



Low Carbon Policies and Actions in City Level

Sirintornthep Towprayoon

Joint Graduate School of Energy and Environment and Earth System Science Research Center
King Mongkut's University of Technology Thonburi

Behavioral Change : Urban and Rural

- ▶ More than 60 percent of population live in rural area
- ▶ Many communities have introduced 'sufficiency economic principle' in their way of living and to co-existing with nature.
- ▶ Mindset of consumption through eco-thinking and routine activities are different from urban communities



Targets, Policies and Actions

Muang Klang Rayong Province

Bangkok Metropolitan

- ▶ Declaration of 5 years plan
- ▶ Cutting 15 % of current emission by 2012
 - Improvement of transportation system
 - Promotion of renewable energy
 - Energy Conservation and Building Retrofit
 - Waste management
 - Expansion of Green area

- ▶ No declaration
- ▶ No cutting target
 - Improving and route setting of city bus
 - Solid waste management
 - Urban Agriculture

Ban Pred Nai village

- Problems encounter
 - Protect coastal erosion
 - Reforestation

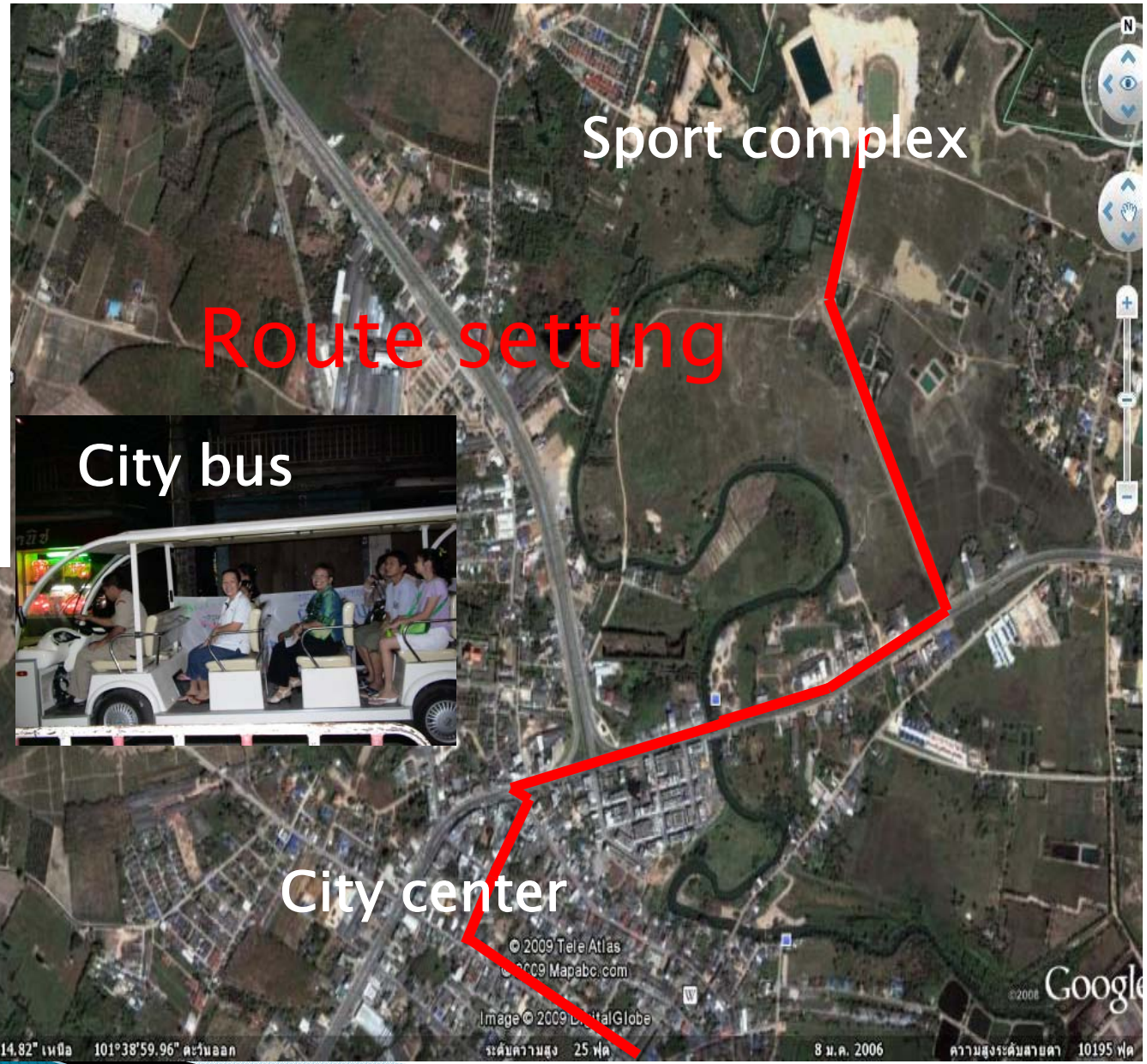
Chumporn Cabana Resort

- Problems encounter
 - Zero waste
 - Energy recovery

Muang Klang Municipality



Implementation of Policies



City bus



City bus



School bus

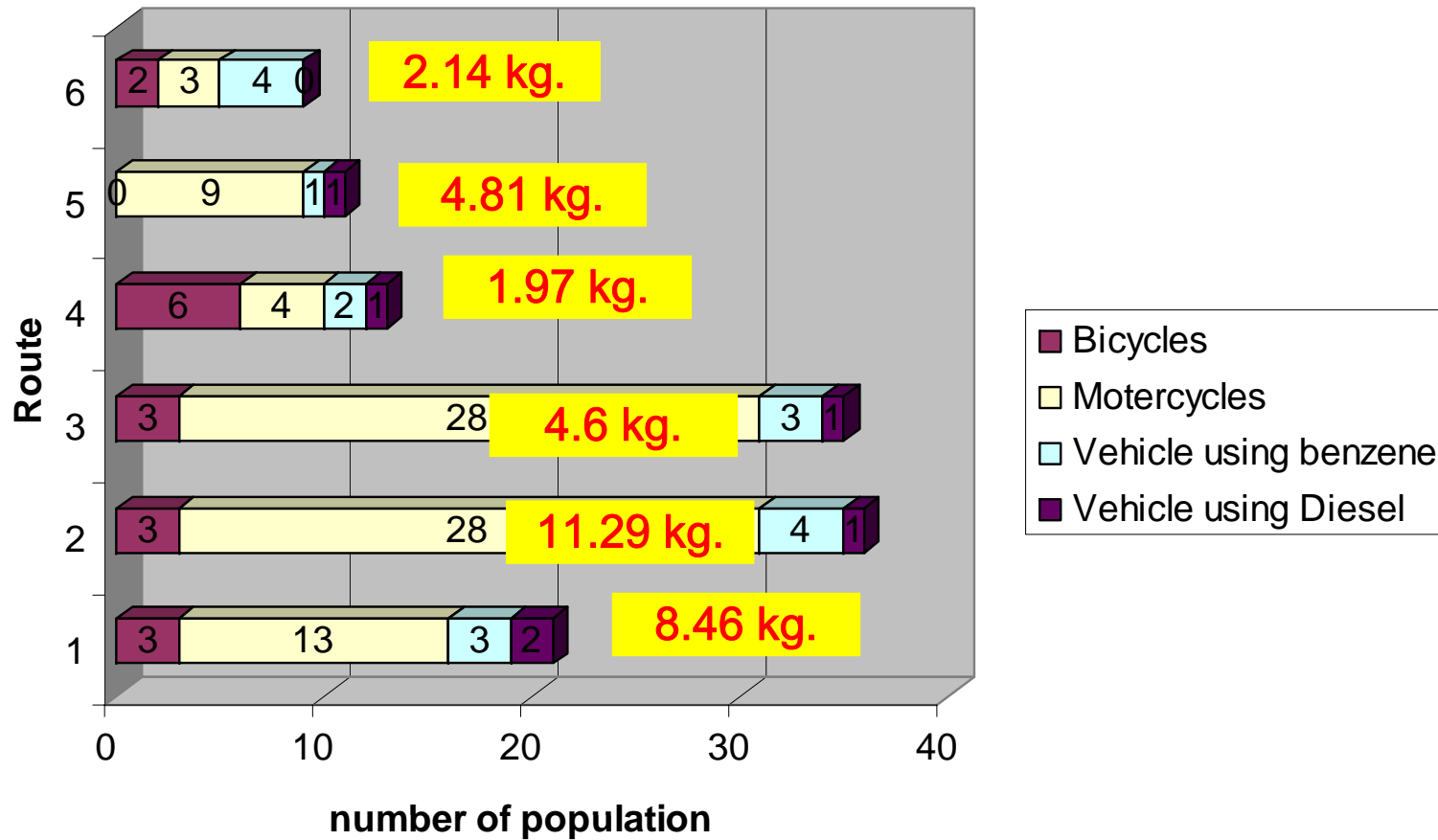
7°14.82" เหนือ 101°38'59.96" ตะวันออก

ระดับความสูง 25 ฟุต

8 ม.ค. 2006

ความสูงระดับสายตา 10195 ฟุต

Number of population used city transportation



126 persons CO2 avoidance 12 tons per year

Implementation of actions Sufficiency economy that support action of low carbon activity

- ▶ Prevention of coastal erosion and reforestation of mangrove area
- ▶ Charcoal production from orchard trimming waste wood



Ban Pred Nai Village, Trad Province

- ▶ Zero waste
- ▶ Eco driving
- ▶ Employee production
- ▶ Energy recovery



Chumporn Cabana resort, Chumporn province

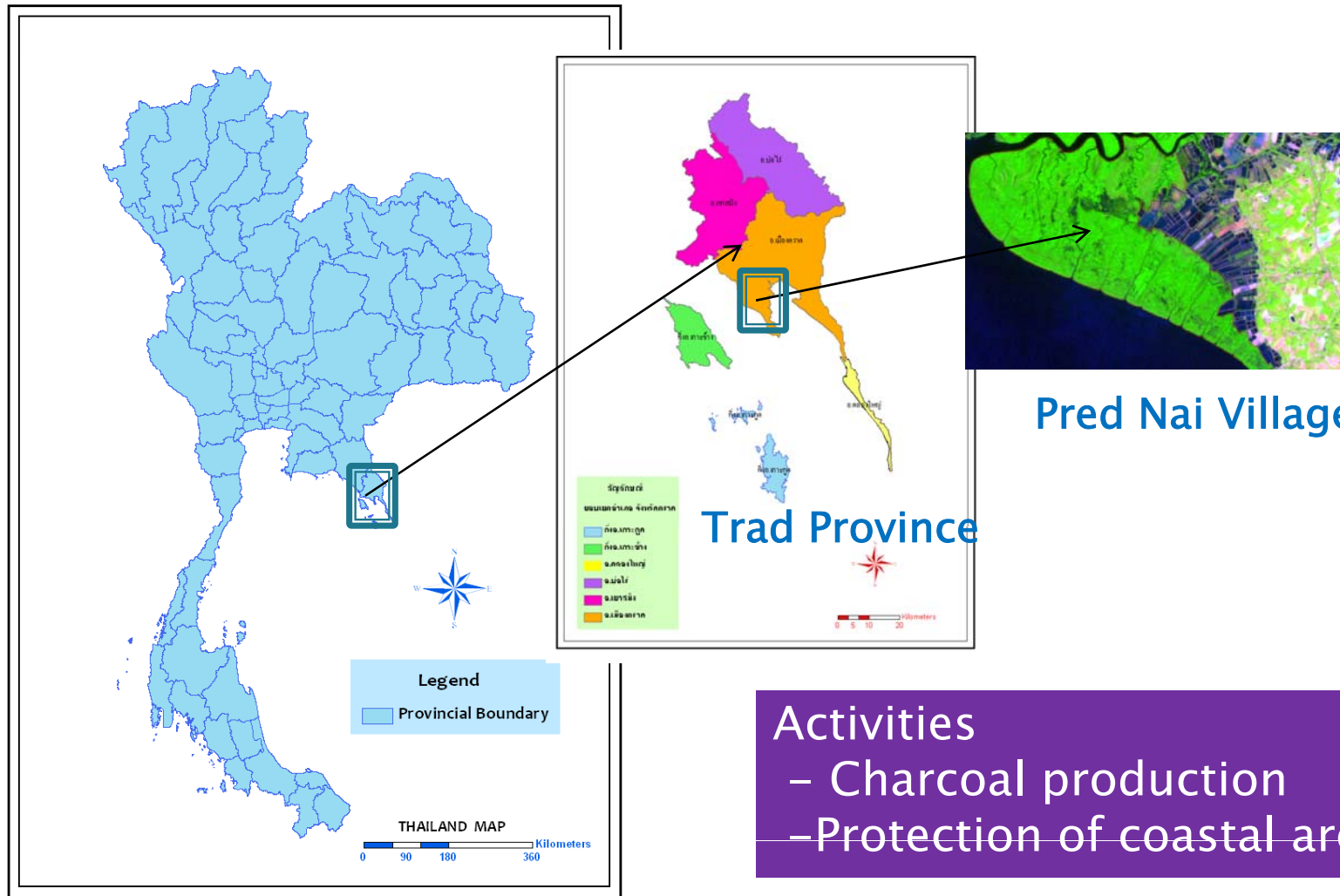
Sufficiency Economy Indicators

- Community activities to conserve and restore natural resources
- Application of rules in using and managing natural resources and the environment
- Human Resource Development and Networks
- Awareness among community members of environmental conservation
- Application of Local Wisdom and Innovation
- Integrated practice in natural resource and environmental management
- Recognition of Carrying Capacity and Ecological Balance
- **An adjustment of lifestyles in consistency with nature**

Low carbon society principles

- Carbon Minimization
 - Minimization of carbon dioxide emissions from all sectors
- Simpler and Richer quality of life
 - Society shifting from consumption towards QOL oriented society. Revolution led by society consumer's choice.
- Coexistence with nature
 - Maintaining and restoring natural environment that is that is essential for LCS

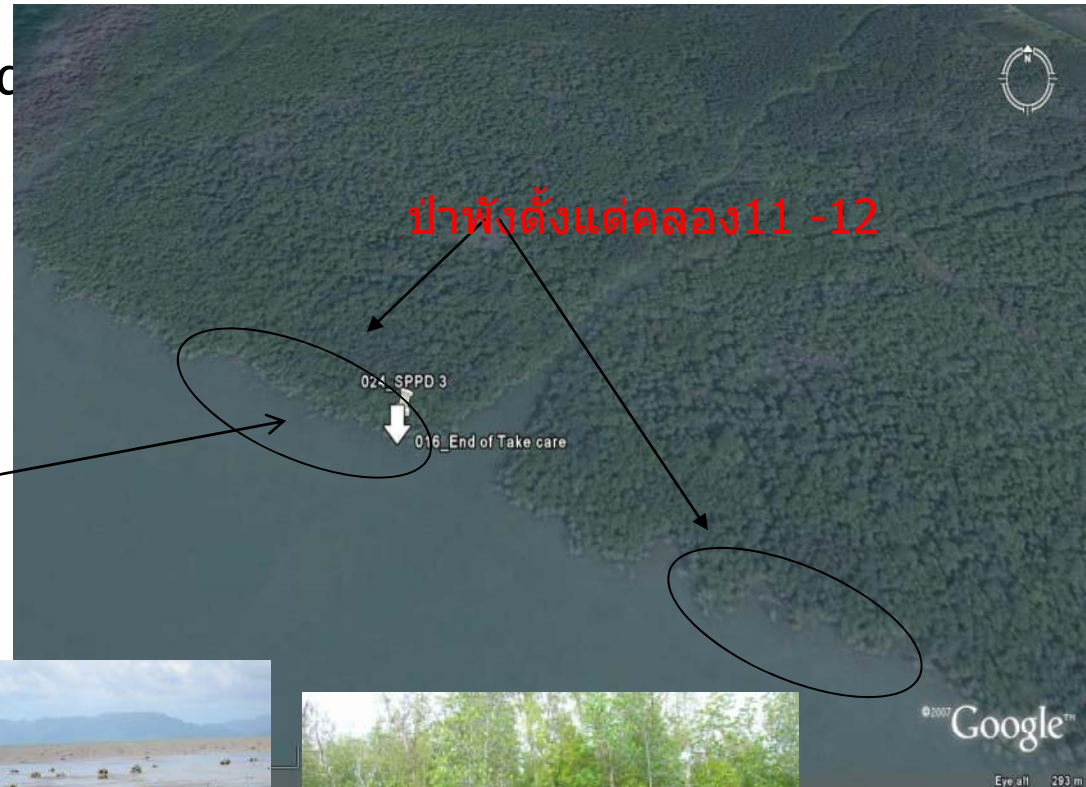
Sufficiency Economy and Low Carbon Society : Sufficiency Carbon Economics Society

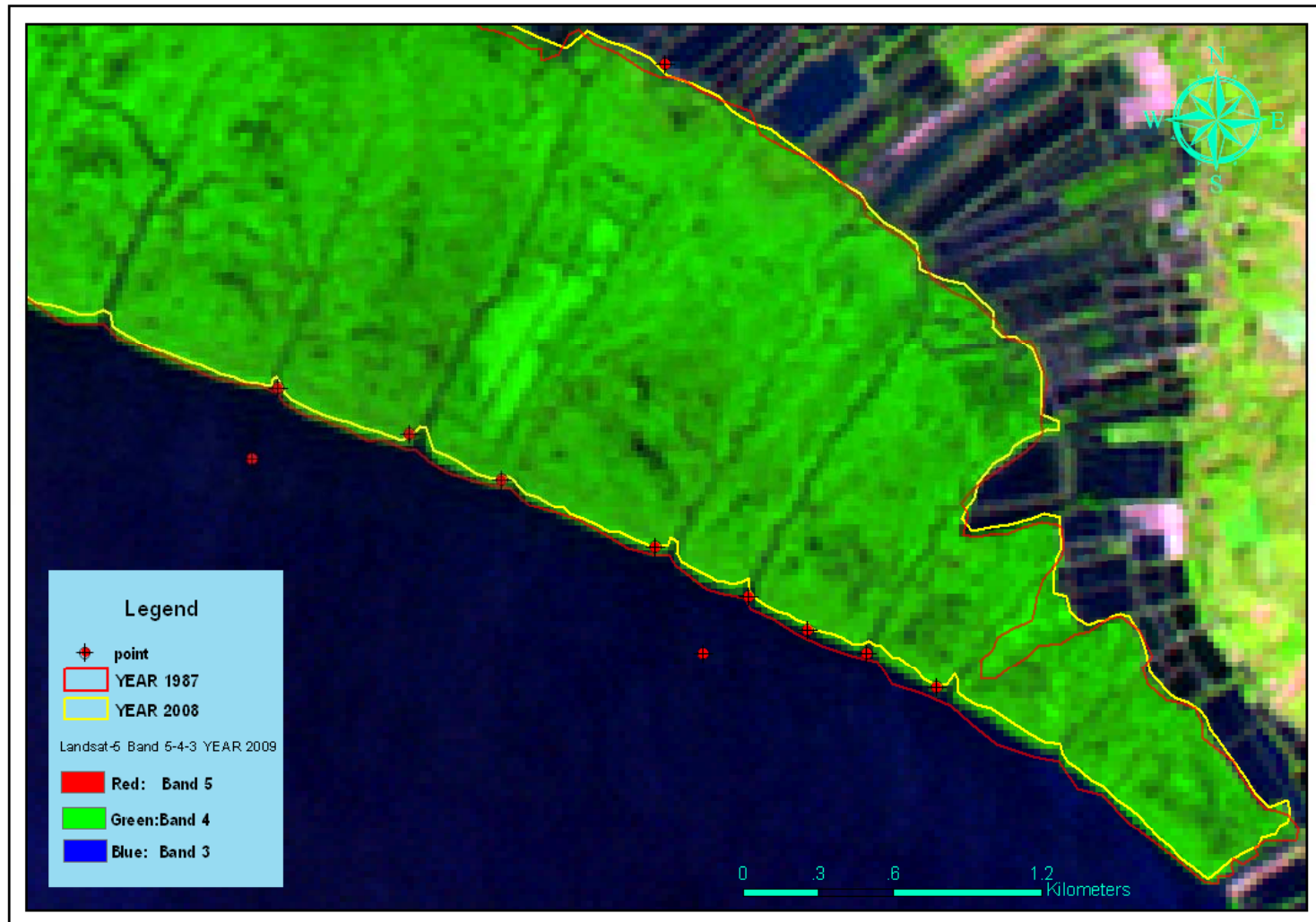


Activities
 – Charcoal production
 – Protection of coastal area etc

Protection of coastal area erosion

- ▶ Coastal area was destroyed by strong wave
 - erosion occurred
- ▶ Mangrove forest was degraded
 - Biodiversity loss
 - Less income



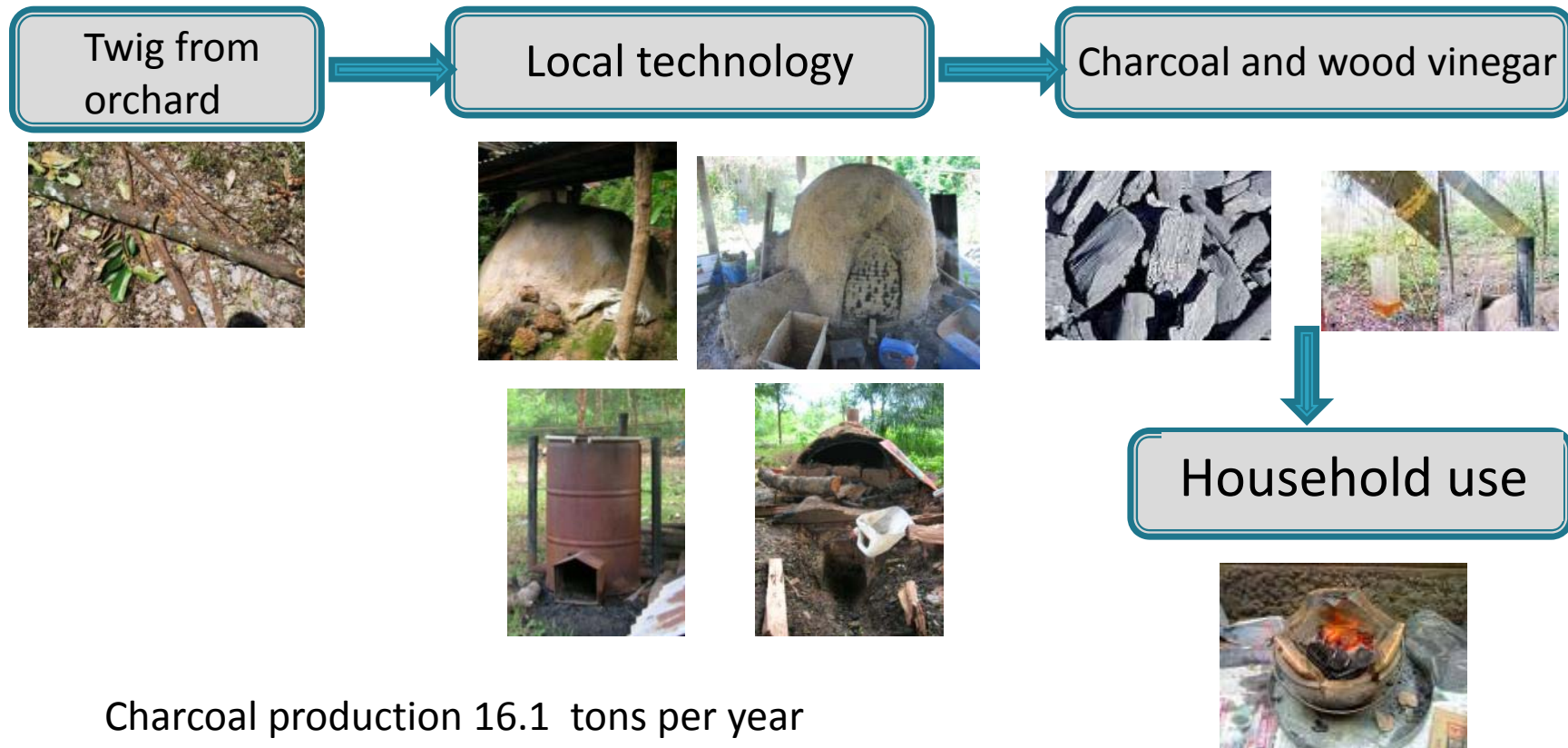




LANDSAT-5

Increasing 102 rai of mangrove area
Removal of CO₂ approx. 593.78 t/yr

Charcoal production



Charcoal production 16.1 tons per year
Reduction of LPG used in household = 9.9 tons per year
Cost saving 5500 USD per year
CO2 avoidance 30.26 tons per year

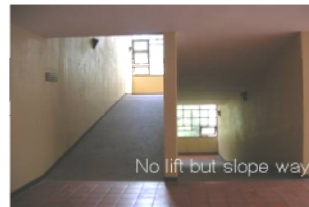
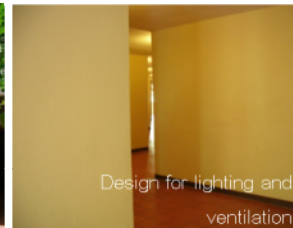
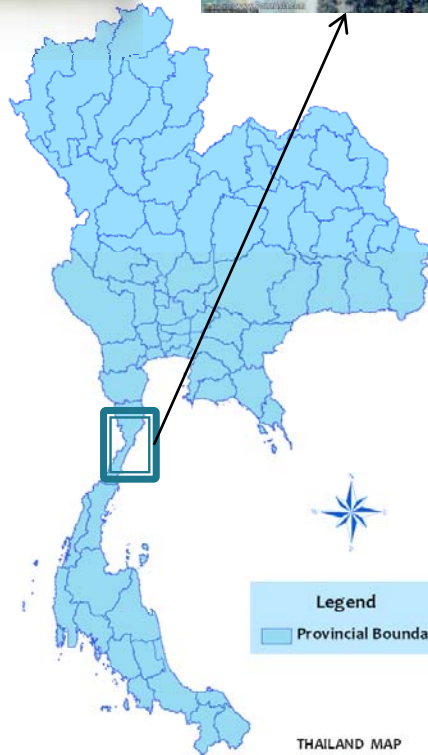
Assessment of CO2 emission reduction

- ▶ Population in Ban Pred Nai Village= 591
- ▶ CO2 avoidance from charcoal production 0.051 tons per head per year
- ▶ CO2 adsorption from forest management and reforestation 2.039 tons per head per year

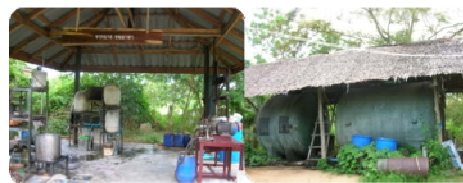
Total CO2 mitigation 2.09 tons per head per year

From National GHG Inventory Average CO2 Emission of Thai people is approx 5.67 tons per head per year

Sufficiency Economy and Low Carbon Society : Sufficiency Carbon Economics Society



Waste water treatment



Energy Recovery



Employee production

Chumphon Cabana Resort

Chumporn Cabana Resort : zero waste

Unit: per month

Raw materials

จากกิจกรรมภายใน
ไข่ 3000-4500ฟอง/

จากภายนอก ผัก 9000 กก, เนื้อสัตว์ 150(แขกน้อย) 900-1200(แขกมาก) กก, รวมได้ประมาณ ข้าว 1 ตัน 11,000 กก.

Activity to support ecotourism

- ทำนา
- ปลูกผักสวนครัว
- เลี้ยงไก่
- ปลูกพันธุ์ไม้ต่างๆ
- ทำผลิตภัณฑ์ต่างๆ

2 Catering

3 Plantation
- 2,000 trees 2 ปี
- 3,000 trees (ยังไม่เข้าธนาคาร)

4 Other services
diving
Spa

Used oil (l/month)
outside 150-1,500

Food waste
6,000 กก./

Yard waste
4,500 กก/เดือน

Rice husk
mul/เศษอาหาร
60 กก/wastewater 15,000 ลิตร

Biodiesel
2,400 l/month

Biogas
3,000 kg/month

Charcoal
1,500 กก/เดือน

น้ำส้มควันไม้
จากภายนอก 200 ลิตร/เดือน

ระเบิดจุลินทรีย์
(ลูก/เดือน)

ปุ๋ยชีวภาพ
360 ลิตร/เดือน

วางขาย

ขาย

ก๊าซเชื้อเพลิง
(ยังไม่ได้ดำเนินการ)

substitutediesel
2191.2 L
CO₂ avoidance
6.015 Ton CO₂

substitute LPG
1817.6 kg
CO₂ avoidance
5.505 Ton CO₂

CO₂ removal
1113.74 kg CO₂

Waste recycle
กระดาษ 30 กก.
พลาสติก(ขวด300 ถุง30) กก
กระป๋องต่างๆ 100

ตัดแยก

gasification

Gasification (ยังไม่ได้ดำเนินการ)

Electricity emitted
58.67 Ton CO₂
LPG 4.046 Ton CO₂

ทดแทนยาปราบศัตรูพืช
เพิ่มปริมาณออกซิเจน
ทดแทนปุ๋ยเคมี

Gasoline 20.81 Ton

CO2 avoidance

Activity	Ton CO2/month	kg CO2/guest night
Avoided CO2		
Charcoal and biogas	5.505	0.98
Biodiesel	6.015	1.07
CO2 removal		
Hard wood plantation	539.24	0.10
Soft wood plantation	579.5	0.10
Total CO2 avoidance		2.26

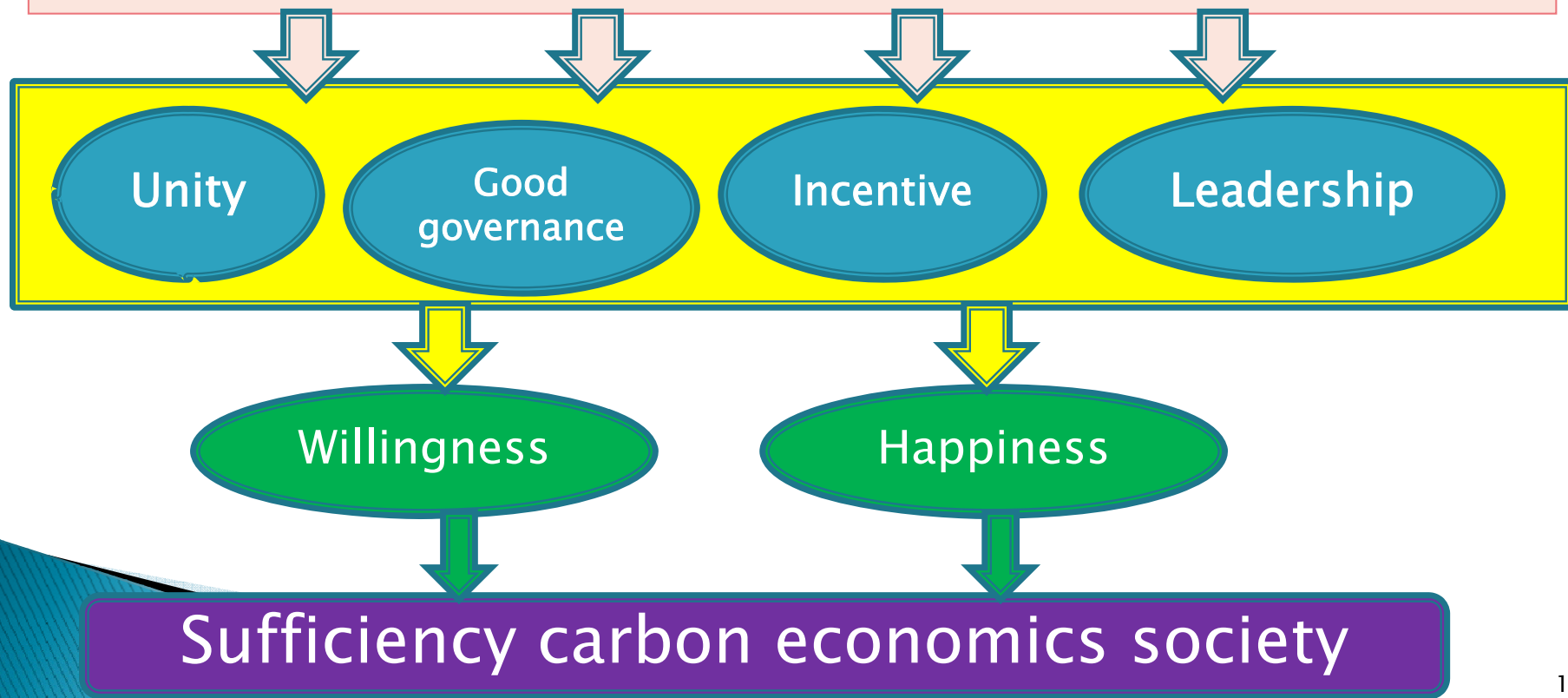
CO2 emission

Activity	Ton CO2/month	kg CO2/guest night
Electricity		10.48
Diesel	15.08	2.69
Benzene	2.71	0.48
LPG (car)	3.02	0.54
LPG (cooking)	4.05	0.72
Total CO2 emission		14.92

Average Hotel emission per guest night of Word Tourist Organization
= 20.6 kg Co2 /guest night

LCS driven by sufficiency approach

- Community activities to conserve and restore natural resources
- Application of rules in using and managing natural resources and the environment
- Human Resource Development and Networks
- Awareness among community members of environmental conservation
- Application of Local Wisdom and Innovation
- Integrated practice in natural resource and environmental management
- Recognition of Carrying Capacity and Ecological Balance
- An adjustment of lifestyles in consistency with nature



Three different drivers



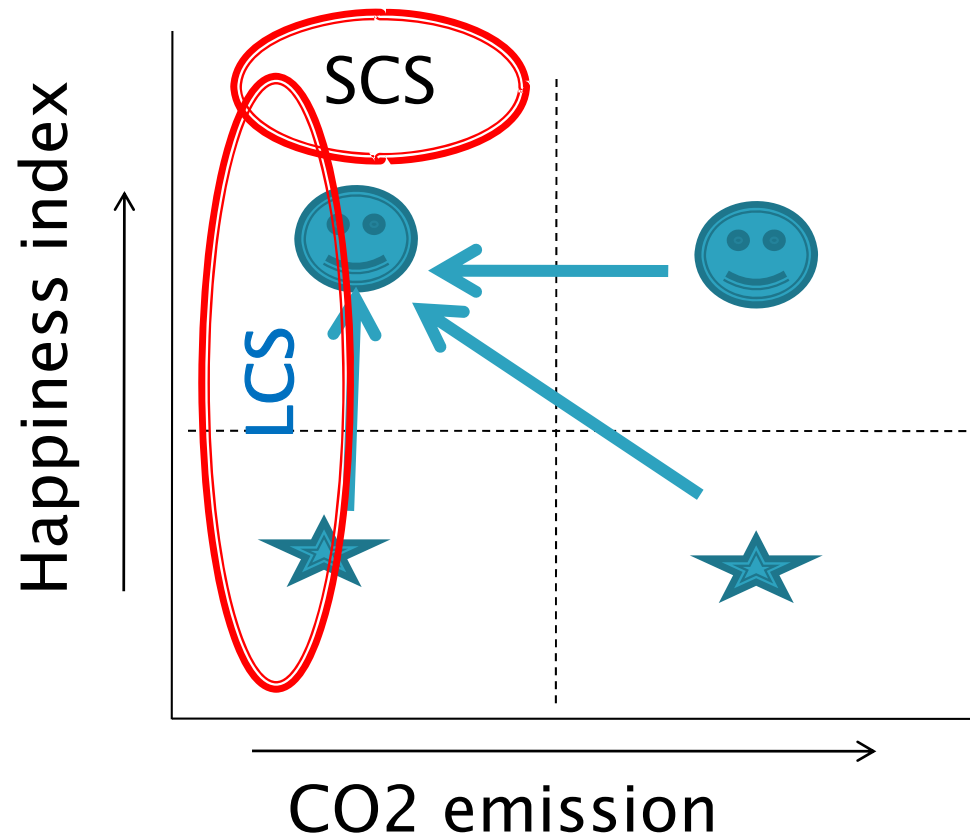
▶ Leadership



• Good governance



• Unity



Towprayoon et al 2009

Issues of low carbon and climate change

Mitigation	Adaptation	Sustainability
<ul style="list-style-type: none">• Carbon dioxide removal (2.037 ton per head per year)• Potential to be a sink of GHG	<ul style="list-style-type: none">• High coping capacity with climate change• Adaptation to coastal erosion	<ul style="list-style-type: none">• Forest management• Increasing income• Self sustainability

Indicators : Ratio of CO2 emission per head / average national emission per head

Mitigation	Adaptation	Sustainability
<ul style="list-style-type: none">• Fossil fuel substitution• Avoid CO2•	<ul style="list-style-type: none">• Adaptive capacity for fuel scarcity• Increase local consumption	<ul style="list-style-type: none">• Wood residue management• Fuel self sustainability

Indicator : Reduction of Fossil fuel consumption and increase local consumption

Indicators of sufficiency carbon society

Emission indicators

- ▶ Ratio of CO2 emission per head /average national emission per head
- ▶ Reduction of fossil fuel consumption and increase local consumption

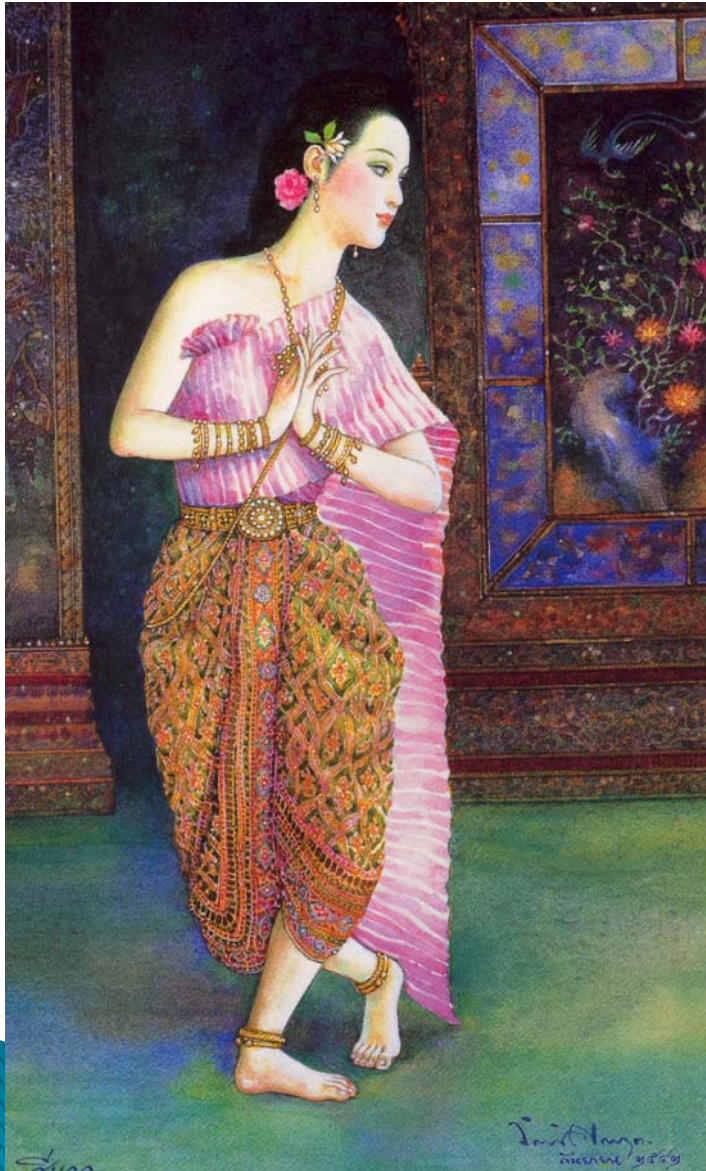
Good governance and Emission Indicators

- ▶ **Reduction** : Increasing ratio of emission reduction from individual than community activity
- ▶ **Technology** : Increasing reduction from local mitigation technology /self dependence mitigation technology
- ▶ **Awareness** : Increasing self mitigation awareness with less dependence on leader or drivers

Conclusion

- ▶ Drivers to implementation of low carbon policies and action in city level are different from metropolitan
- ▶ Sufficiency Economy is a good foundation to move towards low carbon society and to become “ Sufficiency Carbon Economics Society”
- ▶ Transportation and waste management is the major element for LCS in city level
- ▶ Can low carbon emission be associated with willingness and happiness ??

Thank you for your attention and Sawasdee Ka



Acknowledgement

- ▶ Mayer of Muang Klang municipality : Mr.Somchai Chariyacharoen
- ▶ Thailand Research Fund
- ▶ The Good Governance for Social Development and Environmental Foundation