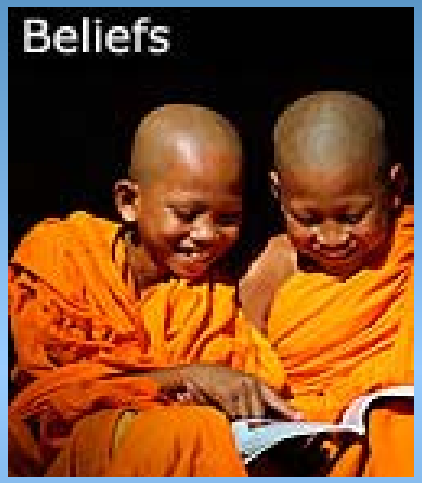
Thailand Country Report

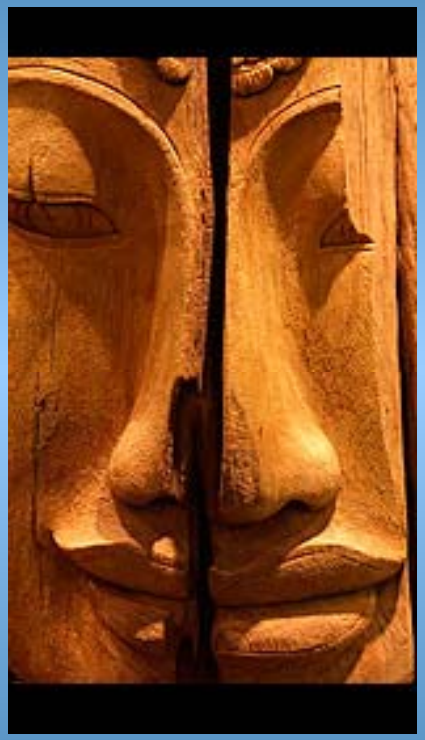
Solid Waste Management: The Case of Bangkok

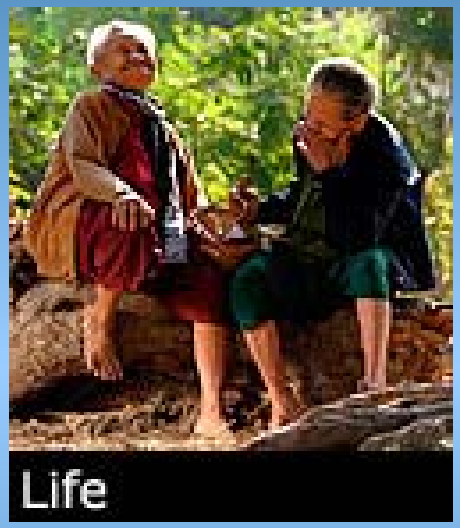
Department of Environment

Bangkok Metropolitan Administration

Thailand







“The Land of Smile”

Location of Thailand

Geographic and Social Indicator

Capital:	**Bangkok**
Area:	**513.1 thousand sq. km.**
Population:	**61.97 millions (2004)** [1]
Density:	**120.8 per sq. km. (2004)**
Average population growth rate (%):	**1.0 (2000-2005)** [2]
Life expectancy at birth (years):	**70 (2003)** [3]
Level of urbanization(%):	**32 (2003)** [2]
Urban growth rate:	**1.9 (2000-2005)** [2]

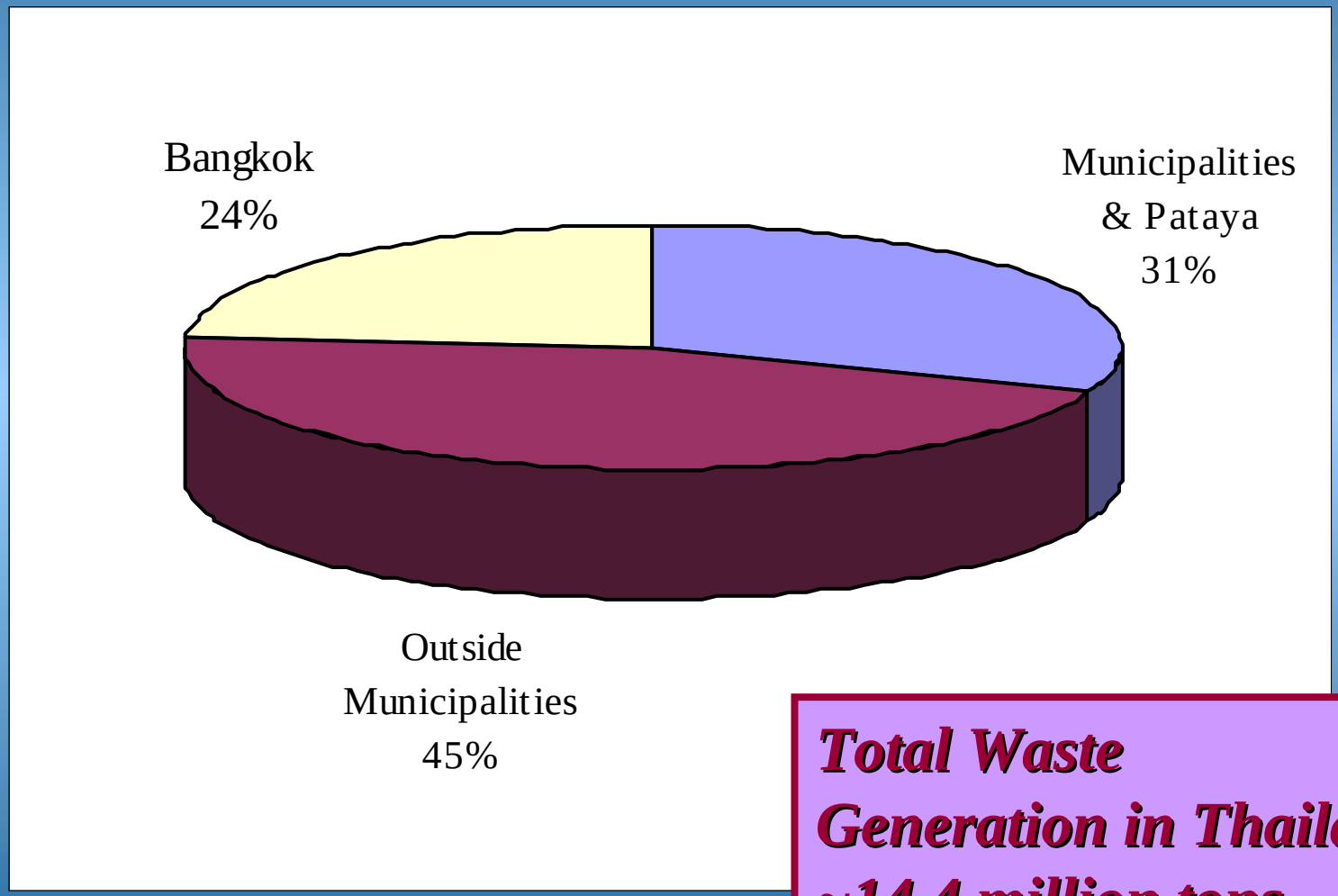
Source:

1 Ministry of Interior, Thailand

2.State of World Population 2007, UNFPA

3 World Health Organization

Percentage of Solid Waste Generation by Area in Year 2007



Total Waste Generation in Thailand ~14.4 million tons

Source: PCD, 2007

Bangkok

"Venice of the East"

Bangkok

Bangkok is the capital of Thailand with the total area of 1,568 sq.km., comprises 50 districts

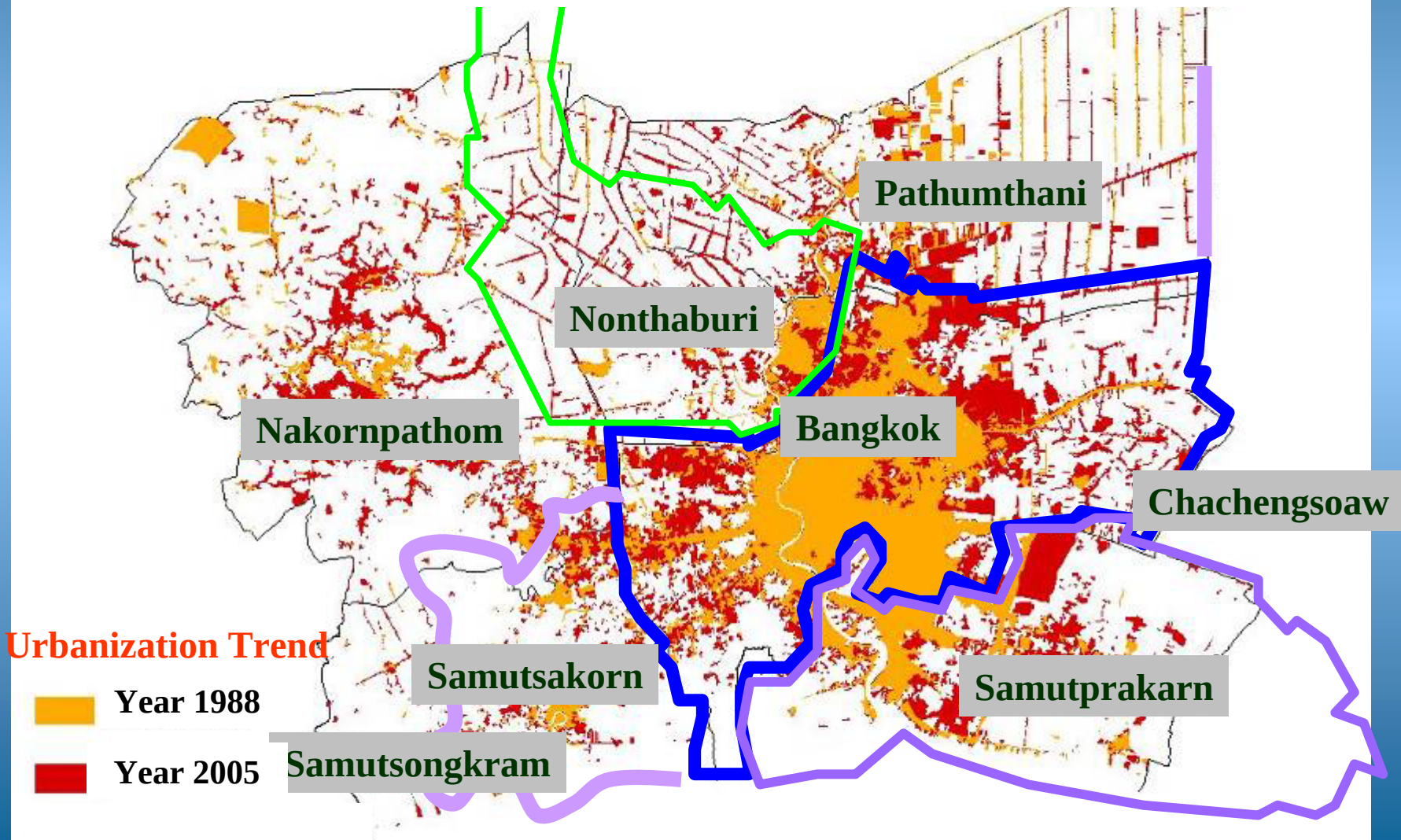
The registered population of Bangkok was approximately 5.64 million (May 2007), which was 10% of the total population of Thailand.

Including non-registered, population are estimated to be around 10 million.

Solid Waste Management in Bangkok

Bangkok Metropolis and Its Vicinity

Satellite Image of Urban Area Expansion from 1988 to 2005



Responsible Organization

BMA

50 District offices

- Waste Collection
- Street sweeping by workers
- Street cleaning by sweeping machine
- Waste collection from households located along the river and canal bank

Department of Environment

- Infectious waste collection from hospital and public health premises
- Waste collection in emergency case and other cases e.g. waste collection from river
- Waste disposal
- SWM planning, research, and technical support for the District Offices
- Cleaning cross-over-road bridges

The Bangkok Governor Policy

M.R.Sukumbhand Prribatr

Environmental Policy:

"Bangkok—our city is clean and attractive where people can live happily in a livable environment."

Goal:

"To raise waste collection efficiency and promote waste minimization in the Bangkok city"

Missions:

- *Launch the campaign to reduce the waste at least 10% by the year 2005*
- *Cooperate with plastic bag producer and department store to produce and sell the three colors bags for people throwing separated waste more comfortably.*
- *Cooperate with Thailand Environment Institute and the Federation of Thai Industries to set up the recycling system*
- *Inspect waste collection activities.*

Expected Outcome:

- *Reduction of Waste Generation*
- *No uncollected waste in Bangkok City*
- *Decreasing of waste management expenditure*
- *Promotion of city cleanliness which meet public satisfaction*

Waste Generation and Composition

Situation of Solid Waste Management in Bangkok

Year 2007

Collected Waste Amount

8,718.78 Tons/day

Waste Reduction Amount

1,000 Tons/day

Sources of Municipal Waste

- Residential
- Marketplace
- Department Store
- Hospital
- Restaurant
- High Rise Building
- Apartment
- Community

Waste Composition at Transfer Stations (2007)

1. Composting waste (49.66%)

1. Food Waste
42.11%

2. Wood and Leave Waste 7.55%

Waste Composition at Transfer Stations (2007)

2. Recyclable Waste (13.68%)

1. Recyclable Paper 2.32%

2. Recyclable Plastic 4.87%

3. Foam 2.01%

4. Glass 2.72%

Waste Composition at Transfer Stations (2007)

3. Disposable Waste (36.66%)

1. Non-Recyclable Paper
9.40%

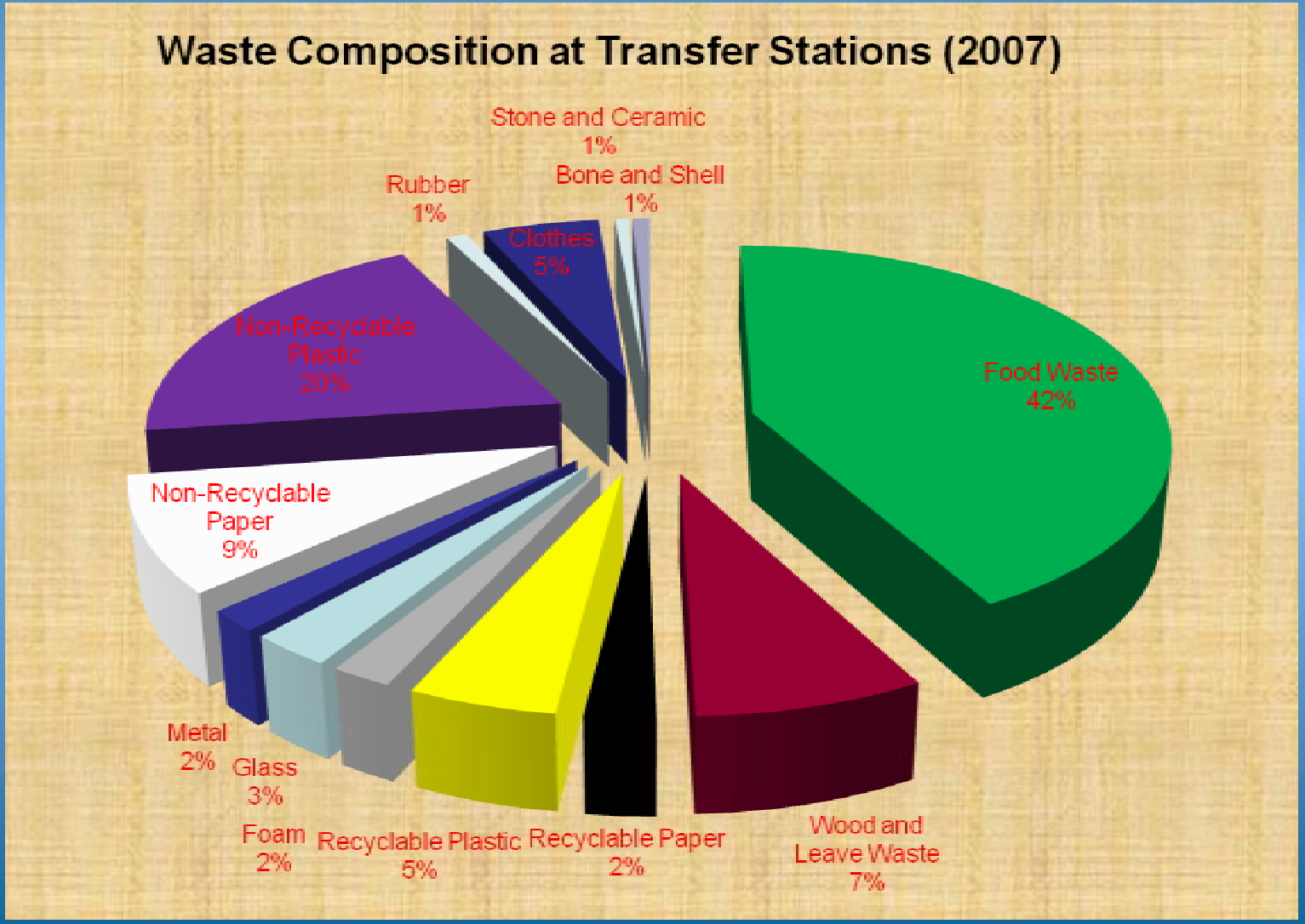
2. Non-Recyclable Plastic
19.63%

3. Rubber *0.95%*

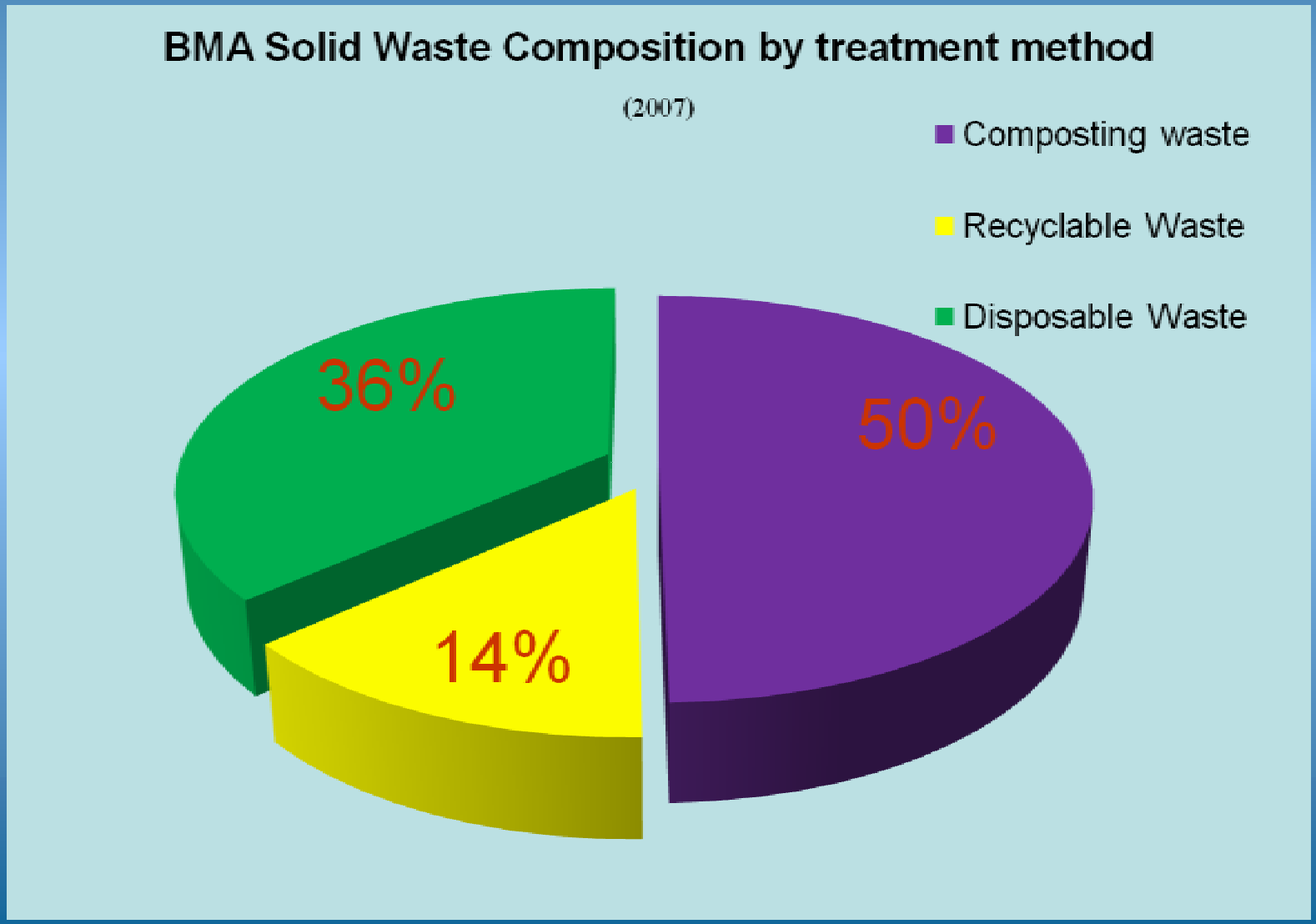
4. Clothes *5.28%*

5. Stone and Ceramic *0.61%*

Waste Composition at Transfer Stations (2007)



BMA Solid Waste Composition by treatment method



Waste Minimization

Public Participation on Waste Separation

Classify into 3 types

Separation at source

1. Recyclable waste: White Bag → **Sell, Processing for new products**

2. Organic waste: Black bag → **Composting, Bio-extract**

3. Hazardous waste: Orange Bag → **Secure Landfill**

3 Rs

- **Reduce**
- **Reuse**
- **Recycle**

To be Practiced in Bangkok

Measure of solid wastes reduction in Bangkok

- **Social approach**
- **Legal measures enforcement**
- **Economic measures implementation**

Social approach

1. Awareness raising
2. Promotion of private sector participation

Legal measures enforcement

Mejor legal restriction on reduction of solid waste is imposed by penalty measures where violations of wastes littering public areas in 50 districts . Furthermore effective wastes collections are proceeding in accordance with definite schedules

Economic measures implementation

- Impose wastes collection fee which charges to each household at Baht 20/month on regular service of solid wastes collection 50 district offices.
- Additional fee be charged private enterprises where produced excessive volume of solid wastes
- Encouragement trading of recyclable materials

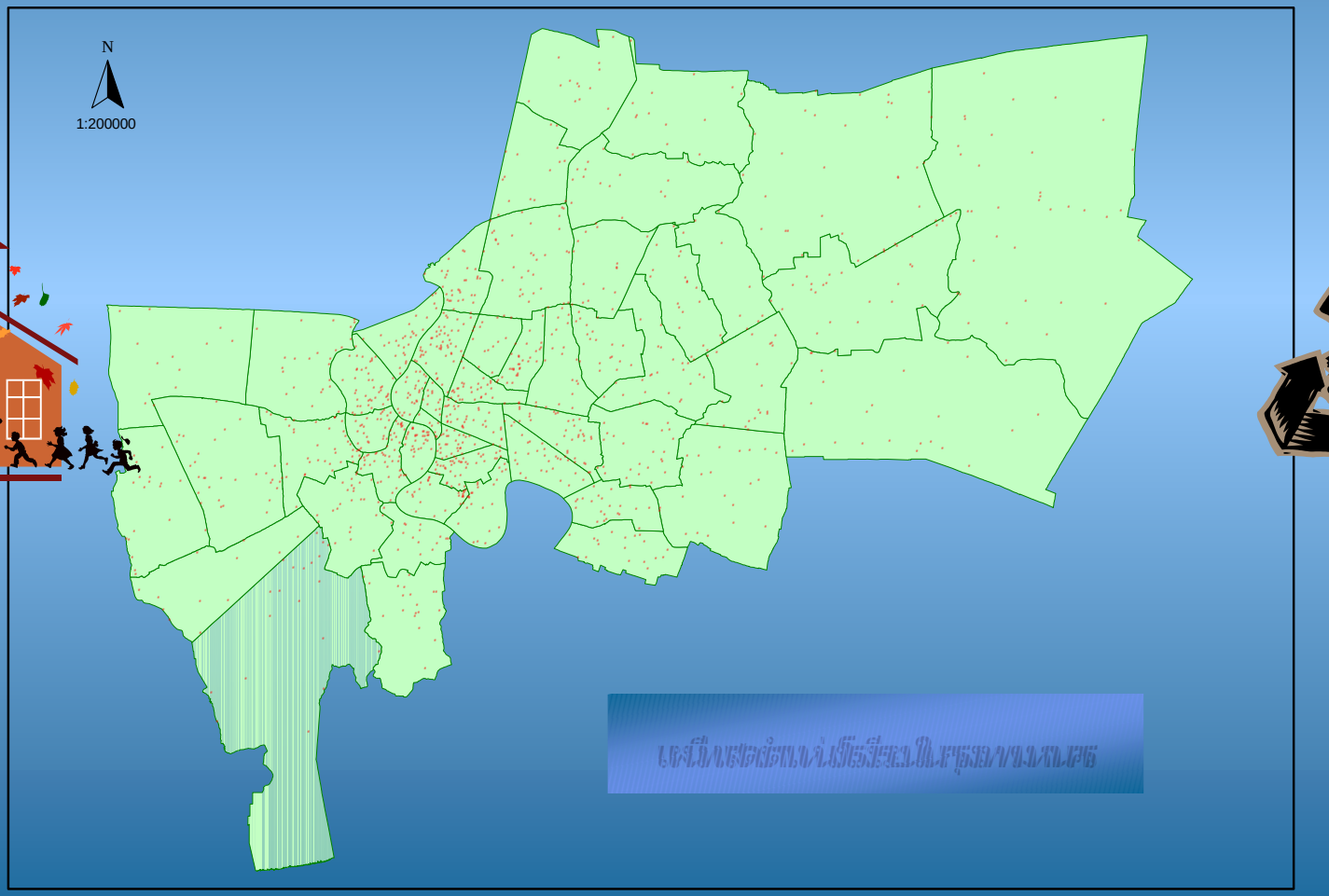
Activities of 3 Rs

1. Waste Reduction at Sources

- **Cooperate with Federation of Thai Industry (FTI)**
  - **Reduce packaging as much as possible**
  - **Label cost of packaging on products**
  - **Producers produce products without packaging at lower price**
- **Consumer**
  - **Educate consumers to purchase products with less packaging**

2. Waste Reduction Center at BMA Schools

451 Schools; Over 300,000 Students



3. **Recycling Sub-Stations (500 Sub-Stations)**
4. **Recycling Stations (17 Stations)**
5. **Recycling Campaign**
   - **Community Recycling Fair**
   - **Recycled Waste Weekend Market**
   - **Recycled Waste through Buddhism Activities**

Implementation Plan

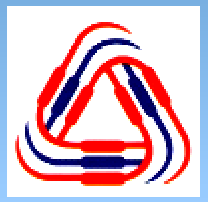
Task	2005	2006	2007	2008	Total
Waste Reduction Center at BMA Schools	**451**	**-**	**-**	**-**	**451**
Recycling Sub-Stations (Distirct)	48	49	49	49	**49**
Recycling Stations	**2**	**3**	**5**	**7**	**17**

Waste Banking Activities

Waste Donation through Buddhism Activities

Promotion on Liquid Fertilizer

Project on recyclable waste management in Academic Institutions




Project on recycled products competition and marketing

Establish recyclable waste drop-off station for charity project

ROBINSON

JUSCO MaxValu

เซ็นทรัล

SIAM PARAGON

Big C SUPERCENTER

FOODLAND Supermarket Co.,Ltd.

THE MALL

Coorperation with convenience stores on consumer's wastes segregation

Establish of recyclable collection for saleng (waste scavenger groups)

Waste Collection

Waste Collection and Transportation

Street sweeping

- **By manpower (Street sweeper)**
- **By sweeping machine**

Waste Collection and Transportation

Waste container

Waste Collection

- **By manpower**
- **By BMA waste collection trucks**
- **By rental waste collection trucks**

Types of collection vehicles

- **Compaction truck**
  - **capacity 2 ton**
  - **capacity 5 ton**
  - **capacity 10 ton**

- **Side loading truck**
  - **capacity 1.5 ton** → **Collection Food Waste (Green)**
    Collection Recyclable waste (Blue-White)
  - **capacity 12 m^3**

- **Recycle truck**
- **Loading container truck**
- **Collection boat**
- **Wood shredding truck**

Waste Collection and Transportation

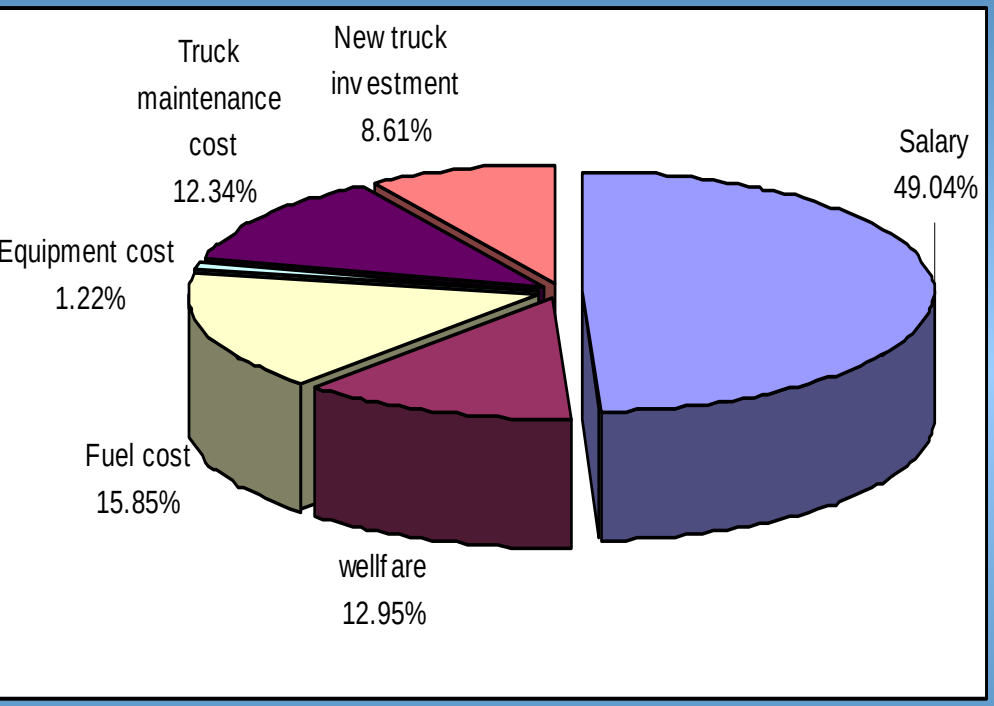
1,885 waste collection trucks

2,587 Driver

7,591 waste collection workers

9,042 sweeping workers

Proportion of BMA Waste Collection Expenditure



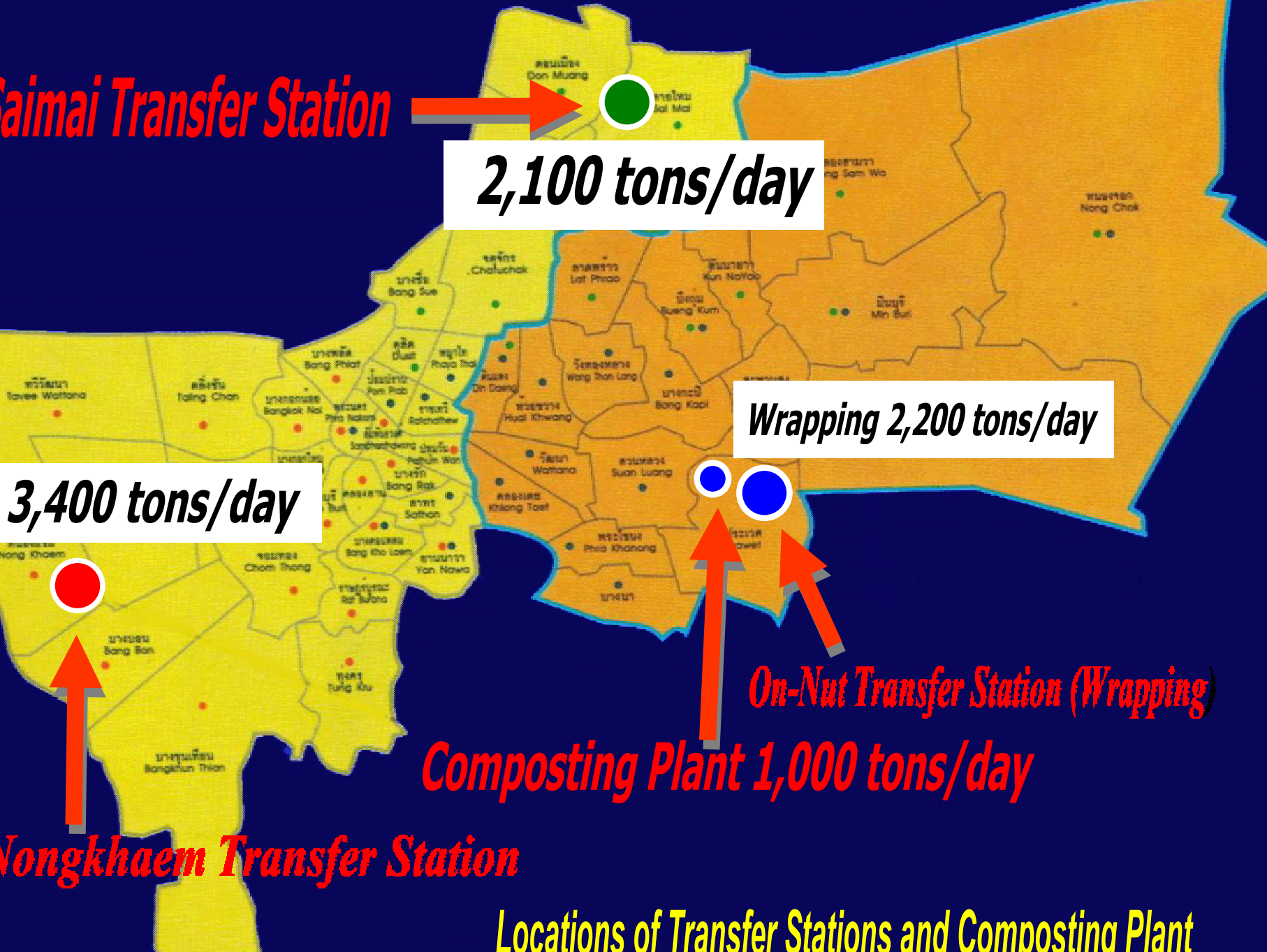
Waste Collection Truck and Boat

Waste Treatment and Disposal

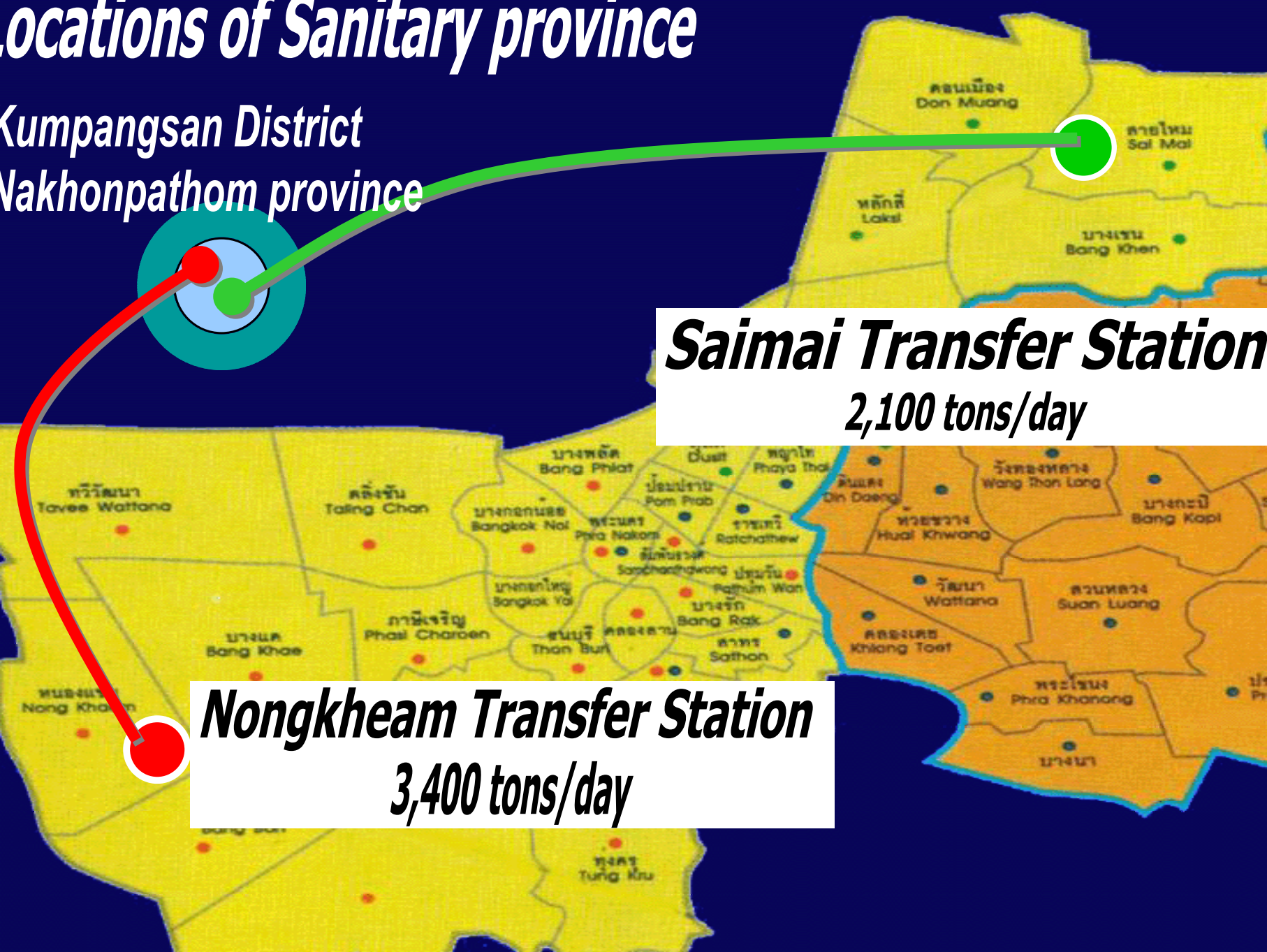
Solid Waste Treatment and Disposal

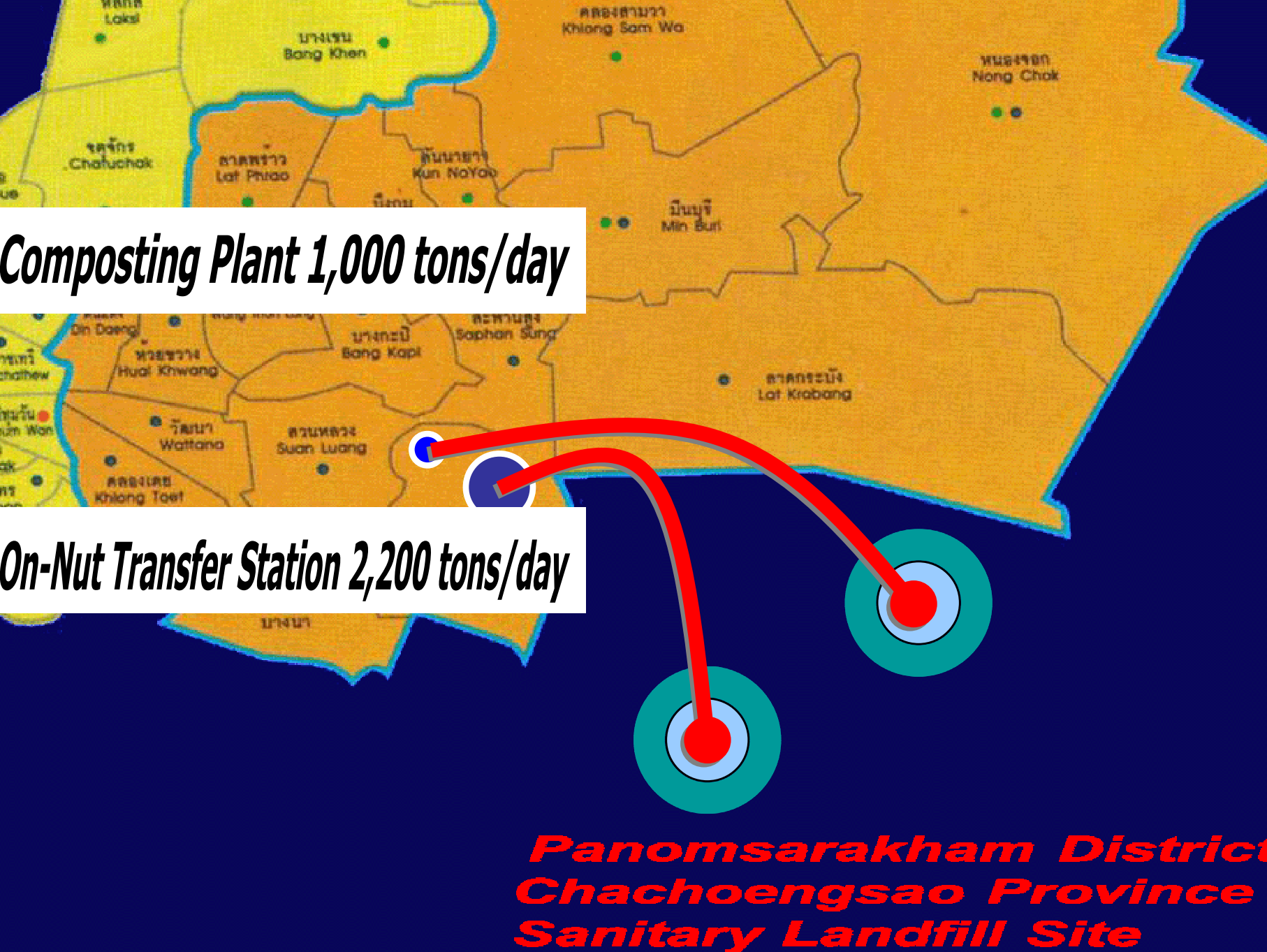
Composting **1,000** **Tons/day**

Sanitary landfill **7,700** **Tons/day**



Locations of Transfer Stations and Composting Plant


ocations of Sanitary province
Kumpangsan District
Nakhonpathom province
Saimai Transfer Station
2,100 tons/day
Nongkheam Transfer Station
3,400 tons/day
Don Muang
Sai Mai
Laksi
Bang Khen
Bang Phlat
Phaya Thai
Din Daeng
Wang Thon Lang
Bang Kapi
Huai Khwang
Tavee Wattana
Taling Chan
Bangkok Noi
Phra Nakorn
Pom Prab
Ratchathew
Wattana
Suan Luang
Bangkok Yai
Pathum Wan
Bang Rak
Phasi Charoen
Bang Khae
Thon Buri
Sathon
Khlong Toei
Phra Khanong
Nong Khaem
Tung Khru


Composting Plant 1,000 tons/day
On-Nut Transfer Station 2,200 tons/day
Panomsarakham District
Chachoengsao Province
Sanitary Landfill Site
Bang Khen
Khlong Sam Wa
Nong Chok
Chatuchak
Lat Phrao
Min Buri
Din Daeng
Huai Khwang
Bang Kapi
Saphan Sung
Lat Krabang
Wattana
Suan Luang
Khlong Toei

Waste Treatment and Disposal

Waste Disposal

1. Sanitary Landfill operates by private sector

Onnuch → **3,800 Ton/day (40.4%**

Nongkham → **3,600 Ton/day (38.3%**

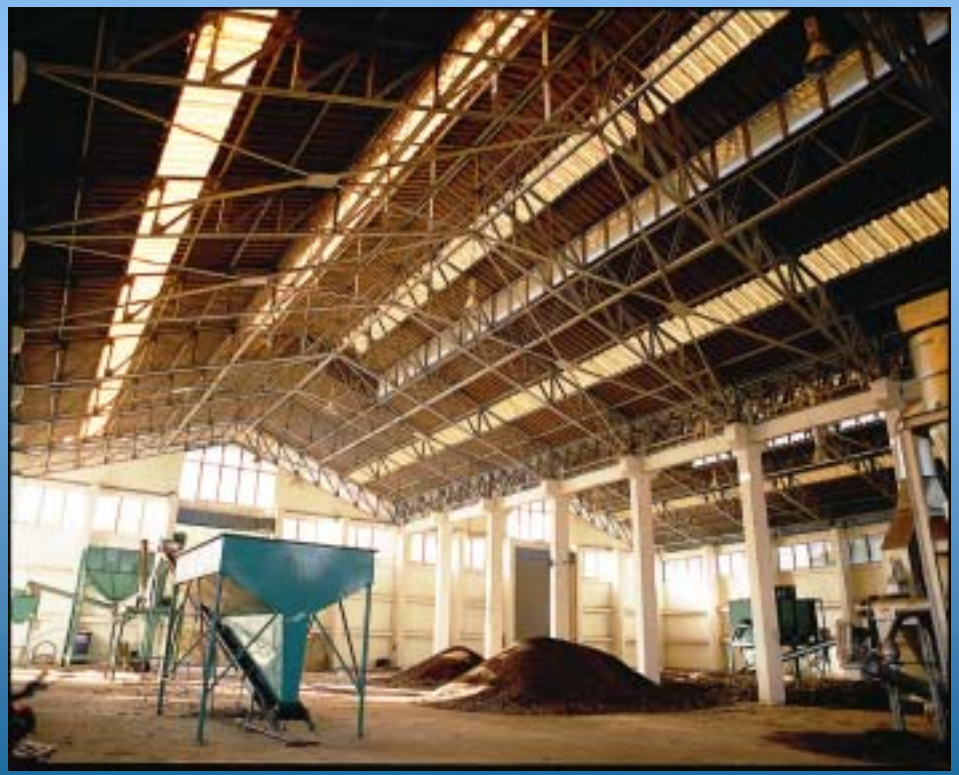
Saimai → **2,000 Ton/day (21.3%**

2. Composting Plant (1,000 Ton/day)

3. Integrated Solid Waste Management (Under consideration)

Composting Plant

- *Capacity 1,000 Tons/day*
- *Compost Product ~300 Tons/day*



Sanitary Landfill

Sanitary Landfill Sites for BMA Waste Disposal

- **HDPE Liner**

- **Leachate Collection Pipe**

- **Leachate Treatment Pond**

Landfill Gas Collection

➢ **LFG Collection System**

➢ **Electricity Generation from LFG used in Site**

Landfill Operation

- **Decreasing of daily operation area**

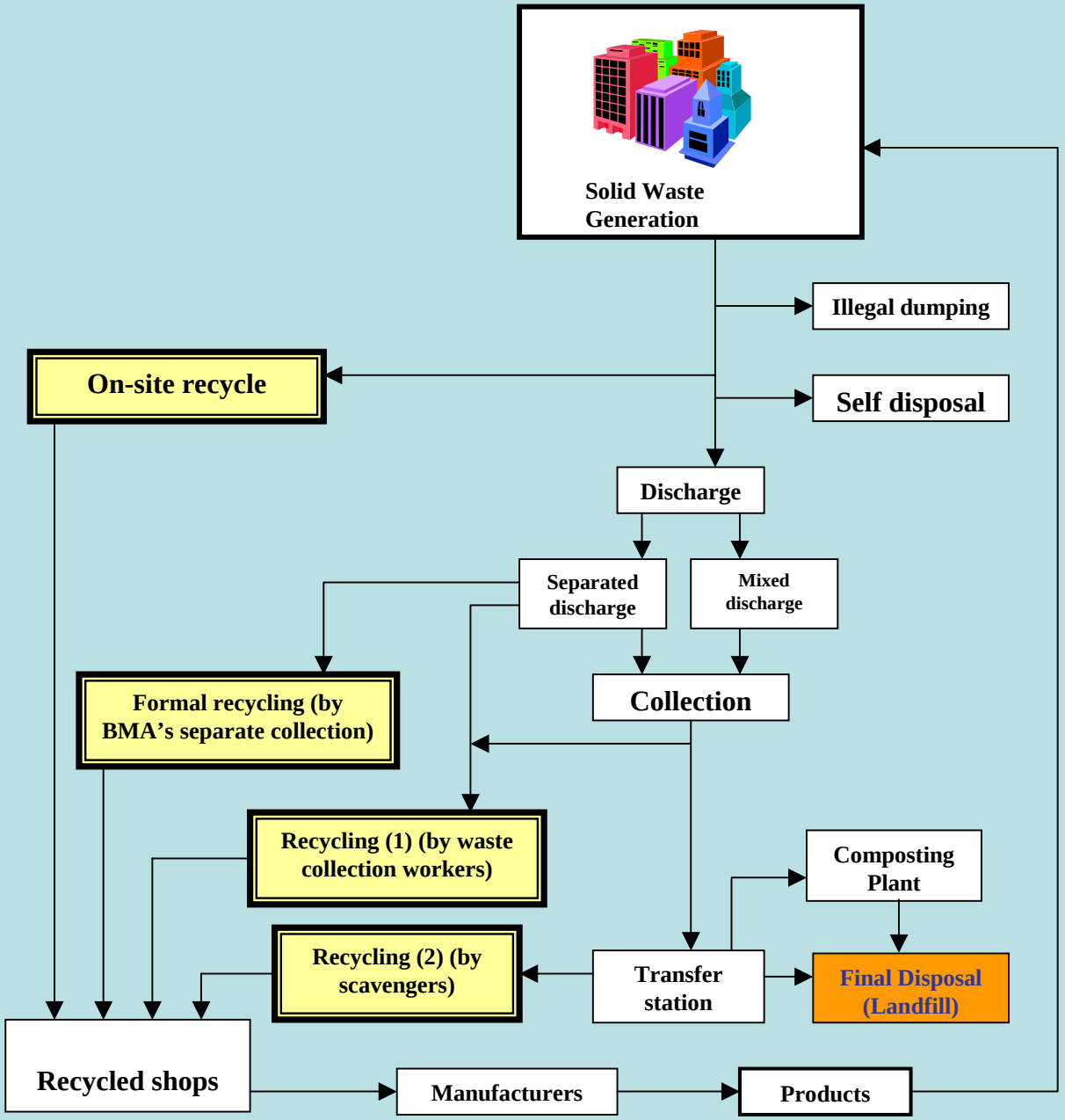
- **Compaction of Waste**

Environmental Monitoring Programme

- **Ground and Surface Water Monitoring**

- **LFG Monitoring**

BMA Waste Management Flow Chart



Moving towards Sustainable SWM

1. Public Participation

2.Economic Instrument

3. Law Enforcement

4. Appropriate Technology

Suan Mokkhaphalaram , Surat Thani

Rice Field , Suphan Buri

Similan Island , Phang-nga

Thank You