686
1,660	B.Pakxon	0.33	1550	10672
1,670	B.Hongkhagnom	0.33	1700	10665
1,680	B.Vangviang	0.33	1697	10642
1,690	B.Thalat	0.33	1602	10637
1,700	B.Kang	0.33	2022	10586
1,710	B.Phonsikhai	0.33	2150	10575
1,720	B.Phabat	0.33	1700	10561
1,730	B.Naxon	0.33	1322	10457
1,740	B.Muangmai	0.33	3005	10449
1,750	B.Phonsavan	0.33	2370	10438
1,760	B.Donkho	0.33	1879	10414
1,770	B.Phonsavang-Nua	0.33	3923	10379
1,780	B.Thalouang	0.33	2046	10364
1,790	B.Phaling	0.33	1220	10337
1,800	B.Phonsavang-Tai	0.33	3117	10296
1,810	B.Namkeung-Kao	0.33	1472	10224
1,820	B.Nakang	0.33	1331	10220
1,830	B.Lak52	0.33	2819	10207
1,840	B.Phoukhaokham	0.33	2312	10093
1,850	B.Dontan	0.33	1636	10059
1,860	B.Dongkalong	0.33	1256	10011
1,870	B.Xekong	0.33	1705	9951
1,880	B.Nongnak	0.33	1916	9940
1,890	B.Kengkabao-Tai	0.33	1239	9871
1,900	B.Lak8	0.33	1330	9831
1,910	B.Phonnsim-Tai	0.33	1477	9770
1,920	B.Laksam	0.33	1815	9763
1,930	B.Xe-Gnai	0.33	2270	9753
1,940	B.Phangdeng	0.33	1265	9747
1,950	B.Phonsin-Nua	0.33	1212	9734
1,960	B.Thapho	0.33	1970	9668

1,970	B.Houayphek	0.33	1235	9659
1,980	B.Saphu	0.33	2142	9642
1,990	B.Nonsavang	0.33	1214	9632
2,000	B.Hinheup neua	0.33	1451	9601
2,010	B.That-Inghang	0.33	1654	9587
2,020	B.Phouhouaxang	0.33	1655	9582
2,030	B.Tha	0.33	1554	9447
2,040	B.Houamuang	0.33	1657	9437
2,050	B.Houayngangkham-Nua	0.33	1203	9429
2,060	B.Xok-Nua	0.33	1750	9399
2,070	B.Houayngangkham-Tai	0.33	1288	9398
2,080	B.Phoxai	0.33	1329	9372
2,090	B.Xok-Kang	0.33	1278	9358
2,100	B.Namcheng	0.33	1430	9334
2,110	B.Thinkeo	0.33	1730	9192
2,120	B.Nongdeun	0.33	1440	9144
2,130	B.Phon-Ngam	0.33	2071	9099
2,140	B.Napho	0.33	1520	9023
2,150	B.Phonsa-At	0.33	2422	8608
2,160	B.Xay	0.33	1464	8606
2,170	B.Bo	0.33	2110	8590
2,180	B.Non-Hin-He	0.33	1648	8561
2,190	B.Houaynamyen	0.33	1443	8489
2,200	B.Paxang	0.33	1689	8411
2,210	B.Phakha-Gnai	0.33	1544	8396
2,220	B.Phakho	0.33	2003	8132
2,230	B.Mai	0.33	1689	8120
2,240	B.Nakham	0.33	1648	8054
2,250	B.Phonxai tai	0.33	1787	8016
2,260	B.Pak-Hang	0.33	1621	7963
2,270	B.Keun-Nua	0.33	1368	7896
2,280	B.Hatsati	0.33	1523	7877
2,290	B.Phok	0.33	1613	7824
2,300	B.Keun-Kang	0.33	1200	7803
2,310	B.Thouay-Gnai	0.33	1399	7624
2,320	B.Lingxan	0.33	1564	7435
2,330	B.Napapha	0.33	1859	7388
2,340	B.Natao	0.33	1232	7272
2,350	B.Naphiang	0.33	1272	7251
2,360	B.Phonngam-2	0.33	2504	7147
2,370	B.Namkham	0.33	2036	7139
2,380	B.Phialat	0.33	1771	7049
2,390	B.Phao	0.33	1686	7002
2,400	B.Na-Ngeun	0.33	1445	6970
2,410	B.Phonsavan	0.33	1654	6911
2,420	B.Nongphong-Nua	0.33	1549	6851
2,430	B.Pakpang-Nua	0.33	1323	6777
2,440	B.Dong-Hai	0.33	1540	6702
2,450	B.Ilai-Nua	0.33	1332	6651
2,460	B.Naxai-Tai	0.33	1799	6613



2,470	B.Thongmang	0.33	2189	6596
2,480	B.Xanakham-Tai	0.33	1791	6568
2,490	B.Tha-Ngon	0.33	2007	6510
2,500	B.Phonxai	0.33	1691	6507
2,510	B.Xanakham-Nua	0.33	1546	6474
2,520	B.Na	0.33	2705	6418
2,530	B.Phoukhaokhouay	0.33	1823	6412
2,540	B.Somsamai	0.33	1456	6340
2,550	B.Houakhoua	0.33	1317	6329
2,560	B.Phoukham	0.33	1277	6315
2,570	B.Bolek	0.33	2024	6241
2,580	B.Thadindeng-Nua	0.33	1425	6191
2,590	B.Hatsadi-Nua	0.33	1205	6129
2,600	B.Chaleumxai	0.33	1416	6110
2,610	B.Saylom	0.33	1201	6107
2,620	B.Sisavat-Tai	0.33	1876	6106
2,630	B.Dongdok	0.33	4189	6104
2,640	B.Hatsadi-Tai	0.33	1246	6099
2,650	B.Sisavat-Kang	0.33	1378	6095
2,660	B.Nongbon	0.33	2570	6085
2,670	B.Fay	0.33	1870	6081
2,680	B.Thongkhankham-Nua	0.33	1574	6071
2,690	B.Dongmiang	0.33	2187	6053
2,700	B.Nongchan	0.33	2774	6043
2,710	B.Nongphouviang	0.33	1230	6027
2,720	B.Sidamdouan	0.33	1844	6022
2,730	B.Phonxai	0.33	2282	6019
2,740	B.Thongsangnang	0.33	2207	6011
2,750	B.Xangkhon	0.33	1845	6011
2,760	B.Thongkhankham-Tai	0.33	1533	6005
2,770	B.Phakhao	0.33	1996	6005
2,780	B.Naxai	0.33	2229	6004
2,790	B.Dongpala-Thong	0.33	1240	6002
2,800	B.Phonsinoun	0.33	1944	5981
2,810	B.Donsangphai	0.33	1266	5977
2,820	B.Sibounheuang	0.33	2097	5962
2,830	B.Savang	0.33	1857	5948
2,840	B.Hongkha-Nua	0.33	1651	5945
2,850	B.Phonsavan-Nua	0.33	2265	5942
2,860	B.Thatlouang-Tai	0.33	2782	5925
2,870	B.Dongbang	0.33	1848	5921
2,880	B.Anou	0.33	1305	5915
2,890	B.Khoualouang-Tai	0.33	2048	5911
2,900	B.Phonsa-At	0.33	1745	5901
2,910	B.Hongkha-Tai	0.33	1422	5894
2,920	B.Thatlouang-Nua	0.33	1800	5891
2,930	B.Chompet-Tai	0.33	2005	5889
2,940	B.Khoualouang	0.33	1875	5889
2,950	B.Tanmixai	0.33	2053	5887
2,960	B.Nongsangtho	0.33	1595	5881

2,970	B.Hatsadi-Tai	0.33	1414	5879
2,980	B.Hongke	0.33	2499	5879
2,990	B.Phaxap-Mai	0.33	1311	5877
3,000	B.Chomphet-Nua	0.33	1715	5873
3,010	B.Phonkheng	0.33	2914	5862
3,020	B.Sihom	0.33	1438	5854
3,030	B.Saphanthong-Nua	0.33	1903	5849
3,040	B.Sisangvon	0.33	1465	5849
3,050	B.Thatlouang-Kang	0.33	2385	5849
3,060	B.Khouaydeng	0.33	1590	5833
3,070	B.Dongpalan-Tha	0.33	2093	5821
3,080	B.Hatxaykhao	0.33	1531	5817
3,090	B.Houaxiang	0.33	2032	5811
3,100	B.Thana	0.33	1381	5802
3,110	B.Kham-Houng	0.33	2196	5791
3,120	B.Hom-Tai	0.33	1305	5785
3,130	B.Latkhouay	0.33	1551	5783
3,140	B.Naxon	0.33	1318	5782
3,150	B.Viangchaleun	0.33	1884	5776
3,160	B.Natham	0.33	1484	5773
3,170	B.Nongdouang-Nua	0.33	1604	5746
3,180	B.Nongdouang-Tai	0.33	1441	5739
3,190	B.Nonsavang	0.33	1414	5730
3,200	B.Xianggnun	0.33	1411	5727
3,210	B.Oudomphon	0.33	1932	5709
3,220	B.Simuang	0.33	1769	5708
3,230	B.Nongdouang-Thong	0.33	1404	5704
3,240	B.Phonthan-Nua	0.33	1840	5691
3,250	B.Dondou	0.33	1447	5687
3,260	B.Viangsavan	0.33	1672	5657
3,270	B.Sikhaithong-Nua	0.33	1334	5656
3,280	B.Phonphanao	0.33	2899	5652
3,290	B.Saphanthong-Tai	0.33	1962	5651
3,300	B.Somsanouk	0.33	2105	5638
3,310	B.Sithan	0.33	1284	5637
3,320	B.Phontongchommani	0.33	2863	5610
3,330	B.Nongbouathong-Tai	0.33	1801	5609
3,340	B.Thatkhao	0.33	1427	5607
3,350	B.Thongphanthong	0.33	2506	5596
3,360	B.Somvang-Nua	0.33	1638	5593
3,370	B.Nahe	0.33	1313	5578
3,380	B.Saphangmo	0.33	2062	5551
3,390	B.Chommani-Kang	0.33	1457	5549
3,400	B.Nongniao	0.33	2151	5549
3,410	B.Dongpalep	0.33	2330	5543
3,420	B.Muangva-Thong	0.33	1731	5535
3,430	B.Phonthan-Tai	0.33	1786	5534
3,440	B.Phontongsavat	0.33	2969	5531
3,450	B.Khounta-Tha	0.33	1321	5506
3,460	B.Chommani-Nua	0.33	2291	5496

3,470	B.Thongpong	0.33	2869	5491
3,480	B.Xai	0.33	1217	5479
3,490	B.Donnoun	0.33	1560	5476
3,500	B.Gnapha	0.33	1368	5474
3,510	B.Phonsavang	0.33	2056	5469
3,520	B.Sokpalouang	0.33	1297	5462
3,530	B.Chommani-Tai	0.33	2282	5460
3,540	B.Nalao	0.33	1386	5451
3,550	B.Sikhai-Tha	0.33	1655	5448
3,560	B.Sibounheuang-Tha	0.33	1221	5445
3,570	B.Sikeut	0.33	1259	5445
3,580	B.Nongtha-Tai	0.33	1417	5442
3,590	B.Phailom	0.33	1249	5438
3,600	B.Thongkang	0.33	1993	5430
3,610	B.Akat	0.33	1994	5428
3,620	B.Phonpapao-Tha	0.33	1500	5421
3,630	B.Sivilai	0.33	3094	5409
3,640	B.Oupmoung	0.33	1314	5402
3,650	B.Nongbouathong-Nua	0.33	2365	5401
3,660	B.Bungkhagnong-Tai	0.33	1296	5398
3,670	B.Samphanna	0.33	1263	5395
3,680	B.Nakham	0.33	2357	5372
3,690	B.Pak-Het	0.33	1335	5370
3,700	B.Phonkham	0.33	1509	5369
3,710	B.Houakhoua	0.33	1260	5367
3,720	B.Dontiou	0.33	1406	5366
3,730	B.Nongveng	0.33	1233	5365
3,740	B.Nonkeo	0.33	2138	5352
3,750	B.Vatnak	0.33	2367	5339
3,760	B.Nongteng-Nua	0.33	1655	5338
3,770	B.Nonkhilek	0.33	1436	5330
3,780	B.Nong-Hai	0.33	2117	5313
3,790	B.Dong-Nasok-Tai	0.33	2174	5306
3,800	B.Nongtha-Nua	0.33	1574	5293
3,810	B.Dondeng	0.33	1485	5283
3,820	B.Nonsa-At	0.33	1443	5272
3,830	B.Thaphalanxai	0.33	1978	5233
3,840	B.Saphangmeuk	0.33	1331	5233
3,850	B.Nagnang	0.33	1256	5223
3,860	B.Nongniang	0.33	1560	5217
3,870	B.Houayhong	0.33	1682	5215
3,880	B.Salakhm	0.33	2900	5196
3,890	B.Pakthang	0.33	2195	5174
3,900	B.Nongphagna	0.33	2289	5150
3,910	B.Donnokkhoun	0.33	1473	5141
3,920	B.Amon	0.33	1281	5138
3,930	B.Sengsavang	0.33	1285	5131
3,940	B.Sokkham	0.33	1868	5123
3,950	B.Hongsouphap	0.33	1438	5103
3,960	B.Xok-Noy	0.33	1624	5044

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3,970	B.Thinphia	0.33	1504	5039
3,980	B.Nonkho	0.33	2436	5021
3,990	B.Nongphang	0.33	1862	4992
4,000	B.Thamouang	0.33	1650	4979
4,010	B.Phonpapao-Thong	0.33	2888	4973
4,020	B.Thadua	0.33	1640	4954
4,030	B.Nakhouay-Tai	0.33	1475	4902
4,040	B.Khokxay	0.33	1327	4860
4,050	B.Tatthong	0.33	1349	4805
4,060	B.Nahai	0.33	1807	4729
4,070	B.Sithan-Tai	0.33	1528	4728
4,080	B.Muang-Noy	0.33	1474	4699
4,090	B.Thanaleng	0.33	1444	4665
4,100	B.Thapha	0.33	1386	4664
4,110	B.Thintom	0.33	1483	4656
4,120	B.Nonvay	0.33	1414	4640
4,130	B.Khamsavat	0.33	1201	4608
4,140	B.Nong-Heo	0.33	2117	4589
4,150	B.Xiangda	0.33	1637	4586
4,160	B.Xiangkouan	0.33	1510	4575
4,170	B.Dongphosi	0.33	1771	4445

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Total number of poles :	<b>417</b>
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## **ANNEX 6 List of Development Poles in Lao PDR (Khammuon)**

DPs in the list are sorted by their “rank”: the lower the rank, the higher the priority. This rank is automatically generated by sorting the list by decreasing population covered (which takes into account both the IPD and the distance of the DP to other settlements). The user is allowed to manually change this automatically generated rank if he wishes to change the priorities.

In case the identification of a particular village with its name is not obvious, please refer to the GIS database.

Area : **KHAMMOUAN**

<u>Rank</u>	<u>Settlements Name</u>	<u>IPD</u>	<u>Population</u>	<u>Population covered</u>
10	B.Laophoxai	0.90	733	8174
20	B.Naphouak	0.41	846	6870
30	B.Poung-Nua	0.63	482	6675
40	B.Thakhek-Nua	0.58	2751	6396
50	B.Phonsavan	0.69	584	6225
60	B.Nakang-Nua	0.48	505	6169
70	B.Nongboua-Kham	0.52	845	6159
80	B.Somsanouk	0.46	9	5993
90	B.Houaphou-Ak	0.71	1296	5900
100	B.Navang-Tai	0.73	847	5763
110	B.Nongping-Tai	0.39	124	5602
120	B.Namdon	0.53	367	5508
130	B.Tan	0.50	1524	5493
140	B.Chomthong	0.40	1652	5166
150	B.Nadon	0.64	253	5029
160	B.Sa-Ang	0.52	409	5023
170	B.Sang	0.62	1382	5010
180	B.Tantheung	0.66	505	4795
190	B.Muanglouang	0.44	910	4789
200	B.Nonglom	0.57	433	4768
210	B.Dong-Tai	0.59	710	4765
220	B.Donkhuanxang	0.46	1541	4762
230	B.Khouaxe	0.90	1552	4656
240	B.Phonsamam	0.40	1589	4651
250	B.Laokha	0.47	580	4649
260	B.Somsa-At	0.40	2247	4644
270	B.Napoung	0.52	522	4619
280	B.Panam	0.59	320	4618
290	B.Nagnavay	0.50	1136	4566
300	B.Phonmuang	0.55	122	4530
310	B.Viangthong	0.57	434	4508
320	B.Thongkham	0.48	447	4406
330	B.Naphao	0.68	643	4371
340	B.Thakhek-Kang	0.39	1542	4360
350	B.Nakatang	0.43	495	4344
360	B.Thami	0.58	829	4217
370	B.Gnang-Gnai	0.58	1268	4093
380	B.Laongoua	0.40	1842	4081
390	B.Mouangsoum	0.53	453	4071
400	B.Nongpham	0.63	896	4041
410	B.Mahaxai-Kang	0.45	324	3999
420	B.Nachampa	0.57	483	3960
430	B.Tung	0.62	1571	3955
440	B.Dongkhouang	0.51	1499	3933
450	B.Nanoy-Thong	0.42	466	3829
460	B.Donkhiao-Kang	0.42	917	3692

470	B.Namdik	0.43	233	3603
480	B.Dongkhong	0.55	1226	3573
490	B.Sixiang-Mai	0.49	279	3562
500	B.Hatxiangdi	0.43	648	3519
510	B.Konglo-Kang	0.37	434	3511
520	B.Gnangkham	0.62	1346	3460
530	B.Pakasa	0.47	437	3434
540	B.Pongkiou	0.54	1298	3349
550	B.Thamlay	0.51	480	3296
560	B.Songmuang-Nua	0.61	615	3218
570	B.Na-Ngeo	0.42	315	3210
580	B.Hat	0.51	202	3189
590	B.Natan	0.47	407	3155
600	B.Lammalat	0.39	235	3129
610	B.Dongkasen	0.45	694	3116
620	B.Langkhang	0.38	463	3076
630	B.Don	0.39	807	3007
640	B.Phit	0.44	228	2984
650	B.Nagno	0.46	406	2969
660	B.Nongthang	0.50	359	2930
670	B.Khounkham	0.73	479	2923
680	B.Xong	0.42	426	2915
690	B.Mai	0.38	407	2901
700	B.Dongboun-Gnai	0.43	919	2901
710	B.Houaykhaomin-Gnai	0.42	518	2881
720	B.Man	0.41	645	2806
730	B.Dongkasin	0.42	1069	2800
740	B.Thap	0.46	630	2672
750	B.Songmuang-Tai	0.49	742	2657
760	B.Hinboun	0.39	197	2619
770	B.Nongping-Nua	0.42	327	2573
780	B.Sikhot	0.37	447	2547
790	B.Phonsa-At	0.39	228	2519
800	B.Nakhamman	0.43	350	2503
810	B.Xiangvang-Thong	0.39	1241	2446
820	B.Phahoy-Thong	0.38	402	2442
830	B.Nase	0.40	255	2351
840	B.Nakham	0.37	889	2213
850	B.Koutchap	0.39	639	2163
860	B.Navang	0.38	306	2118
870	B.Naphoktha	0.41	426	2079
880	B.Kengchon	0.47	607	1712
890	B.Thasida	0.37	283	1655
900	B.Nathan	0.44	686	1488

Total number of poles :	<b>90</b>
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