

Institute for Global Environmental Strategies (IGES)

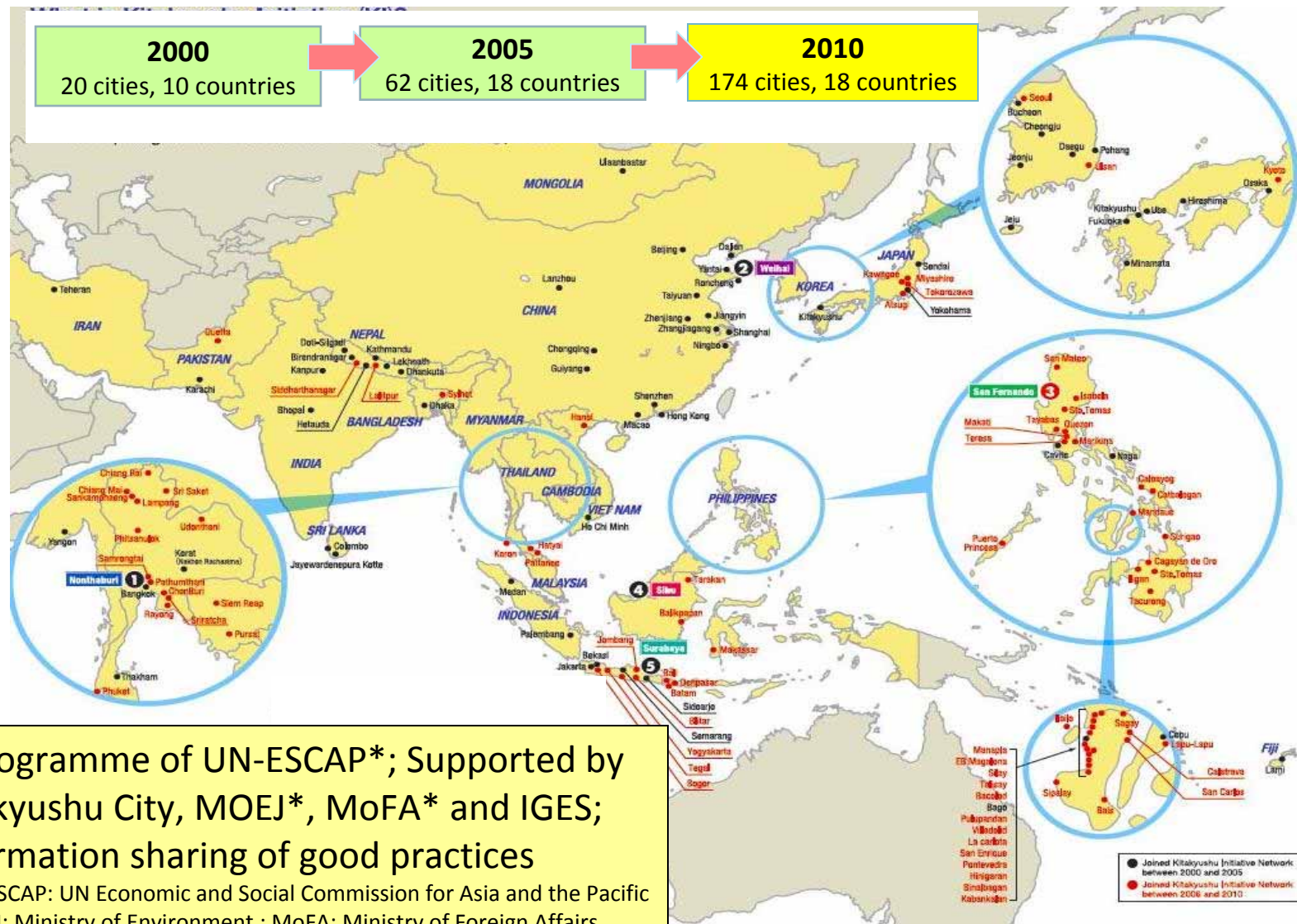
Kitakyushu Initiative for a Clean Environment

Enhancing **public awareness** and **stakeholders' empowerment and involvement** in waste management –
Through a case in Surabaya, Indonesia

18 March 2010

Toshizo Maeda, IGES Kitakyushu Office

Kitakyushu Initiative for a Clean Environment (2000-2010)



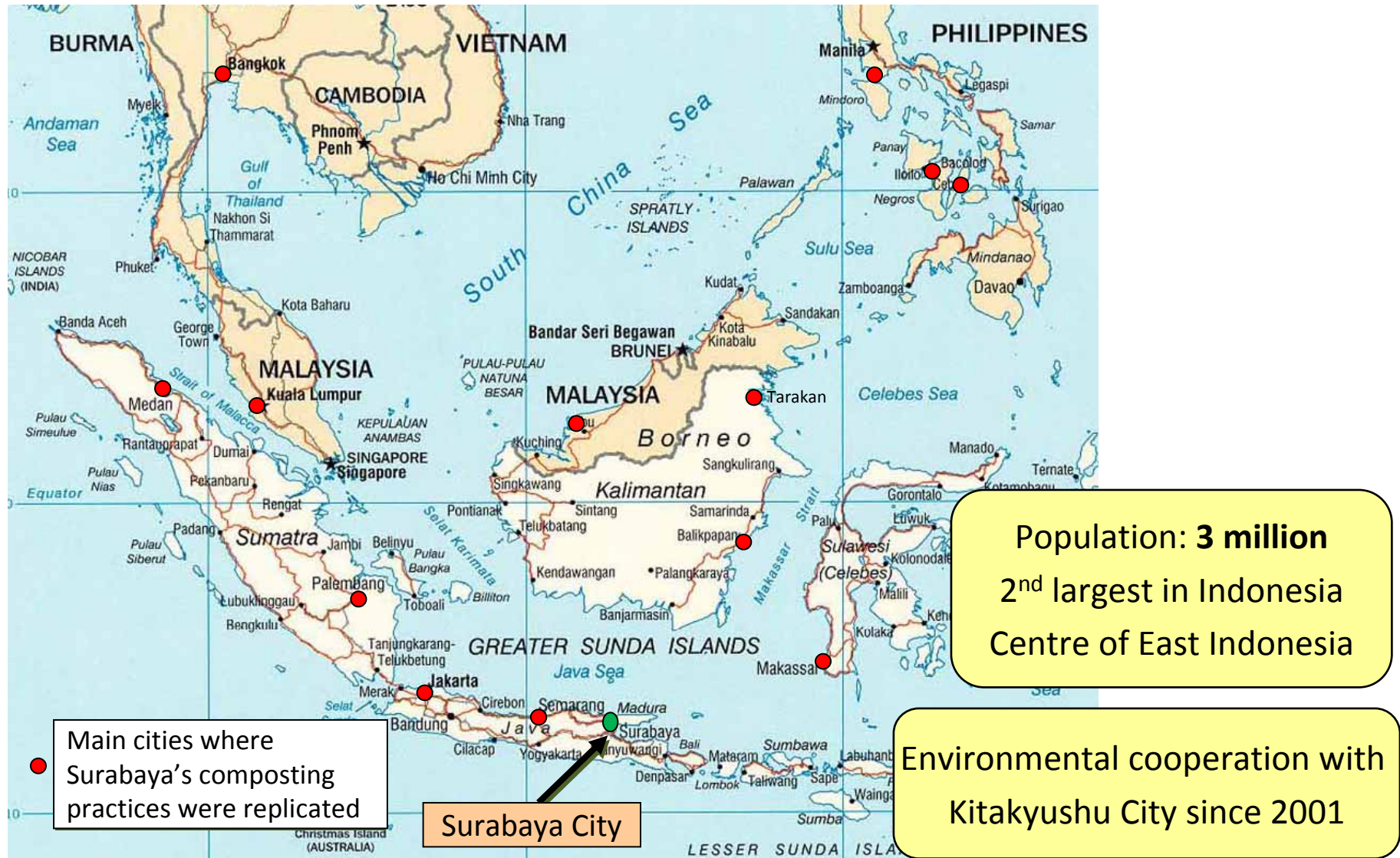
A programme of UN-ESCAP*; Supported by Kitakyushu City, MOEJ*, MoFA* and IGES;
 Information sharing of good practices

* UN-ESCAP: UN Economic and Social Commission for Asia and the Pacific
 * MOEJ: Ministry of Environment; MoFA: Ministry of Foreign Affairs

A case of Surabaya, Indonesia

http://www.lib.utexas.edu/maps/middle_east_and_asia/indonesia_pol_2002.pdf

Figure-1 Location of Surabaya City and replication of Surabaya's practices in other cities



Background

Status in 2001



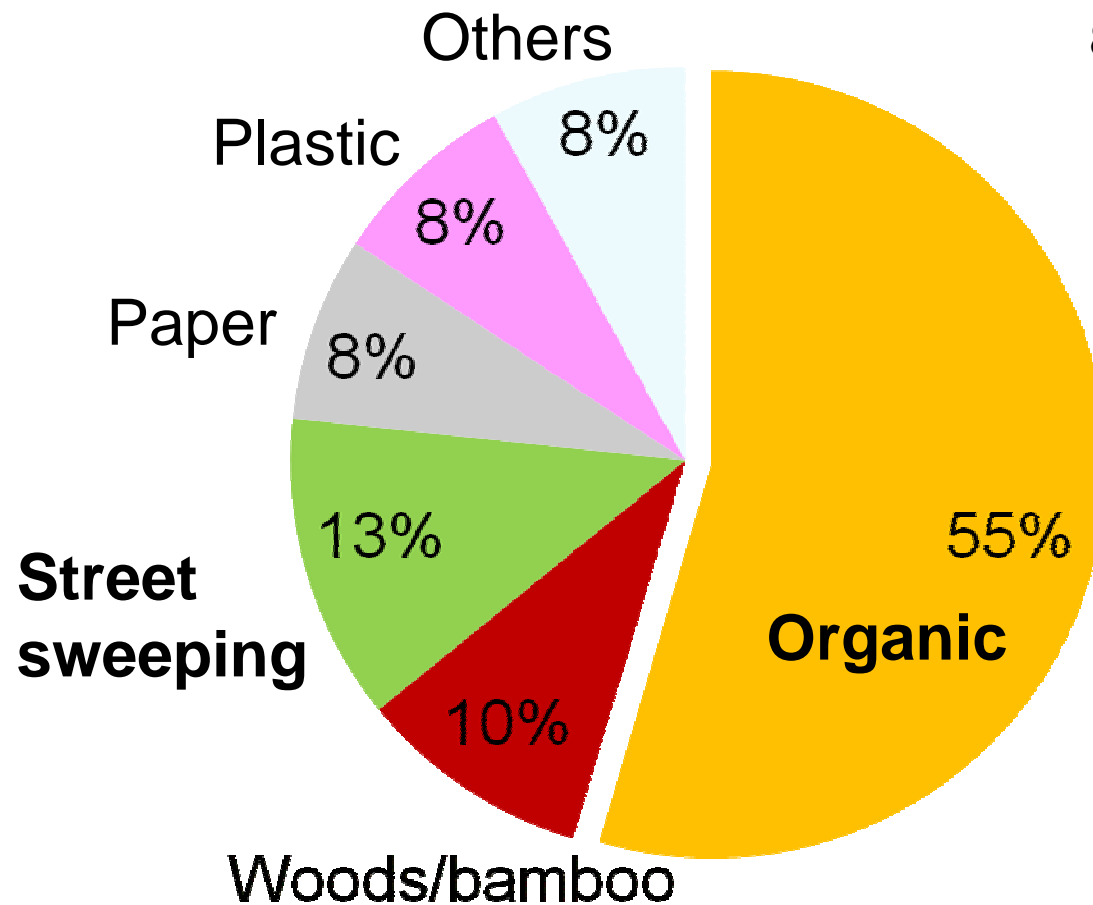
(Photo courtesy of PKK Surabaya)

New **Benowo Landfill**: 800 scavengers; 35km from city centre;
Surrounded by fish ponds; demand for waste reduction is high

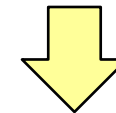
Keputih Final disposal site was closed in 2001 due to opposition by residents. Waste filled the streets and drains.



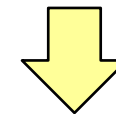
Waste Composition in Surabaya



Organic waste shares more than half (as much as 70-80%) of total amount of waste generation



Prioritize reduction of **organic waste**

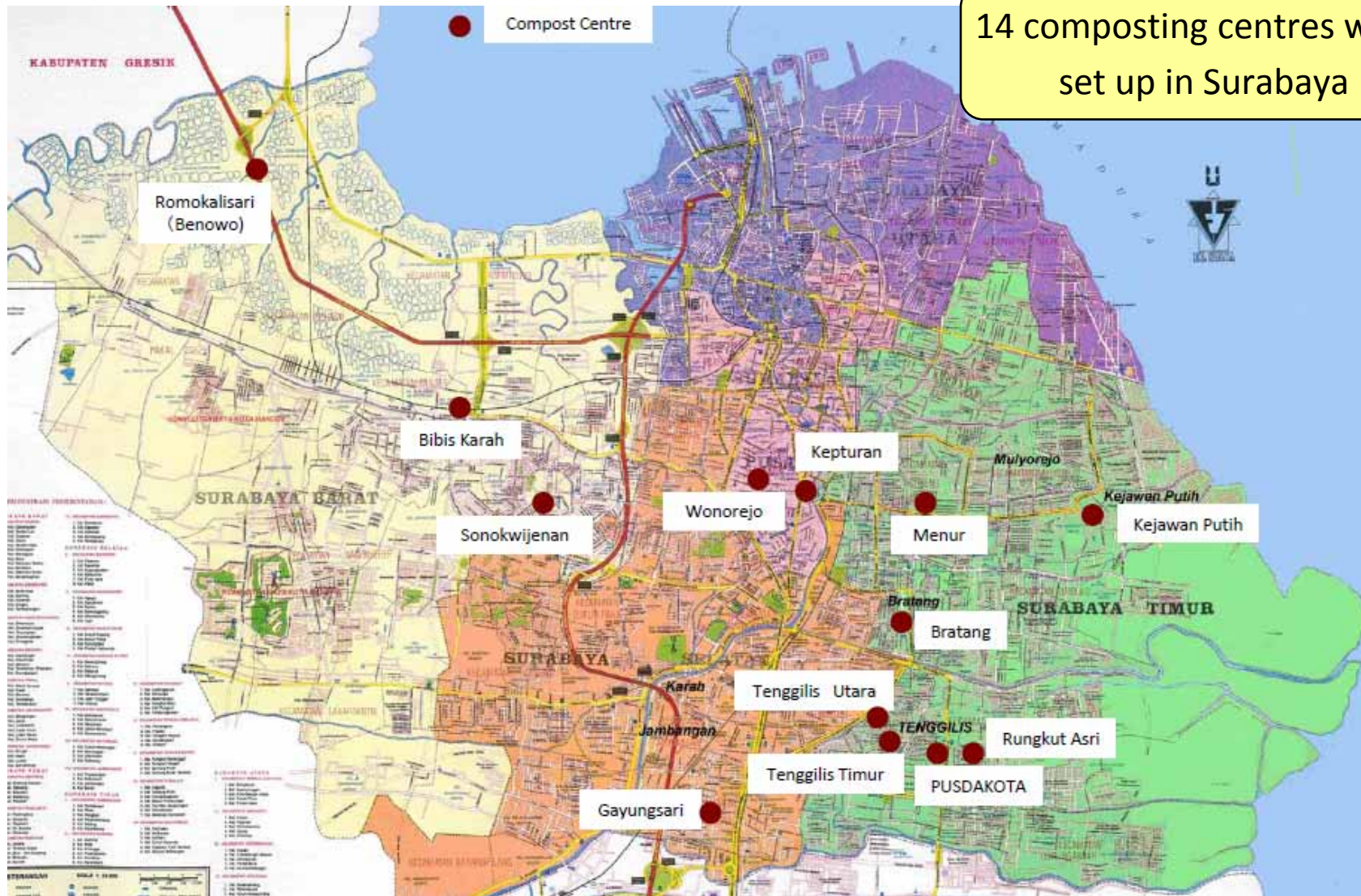


Promote **composting**
A) at each household
B) at composting centres

Source: KITA (2002)

Inputs by the city

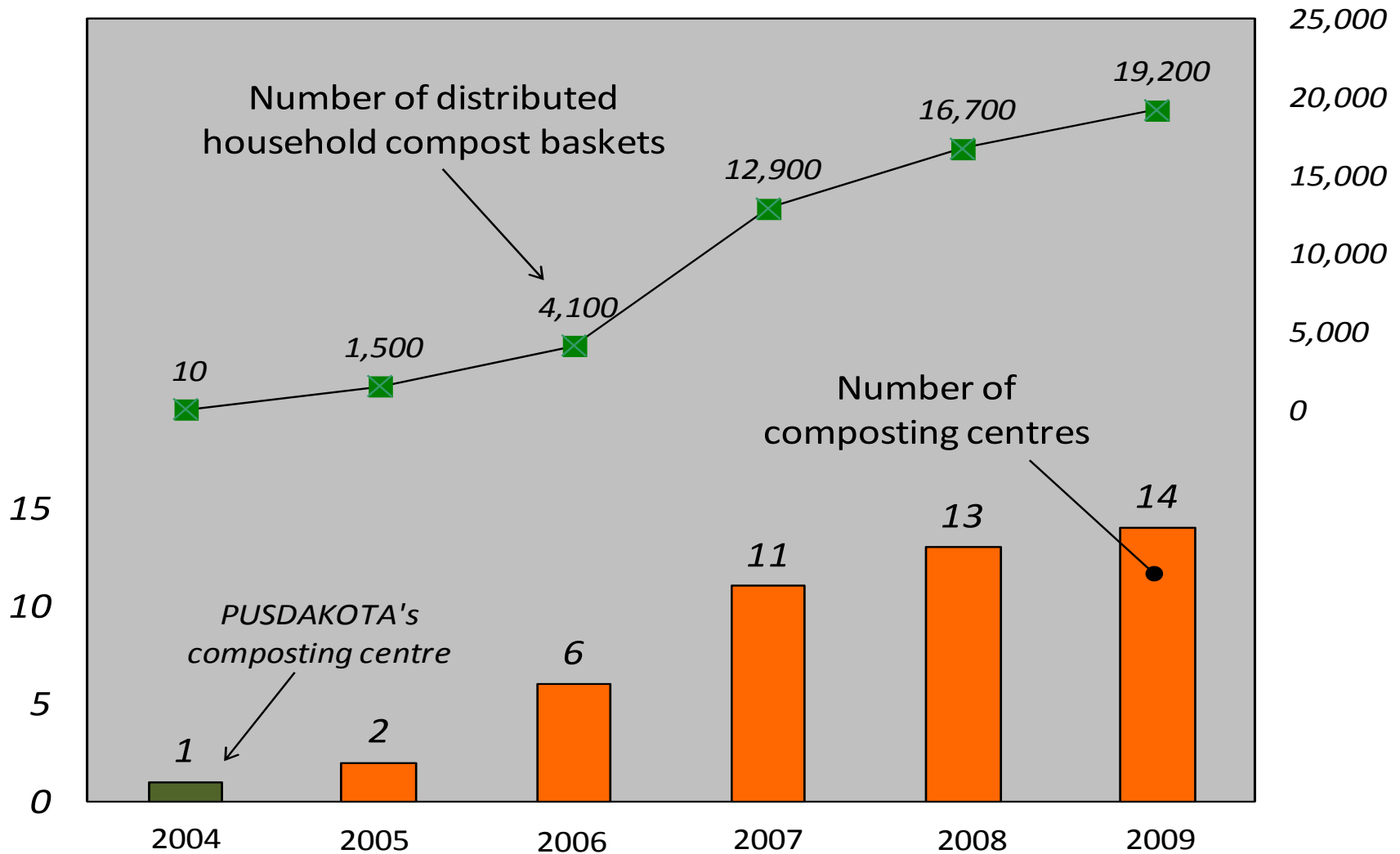
*Map copied from El Sena, Surabaya, Indonesia
Figure-7 Location of composting centres in Surabaya



14 composting centres were set up in Surabaya

Inputs by the city

Figure 2 Number of compost baskets and composting centres in Surabaya
 The city adopted the composting method at three existing composting centres in 2005 and 2006 and has since established ten additional centres. There are 13 composting centres managed by the city, in addition to the one managed by Pusdakota. (Data source: Pusdakota, Kitakyushu City, and Cleansing and Landscaping Dept., Surabaya)

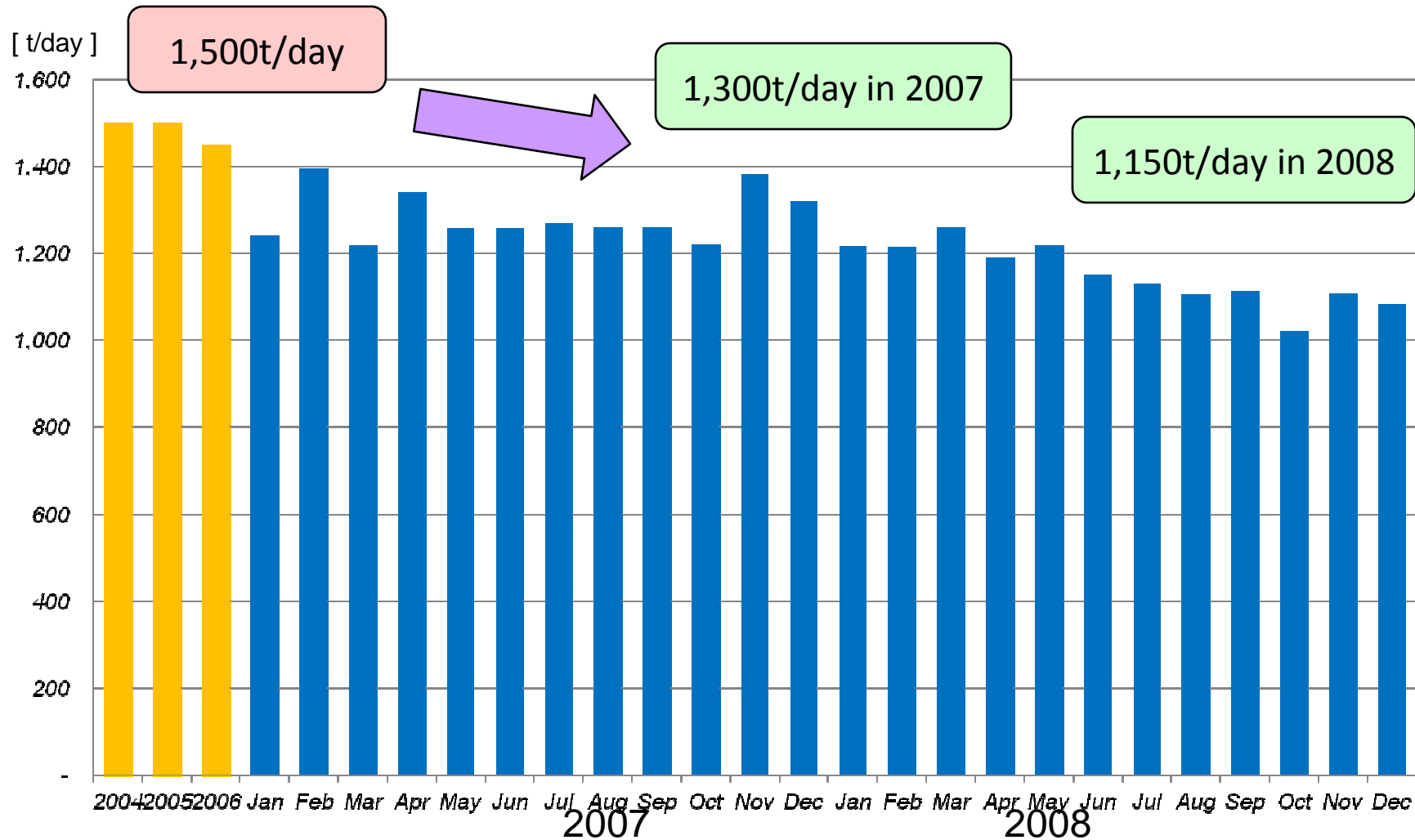


Output: waste reduction

* Note: Benowo is the only final disposal site in Surabaya City.

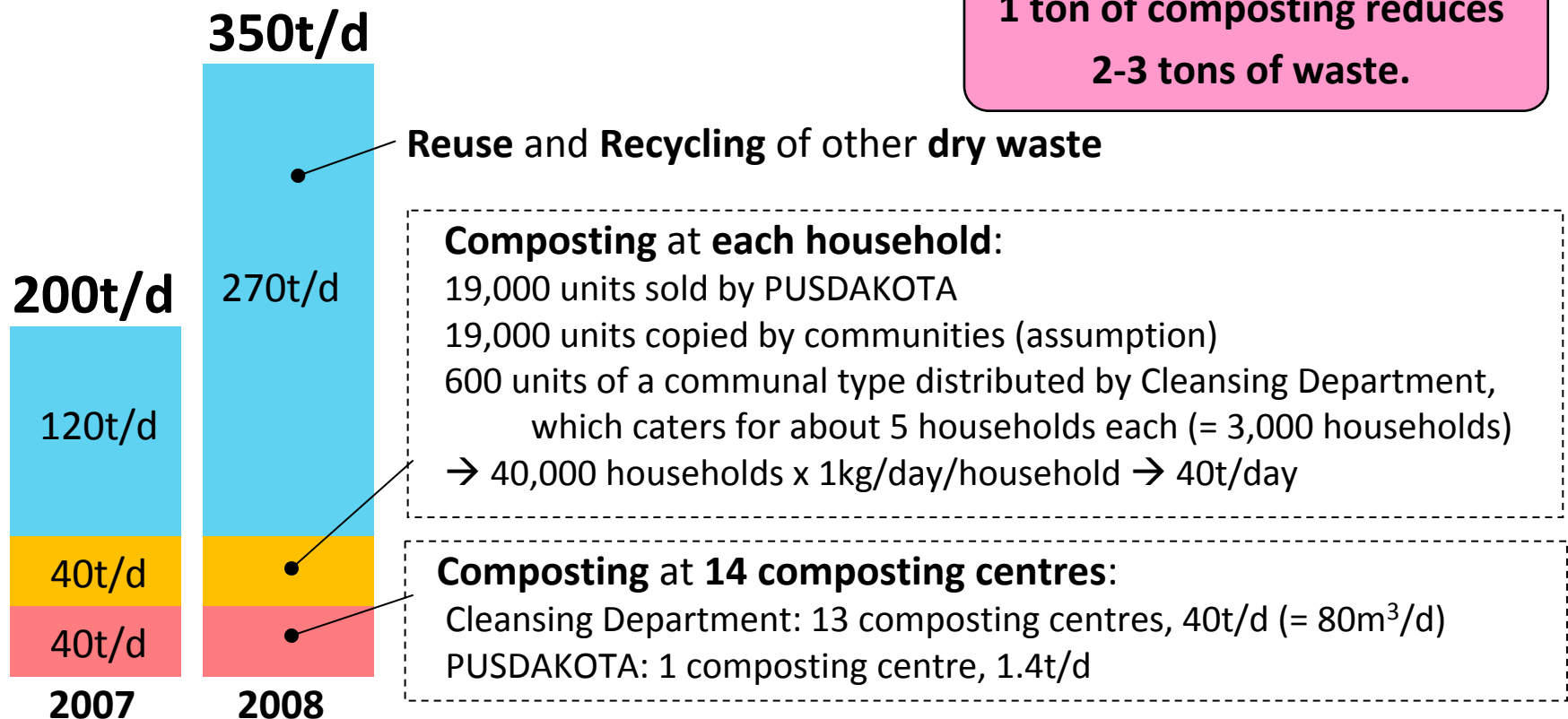
(Data source: City Development Planning Department (BAPPEKO), Cleansing and Landscaping Department, Surabaya;)

Average daily amount of waste transported to Benowo Landfill* in Surabaya, 2004-2008



Output: waste reduction

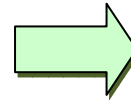
Figure 4 Breakdown of reduced waste by each measure in Surabaya
 (Data source: Cleansing and Landscaping Department, Surabaya))



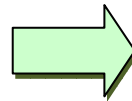
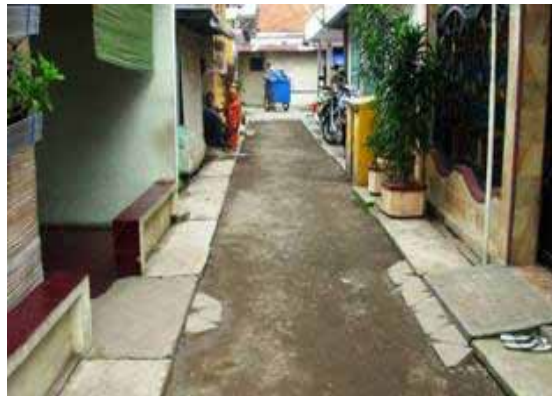
40t/d reduction by household composting,
 40t/d reduction at composting centres,
Composting capacity: 80t/day

Remaining **120t/d (2007)** and **270t/d (2008)**
 reduction by **Reuse and Recycling.**

Social and environmental benefits



Better household
environment



Greener and
cleaner streets



Good environmental
education tools

Social and environmental benefits



Employment



Production of herbs and vegetables using compost



Waste segregation and promotion of recycling

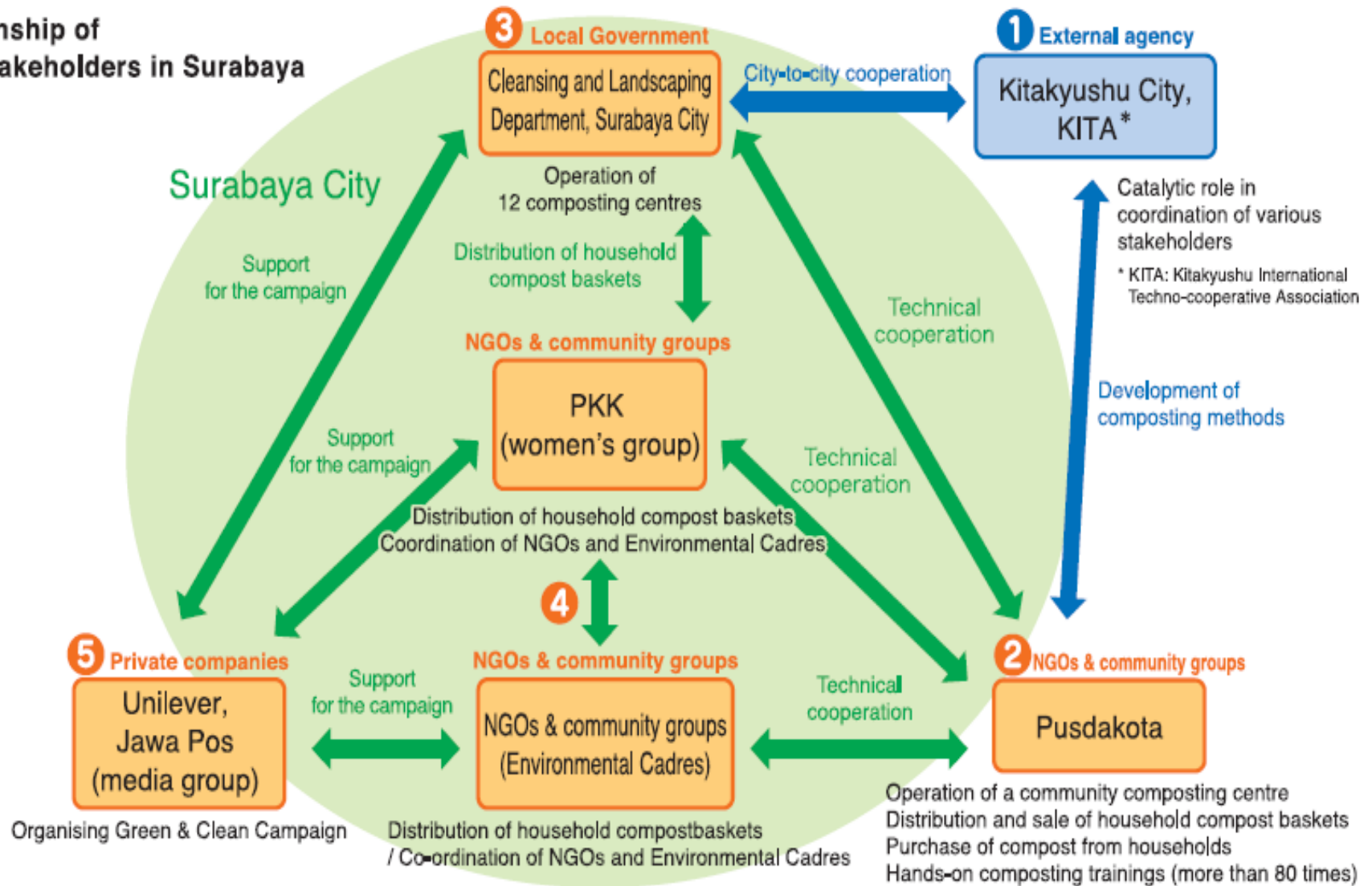


Income by selling compost



Main Stakeholders

Relationship of main stakeholders in Surabaya



Step1.

Development of a model community:

Cooperation between Kitakyushu
International Techno-cooperative Agency
(KITA) and Pusdakota, a local NGO,
from 2004 to 2006

Starting a model project

(photo courtesy of KITA)



Waste composition survey



Shredding of waste



Mixing with seed compost



Temperature measurement



Fermentation and pH tests



Explaining how to use baskets to residents

Development of a model community (Pusdakota (NGO)'s activity)



Segregated waste collection from the community



Shredding at the composting centre



Fermentation



Household compost basket



Selling compost



Green streets using compost

Achievements by KITA's intervention

(photo courtesy of KITA)



PUSDAKOTA's compost centre: before and after KITA's intervention

Step2.

Scaling up the model project by the City Government, from 2005 – 2010:

- Setting up composting centres
- Distributing compost baskets to residents

Composting and its positive impacts in Surabaya

(Photos cited from "Sparking Parks in Surabaya", Cleansing Department, Surabaya City, 2008)



Parks became greener using compost



Streets became greener using compost



Bratang Compost Centre



Sonokwijenan Compost Centre



Keputran Compost Centre

Activities of PKK (a women's group) and Environmental Cadres



Organic-unorganic waste sorting

Waste segregation training



VICE CHAIRMAN OF PKK DIRECTLY GIVING TRAINING

Explaining how to use compost baskets

9th main program ENVIRONMENT PRESERVATION



Recycling trainings

Turn waste into blessing

Manufacturing bags from waste



Meeting of Environmental Cadres



Activities of Environmental Cadres



Environmental Event

(Photo courtesy of PKK Surabaya (top row) and Environmental Cadre of Tegalsari, Surabaya (bottom row))

Step 3.

Organising a community clean-up campaign, from 2005 – 2010:

- Cooperation with NGOs, private companies and the media
- Successful involvement of citizens in the waste management activities

Community and Private Sector Involvement



(Photo courtesy of Uli Peduli)

Award winning community



Green streets



Campaign sponsors



Products made from waste



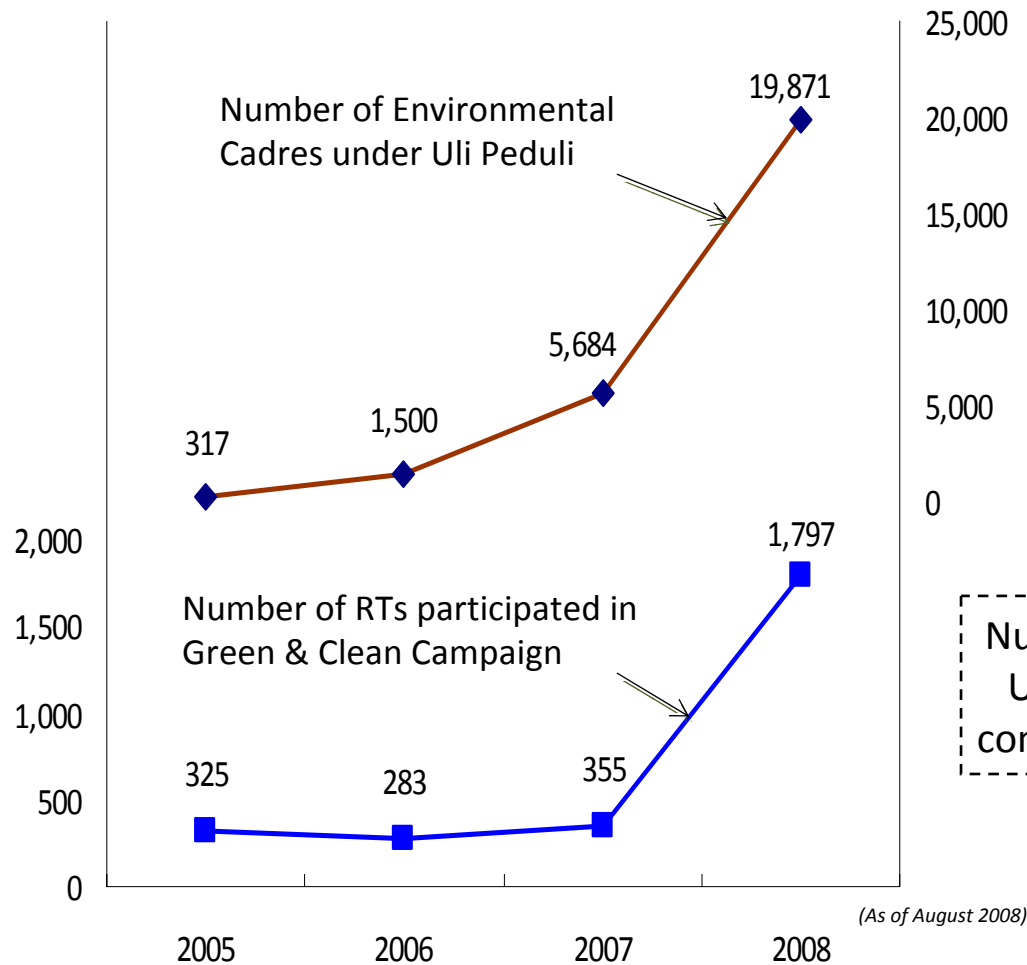
Award winning housewives group



Entrance to a community



(5) Main stakeholders (Uli Peduli (an NGO funded by Unilever))



Total number of Environmental Cadres in Surabaya Is 28,000 !

20% of communities are participating in the campaign

Number of Environmental Cadres under Uli Peduli (Unilever) and participating communities in Green & Clean Campaign

Figure-30 Number of RTs which participated in Green & Clean Campaign and the number of Environmental Cadres under Uli Peduli (source: Uli Peduli (2008))

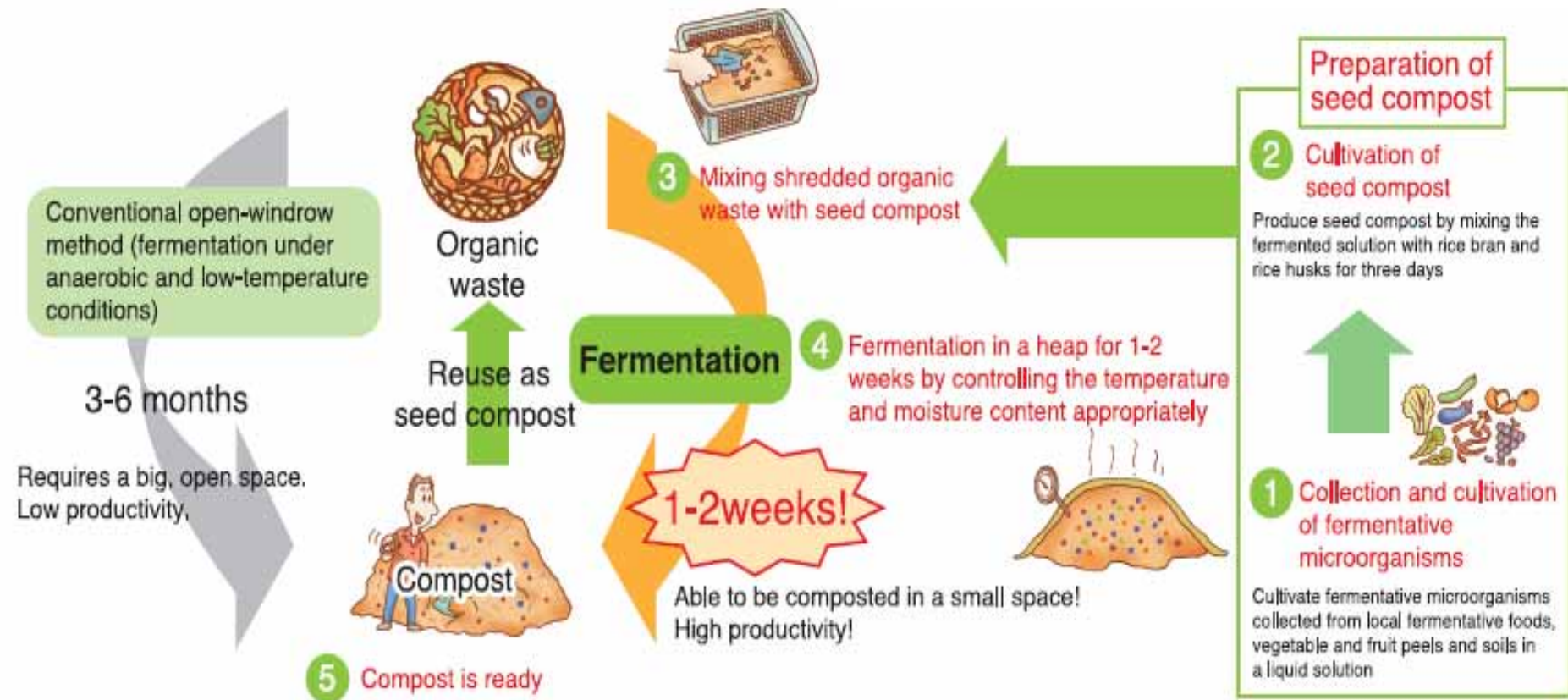
Efficient Composting Method

- **High productivity**
- **Using only local materials**
- **No offensive smell, no leachate**
- **Fast, cheap and good quality!**

COMPOSTING METHODS

Figure 8 Operational flow of Takakura Composting Method

(Prepared by Maeda (2009) with technical supervision by Kouji Takakura, JPec Co., Ltd.)



(Note: Spread on the soil for more than two weeks before planting.)

Features:

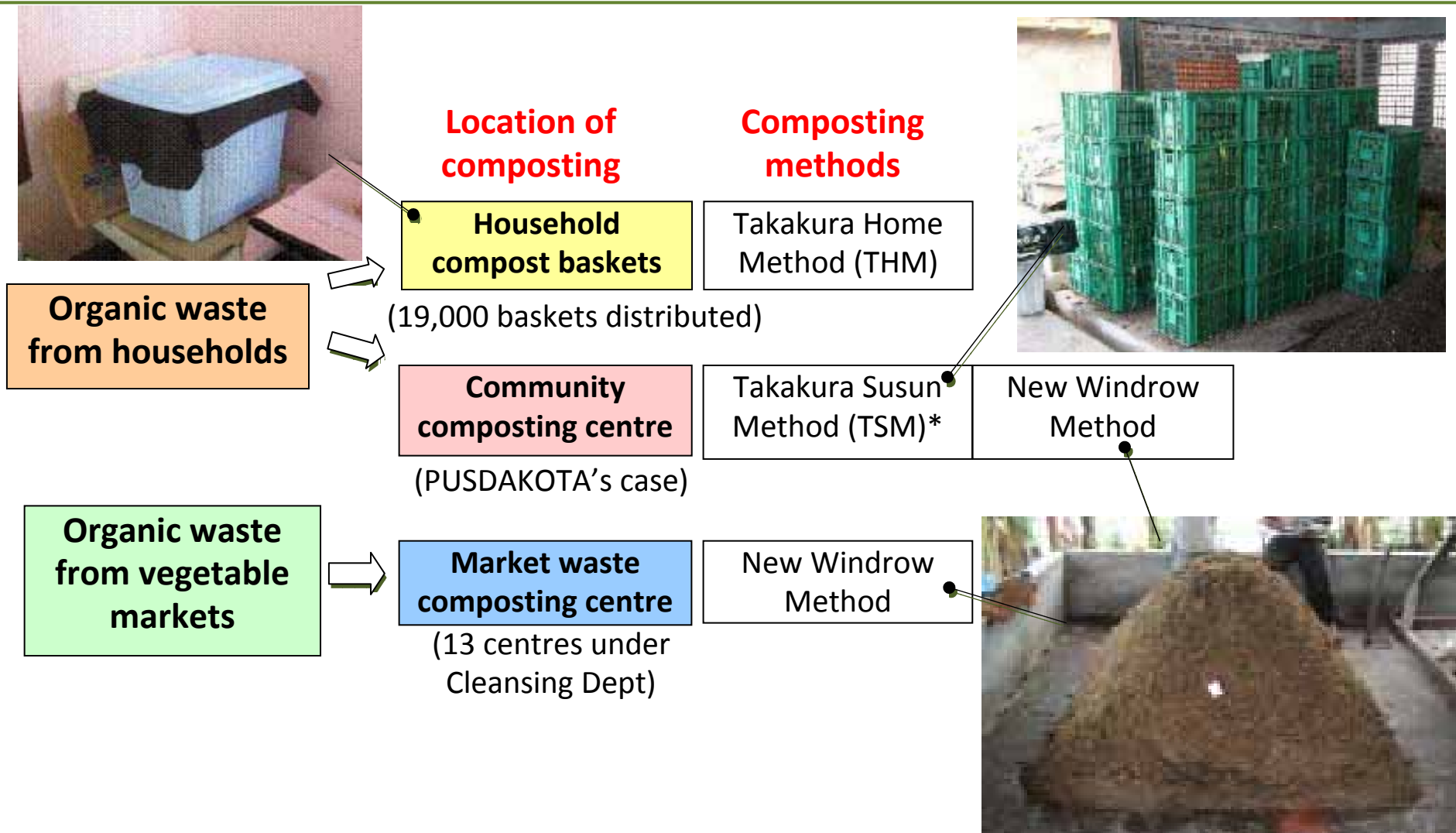
1. **Fast** and less space requirement
2. No foul smell (not rotting)

3. **Low-cost**, low-tech and easy operation

4. Using **only local materials**

5. Active microorganism in compost enriches the soil

Composting Options



Types of composting options in Surabaya

Financial Analysis of Composting Practices

- **Does it make business sense?**

Costs to promote composting

Expenditure of Cleansing Department Surabaya, 2006-2008

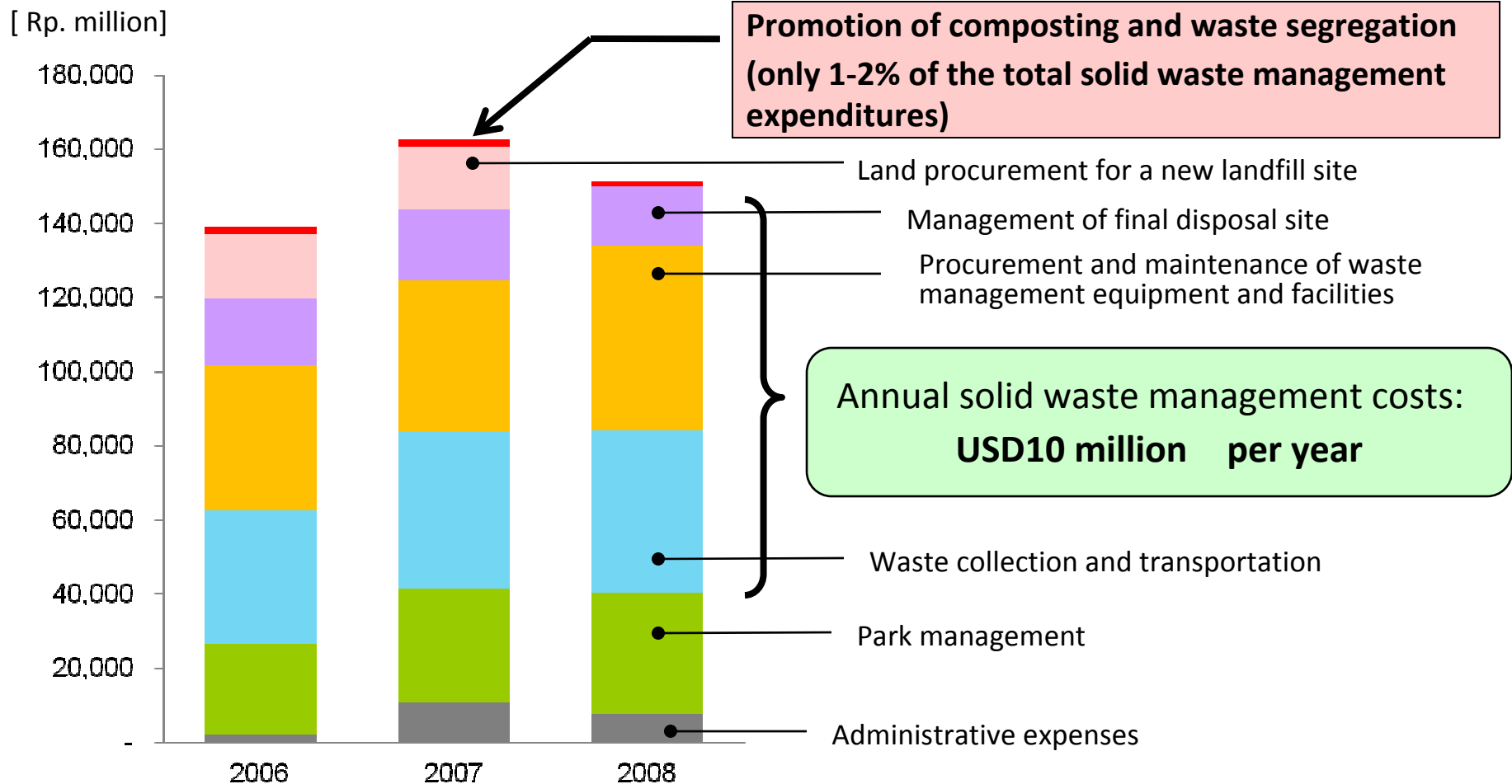


Figure 5 Annual expenditures of Cleansing and Landscaping Department, Surabaya, 2006-2008
 (Data source: City Development Planning Department (BAPPEKO) Cleansing and Landscaping Department, Surabaya; prepared by Maeda (2009))

How much is the solid waste management cost per tonne?



Waste management cost in **Surabaya:**
(collection and landfill management)
USD10 million (2007)

Divided by $1,300\text{t/d} \times 365\text{days}$:
→ USD21/t

Landfill construction cost (27ha):
USD6.5 million

Divided by $1,500\text{t/d} \times 365\text{days} \times 5\text{yrs}$
& $1,300\text{t/d} \times 365\text{days} \times 2\text{yrs}$
→ USD2/t (not including cover soil)

Waste management cost:
USD23/t

Is operation of a composting centre financially sustainable?



PUSDAKOTA's composting centre:

1.4t/day collection → 40t/month collection

→ 10t/month of compost production

Selling at USD100/t

→ Income USD1,000/month

Expenditure: **USD650/month**

→ Profit: USD350/month

= USD4,200/year

→ Can purchase a new shredder!!

Plus, cost saved from waste reduction (40t/month)

→ Hidden profit: 40t/month x USD23/t = USD900/month = USD11,000/year

→ Can build a new composting centre in few years!!

How much did the city save by reducing waste?



Composting centre

13 composting centres of Surabaya City:
Composting **40 t/day = 1,200 t/month**

Compost production: **300t/month** (25% of input)
→ Replacing the purchase of **soil conditioners**
 $300\text{t/m} \times \text{USD}20/\text{t} = \text{USD}6,000/\text{month}$

PLUS, cost saved from waste reduction:
 $1,200\text{t/month} \times \text{USD}23/\text{t}$
 $= \text{USD}27,000/\text{month}$

→ **Profit: USD33,000/month**
 $= \text{USD}40,000/\text{year}$

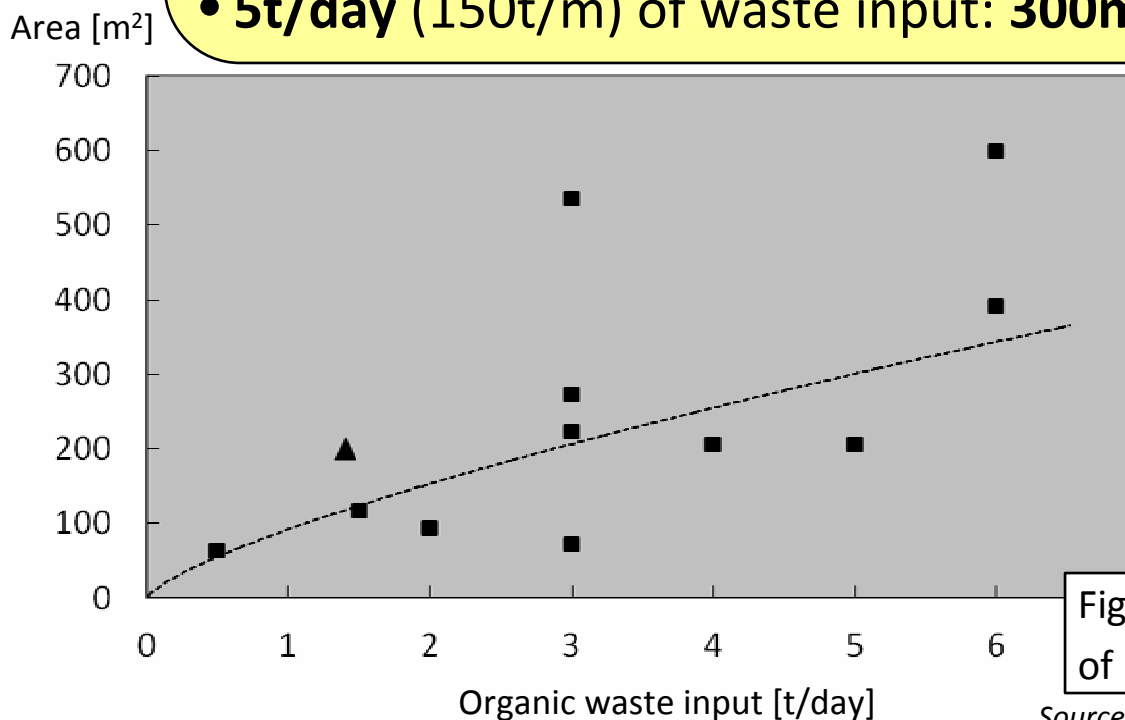


Soil conditioners

How much space is required for composting centres?

Necessary space for a composting centre (incl. the office space):

- **1t/day** (30t/m) of waste input: **100m²** → Compost production: **6t/m**
(Income: USD600/month)
- **3t/day** (90t/m) of waste input: **200m²** → **18t/m** (USD1,800/m)
- **5t/day** (150t/m) of waste input: **300m²** → **30t/m** (USD3,000/m)



Composting Centre is operational in a **small space!**

Fig. Area of composting centres and amount of processed organic waste in Surabaya

Source: Interview with Cleansing Department Surabaya

Does free distribution of compost baskets make business sense?

Distribution of **household compost baskets** in Surabaya:

- **19,000 units** distributed for free by the city in 5 years
- Distribution cost: USD10/basket x 19,000 = USD190,000
- Campaign cost: USD10/basket x 19,000 = USD190,000
- Total cost: **USD380,000**

Benefit:

- Waste reduction: **19t/day** (= 19,000 households x 1 kg/day)
- Cost saved from waste reduction: 19t/d x 365days x **USD23/t**
= **USD160,000/year**

Cost recovery in 2.5 years!

Enlarged benefit:

- Waste reduction: **40t/day**
- Cost saved: **USD340,000/year**

Cost recovery in 1 year!!

Why people practice composting at home?

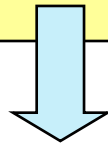
Household financial analysis:
1kg of organic waste/day/household
→ 30kg/month

→ 6kg/month of compost (20% of input)

Purchasing price: USD0.07/kg

→ Income: USD0.42/month

→ **Not enough economic incentive.**



Plus,
**improvement of kitchen environment &
use of compost for plants and gardens**



Estimated GHG emissions avoided and projection at landfills

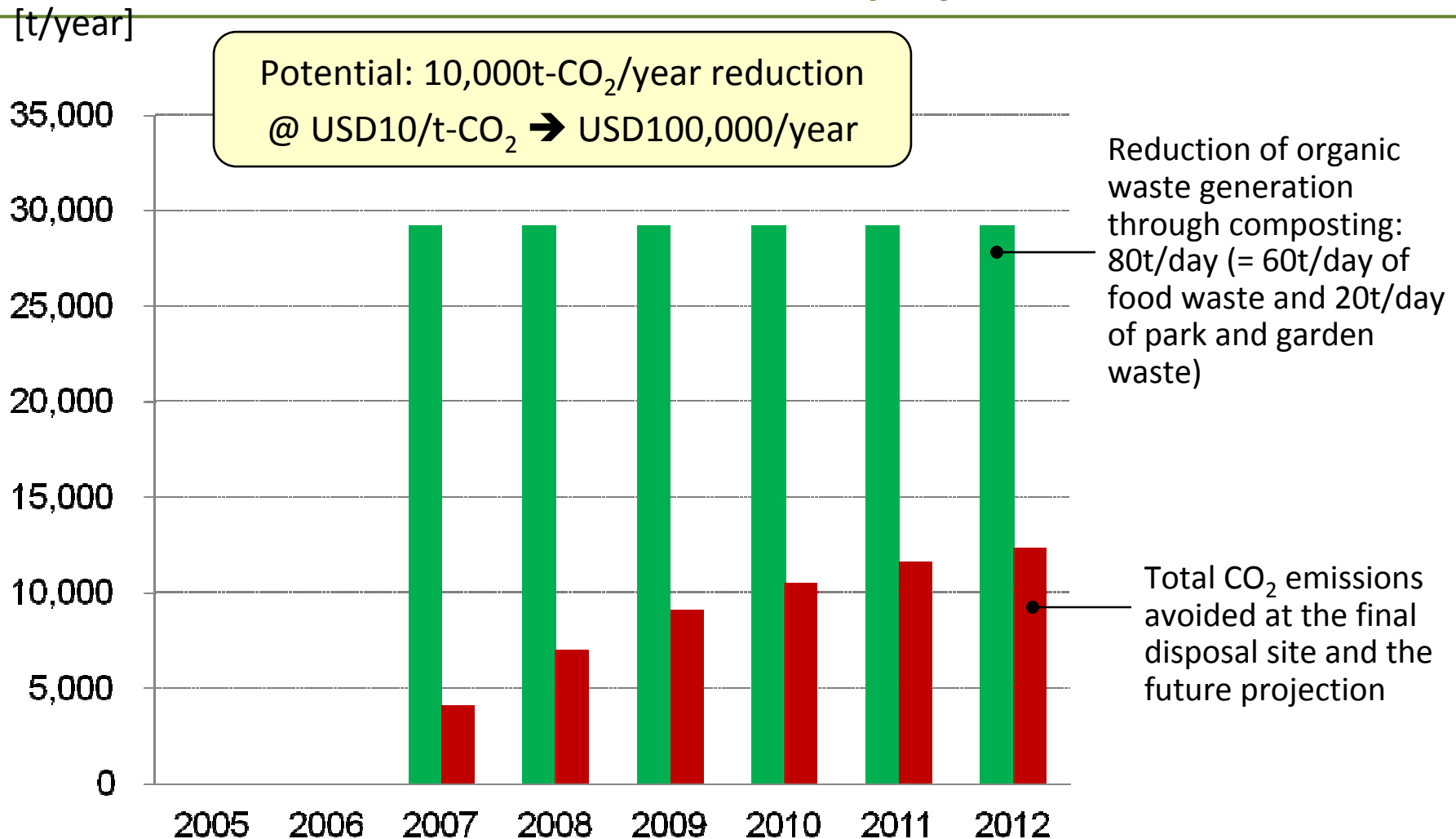


Figure 6 Reductions of organic waste generation and consequent greenhouse gas emissions in Surabaya (Prepared by Maeda (2009), based on the first order decay model from "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site (version 04)", CDM Executive Board, UNFCCC)

4. Recommendations for other cities

e.g. Actions for 15% reduction in waste generation

Inputs in Surabaya:

10-15% reduction target

Waste generation: 1,500t/day → 1,300t/day

→ Composting Centres: processing **40t/day (= 2-3% of total waste)**

Population: 3 million (= 600,000 households)

→ Household compost baskets: **19,000 units (= 2-3% of households)**

Inputs in Sibul, Malaysia (proposal):

Waste generation: 130 t/day → 110 t/day (**15% reduction!**)

→ Composting Centres: process **10 t/day (= 7-8% of total waste)**

Population: 200,000 (= 40,000 households)

→ Compost baskets: **2,000 households (= 5% of households)**

e.g. Possible actions in Sibul, Malaysia

Target 20 t/day reduction
130 t/day → 110 t/day
(10 t/day by composting &
10t/day by recycling)

1. Market-waste composting centres

- Process **5 t/day** (= producing 1t/day)

2. Composting centres in communities and schools

- Process 1 t/day @ 3 sites → **3 t/day**
- Purchasing of compost; promotion of compost use for farmers

3. Distribution of **compost baskets** to residents

- 2,000 households (5% of the total households) → **2 t/day**

4. Organising a community clean-up **campaign**

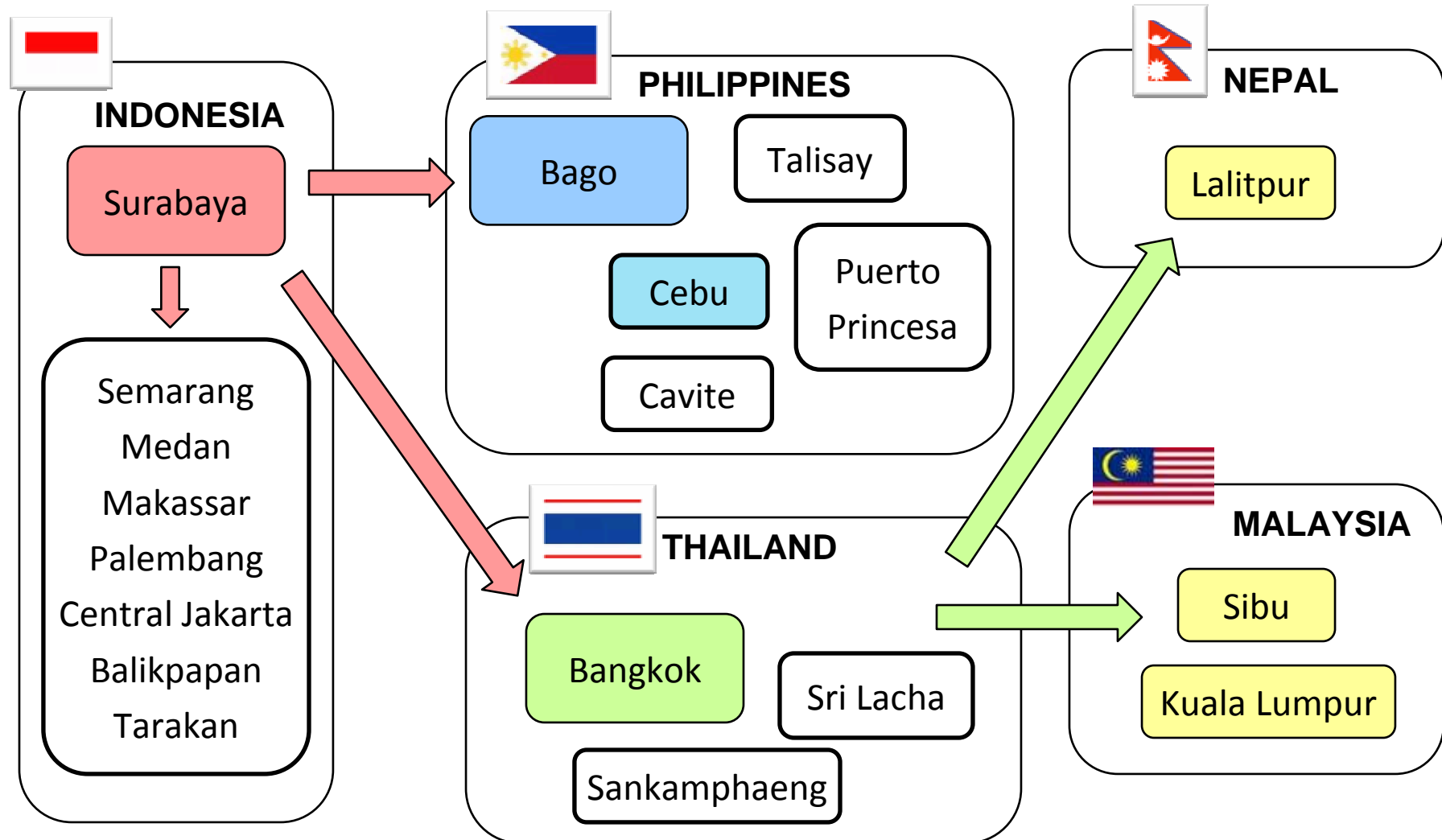
- Involve private companies and local newspapers and TV programmes

5. Compost **purchasing scheme**

- City starts purchasing the compost for park maintenance
- Free distribution to farmers; marketing of compost

6. **Technical assistance** by Kitakyushu City, IGES and JICA

Spread of Surabaya's model in other cities and countries



Workshop in Surabaya,
August 2008



Replication in 5 cities in Indonesia

In cooperation with JICA, Ministry of Environment and Ministry of Public Works, Indonesia



Central Jakarta City

Makassar City

Palembang City



Tarakan City



Balikpapan City



Development of a model project in Bago, Philippines



Using mud-press from sugarcane



Changing to Takakura Method
(2 weeks for fermenting)

Vermi composting

3 months for processing



Household compost boxes and pots

Implementation in Bago, Philippines



Composting training



Monitoring the use of basket



Open dumping site



Workshop in Bago



Distribution of baskets

Copied from Bago to Cebu, Philippines



2,000 baskets were distributed
by Pagtambayayong (NGO)



Dump site is full



A small vegetable garden next to a make-shift hose
using compost made from kitchen waste



Copied from Bago to Talisay, Philippines



Composting Workshop in December, 2008 in Talisay



Hon. Mayor of Talisay



Day 1



Day 11

Copied from Bago to Ternate, Cavite, Philippines



A composting centre build by an NGO in Ternate, Cavite



Participants in a work shop in Ternate, Cavite

Application in Bangkok, Thailand



Checking the condition of a household
compost baskets



Hon. Vice Governor of
Bangkok



Workshop-training in Bangkok, March 2009



Copied from Bangkok to Lalitpur, Nepal



preparing seed compost



200 out of 600 household using baskets



Compost Basket



Application in Sibul, Malaysia



Workshop training



Hon. Mayor of Sibul (right)

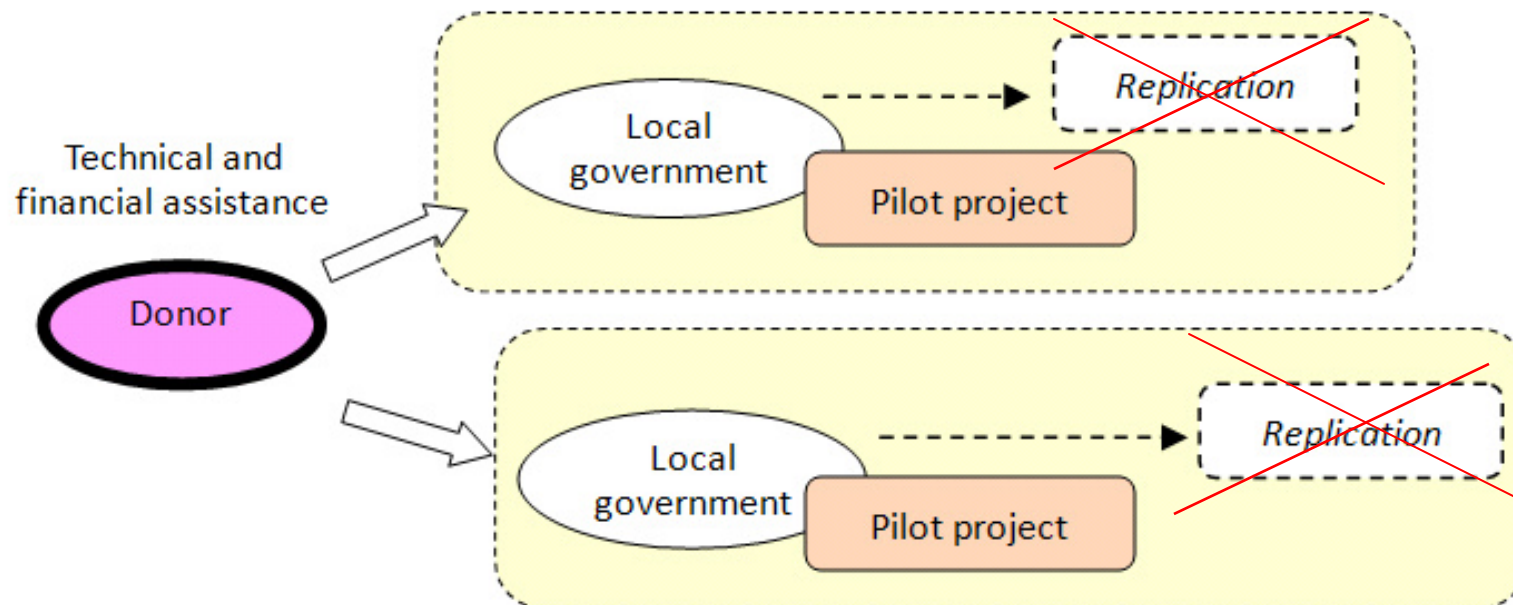


Source: Sibul Municipal Council

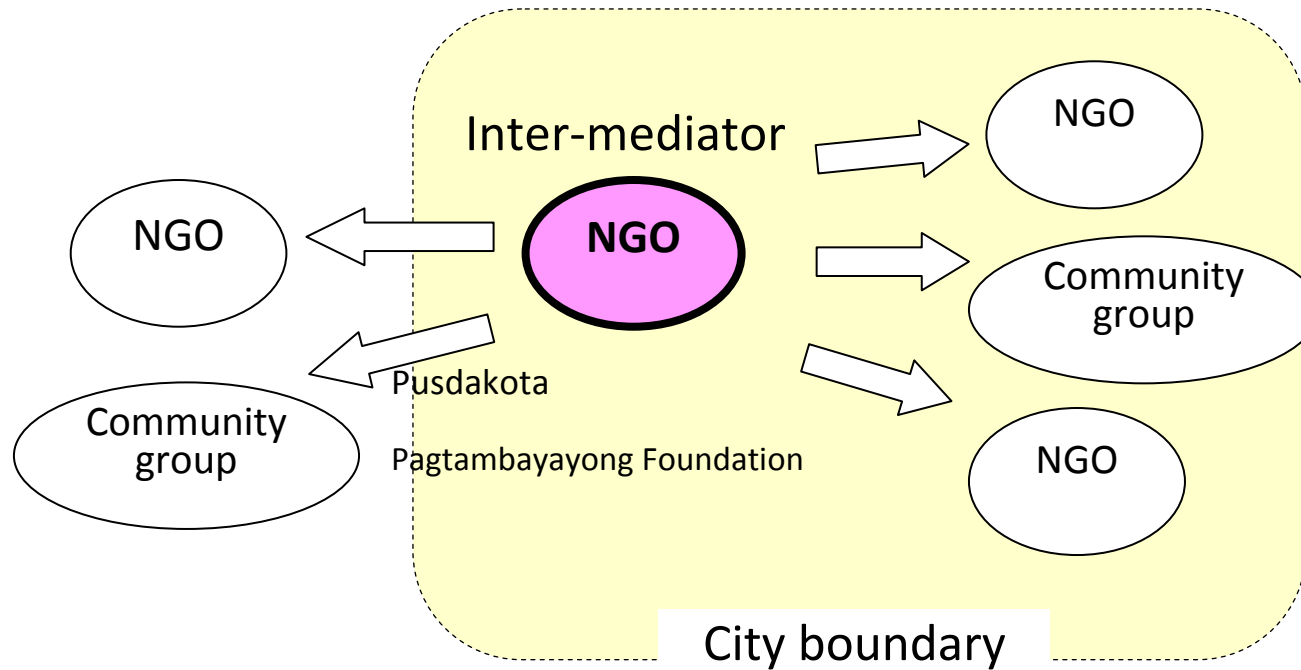
Replication Models of Good Practices

Replication does not happen automatically

- It was learnt that the implementation of pilot projects and sharing knowledge on best practices were insufficient (1st cycle)
- Many projects remain singular events without further replication. Why?

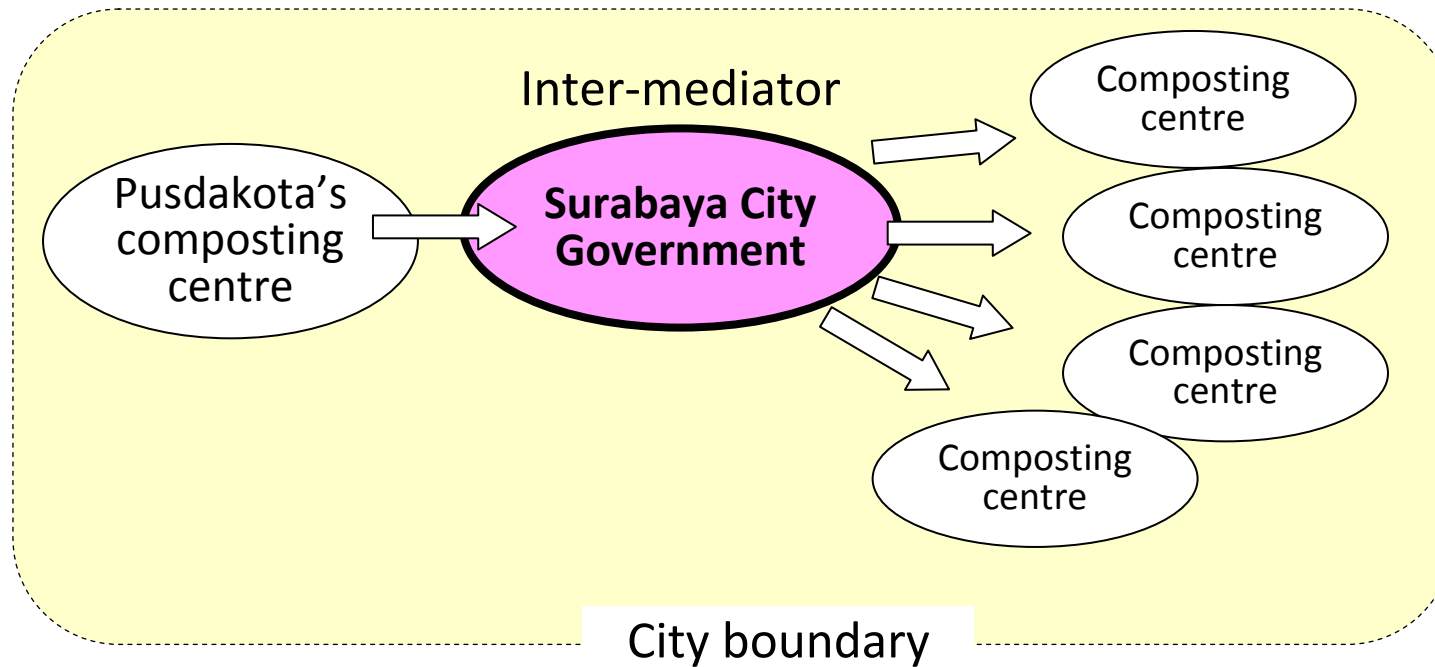


Replication by NGOs



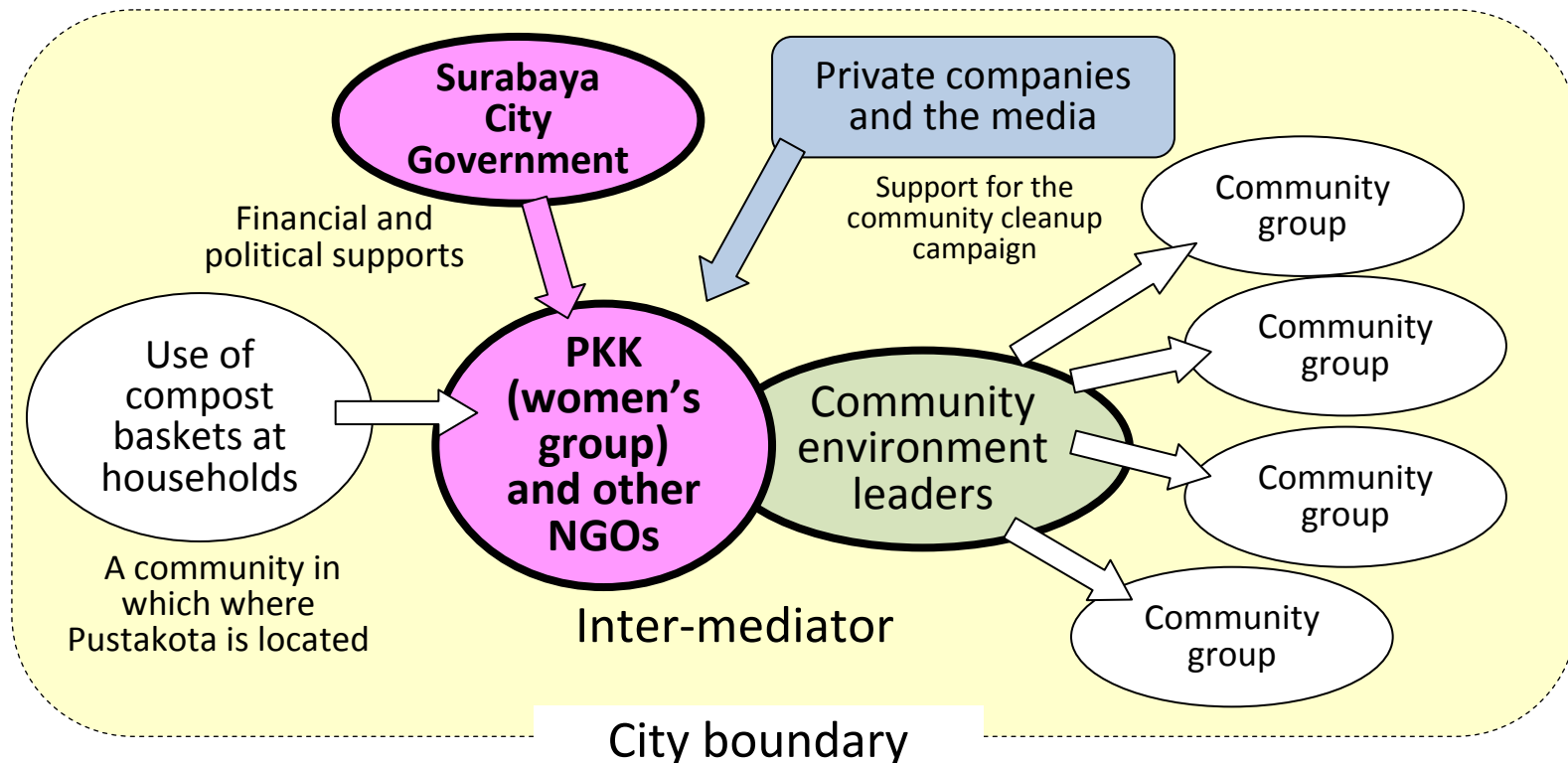
1. Training provided to others became source of NGO's revenue
2. Common feature: Strong mandate and high motivation to spread good practices beyond their operating borders
3. Win-win situation for NGOs and KI programme

Scaling up by local governments



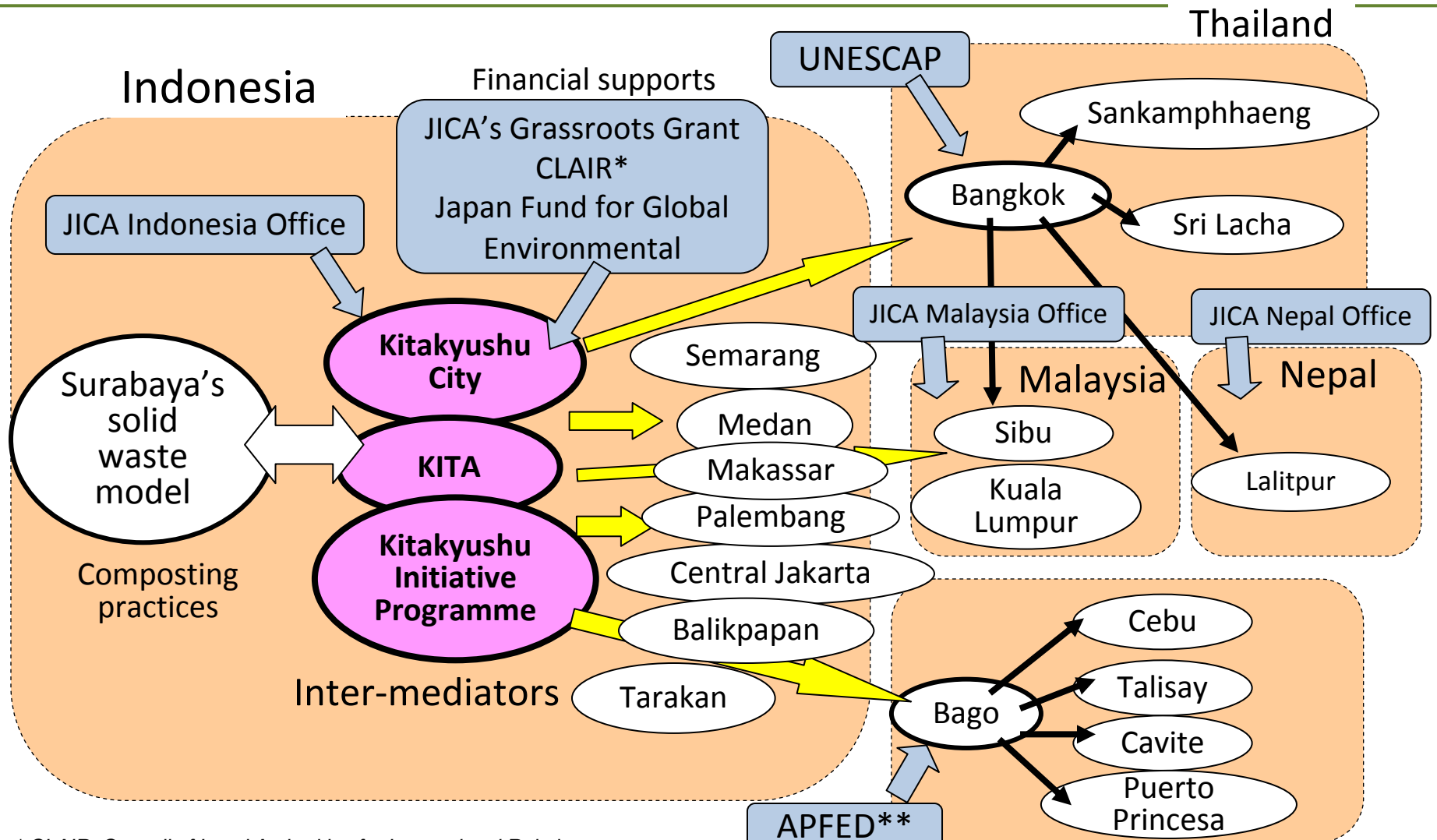
New composting centres were set up

Scaling up by local governments in cooperation with NGOs



1. Household compost baskets were distributed through the network of NGOs and environmental cadres
2. Community cleaning campaigns were organized with the support of private sector and media

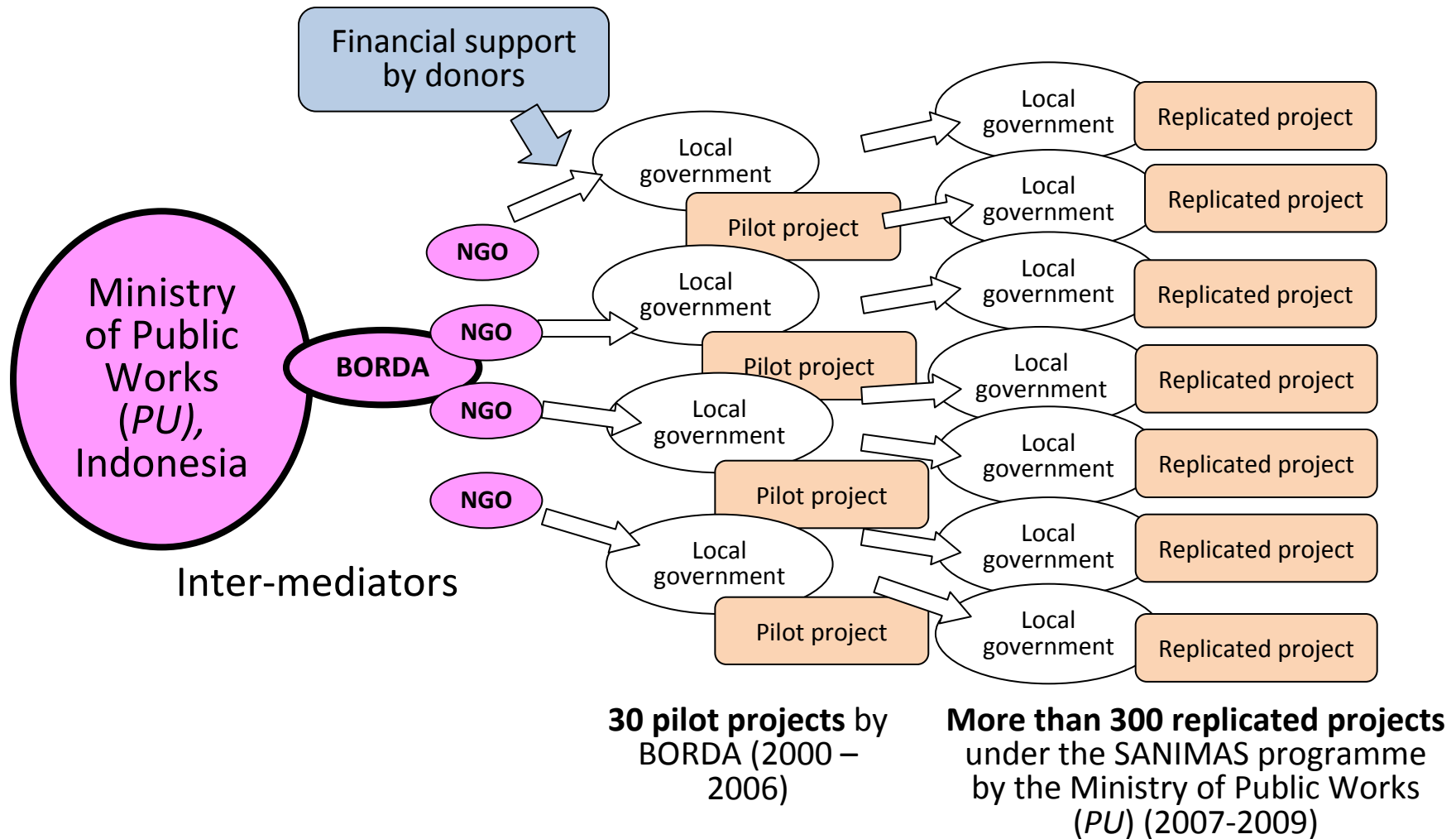
Replication from city-to-city & through inter-city network



* CLAIR: Council of Local Authorities for International Relations
 ** APFED: Asia Pacific Forum for Environment and Development

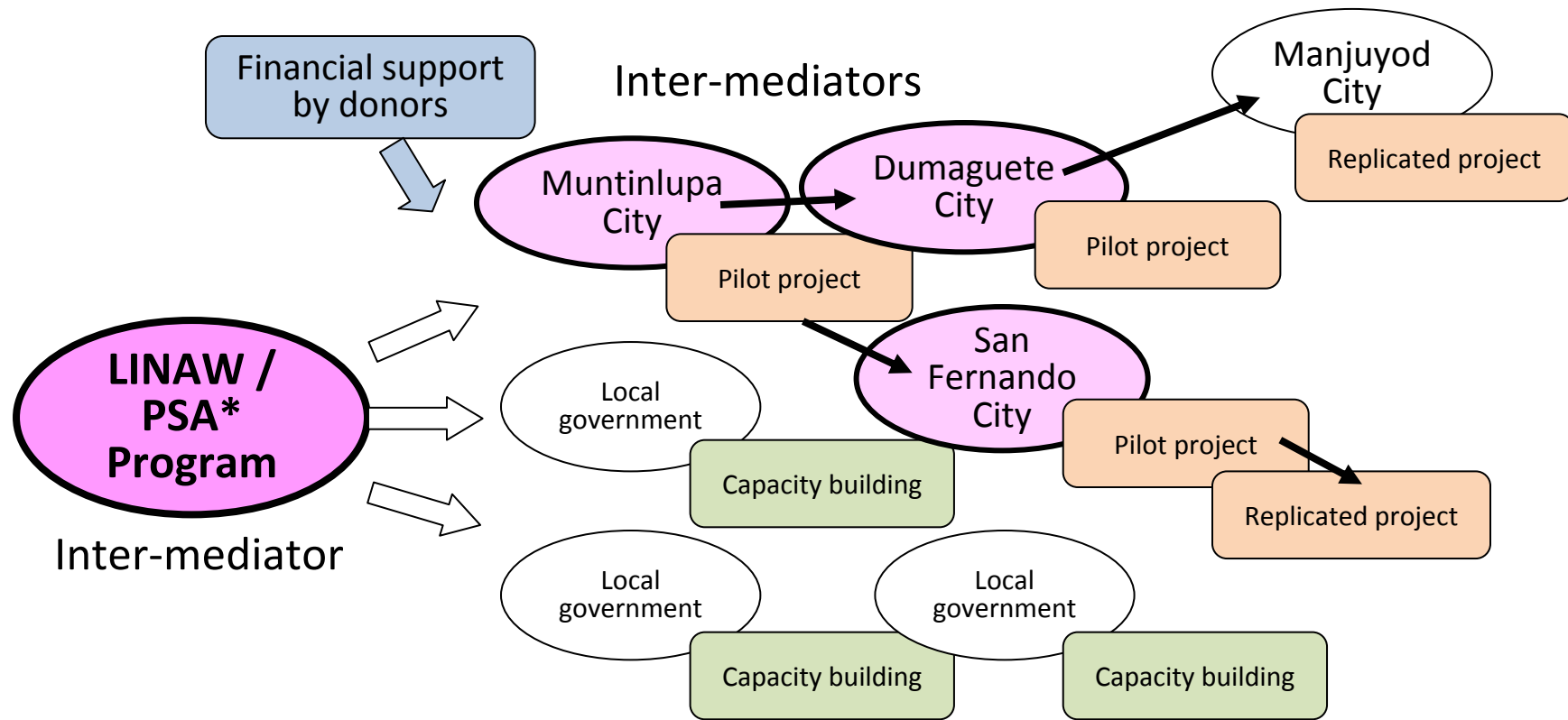
Philippines

Replication by Central Government (SANIMAS* in Indonesia)



* SANIMAS: Low-cost decentralized wastewater treatment programme in Indonesia

Replication by External Organisations and City-to-City



LINAW programme (2003 – 2006) 4 cities → PSA programme (2007 – 2010) 10 cities and 2 Water Districts

Replication of low-cost wastewater treatment systems in the Philippines

* LINAW: Local Initiative for Affordable Wastewater Treatment; PSA: Philippine Sanitation Alliance; both programs are funded by the United States Agency for International Development (USAID)

Replication models are applicable in other areas

Replication and expansion of good practices/policies are an easy way to induce large impact

Needs for **information/knowledge sharing**

Roles of **inter-mediators**: NGOs, local governments, central governments, inter-city networks,



Potential areas

3Rs & RESOURCE EFFICIENCY

- Centralized composting
- Household composting
- Recycling, waste banking
- Improving final disposal sites

WASTEWATER

- Septic tanks and septage management
- Decentralized (on-site) wastewater treatment

CROSS-CUTTING ISSUES

- Environmental education

Thank you! maeda@iges.or.jp

http://form.iges.or.jp/r/c.do?4n_12l_3e_zoq

<http://kitakyushu.iges.or.jp/publication/index.html>

Summing up...

- **Empowerment and involvement** can improve MSWM decision making and facilitate implementation.
- Building trust and respect **takes time**; it is a task of deepening local democracy which goes far beyond just improving MSWM.
- Involving citizens is **easier** if working through **established and respected organisations and leaders**.
- The case of **Surabaya** shows clearly the **benefits** of involving stakeholders in SWM.
- This case also illustrates the **need to develop partnerships** with multiple stakeholders.

Thank you for your
kind attention!