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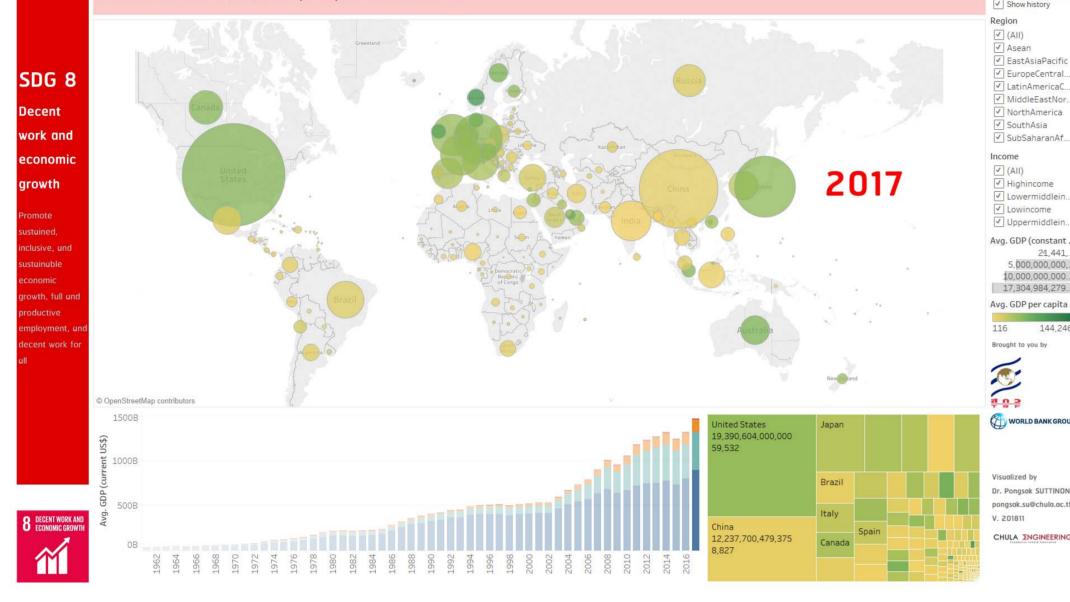
Foundation toward Innovation

## Water-Energy-Food NEXUS for Socio-Economic Development: Case of Thailand

Pongsak Suttinon<sup>1\*</sup>, Sucharit Koontanakulvong<sup>1</sup>, Viganda Varabuntoonvit<sup>2</sup>, Pongsun Bunditsakulchai<sup>3</sup>, Nattapong Puttanapong<sup>4</sup>, Piyatida Ruangrassmee<sup>1</sup>, Chokchai Suthidhummajit<sup>1</sup> Department of Water Resources Engineering, Faculty of Engineering, Chulalongkorn University<sup>1</sup>, Kasetsart University<sup>2</sup>, Chulalongkorn University<sup>3</sup>, Thammasart University<sup>4</sup>, Thailand (\*email: pongsak.su@chula.ac.th)

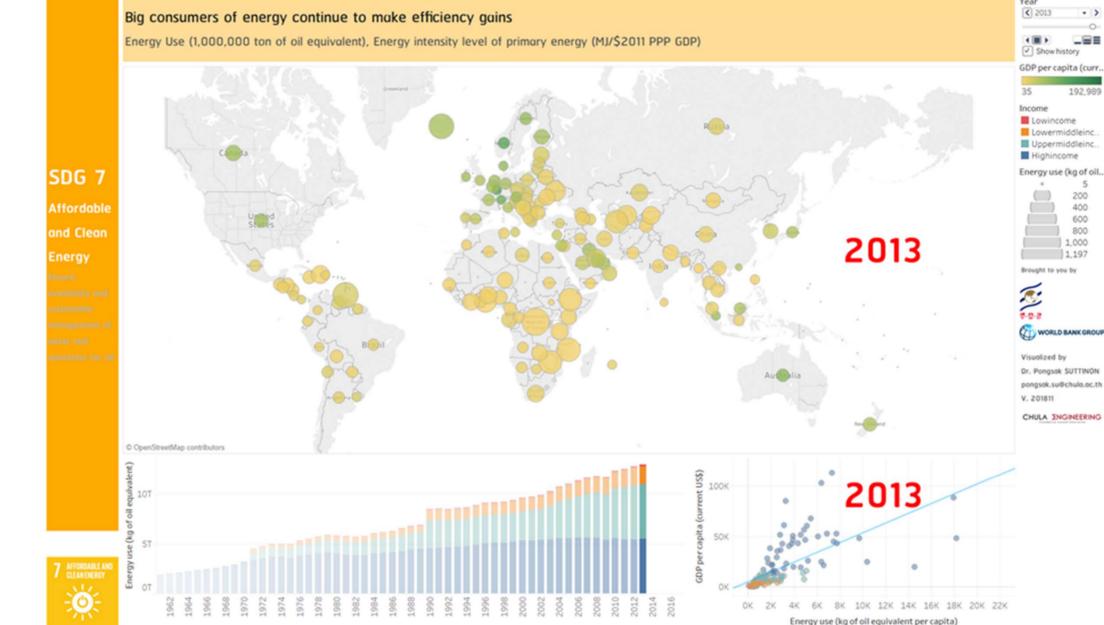
Why WEF NEXUS? Rapid urbanization in our world with regional socio-economic development is vulnerable under resource scarcity. Water, energy and food/land are essential to meet these demands. It is certain that all resources are also intensifying vulnerabilities to future demands. The "Water-Energy-Food NEXUS" approach aims to link socio-economic development and management of water, energy, and food securities by minimizing cotrade-off and optimizing co-benefit. "Data-Driven-Decision" is the main issue to support policy makers, developing database for synergies.

#### hiddle-income countries taking greater share of global economy ross Domestic Product (GDP) & GDP per Capita: constant 2010 USD



Development of Thailand in the world: Asian Development Bank concluded that "Asia's march to EastAsiaPac EuropeCentr LatinAmeri prosperity will be led by seven NorthAmer economies, two of them already developed and six fast growing middle income converging Avg. GDP (constant economies: PRC, India, Indonesia, Avg. GDP per capita Japan, Republic of Korea, Thailand and Malaysia" especially in socioeconomic terms.

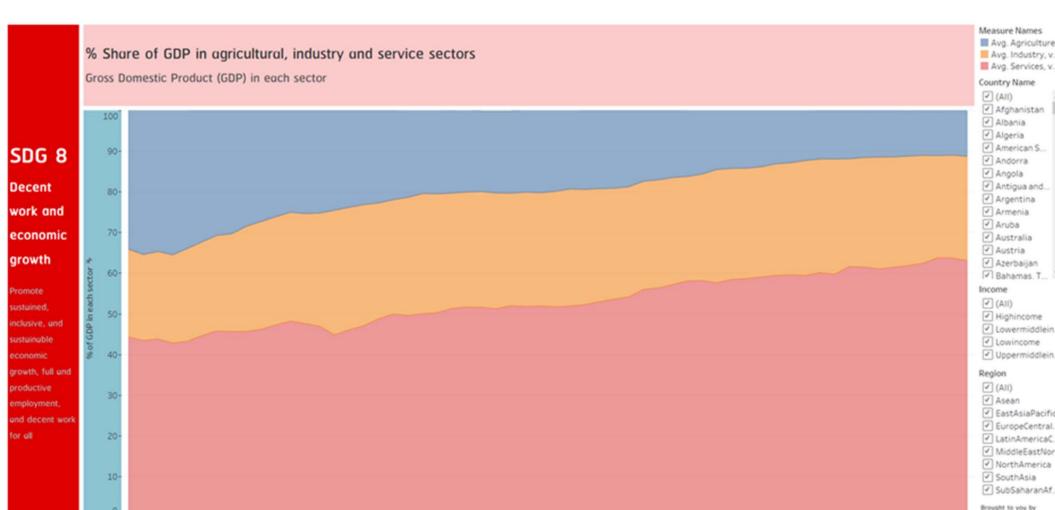
< 2017



**Energy** intensity Energy is the same trend as water issue. High-income country always consumes greater water use per

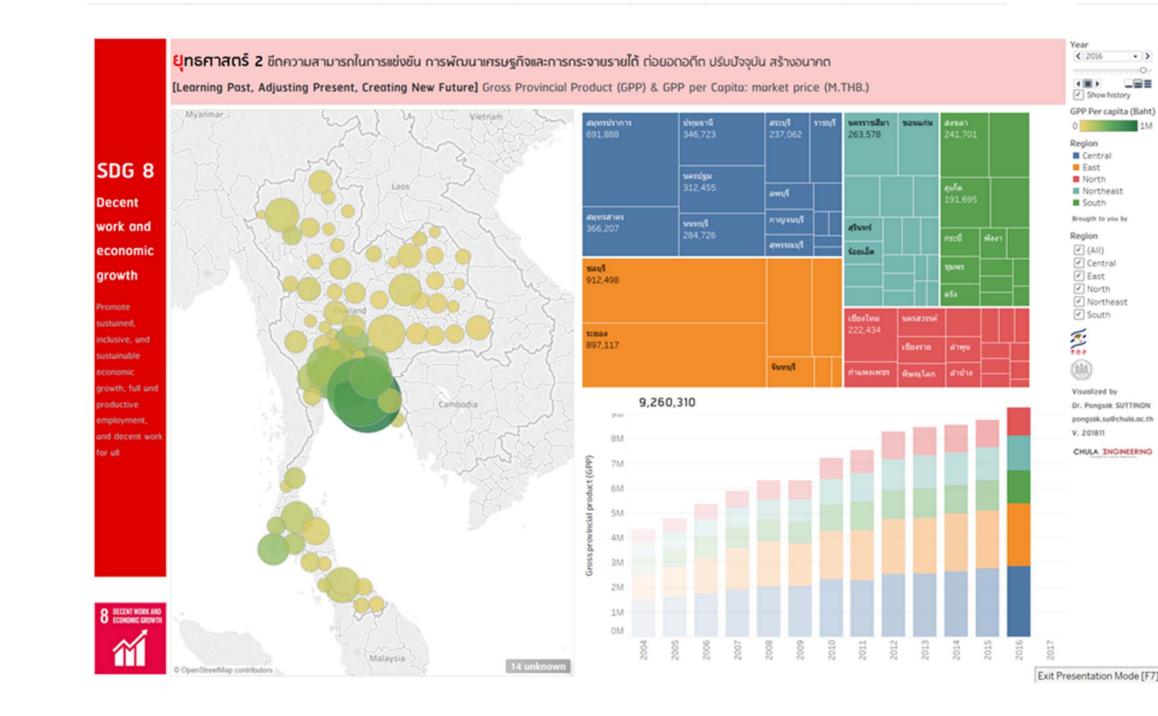
Energy use (kg of o capita. If Thailand would like to be developed country in the near future. We should carefully consider how to manage water, energy, and

land in a sustainable way. Visualized by Dr. Pongsak SUTTINO pongsak.su@chula.oc.th V. 201811 CHULA ENGINEERING



#### Economic structural change

Change of economic structure from the past to present shows that percentage of GDP in agricultural sector is decreasing and service sector is increasing. Thailand is also changing with this trend under concerns of water, energy and food security.



#### < 2016 Security in Local level

Region

East North

Northe

Brougth to you

Region (All) Central East North Northeau South

1

Visuolized

V. 201811

Region Central

East

North

South

Region

🗹 (All)

Centra

Brough to you

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**Dr. Pongsak SUTTINON** 

pongsak.su@chula.ac.th

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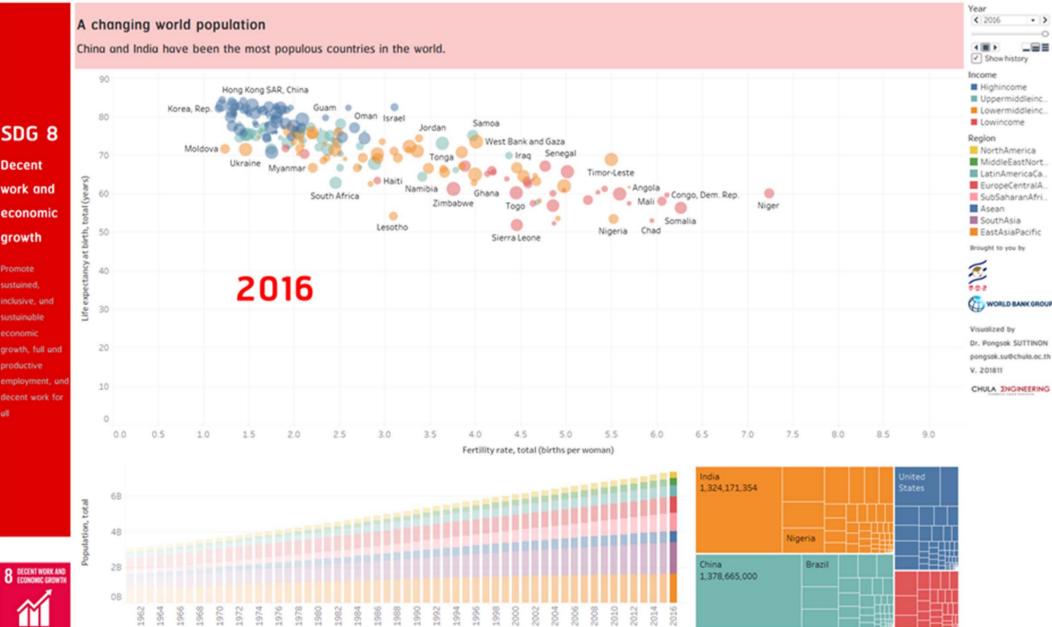
🖌 East

Northea

South

Socio-economic development in GPP Per capita (Bah each province For local scale in Thailand, gross provincial product (GPP) and GPP per capita are considered from the past. It is certain that we are growing to be one of developed Dr. Pongsok SUTTING country in the near future based on pongsak.su@chula.ac.t CHULA ENGINEERIN national long-term strategy. However, income gap between urban and rural is also expanding. Urbanization may make an inequality issue.

	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2017
Avg. Agriculture, value added (% of	35.59	32.33	26.18	23.83	20.54	20.15	19.59	17.41	14.58	12.98	11.54	11.06	11.22
Avg. Industry, value added (% of GD.,	21.64	23.03	26.61	30.14	29.55	28.47	28.77	26.60	27.89	27.55	26.94	25.17	25.65
Avg. Services, value added (% of G.,	44.22	44.64	47.22	46.03	50.00	51.22	51.88	55.96	\$7.57	59.56	61.47	63.74	63.05



#### A changing world population Aug. GDP (constant 2010 USS Water productivity, GDP and kilocalories of food Income Highincome Uppermiddlein Lowermide Lowincome Brought to you by 1

### Population change

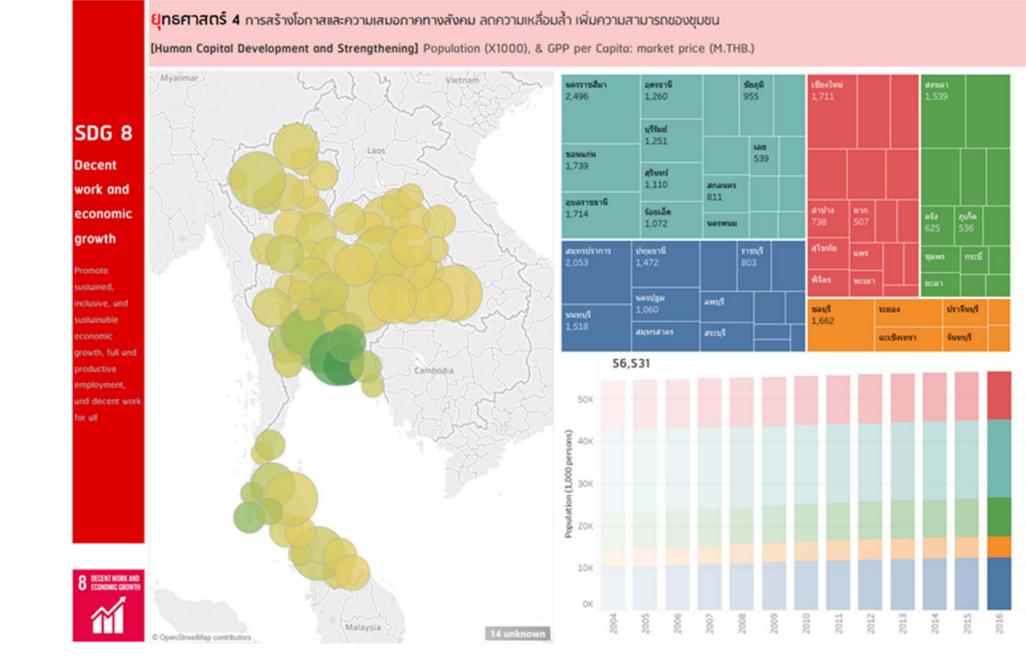
WORLD BANK GROU

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Ageing society is one of megatrends in our world. Reducing fertility rate with increasing life expectancy are mainly illustrated for all high-income, middle-income and low-income countries.

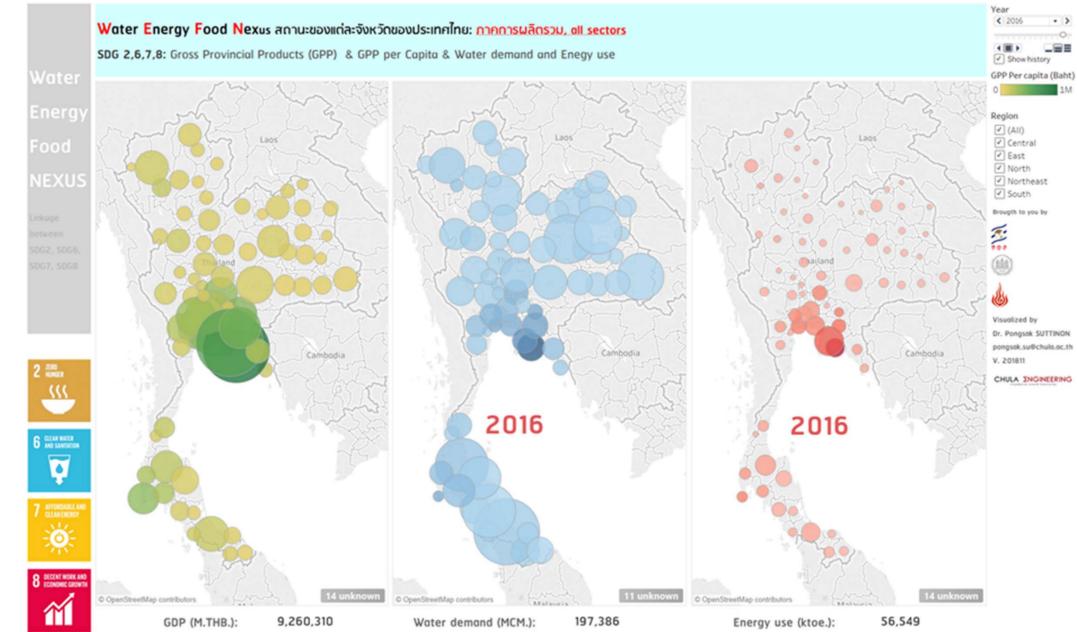


#### Population change < 2016

Number of populations in Thailand GPP Per capita (Ba is still growing with slower rate. National Economic and Social **Development Board concludes that** ageing society will be an important ✓ North
✓ Northeast
✓ South issue in the near future.

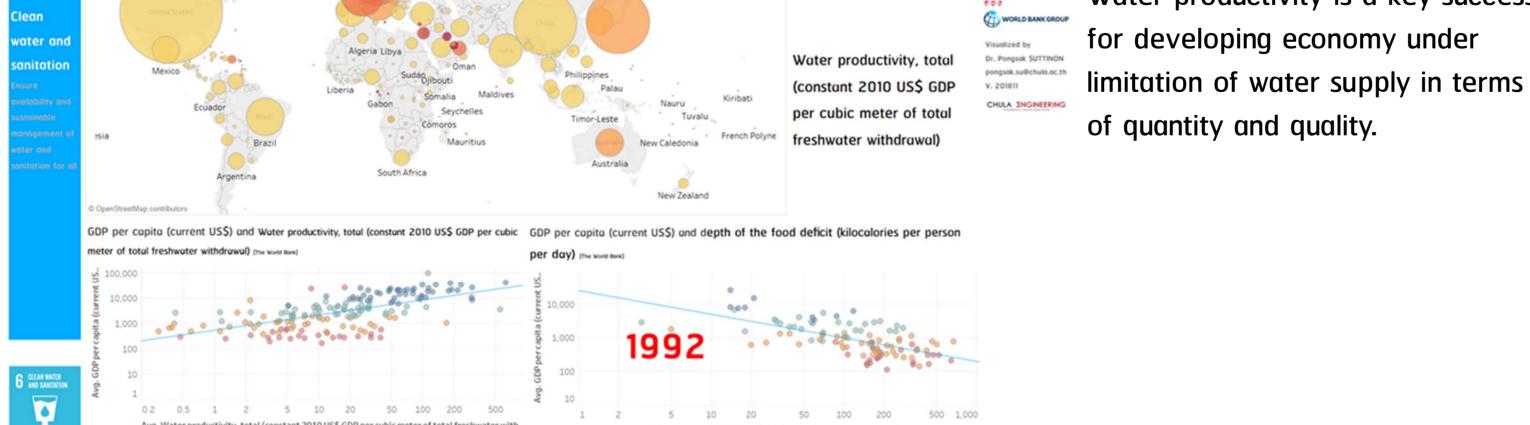
#### Water productivity

High-income country needs more water use per capita to meet socioeconomic development. Water productivity is a key success



## Linkage of socio-economic, water, and energy

Water-Energy-Food/Land NEXUS illustrated how all resources are managed to meet the past development. In the near future, greater productivity and linkage of each resource to socio-economic development is the main issue for policy makers in each level from central government with policy to local community with implementation.



### **Conclusions and recommendations**

The "Water-Energy-Food NEXUS" is an approach to link socio-economic development and management of water, energy, and food securities by minimizing co-trade-off and optimizing co-benefit.

For economic development and urbanization, Thailand needs database and management tool that can integrate socioeconomic development and resources.

#### Acknowledgements

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