

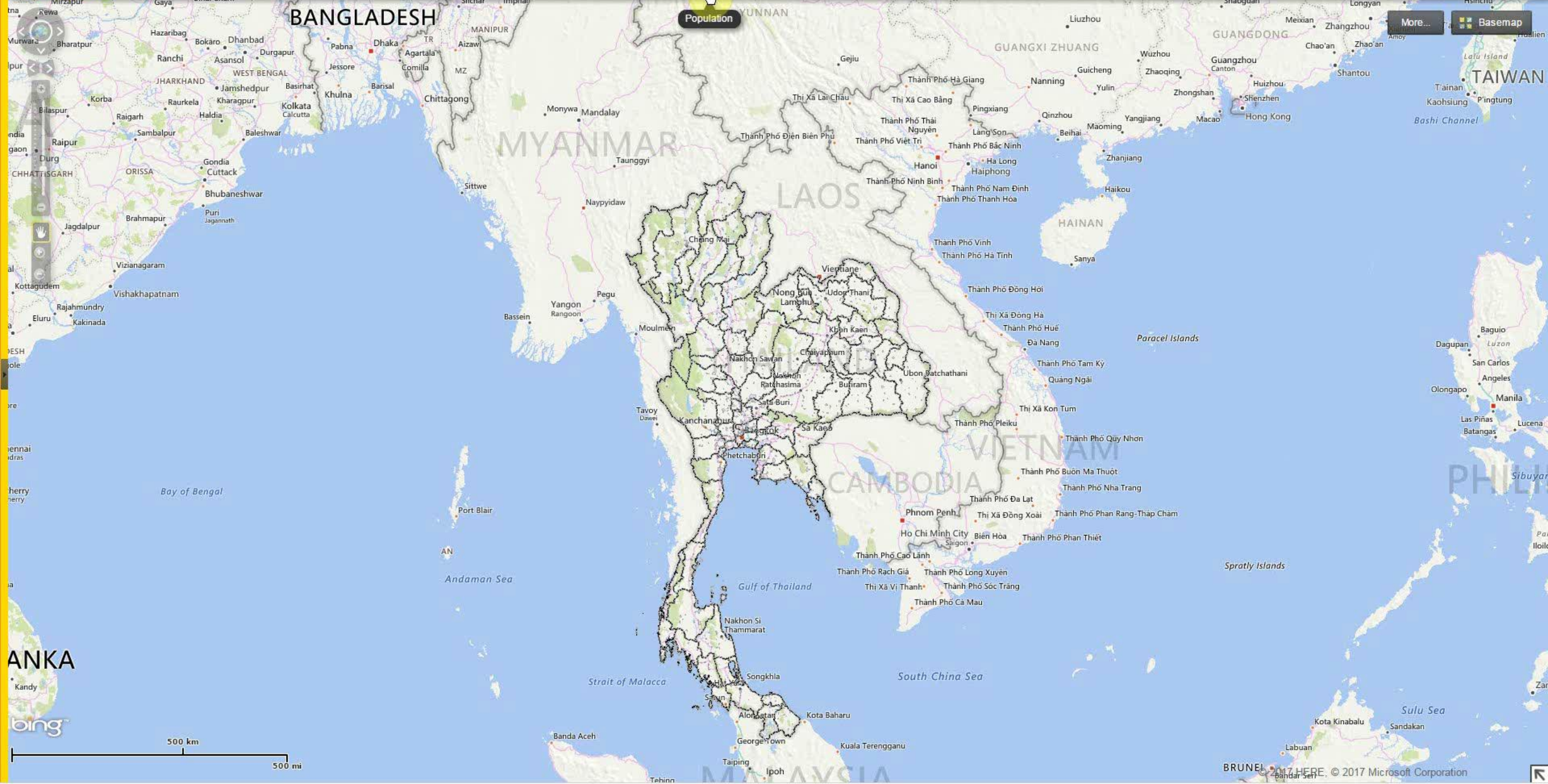
Geographic Data Visualization

Xiaowen Yang

MIT Department of Economics

MIT Lab for Economic Analysis and Design

Spatial/Temporal Trend of Thailand Population Growth



Agenda

- International Collaboration (China, Brazil and U.S.)
- Thailand Econ Web GIS
- Comparison Summary
- Behind the Scenes
- Collaborate and Share
- Q&A

IndicatorList

Selected Indicators

Year: 2010
 Indicator: Birth Rate
 Theme: Field: censusbirthrate2010

Year: 2010
 Indicator: Average Education Years
 Theme: Field: censusaverage_educ2010

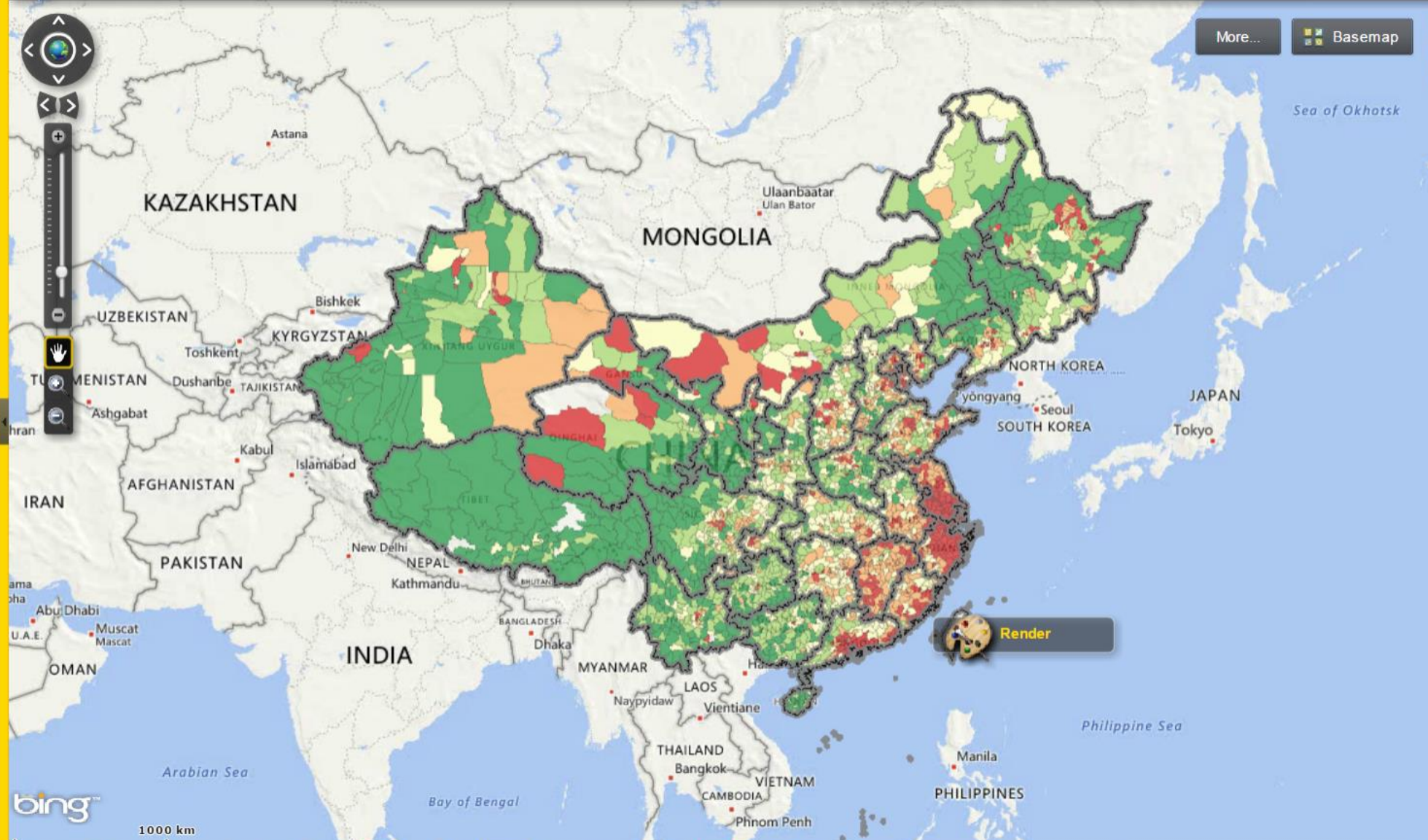
Year: 2010
 Indicator: Percentage of Population in Secondary Industry to Total Employed Population
 Theme: Field: censussecondary_ind_propor2010

Download Data

China Data Viewer

Visualize Data

Enter address [help](#) [About](#)



IndicatorList

Selected Indicators

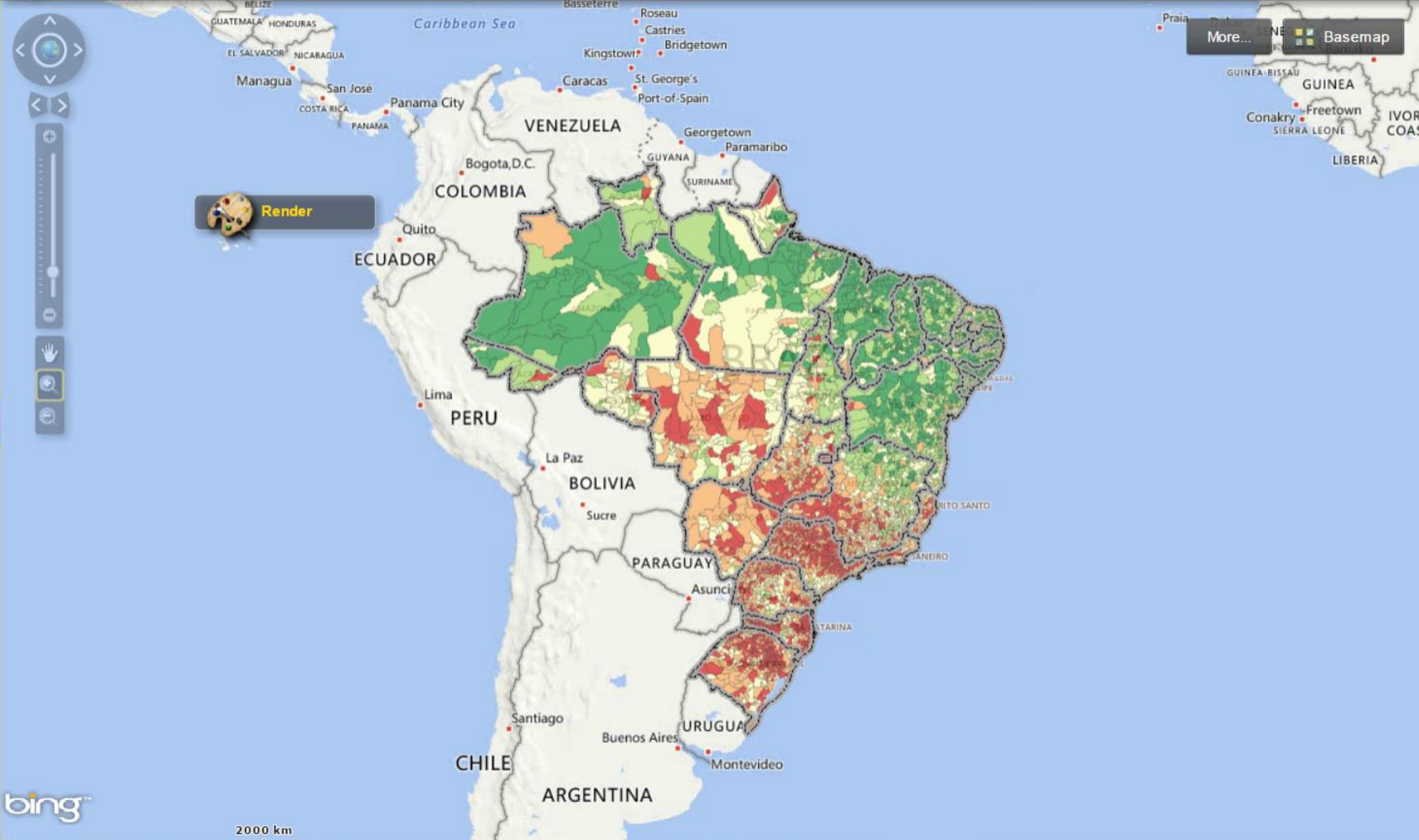
Year: 2010
 Indicator: family income per capita
 Theme: mean Field: censusmean_n_fmlyncper201

Download Data

Brazil Data Viewer Visualize Data

Navigation controls: zoom in (+), zoom out (-), home, pan, full screen, print, and a vertical zoom slider.

Render button with a color palette icon.



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More... Basemap

Collaboration and Sponsorship

-- in China, Brazil and United States



**PEKING
UNIVERSITY**

School of Government

Raj Chetty

SIEPR

STANFORD INSTITUTE
FOR ECONOMIC POLICY RESEARCH



**CLIMATE
POLICY
INITIATIVE**

SAMUEL TAK LEE

MIT REAL ESTATE ENTREPRENEURSHIP LAB

MIT Lab for Economic Analysis and Design

-- analysis of economic and financial systems

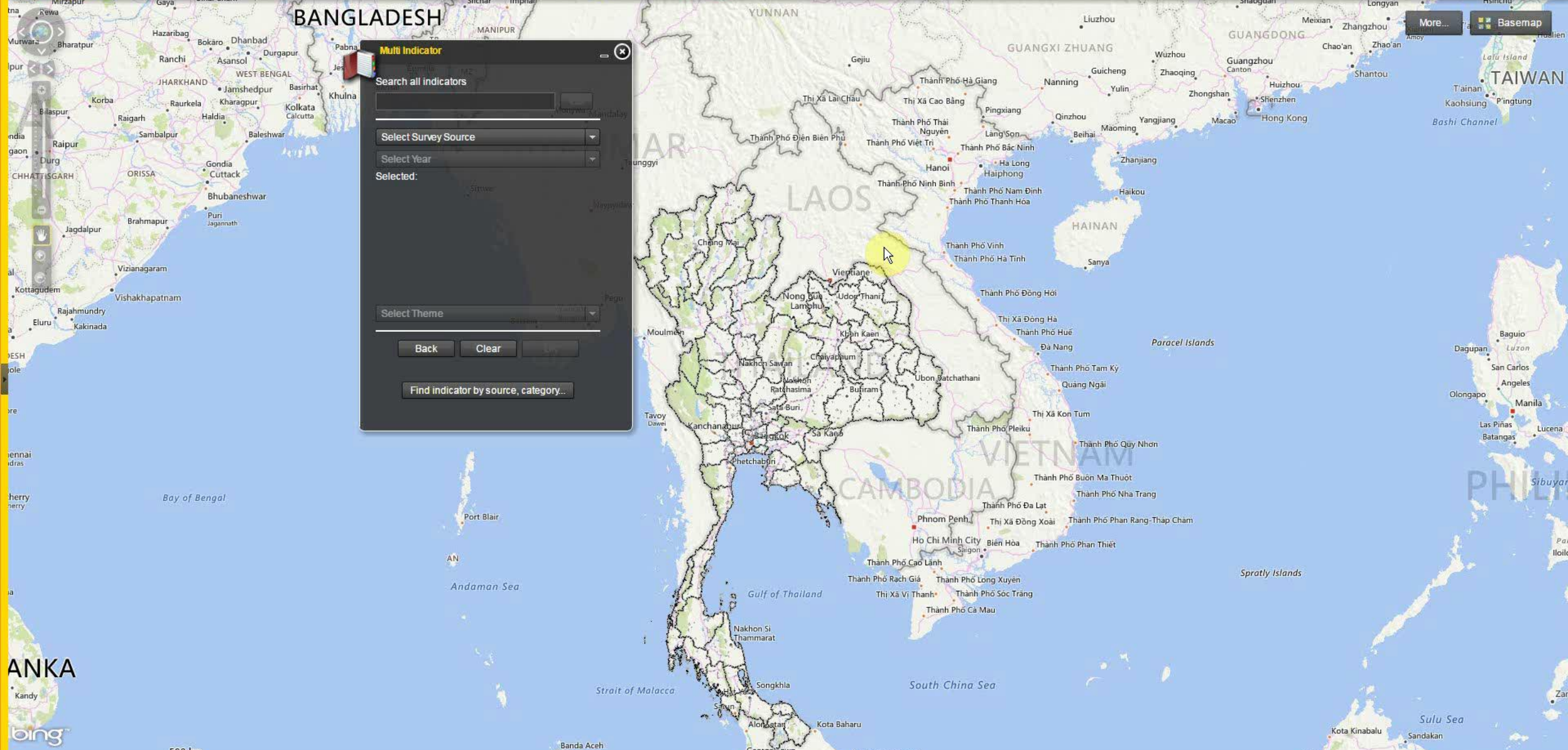
Thailand Econ Web GIS

-- Clicks away from knowing the spatial-temporal trend

Major Functions

- Search and map indicator
- Overlap indicators
- Townsend Thai Survey
- Temporal animation
- Control legend
- Export map
- Download data
- Upload and map uploaded indicators

Search and Map



Multi Indicator

Search all indicators

Select Survey Source

Select Year

Selected:

Select Theme

Back Clear

Find indicator by source, category...

Overlap

IndicatorList

Selected Indicators

Year: 2001
Indicator: Typical daily wage for hired labor in baht
Theme: mean Field: nrdmean_dailywage2001

Download Data

Thai Econ Web GIS
Visualize Data



Enter address

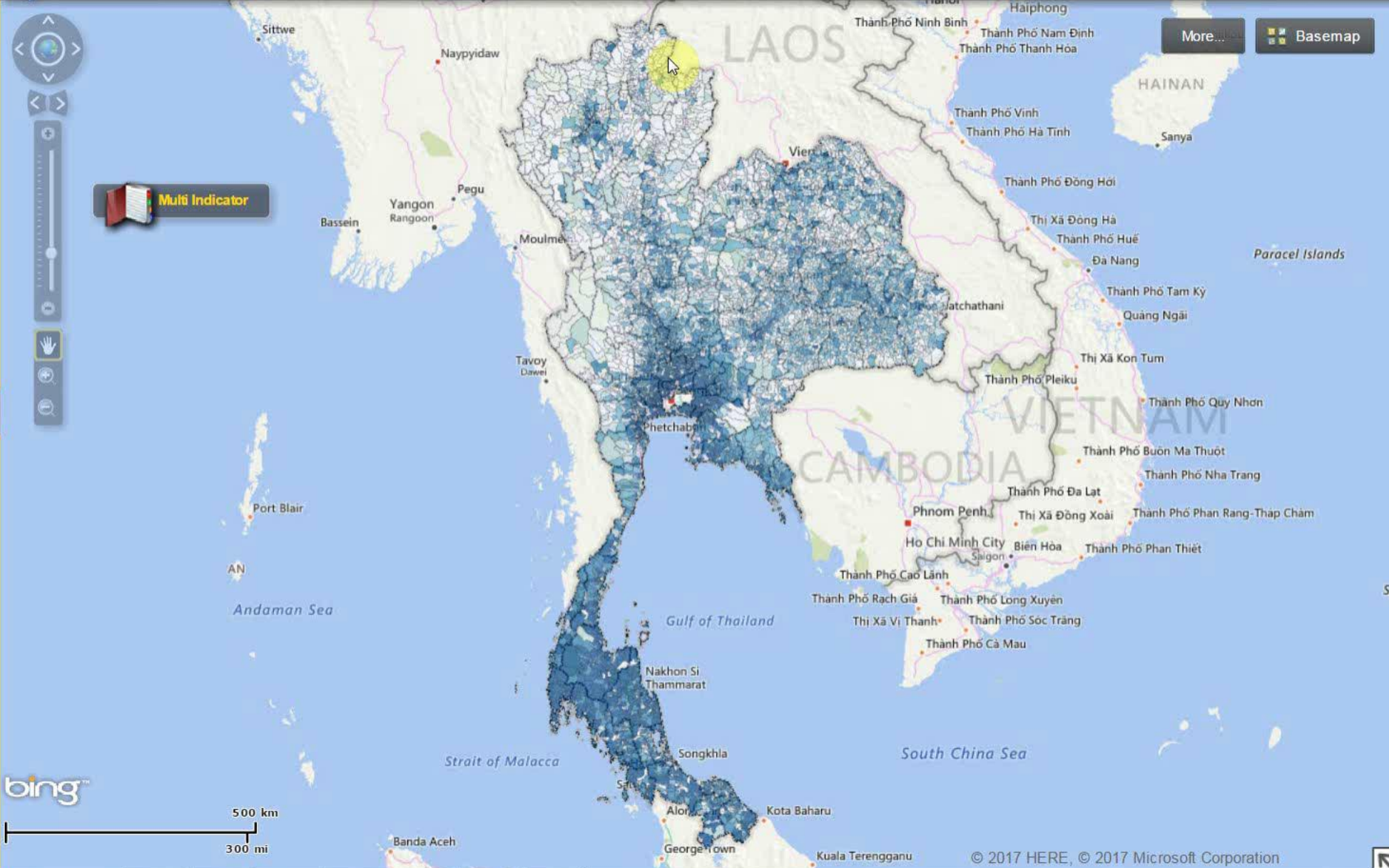
help About



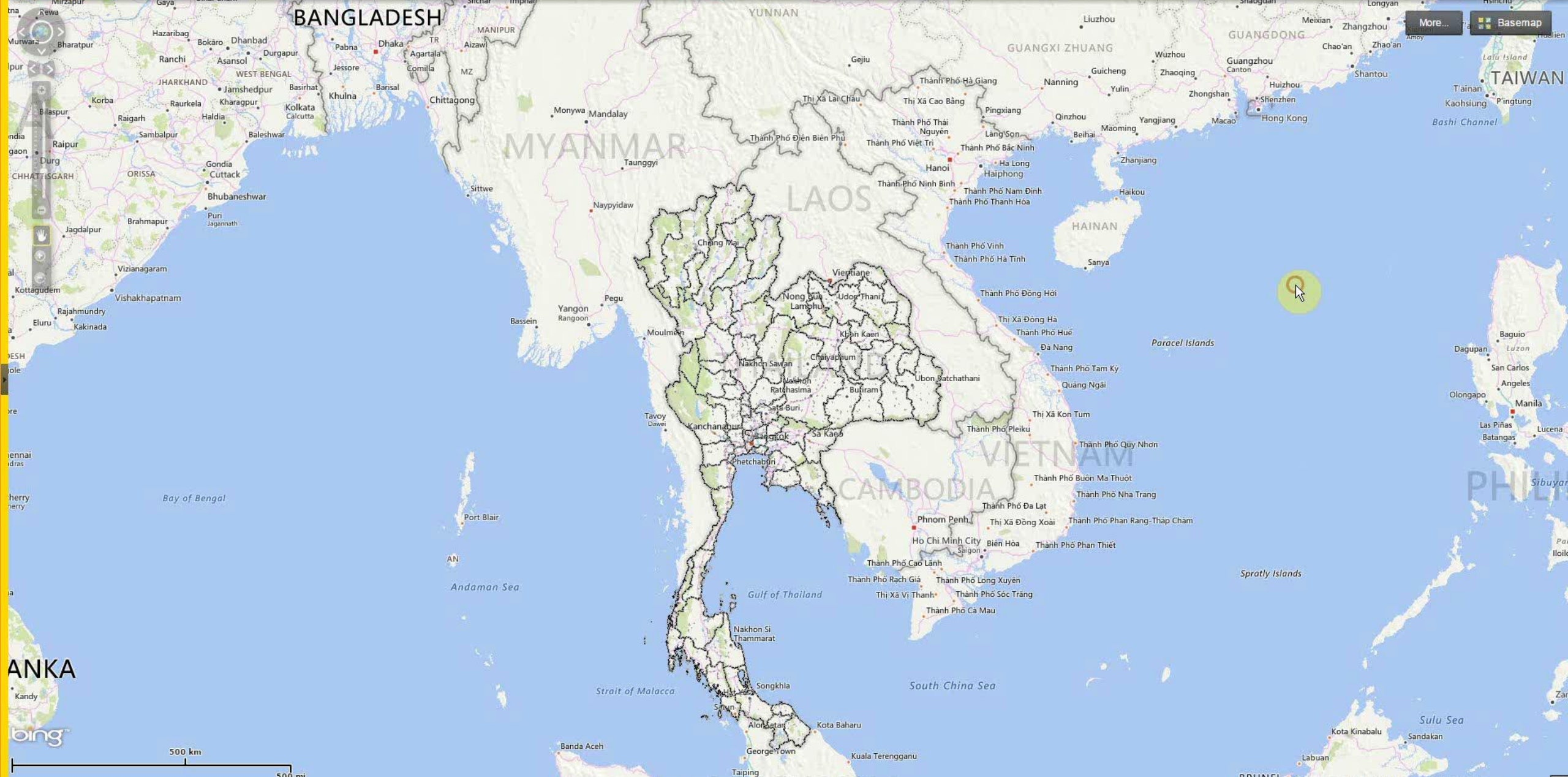
Multi Indicator



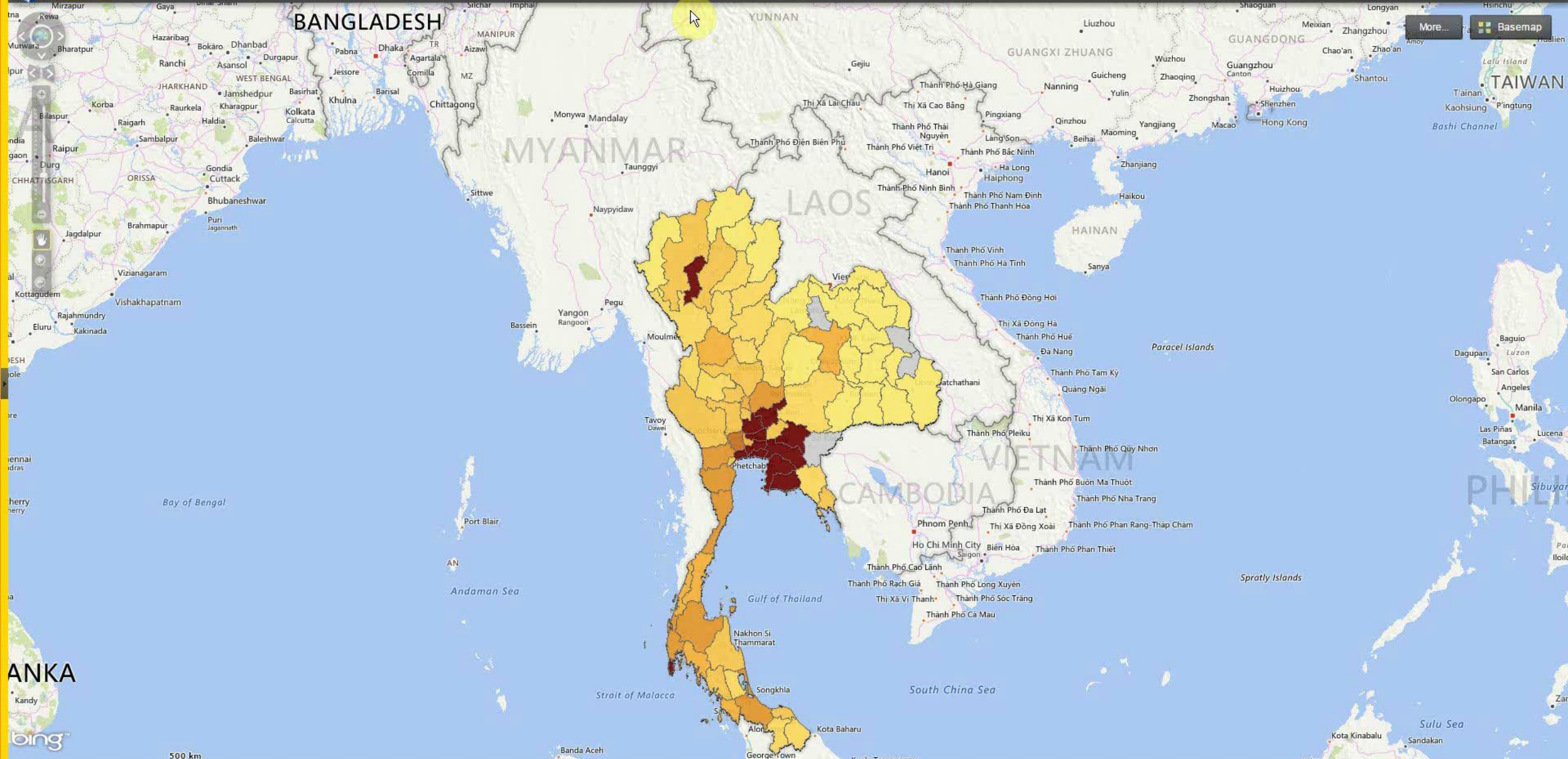
500 km
300 mi



Townsend Annual Resurvey



Temporal Animation



Print/Download

IndicatorList

Selected Indicators
Year: 2001
Indicator: Typical daily wage for hired labor in baht
Theme: mean Field: nrdmean_dailywage2001

Download Data

Thai Econ Web GIS
Visualize Data

Map navigation controls including zoom in (+), zoom out (-), pan, and a vertical zoom slider.

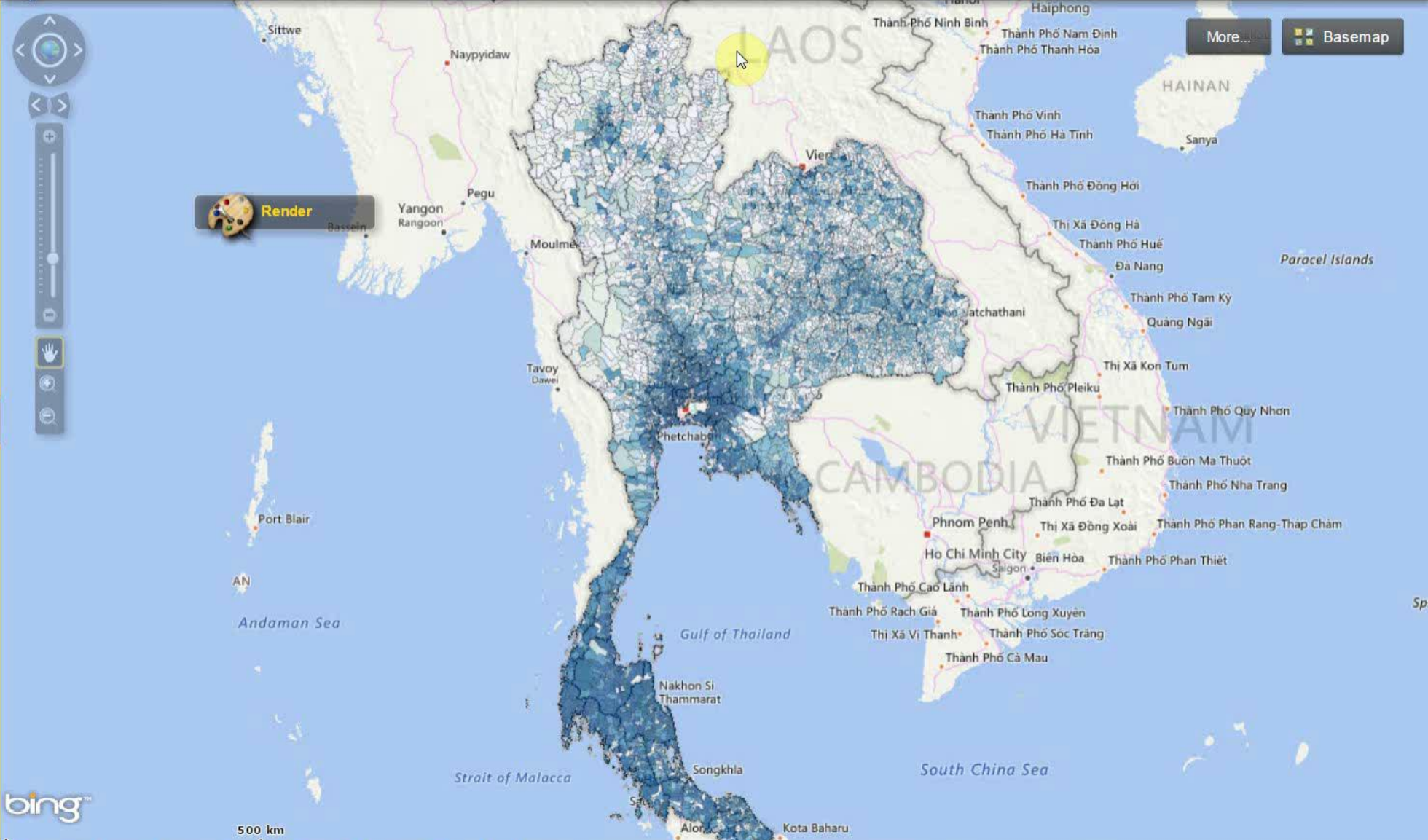
Render button with a color palette icon.

Enter address

help About

More...

Basemap



bing

500 km

Search and Map– From Multiple Sources

- Traditional Method –**days**
 - Collect data from multiple sources
 - Find out linking method among datasets
 - Merge data
 - Map
- Econ Web GIS –**seconds**
 - Search indicators by keyword
 - Map

Thousands of Indicators from Multiple Sources

- General
 - Over 200,000 variables
 - 1597 different indicators from 4 sources -- Census, Labor Force Survey, National Rural Development, Townsend Annual Resurvey
 - Span over 20 years (biannual for NRD, annual for LFS)
 - 3 different spatial units (Province, Amphoe, Tambon)
- Specifics
 - NRD Survey
 - 1,467 indicators
 - From 1986-2009, biennial, 1998 is skipped
 - Labor Force Survey
 - 54 indicators
 - From 2004-2009, annual
 - Census
 - 151 indicators
 - 1980, 1990, 2000 (1980 can only be available at Amphoe and Province level)
 - Townsend Annual Resurvey
 - 113 indicators
 - From 2008-2015, annual

Comparison Summary

	Econ GIS (MIT)	World Bank Data	GeoFred (U.S. Fed St. Louis)	Census Data Mapper (U.S. Census Department)
Spatial Resolution	Maximized	Limited	Maximized	Maximized
Indicators Potential	Unlimited	Unlimited	Unlimited	Limited
Speed	Fast	Mediocre	Mediocre	Fast

Light Weight

(On a server with power similar to a desktop)



Hard Work
Behind the
Scenes

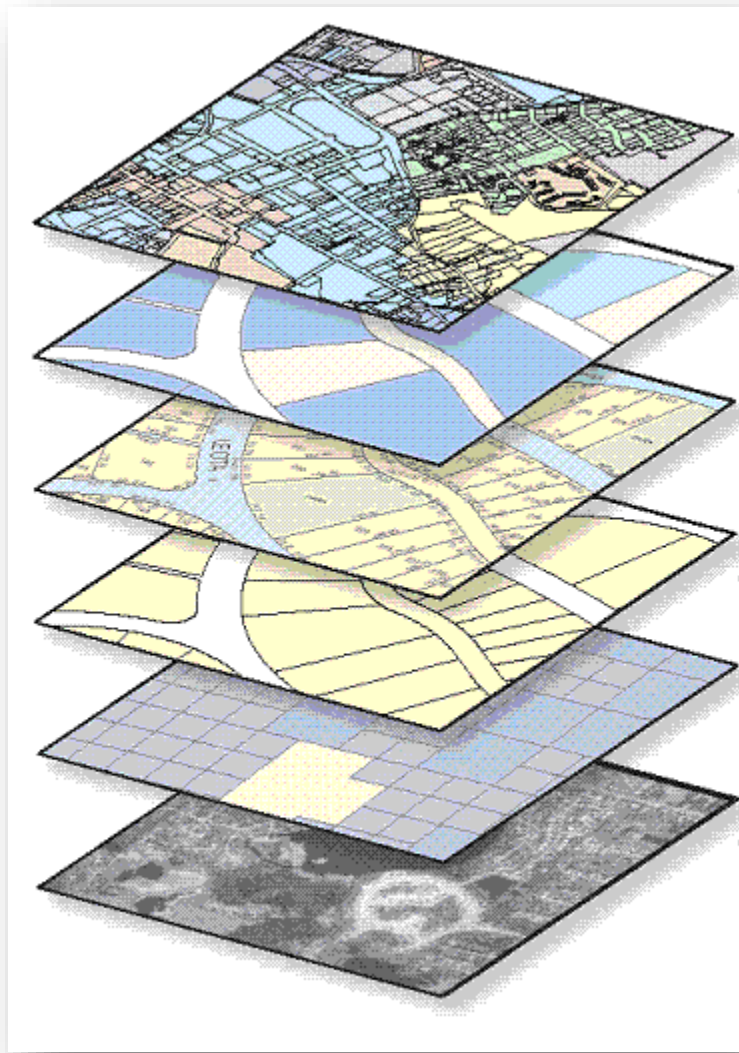
Choosing Technology Platforms

- General Guidelines
 - Expandable and developable
 - Easy to maintain and update
 - Light weight
- Options
 - Geoserver(free)
 - Mapbook
 - ArcGIS Web Server

GIS Website for Social Science

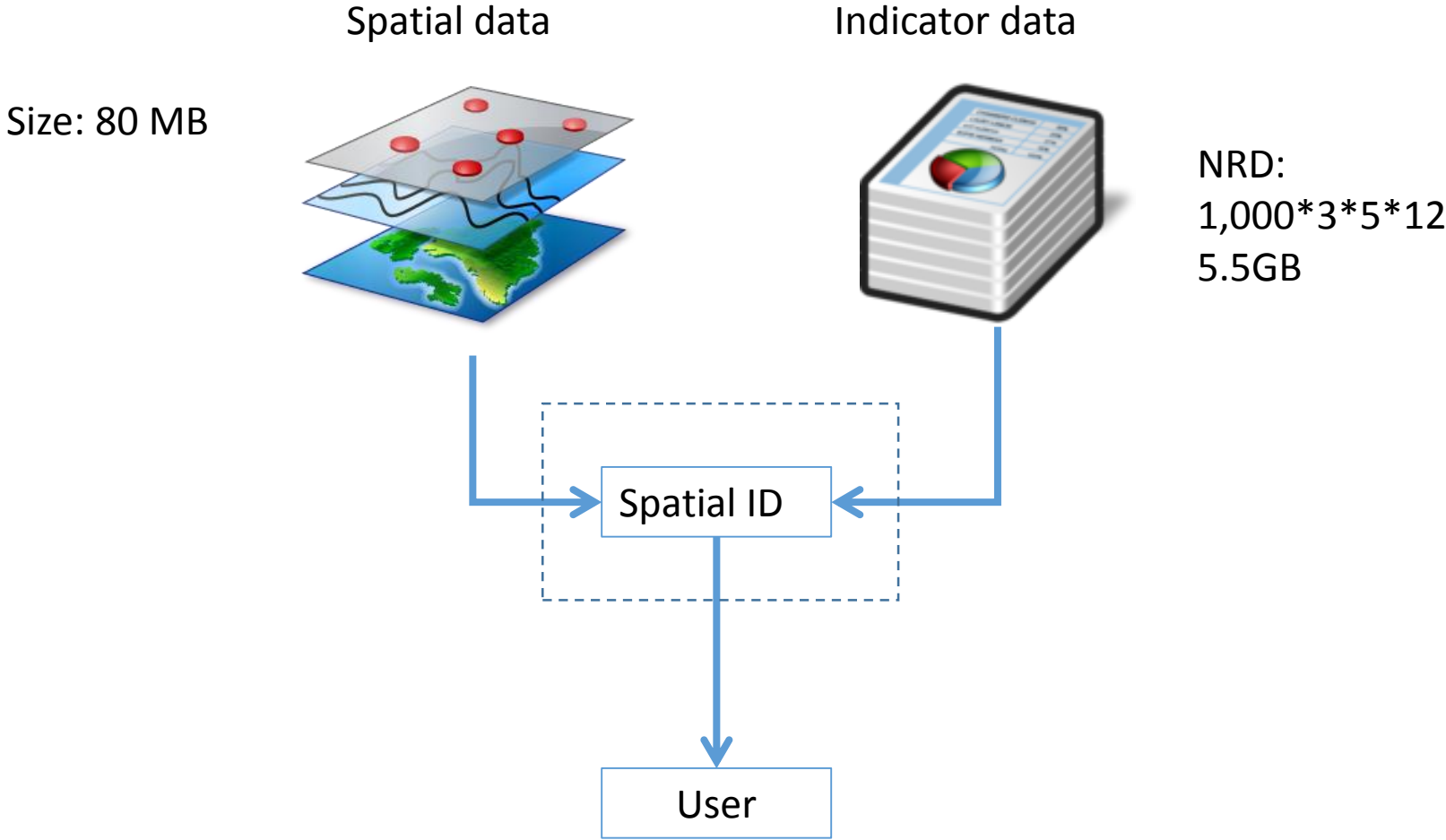
- Light load of spatial component (MB)
 - Boundary data
 - Bank point data
 - Enterprise point data
 - Central point data
- Heavy load of attribute component(indicators, variables) – (GB)
 - With spatial ID

General GIS Database Structure

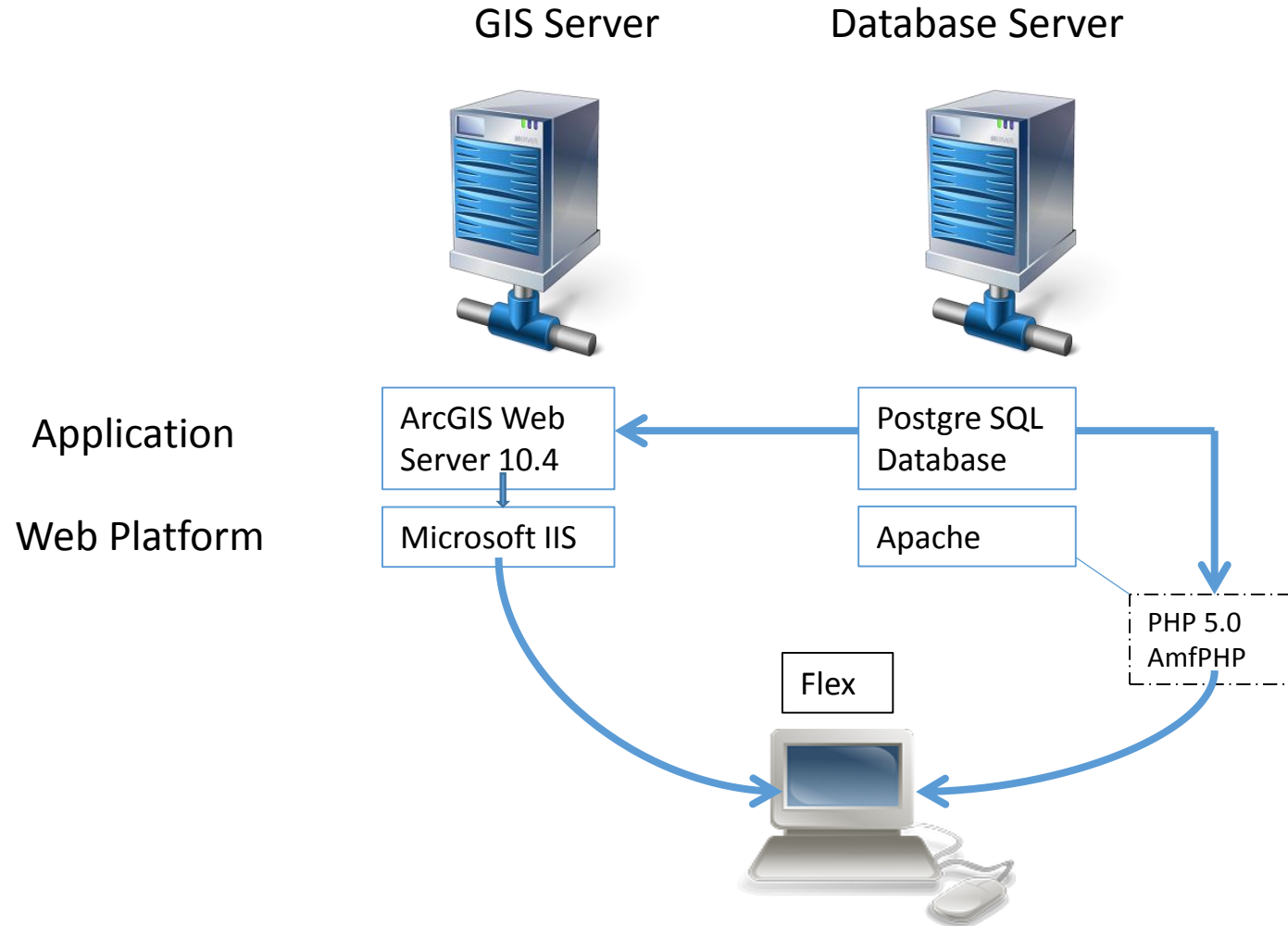


FID	Shape	FNODE#	TNODE	LPOLY#	RPOLY#	LENGTH	ROADS	ROADS-ID	ROAD_NAME	DESCRIPTION	SURFACE	USE	USE_CLASS
1	Polyline	2	1	0	0	1243.893107	1	1	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
2	Polyline	3	4	0	0	2387.647518	2	3	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
3	Polyline	5	6	0	0	484.818418	3	6	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
4	Polyline	7	8	0	0	326.794715	4	7	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
5	Polyline	9	10	0	0	803.435155	5	9	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
6	Polyline	10	11	0	0	6314.783059	6	10	1000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
7	Polyline	13	12	0	0	699.327419	7	11	300 ROAD	ROAD	GRAVEL	UNIMPROVE	TERTIARY
8	Polyline	13	14	0	0	5088.004055	8	12	300 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
9	Polyline	5	15	0	0	1881.433408	9	13	1040 ROAD	ROAD	GRAVEL	UNIMPROVE	TERTIARY
10	Polyline	16	17	0	0	945.055371	10	14	1050 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
11	Polyline	16	18	0	0	2413.742321	11	15	1060 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
12	Polyline	11	19	0	0	1035.360644	12	18	1080 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
13	Polyline	19	20	0	0	273.480025	13	19	1081 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
14	Polyline	20	21	0	0	207.541925	14	20	1081 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
15	Polyline	21	22	0	0	831.745741	15	21	1081 SLUDGE RD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
16	Polyline	20	23	0	0	255.21863	16	22	1081 SPUR RD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
17	Polyline	24	21	0	0	3545.786418	17	23	1081 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
18	Polyline	25	25	0	0	357.182352	18	26	1200 ROAD	ROAD	GRAVEL	UNIMPROVE	TERTIARY
19	Polyline	8	27	0	0	4657.619118	19	27	1300 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
20	Polyline	28	29	0	0	1341.955572	20	31	1336 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
21	Polyline	31	30	0	0	1494.004407	21	36	1330 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY
22	Polyline	10	32	0	0	7698.07844	22	37	1400 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
23	Polyline	33	34	0	0	1869.375648	23	38	1600 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
24	Polyline	34	35	0	0	842.850471	24	39	1600 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
25	Polyline	34	36	0	0	148.26042	25	40	1600 ROAD	ROAD	GRAVEL	UNIMPROVE	SECONDARY
26	Polyline	37	38	0	0	3353.325873	26	42	2000 ROAD	ROAD	GRAVEL	LIGHT-DUTY	PRIMARY

Thailand Econ Web Database Structure



Software



Data Processing

- General Rule
 - Aggregate to Tambon, Amphoe and Province level to protect privacy
 - Distinguish categorical and numerical variable
 - Multiple version of Null value
- Output
 - Aggregated data at each spatial unit
 - Indicator description

Next Step

- Uploading more data
- Upgrading to JavaScript
- More functions

Seeing is knowing

- User
 - Researcher
 - Business Analyst
 - Public Policy Maker
 - General Public
- Benefits
 - Save Cost/Time
 - Inspiration

Collaborate and Share

Q & A