

# Decentralized Urban Solid Waste Management in Indonesia

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Grant No. 103074-001

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## Final Technical Report



BALIFOKUS



September  
2009

*Decentralized Urban Solid Waste Management in Indonesia*

<b>IDRC Project Number</b>	: <b>Grant No. 103074-001</b>
<b>IDRC Project Title</b>	: Decentralized Urban Solid Waste Management in Indonesia
<b>Country/Region</b>	: <b>Indonesia</b>
<b>Full Name of Research Institution, Address of Research Institution</b>	: Bremen Overseas Research and Development Association/BORDA Indonesia Bina Ekonomi Sosial terpadu/BEST BALIFOKUS
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1 CAD = 9256.18 IDR

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**ABBREVIATIONS**

AMPL	Air Minum dan Penyehatan Lingkungan / Water Supply and Environmental Sanitation
APBD	Anggaran Pengeluaran dan Belanja Daerah/Regional Fiscal Budget
APBN	Anggaran Pengeluaran dan Belanja Negara/National Fiscal Budget
Bappenas	Badan Perencanaan dan Pembangunan Nasional/National Planning Board
CDM	Clean Development Mechanism
CAD	Canadian Dollar
CAP	Community Action Plan
DED	Detailed Engineering Design
DLH	Dinas Lingkungan Hidup/Municipal Environmental Agency
DKP	Dinas Kebersihan dan Pertamanan/City cleanliness/Sanitation agency
DESWAM	Decentralized Solid Waste Management
EOI	Expression of Interest
GAIA	Global Alliance for Incinerator Alternatives/ Global Anti-Incinerator Alliance
GHG	Greenhouse Gasses
GOI	Government of Indonesia
HIA	Health Impact Assessment
ICC	Informed Choices Catalogue
IDR	Indonesian Rupiah
IDRC	International Development Research Centre
KMPS	Kelompok Masyarakat Pengelola Sampah/ Community-Based Organization (CBO)
KSM	Kelompok Swadaya Masyarakat / Community-Based Organization (CBO)
KIPRAH	Kita-Pro-Sampah/'We-pro-Waste' (Slogan to promote waste management)
KLH	Kementrian Lingkungan Hidup/Ministry of Environment
LGs	Local Governments
LLs	Lessons Learnt

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MoU	Memorandum of Understanding
MSEs	Micro- and Small Enterprises
MRF	Material Recovery Facility
O&M	Operation and Maintenance
Pokja	Kelompok Kerja / Task Force
PCP	Public to Community Partnership
PPP	Public to Private Partnership
PU	Pekerjaan Umum/Public Works
RAB	Rencana Anggaran Biaya/Budget plan
RPA	Rapid Participatory Assessment
RPP	Rancangan Peraturan Pemerintah/Governmental Regulation Draft
RKM	Rencana Kerja Masyarakat/ Community Action Plan
Satker PK PLP	Satuan Kerja Peningkatan Kinerja Penyehatan Lingkungan Permukiman/ Task Force of Performance Improvement on Environmental Health
SOP	Standard Operation Procedure
STBM	Sanitasi Total Berbasis Masyarakat/ Total Community Based Sanitation
SANWAG	Sanitation Working Group
SWG	Small Working Group
TFL	Tenaga Fasilitator Lapangan/ Field Facilitator
THM	Takakura Home Method
TPA	Tempat Pembuangan Akhir/Final Dumpsite
TPS	Tempat Pembuangan Sementara/Temporary Dumpsite
UMR	Upah Minimum Regional/ Minimum Regional Wage
1 CAD	Rp. 9,139.43
1 USD	Rp. 9,910.80

**Abstract****DECENTRALIZED URBAN SOLID WASTE MANAGEMENT IN INDONESIA**

In Indonesia, solid waste services are still monopolized and provided by government agencies. Although local regulations, which define the setup of the solid waste handling from household level to the temporary collection station, stipulate the involvement of the village or community level, community, especially the urban poor's, participation and involvement in managing waste from the source to the temporary station is not progressing.

Lack of awareness, weak law enforcement and insufficient incentive systems for waste minimization and recycling do not encourage the community to make an effort. These kinds of practices lead to high waste generation, with unsorted waste brought to dumpsites shortening the lifetime of the landfills. Local governments appear only interested in big scale projects and invite the private sector to solve the waste problem.

Community-based solid waste management is already implemented in several cities but so far no room for replication exists and it is still not introduced in a systematic way. Consequently, this decentralized, low-cost, pro-poor and climate friendly approach needs to be promoted more.

A systematic approach on community-based solid waste management, especially for urban poor or low-income communities, has to be supported by all stakeholders, especially local governments. The pilot projects implemented in typical urban poor/low-income areas in 7 cities were developed as a model which can potentially be replicated across the country.

Seven community clusters with a served population range of 300-1000 households were able to manage their own waste with an operational cost recovery system which involved all community members and was supported by all stakeholders in a sustainable way. This simple solution, close to the source, reduced waste volume up to 80%, increased community cohesion and was economically viable.

**Keywords:** *community-based, decentralized solid waste management, material recovery facility/MRF, operational cost-recovery, Waste reduction, multi-stakeholders*

**i) The Problem Addressed in the Research**

In the densely populated regions of Indonesia, the living conditions of the increasing population are worsening due to insufficient basic sanitation in poor settlements. This is exacerbated by contaminated water resources from untreated domestic and industrial wastewater, as well as a lack of appropriate urban solid waste management.

Solid waste, when improperly managed, can create significant health problems and a very unpleasant living environment. If not correctly disposed, waste may provide breeding sites for insects, pests, snakes, vermin (rats) and other vectors that increase the likelihood of disease transmission. It may also pollute water sources. Based on the infrastructure book of Indonesia (Bappenas, 2003) in the year 1995 the total garbage produced amounted to approximately 22.5 million ton, a figure which is projected to increase to 53.7 million ton in the year 2020. In large cities the production of garbage per capita is approximately 0.6 – 0.85 kg per day.

As an illustration, Jakarta City produces 6.2 thousand ton, Bandung 2.1 thousand ton, Surabaya 1.7 thousand ton and Makassar 0.8 thousand ton (Damanhuri, 2002) per day. About 4.2% of the waste was collected and transported to final dumpsites, the rest was burnt (37.6%), dumped into rivers (4.9 % ) or remained uncollected (53.3%) .<sup>1</sup> The main problems are landfill lifetime limitation and high operational and maintenance cost.

In general, in the urban context, the amount of garbage being produced is increasing while availability of land is decreasing. This will create major problems in the future, if no significant effort to address the issue is made. Therefore, an applied research in several low-income housing complexes and poor settlement areas in a variety of cities is proposed to be carried out in order to develop good practices and standards on how to manage the increasing solid waste problems of the growing urban centers in Indonesia and the region.

Existing approaches are insufficient in terms of being oriented towards single components of the system. Interfaces and integration of the different components (waste prevention, separation, collection, re-use, recycling, composting, intermediate storage, transportation and final disposal) are not considered.

There is a need to provide affordable service packages to private and governmental housing developers, local governments as well as communities in urban areas. Cost recovery for operation and maintenance is a must. Local regulations need to be stipulated to enforce an integrated planning and development of urban centers from the beginning.

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<sup>1</sup> *Infrastruktur Indonesia Sebelum, Selama dan Pasca Krisis, Deputi Bidang Sarana dan Prasarana Bappenas, Oktober 2002*



Further research is required to elaborate how decentralized waste management systems can be designed and what parameters are necessary to fine-tune these into solutions which reflect local conditions such as income level, interference with scavengers, mobility, social homogeneity as well as ability to pay. Appropriate technical and managerial solutions need to be developed and to be integrated into the process of implementing adequate local regulations.

## ***ii) Methodology***

Methodologies applied in this research were:

- Desk studies
- Field/exchange visits to Manila and Bangkok
- Focus Group Discussions
- Workshops
- Field trial/implementation
- Review
- Dissemination

The project combined research and practical applications, known as action research. NGOs acted as facilitators, mediating between communities, civil society and local governments (LG). The approach allowed matching local government policy with grassroot demands and abilities. Basic principles of this approach are:

- *Gender sensitivity:*  
Environmental health and hygienic living conditions mostly affect women and children. With regards to garbage collection, the main source of garbage generation of the urban poor is households, which are mostly managed by women. The approach considered an equal involvement and participation of men and women, which allowed a proper communication of basic needs and support the development of sustainable solutions.
- *Demand responsiveness:*  
As the operation and maintenance costs should be fully financed by the services run by the community committee, only communities with a defined demand were considered as potential target groups. Common tools for community appraisals and capabilities were adopted and applied within the research activities.
- *Matching funds for initial investment:*  
Low-income communities were not in a position to finance capital/investment costs, but only the operation and maintenance costs. Therefore a multi-stakeholder approach was applied, which allows matching funds from different sources. During the research activities matching funds were generated from the IDRC/BORDA funds as well as from local governments and central government, in this case the Ministry of Public Works through their task force at the provincial level.

Existing conditions show, that there was a need for decentralized solid waste management. This need serves as the theoretical basis for different models applied in the research. This need had to be urgently addressed due to the limited availability of waste transportation capacity, lacking space for

final disposal sites and already pre-separated garbage fractions at the household or local community level. Based on those conditions this proposal starts interfering directly at the local level.

Different organizational and managerial setups were reviewed, observed and discussed. The basic component consists of the decentralized solid waste management system, which was applied for all research approaches and involves a Material Recovery Facility/MRF establishment at the community level.

The basic concept developed as follows:

**a) Initial discussion with national policy makers as well as regional or local government stakeholders**

The initial discussion was held to gain the support of national agencies and to establish guidelines along with national policy on solid waste management. Discussions with local stakeholders were held as an inception and initial coordination meeting regarding the proposed project. The discussion and lobbying with national agencies as well as local government stakeholders was essential to the project as it contributed as a new approach towards national SWM strategy.

**b) Selection of the urban poor community/location of the project based on the demand driven criteria**

At least 4 sites in each city were shortlisted, as the potential urban poor communities or sites to work with were explored based on the visual conditions, lists provided by the municipality on recognized slums/projects as well as data from previous research or projects. The community or site was then selected based on several criteria, which were developed by the project team in a participatory manner with LGs and national stakeholders during the project preparation.

**c) Rapid Participatory Assessment of the location/community**

The Rapid Participatory Assessment (RPA) was used as a selection tool for community selection. The tool was developed using several parameters and scoring systems to assess the condition of the potential communities. Social, economic and technical aspects related with existing and future potential solid waste management have been assessed.

**d) Establishment of the Community-Based Organizations**

Once the community or project site was selected, it was recommended to the beneficiaries to set up formal community-based organizations (CBOs). This was important to ensure the communication, coordination and implementation of the project is beneficial for the target groups. By forming a CBO it was easier for the beneficiaries to organize the work and show the results. The CBO later developed several divisions based on the interests and the demand of all beneficiaries, i.e. an agribusiness division, a recycling division, a craft division, a composting division, an education division, an awareness campaign, a micro-economic division, etc.

**e) Selection of the feasible technical and management options from the informed choices catalogue**

Feasible decentralized technical solid waste and management options have been explored and developed. The options are formulated in the form of a catalogue and/or posters to be displayed as informed choices for the community and completed with the advantages and disadvantages of each technical option. The selected options are then followed up to the implementation stage.

The informed choices consist of the following options:

- (i) Waste handling at household level: separation as well as composting options
- (ii) Waste collection from households to the next handling level (options are: separated motor cycle collector, container, temporary collection, MRF, compost center, etc.)
- (iii) Waste handling at temporary collection site: improved temporary collection, simple MRF, MRF with composting, etc.)
- (iv) Waste handling from temporary collection to the final dumpsite.
- (v) Further utilization and marketing of organic as well as an-organic waste (e.g. for urban crops/agriculture sector, for herbal medicine plants, nursery, crafts, etc.)

**f) Implementation of the selected system**

The selected options were implemented in stages within a period of 12 months:

- (i) Stage 1: Implementation at the household level
- (ii) Stage 2: Implementation of the collection system
- (iii) Stage 3: Implementation at the temporary collection level
- (iv) Stage 4: Implementation of residue transfer from the temporary collection to the final dumpsite
- (v) Stage 5: Implementation of waste utilization and marketing

**g) Operation and maintenance of the system**

The systems are functioning and maintained; all efforts are optimized to step by step reach the cost self-recovery status. Subsidy has been provided in decrement stages.

**h) Monitoring and evaluation**

The monitoring and evaluation of the activities is conducted every 6 months, beginning at the project initiation till the end of the 3rd year.

**i) Dissemination**

Dissemination has been conducted before the end of the 3rd year to share feasible examples of decentralized solid waste management in 4 urban poor communities to public and other stakeholders. Dissemination has been conducted in one of the project sites to provide an opportunity for the stakeholders to visit the community as well as the site.

**iii) Project Activities****PROJECT MANAGEMENT****3.1 PROJECT PLANNING AND EVALUATION**

Planning and evaluation workshops were conducted once a year during the project implementation.

Project evaluation by external consultants was conducted in November 2008 by DR. Bernd Gutterer and Mr. Handy B. Legowo.

**3.2 ESTABLISHING OF PROJECT ADMINISTRATION SYSTEM**

A project administration system has been set up according to the IDRC Financial Report. Accountants of the partners have been trained by BORDA's chief accountant.

The project administration system has already been applied during the project implementation using the accounting system required by IDRC. The system was applied in all 3 project offices, at BORDA, BALIFOKUS and BEST, and operated by 3 project administrators: Dyah Purwanti (BORDA), Ketut Sri Artini (BALIFOKUS) and Suwardi (BEST).

**3.3 PROJECT COORDINATION MEETING**

Project coordination meetings were conducted in 2006 – 2008 every 2 months and attended by the Coordinator, Co-coordinator, and Team Leaders. The coordination meetings have been conducted on schedule at different offices: Jogjakarta (BORDA office), Tangerang (BEST office), and in Denpasar (BALIFOKUS office).

**3.4 MOBILIZATION OF STAFF AND ADMINISTRATION**

Project has appointed and hired a number of staffs at different levels, such as:

- BORDA has appointed Mr. Frank Fladerer as an international backstopper; Mr. Surur Wahyudi as a part time Project Coordinator; Ms. Dyah Purwanti as a part time financial administrator.
- BEST has appointed Mr. Hamzah Harun Al-Rasyid as a part time Team Leader of the Tangerang and Surabaya region; assigned Mr. Ilhamsyah Lubis and Mr. Abdullah Basyri as Community Development Experts; Mr. Santoso, later replaced by Mr. Suwardi, as a project accountant. BEST also hired one Field Facilitator, Mr. Sulfuad. Due to personal

reasons, however, Mr. Sulfuad resigned after two months as Field Facilitator and was replaced by Mr. Imam Sutopo in July 2006.

- BALIFOKUS has appointed Ms. Yuyun Ismawati as a part-time Team Leader for the Bali and Mataram region; assigned Ms. Prapti Wahyuningsih together with Ms. Noka Destalina as Community Development Experts. During the 2nd year of implementation, Ms. Prapti and Ms. Noka resigned, and were replaced by Ms. Eka. Mr. Tedy Bramanca acted as project accountant. BaliFokus also hired Ms. Sumiati as Field Facilitator in April 2006, however, she was later replaced by Ms. Eka.
- Field facilitators have been recruited and trained for all 7 pilot implementations: Tangerang, Denpasar, Sidoarjo, Tarakan, Makassar, Blitar and Badung. The field facilitators are the key players to translate CBSWM ideas in the field and in communicating them directly to the community.

### 3.5 COLLECTING of EXPERIENCES, REVIEW AND CONCEPT DEVELOPMENT THROUGH SMALL WORKING GROUPs (SWGs)

A small Working Group related to the solid waste management project cooperation of IDRC funded projects was established. Several meetings were conducted at the BORDA office in Yogyakarta, the BEST office in Tangerang as well as at the BALIFOKUS office in Bali, at three monthly intervals. The SWG meetings are attended by all project team members.

Through the SWG, the project research team collected, analyzed and synthesized experiences and lessons learned from the experiences of different stakeholders in Indonesia as well as in neighboring countries, like the Philippines and Thailand. The study was conducted in two ways, with the information being collected through desks studies, references and web surfing, article clippings as well as site visits whenever feasible.

Since the information collected was of a large variety and showed different levels of experiences and perspectives, the team then synthesized and developed the structure to provide an easier format to study all related experiences. The synthesized structure comprised of sub-topics, which were: technology, financial, institution and management, policy and regulation as well as capacity building.

During the period of March – September 2006 researches, desk studies and exchange visits to several cities in Indonesia as well as to neighboring countries were conducted. The research focused on several main perspectives on urban or domestic solid waste management as follow:

1. Policy, law and regulation

- A national policy umbrella and commitments from the central government are keys to a successful solid waste management program. Further elaboration by several laws and local regulations ensures the implementation of the policy in the field.
  - In the Philippines and Thailand clear national targets on waste minimization and environmentally sound practices (the incineration technology is banned all over the Philippines), which are stated clearly in the National Act, provide unambiguous directions for all stakeholders.
  - Proper monitoring teams and mechanisms also need to be set up accordingly. Incentives and award programs are enforced to acknowledge the successful implementation in the field.
  - Strong involvement of multi-stakeholders, like the Philippine case of eco-waste solid waste management, is a good example of policy implementation.
2. Solid Waste Program Financing
- Funds for solid waste implementation until the village level are provided by national agencies as well as provincial and city level agencies for active communities or stakeholders who are willing to tackle their own solid waste problems.
  - Funds for solid waste management allocated in the annual budget amounted to approximately 3-5% of the national annual budget or municipality annual budget.
  - Governments provide funding support for infrastructural procurement in the form of equipment, waste processing buildings or cash. Beneficiaries or communities provide the operation and maintenance costs and must maintain the system in a sustainable way.
  - Budget allocated only for demanding communities/villages.
3. Organization and institutional aspects
- For solid waste management in commercial areas, at the community or village level, a management option was provided; either: community-managed (composting facility, eco-waste project, Material Recovery Facility (MRF)) or semi-cooperative managed (garbage bank).
  - Incentives and recognitions (cash, certification, awards) were given to the best practices
4. Technical aspects
- Simple and appropriate technologies are used in most of the waste processing facilities and composting sites. No dependency on foreign experts and spare parts are the key to a successful technical implementation.
  - Technology adjustment to the local condition is necessary.
5. Sustainability issues
- Cost recovery concepts for operation and maintenance purposes are being pursued by all beneficiaries/communities.

- Waste minimization efforts reduced the waste transportation costs and the waste volume transported to the dumpsites.
  - Capacity building for the operators and management team of the service providers is one of the important aspects to maintain the sustainability of the service.
  - A continuous awareness campaign is necessary.
  - Leadership is the key to the sustainability of the program.
- The Small Working Group (SWG) of KIPRAH is still active to this day, in particular as a forum for communication and exchange of up to date information related to KIPRAH, as well as a forum to share the lessons learnt from various sources collected by the research team members.

#### ***iv) Research Objectives and Outputs***

The research's main objectives are:

- 1. To improve and develop options for solid waste management in urban areas.**
- 2. To disseminate and network more broadly lessons learnt and feed policy dialogue nationally and regionally.**

#### **Specific Objectives**

- 1. To create a communications/marketing strategy for stakeholders at the community and local government (LG) level to build demand and buy-in for improved solid waste services.**

One of the primary objectives of the project was to create a communications/marketing strategy for stakeholders in the communities and LGs in order to build demand for solid waste services. This was successfully implemented by drawing up a service package for decentralized urban solid waste management which was delivered to the communities and LGs with some important aspects to be considered: waste had already been recognized as a problem in the community, land availability was an important issue, and LG co-financing allocation for investment costs had to be ensured. The marketing strategy for community-based solid waste management was conducted through seminars with stakeholders, LGs, socialization at the community level, and exchange visits.

- 2. To develop participatory bottom up processes with local stakeholders for implementing sustainable decentralized solid waste management systems in seven communities.**

- 2.1 One of the crucial aspects of decentralized solid waste management is the establishing of participatory bottom up processes together with stakeholders for the implementation of solid waste systems. This is a necessity due to the fact that the key to a successful implementation and sustainability of CBSWM is the involvement of the community in all stages: planning, technology options, infrastructure development, operational, and

evaluation. This approach has been proven to develop a sense of ownership in the community. Therefore, to strengthen the participatory bottom up processes with stakeholders for the implementation of solid waste systems the following steps were implemented:

## 2.2 DEVELOPMENT of TOOLS, CRITERIA FOR LOCATION, SHORTLIST, SELECTION CRITERIA, AND PROJECT ECONOMICS

The research team developed participatory tools which have been used for the project implementation. Involvement of the community is a key activity to ensure the sustainability of the project; therefore those tools have a great influence on community development aspects.

Some participatory tools have been modified from the popular participatory method MPA-Methodology for Participatory Assessment, which was developed by the Water Sanitation Program-World Bank and successfully tried out in a previous community- based sanitation (SANIMAS) project where BORDA and partners BALIFOKUS and BEST have been pioneering the implementation of the project. Tools have been modified for community selection processes and assistance for communities to establish their action plans.

Participatory tools developed consisted of tools for:

- Site/community selection process
- Service area coverage
- Willingness of beneficiary community to contribute

Location(s) selected by applying criteria, such as:

- Settlement with minimum of 500 households ( $\pm$ population of 2500 )
- Low-middle income status
- Village level or low-middle class residential areas
- No waste collection system or minimum level of waste collection system

Selection criterias set up for several parameters:

- Local government's willingness to contribute to infrastructure investment
- Level of demand for solid waste service
- Level of awareness
- Amount or level of community contribution



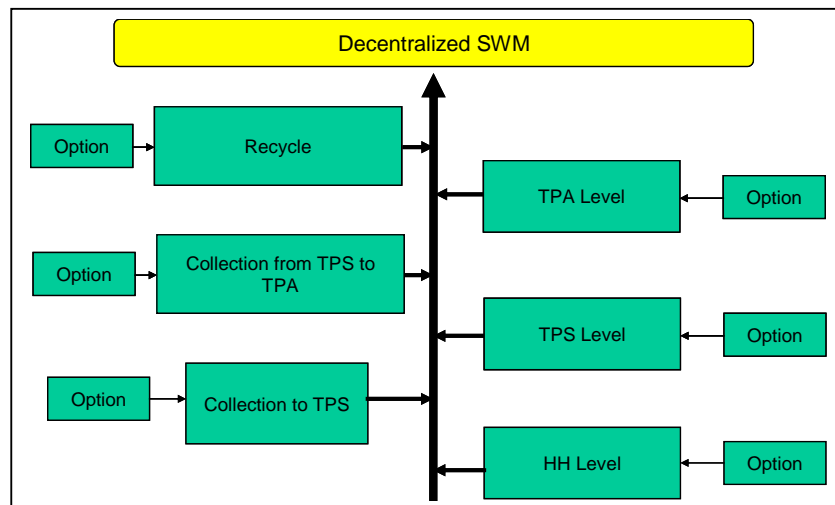
### 2.3 DEVELOPMENT of DESWAM ICC PACKAGE

DESWAM Informed Choices Catalogue (ICC) is a set of technical options on solid waste management techniques. The ICC also describes the advantages and disadvantages of every option, investment and operation and maintenance costs of every option as well as management/institutional/operator options.

The benefits of using the ICC before project implementation are:

- Help beneficiaries to recognize the appropriate SWM service at different levels
- Simplify the decision making of the SWM system according to stakeholders' choices
- Appropriate tool for “bottom-up” planning process
- Can be used as SWM technical reference by all stakeholders

The DESWAM ICC is structured in a systematic way as follow:



Decentralized Solid Waste Management (DESWAM) ICC:

1. SWM options at household level
  - a. Containment (one container, 2 containers, 3 containers)
  - b. Composting
2. SWM collection options from household to temporary collection site
  - a. Conventional pushcart
  - b. Bicycle cart
  - c. Motorbike collector
  - d. Small pick-up

3. SWM option at temporary collection sites
  - a. Container
  - b. Temporary dumpsite (TPS) with separation process
  - c. TPS with separation process and composting site
  - d. TPS with separation process, composting site and other recycling activities
4. SWM transportation options from temporary collection sites to dumpsite

An example of the ICC options on SWM collection systems from household to temporary collection sites is shown in the following figure.

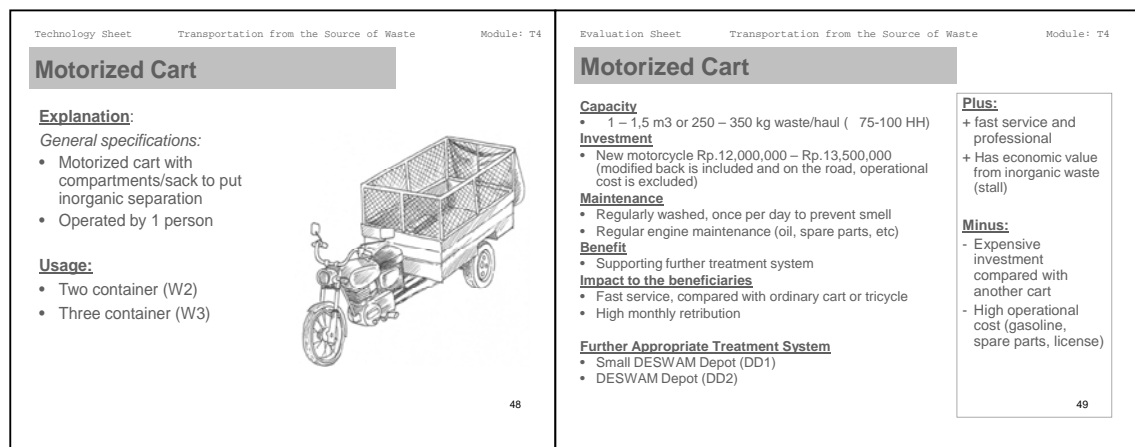


Figure 1. Household level: Waste collection transportation mode option

## 2.4 DEVELOPMENT of CAPACITY BUILDING MODULES AND AWARENESS CAMPAIGN

Capacity building modules for Field Facilitators, Communities, Operators and Heads of MRFs and management systems as well as Awareness campaign material have been developed and tried out in all facilities.

The available training modules are:

- Training module for community – on waste separation at source, home composting, recyclables utilisation, etc.
- Training module for operator – on waste collections from houses to MRF, waste separation at the MRF, composting options at the MRF, recyclables management at the MRF, etc.
- Training module for MRF management for CBOs – journals, balance, waste records, etc.

The awareness campaign for communities has been jointly developed with two German students who were participants of the ASA North-South Exchange Program from 22 August – October 30, 2006. The Awareness campaign modules were finalized after having been tried out on the Tangerang and Denpasar sites, and are now used in all locations of KIPRAH.

## 2.5 TOOLS VERIFICATION AND PROTOTYPE FINALIZING

Tools for community selection have been tried out and verified by all team members jointly with BORDA, BEST and BALIFOKUS in Denpasar during May 10-12, 2007

## **3. To pilot seven decentralized/community-level solid waste systems to test various management approaches, financial options and technical alternatives and to verify most viable options.**

The initial aim of the project was the completion of 4 systems/models which included the waste collection and Operation and Maintenance systems being tuned for cost recovery, followed by Best Practices being formulated for decentralized solid waste collection and separation, draft manuals, and informed choices catalogue.

However, since the approach changed towards increasingly promoting the LG's role as the responsible authority to manage waste in all cities in Indonesia, the LGs' contributions for investment costs became the priority of the pilots. Instead of delivering 4 sites as submitted in the initial proposal, the project was able to deliver the pilot in 7 sites in 7 cities with a variety of financing sources, while using the same O&M cost recovery approach. The implementation in the 7 cities was based on the following steps:

### 3.1 CITY SELECTION (PRE SELECTION, ROAD SHOW, CITY STAKEHOLDER MEETING, EXPRESSION OF INTEREST (EOI) AND MEMORANDUM OF UNDERSTANDING (MOU) SIGNED).

In the initial design of the research project, pilot implementation was planned for 4 locations and was scheduled to be implemented at the beginning of September 2006. It was planned to fully finance the infrastructure through the project. As during the project introduction process towards the National Planning Board (BAPPENAS) and the Sanitation Working Group (SANWAG) the option of municipal co-financing was successfully discussed, the schedule had to be delayed by a number of months as certain administrative requirements at the local government level needed to be met. Additionally it was necessary to conduct lobbying activities to the SANWAG team, which will ensure co-financing for the implementations to come.

Since the financial scheme changed with possible municipal co-financing, after consultation with the IDRC, the number of pilots was increased to 7 locations. This foresaw the implementation of 2 pilots in 2006, 2 pilots in 2007 and 3 pilots in 2008.

The Ministry of Public Works allocated financial sharing for 2 locations in 2006. In June 2006 BEST was approached by the Ministry of Public Works to participate in the solid waste project which provides Material Recovery Facilities (MRF) in two cities in Tangerang City (Banten Province) and Cirebon City (West Java Province). The Ministry of Public Works agreed to provide matching funds for 2 locations through their project consultants. The project (BEST-BORDA/IDRC) provided a financial share of approximately Rp 150.000.000.- out of Rp 400.000.000.- for investment costs in each location. Since the Denpasar pilot project only received approval from the LG and had to deal directly with the community, the investment cost had to be covered by the project.

For the 2007 pilot project, the selected cities were Sidoarjo, East Java and Tarakan, East Kalimantan. The Sidoarjo pilot project was financed by three parties: the Public Works Department, the LG and BORDA/IDRC; while the Tarakan pilot was financed by the LG and BORDA/IDRC. The 2008 pilot consisted of three selected cities: Blitar, East Java, Makassar, South Sulawesi and Badung, Bali. The models for co-financing the pilot could be replicated as Blitar was co-financed by the Public Works Department, the LG and BORDA/IDRC; Makassar was co-financed by the Public Works Department and BORDA/IDRC, while Badung was co-financed by the Public Work Department, BORDA/IDRC and the private sector.

Considering these developments, the pilot implementation in 2006 -2008 was as follow:

**Table 1. Financial sharing of pilot implementation**

Year	No	Locations	Investment Cost (IDR x 1mio)	Min. of Public Works (IDR x 1mio)	LGs (IDR x 1mio)	IDRC/ BORDA (IDR x 1mio)	Private Sector (IDR x 1mio)	Community (in kind) (IDR x 1mio)	Remarks
2006	1	Tangerang, BANTEN	495	350	-	135	-	10	Land provided by developer with total area 550m2 (1m2 = Rp 500,000)
	2	Denpasar, BALI	905.75	-	500	402.75	-	3	Land provided by the village with total area 400m2 (1m2 = Rp 1,000,000)
2007	3	Sidoarjo, EAST JAVA	932	600	250	75	-	7	Land provided by the community with total area 650m2 (1m2 = Rp 1,500,000)
	4	Tarakan, EAST KALIMANTAN	223	-	125	90	-	8	Land provided by the LG with total area 350m2 (1m2 = Rp 1,500,000)

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2008	5	Blitar, EAST JAVA	685	400	200	81	-	4	Land provided by the LG with total area 600m2 (1m2 = Rp 200,000)
	6	Makassar, SOUTH SULAWESI	259	165	-	90	-	4	Land provided by the village with total area 400m2 (1m2 = Rp )
	7	Badung, BALI	404	200	-	120	80	4	Land provided by the community with total area 400m2 (1m2 = Rp 1,500,000)
<b>Total amount in IDR</b>			<b>3,903.75</b>	<b>1.715</b>	<b>1.075</b>	<b>993.75</b>	<b>80</b>	<b>40</b>	
<b>Amount in CAD</b>			<b>421,745</b>	<b>185,282</b>	<b>116,139</b>	<b>107,361</b>	<b>8,643</b>	<b>4,321</b>	
<b>Percentage</b>			<b>100.00%</b>	<b>43.93%</b>	<b>27.54%</b>	<b>25.46%</b>	<b>2.05%</b>	<b>1.02%</b>	

Initially the project was targeted to the benefited community only. But during the project development, as national agencies and SANWAG agreed on a collaboration, local governments at the provincial as well as the municipality level were also considered as the research users or beneficiaries of the research. They benefited from this project in the following manner:

- Received inputs to develop local policy and regulation on solid waste management programs
- Capacity building for their technical facilitators
- Implemented an innovative program in their city to provide solutions for urban solid waste management, especially in slums and densely populated areas

The locations of the cities are shown in Figure-02:

**Figure-02 Map of DESWAM/KIPRAH Pilot Locations 2006-2008**



Note:

- Pilot implementation 2006: Tangerang, Denpasar (2 cities)

- Pilot implementation 2007: Sidoarjo, Tarakan (2 cities)
- Pilot implementation 2008: Blitar, Badung, Makassar (3 cities)
- Canceled proposed cities in the proposal: Medan, Mataram (2 cities)

The pilot locations represent a variety of areas and different city/regency types. Tangerang, Denpasar and Sidoarjo all fall under the category of big cities, with a population number of above 500,000 inhabitants. Tarakan, Blitar and Badung fall under the category of small cities, with a population range between 200,000 – 500,000 inhabitants.

Meanwhile, Makassar is considered a metropolitan city, with a population number of above 1 million inhabitants. Each community in the respective cities represents different urban population settings. By selecting a wide range of pilot locations with different characteristics and settings it was hoped that the replications in similar cities could be implemented easier based on the lessons learnt in each city.

**BOX 1:**

**CITY SELECTION**

*To become the pilot locations, cities were selected based on several criteria:*

- *Willingness to contribute, especially for infrastructure co-financing, minimum of Rp.200 million*
- *Willingness to participate and follow all KIPRAH implementation steps*
- *Willingness to allocate human resources as facilitators, representing the Local Government agency*
- *Willingness to replicate KIPRAH within the local government environmental management policy*

*All of these requirements have to be stated in an Expression of Interest (EoI,) signed by the mayor or head of the regency and sent to BORDA or partners as one of KIPRAH's demand responsive principle indicators.*

*In an initial proposal, Mataram and Medan were mentioned based on a preliminary study. Later on, after the project launched, Mataram City and Medan City did not sent the EoI.*

In every pilot location KIPRAH tested a waste management system which will be run by a community committee. Based on the reference, the four basic types of arrangements for SWM by micro-and small enterprises (MSEs) identified by Haan, Coad and Lardinois (1998)<sup>2</sup> are:

- Private enterprises that work to make a profit;
- Co-operatives that provide mutual support for workers;
- Community-based enterprises that are established to meet a local need; and
- Labour contracted by an individual or social organisation to meet a local need.

<sup>2</sup> Haan, H.C., A. Coad and I. Lardinois. *Municipal Solid Waste Management: Involving Micro-and Small Enterprises Guidelines for Municipal Managers. International Training Centre of the ILO, Swiss Centre for Development Co-operation in Technology and Management (SKAT) and Urban Waste Expertise Programme (WASTE), 1998*

Following from this, the KIPRAH waste management approach falls under the third category. Haan, Coad and Lardinois (1998) conclude that the best arrangement for SWM is when the durable motivation to earn money is complemented with concern for public welfare and the environment.

### 3.2 COMMUNITY SELECTION, SYSTEM SELECTION, DETAILED ENGINEERING DESIGN (DED) OF SELECTED SYSTEM

Community selection and system selection for 7 out of 15 sites in 2006 – 2008 were accomplished. Firstly, longlists and shortlists were prepared, then continued with the presentation of the KIPRAH concept. The site survey was then conducted based on the expression of interest sent by the community. Introduction to community stakeholders was then conducted and continued with the participatory selection process.

The next step was the development of a Community Action Plan (CAP) document for the selected site. The CAP contains information on the waste infrastructure and details on how the community will manage the system and deliver the service at a later stage. The Detailed Engineering Design and budget proposal of each location are also developed and incorporated in the CAP document.

### 3.3 CONSTRUCTION OF SYSTEMS IN 7 LOCATIONS IN 2006 - 2008

- The 2006 pilot in Tangerang, Banten province, has been completed and is functioning since February 2008.
- The 2006 pilot in Denpasar, Bali, has been completed and is functioning since February 2008.
- The 2007 pilot in Sidoarjo, East Java, has been completed and is functioning since February 2009.
- The 2007 pilot in Tarakan, East Kalimantan, has been completed and is functioning since February 2009.
- The 2008 pilot in Makassar, South Sulawesi, has been completed and is functioning since February 2009
- The 2008 pilot construction in 1 location, in Blitar, East Java, has been completed and is functioning since February 2009
- The 2008 pilot construction in 1 location, in Badung, has been completed and is functioning since October 2009

### 3.4 OPERATION AND MAINTENANCE (O&M) SUPPORT, COMMUNITY EMPOWERMENT, TRAINING, AWARENESS CAMPAIGNS

- Ongoing O&M activity in Tangerang (2006), Denpasar (2006), Sidoarjo (2007) Tarakan (2007), Makassar (2008), Blitar (2008), Badung (2008) pilot implementation
- O&M support and assistance of KIPRAH system was provided for all sites, with minimum

assistance for old sites such as Tangerang, Ubung, Sidoarjo, and Tarakan.

- Trainings were conducted at the individual MRFs and together with other KIPRAH community groups on waste separation in individual households, waste handling in their own house, and training for operators in the MRFs: waste collections, waste separations, composting processes, storage of recyclable waste, etc.
- Participatory evaluations with the target beneficiaries of the new system/intervention were conducted at all sites, except Blitar and Badung, where they will be conducted in December 2009.

#### **Deviation:**

With the changed approach, the implementation scheme contributed by IDRC-BORDA could be reduced from the planned 100% to 25%. Therefore, the project was able to implement the pilots in up to 7 sites, which led to an increase of the number of beneficiaries, as well as the amount of waste which the community was able to manage.

The co-financing from the LGs shared 27%, the national agency 43%, the private sector 2% as well as community in-kind contribution. The remaining funds, which were initially dedicated to hardware, have been shifted towards the increased community facilitation costs for the MRF's, as the number increased from 4 to 7.

#### **4. Develop an integrated approach towards all components of the system and interfaces in between the different components (waste prevention, separation, collection, re-use, recycling, composting, intermediate storage, transportation and final disposal).**

By the end of the research period and the implementation of the seven units the KIPRAH model had been developed which allowed the integration of the different components and defining of the interfaces. The Community action plan reflected those different components on the community side:

1. Waste collection at household level (awareness building modules)
2. Waste prevention (awareness building modules)
3. Intensity of separation at household level and household composting
4. Transportation system from Households to MRF (interface 1)
5. Management system at MRF (influenced by the level of waste separation and household composting)
6. Transportation system of residues from MRF to final disposal site.

The project did not include: Management options for final disposal sites.

#### **5. To achieve recognition of scavengers to improve the social-economic image of the currently informal groups.**



Since waste collection in Indonesia is largely reliant on informal waste collectors, it had to be ensured that the implemented decentralized solid waste management projects included a role for the scavengers who undertake this work in order to improve their socio-economic image.

The projects achieved that aim since most of the MRF and service workers in all project sites formerly worked as free-lance scavengers, which entailed working 12 hours a day all around the city in order to earn US\$ 2 a day to cover their living costs. Since they work as the employees of the MRFs, their status has changed and the availability of a permanent job with a decent salary has improved their living conditions.

**6. To develop national networks of stakeholders and practitioners through exchange, compiled best as well as bad practices and a knowledge management system.**

To facilitate and encourage the information exchange on decentralized solid waste management, one aim of the project was the development of a stakeholder and practitioner network. A crucial part of this information exchange was also the review of best practices and the implementation of a knowledge management system. The following networks have been established:

**6.1. STRENGTHENING THE SOLID WASTE MANAGEMENT NGO NETWORK**

In agreement with IDRC the program was shifted to support the POKJA AMPL communication and knowledge platform as well as the support for KIPRAH CBOs workshops and trainings.

Participation and development of a national/regional networks for solid waste: The KIPRAH network became part of the Sanitasi Total Berbasis Masyarakat (STBM)/Total Community Based Sanitation, which was developed by the central government. The STBM contains 5 pillars: open-defecation free, hand washing with soap, safe water handling, wastewater treatment, and solidwaste management. KIPRAH supports these 5 pillars.

A KIPRAH network was also established at the LG level as well as at CBO level. The LG network consists of LGs which have already or will develop KIPRAH in the near future. At the CBO level an embrio of KIPRAH Indonesia, CBOs Association, was initialized as an embrio forum for knowledge and skill sharing. The forum conducts yearly exchanges and serves as a recyclables product marketing network.

**6.2 REVIEW OF BEST PRACTICES**

Best practices have been taken from previous experiences and are analysed, synthesized and formulated for the development of decentralized solid waste collection and separation manuals and informed choices catalogue. They have shown the best aspects from previous experiences in several topics for KIPRAH post-project replication planning, especially involving investment costs, the co-

financing scheme, service coverage, efficient and sustainable O&M costs, the volume of garbage separated, compost produced as well as the role of the LGs and community.

**7. To disseminate best practices to stakeholders at governmental, NGO and community level by applying an e-learning course on decentralized solid waste management.**

It was planned to create a comprehensive e-learning module in an e-learning course for LGs, developers and NGOs as part of the project, however, due to the complexity of the preparations and time limitations the e-learning module was cancelled.

**8. To feed local and national policy development through collaboration with WASPOLA, BAPPENAS and the Department of Public Works as well as local governments.**

Providing inputs to local and national policy development is a major achievement for any project. KIPRAH achieved to submit inputs to the national strategy (AMPL) on environmental management in the housing sector in a number of ways. Initially, before implementation, KIPRAH managed to secure the support of the national planning board (BAPPENAS) through a workshop which emphasized the advantages of decentralized solid waste management. After the successful implementation stage, inputs were submitted to the national agencies through POKJA AMPL and finally KIPRAH was assured of the Public Ministry's continuous support at a national decentralized solid waste management seminar organized by BORDA.

**8.1 WORKSHOP "LAUNCHING OF THE INTEGRATED MUNICIPAL SOLID WASTE MANAGEMENT PROJECT"**

The launching or kick off workshop of the Integrated Municipal Solid Waste Management Project was conducted on July 26-27, 2006 in Surabaya, in cooperation with the Sanitation Working Group (SANWAG or *Kelompok Kerja Air Minum dan Kesehatan Lingkungan/POKJA AMPL*), with approval and invitation from the Director of Human and Settlement Directorate of the National Planning Agency (Bappenas). The successful workshop was opened and closed by Ir. Kati Andriani Darto, MP, Head of the Sub-Directorate of Solid Waste of the Directorate of Environmental Health Development of Public Works Department, as a representative of SANWAG. The workshop was well attended by 28 invitees from the SANWAG team members (consisting of representative from the Ministry of Public Works and the Ministry of Home Affair), several municipalities' representatives, local universities and also from another NGO, Mercy Corps Indonesia (MCI). As the result of the workshop one LG, Sidoarjo Regency, and one province, East Java, expressed their interest to contribute and join the demonstration project implementation.

Continuous lobbying was also conducted before and after the project was launched. During the project development stage, the research team, supported by the IDRC Senior Program Officer Ms.

Ann Thomas, agreed to build a cooperation with the SANWAG group for the implementation of the project.

As requested by SANWAG Coordinator, Dr. Oswar Mungkasa, the cooperation was going to be based on a specific memorandum of understanding (MoU) between the project and SANWAG. The project agreed to support the establishment of provincial SANWAG in several provinces, jointly with the WASPOLA (Water and Sanitation Policy and Action) Project funded by AusAID through WSP (Water and Sanitation Project) of the World Bank, in particular those provinces related to the project locations.

SANWAG at the provincial level agreed to mobilize LGs to be more pro-active in sanitation issues, including in solid waste management. SANWAG/POKJA AMPL so far is considered as the only “institution” for future strategic activities. SANWAG members are representatives of different departments at national level as well as provincial and city/regency level. Programs endorsed by SANWAG/POKJA AMPL will automatically be adopted and implemented by related technical departments, such as the Public Works Department, which is responsible for the provision of the infrastructure for the solid waste management program.

The SANWAG Coordinator agreed to support the introduction and implementation of the demonstration project in 5 Provinces in Java, Bali and West Nusa Tenggara. Some of those provinces have already established a SANWAG provincial committee.

By involving the SANWAG group and its associates it was possible to obtain the support of BAPPENAS, which provides the umbrella at the national level and acts as a national counterpart of the project.

## 8.2 PROVIDE INPUTS TOWARDS POLICY DEVELOPMENT

KIPRAH has successfully demonstrated to governments, especially LGs, how the program can be implemented in the urban poor areas, and what kind of support can be provided by the LG to the community proportionally. Some of the support can be delivered in form of infrastructure investments, by buying the KIPRAH products, such as composts and handicrafts, as well as by transferring the residues to the landfill.

A review of Indonesia’s newly launched Act on Solid Waste No.18/2008 was conducted at the BAPPENAS office last February 27, 2009 and was attended by national stakeholders and the KIPRAH research team. The seminar attempted to find clear support for KIPRAH or similar community-based solid waste management approaches in an effort to contribute to Indonesia’s waste management strategy and implementations. The forum also discussed what kinds of reward systems are available to encourage and invite more community efforts.

## 8.3 DEVELOPMENT AND IMPLEMENTATION OF CAPACITY BUILDING ACTIVITIES (SCHOLARSHIP AND REGIONAL WORKSHOP)

A national seminar and dissemination was conducted on June 16-17, 2009 in Surabaya, East Java. (A previously considered regional seminar was canceled due to scheduling problems.) The National seminar, with limited international participation, was well attended by 100 participants from the central government (BAPPENAS, PU, KLH), province taskforces (Satker Propinsi), LGs, NGOs and KIPRAH CBOs. Some LGs showed interest in replicating the approach in their respective areas. The Ministry of Public Works/PU was also interested in extending its financial support. As one of the follow ups of the seminar, a road show was planned to be conducted in September/October 2009 to several cities in an effort to provide the LGs with the option to allocate their support in the 2010 fiscal budget year.

Dissemination was conducted in form of support for the PERCIK magazine special edition on community-based waste management. PERCIK is a special magazine for water supply and environmental sanitation published by POKJA AMPL every two months. The readers are decision makers at the central level, provinces as well as city/regency, NGOs and members of the private sector who work in the sector.

The project also added the PERCIK Special Edition with field notes from all demonstration sites. The magazine was published in June 2009 with a circulation of 1000 copies in Bahasa Indonesia and another 500 copies in English. The Bahasa Indonesia version has already been distributed to all stakeholders. The magazine was also widely distributed in the National Seminar on KIPRAH in Surabaya.

## **9. To improve capacity of local researchers through regional exchange visits and dissemination of the results.**

### **9.1 CONDUCTING AN INTERNATIONAL EXCHANGE TO THE PHILIPPINES AND THAILAND**

Exchange visits to Thailand and the Philippines have been conducted by the research team. The team consisted of 2 persons from BEST and 2 persons from BALIFOKUS. The objective of the exchange visits was to learn about urban solid waste management programs from several organizations, institutions, communities and municipalities especially in urban poor areas.

#### Bangkok – Thailand exchange visit

The exchange visit to Bangkok - Thailand was conducted by Noka Destalina (BALIFOKUS) and Abdullah Basyri (BEST) on May 30 to June 1, 2006. The exchange visit team met with several organizations as well as municipality and community representatives, such as:

- Urban Environment Management, Southeast Asia Urban Environmental Management Applications (SEA-UEMA) Project, School of Environment, Resources and Development, Asian Institute of Technology
- Bangkok Metropolitan Administration office, Solid Waste Management Department
- Romklao Garbage Bank - Bangkok
- Laksi Garbage Bank - Bangkok
- Pak-Kred composting facility - Bangkok
- Nonthaburi composting facility - Bangkok

#### Manila – the Philippines exchange visit

The exchange visit to the Philippines was conducted by Prapti Wahyuningsih (BALIFOKUS) and Ilhamsyah Lubis (BEST) on May 30 to June 1, 2006. The exchange visit team met with several organizations as well as municipality and community representatives, such as:

- GAIA (Global Alliance on Incinerator Alternatives/Global Anti-Incinerator Alliance)
- Mother Earth Foundation
- Ecological Solid Waste Management Project at Barangay Parang
- Ecowaste Project at Barangay Escopa
- KILUS Foundation in Barangay Ugong, Pasig City
- MENRO (Municipal Environment Natural & Resources Office) in Silang Public Market, Cavite
- Eco-waste management project at Barangay Yakal, Silang, Cavite
- Eco-waste management project at Barangay Bancod, Indang, Cavite
- CELL (Center for Ecozoic Living & Learning) in Cavite
- Eco-waste Management Project at Barangay Bagumbuhay, Quezon City

These exchange visits were considered as the initial initiative of regional networking between BALIFOKUS and BEST with organizations in Thailand and the Philippines on solid waste management in South East Asia.

#### **v) Project Outcomes and Overall Assessment**

The main outcomes of the project are:

1. Improved and increased demand for community-based solid waste management.  
KIPRAH has now become one of the alternative solutions to solve waste problems in the city which is affordable for LGs. Interested LGs allocate their funds from the local fiscal budget/APBD. The KIPRAH approach includes selection criteria and principles which reflect a demand responsive approach, thus it will only be applied in communities and local governments which show demand and commitment. Requests from communities outside of the project sites have already been received.
2. Strengthened networks of practitioners at national level.

POKJA AMPL or Water and Environmental Sanitation Task Force at the national level connects and links-up practitioners, especially in the water and sanitation sector. Community-based solid waste management became one of the programs that is mainstreamed in several cities/regencies.

KIPRAH is also considered as one of the pillars in the STBM or Community-led Total Sanitation. STBM is widely promoted now by POKJA AMPL to several cities.

The CBOs who manage and are responsible for KIPRAH agreed to form a communication platform in form of an association or forum. The establishment of the forum was raised in June 2009 during the CBO workshop in Surabaya. KIPRAH CBOs suggested several options for naming the forum: Indonesian KSM KIPRAH Communication Forum or Indonesian KSM KIPRAH Association (Forum Komunikasi KSM KIPRAH Seluruh Indonesia of FoK3SI or Asosiasi KSM KIPRAH Seluruh Indonesia/AKCSI). BORDA will provide support to the Forum to develop a workplan and implement its activities in the future until it is self sustained.

3. Increased awareness and options for best practice and policy development for all stakeholders concerning need and the way to implement proper decentralized/community-based solid waste management.

*Awareness Building:*

- The Task Force (Satker PU) at the Provincial level copied KIPRAH (MRF only) without consulting the project team
- Community awareness of how to manage its own waste is increased
- After the National Seminar in Surabaya, more cities are interested in implementation of KIPRAH
- Currently KIPRAH is modelled as one of the options to manage waste in well-off neighborhoods.

*Policy development at local government (LG) level:*

- Local governments started to develop financial plans for extending the KIPRAH approach to other locations within their regions (e.g Tangerang, Tarakan, Sidoarjo, Denpasar). This is in line with the National Law on Waste Management.

4. Capacity of NGOs and other implementing agencies, such as community based organizations, is strengthened.

*Non-Governmental Organisations/NGOs:*

- BALIFOKUS and BEST gained better knowledge and more experience in CBSWM through KIPRAH implementation
- Tools development, processes, knowledge exchange and skill-sharing improved the organizations' human resources capacity.

*Community Based Organisations/CBOs:*

- Communities in 7 KIPRAH sites gained better knowledge and confidence that they can manage their waste in a professional way.

## 5. Community-based solid waste management and gender aspects

- *Gender aspects are reflected in every step of the intervention.*

Equal participation of men and women in the project implementation varied from one place to another. In most cases women's active involvement is seen at the source level: they promote the waste separation at the household level, organize garbage banks and utilise the recyclables and compost as additional income for their family. At the neighborhood or village level where hardware components are involved, men are the driving force. They are mostly active in building/maintaining relations with external stakeholders.

- *The way women and men perceive garbage has changed.*

Women see the potential economic value of garbage from recyclables, which is strongly related to products or personal goods they regularly purchase. Men are only interested in dealing with the collections by using vehicles, separation and composting at the MRF level. In some areas, the composting activity at the household level is perceived as 'the competitor' of the composting at MRF level. Men are also involved mostly in hardware components of the project, deal with external stakeholders and fix things. But in general at all sites, men and women agreed that they have to work together to implement the project.

## 6. Community-based solid waste management improved the social strata of the local solid waste activists and waste pickers/ scavengers.

- Most of the MRF workers and the service workers in all project sites formerly worked as free-lance scavengers, working 12 hours a day all around the city in order to earn US\$ 2 a day to cover their living costs. Since they work as the employees of the MRFs, their status in society has changed and the availability of a permanent job with a decent salary has improved their living conditions.
- CBO leaders – the head, treasurer and secretary- received more recognition from other stakeholders, participated in cities' workshops/meetings, and were exposed to several new forums or activities.

**Unintended outcomes**

- Implementing NGOs have been asked and invited by the Ministry of Environment to share their knowledge and experiences from the best practices for the Solid Waste Act
- The waste management system chain and paradigm has been changed – applying waste minimisation, introduced the zero waste approach

- Opportunities for LGs to replicate the program initiatives and change LG perspectives about a community-based concept, which was previously translated as a 100% community initiative. After the KIPRAH implementation, LGs can and are willing to support the approach.
- Change government way of thinking about waste; from a Public to Private Partnership (PPP) to a Public to Community Partnership (PCP)
- Activities within KIPRAH, the composting and separation of waste, can be considered as activities which can avoid methane release. Open dumping practices at the landfill in many cities are still considered as one of the biggest greenhouse gas (GHG) contributor in a city. First assessments of carbon financing have been conducted within the project implementation and provide a feasible basis for further intervention towards carbon financing.

### **Overall Assessment:**

Based on the implementation experience, the research team concludes that the project contributed to scientific/knowledge development, changes of behaviour, human resource capacity building, policy influence and technology development,. such as mentioned below as follows:

- Scientific or knowledge development:
  1. Introduced the MRF term and physical design;
  2. CBSWM implementation was introduced and implemented in a more systematic way and can be replicated by other interested parties;
  3. Carbon Financing can be considered as a field for future applied research within the KIPRAH context.
- Changes in behavior:
  1. Communities do not throw away their garbage at home any longer, some of them are already familiar with the principles and conduct waste separation at the source.
  2. Communities see waste as a renewable resource
  3. Healthier and cleaner neighborhoods
- Human resource capacity increased :
  1. Communities are able to manage their own waste independently;
  2. NGOs: number of staff who understand about waste is increased; recognized as a new player in the field;
- Policy influence: CBSWM as introduced through KIPRAH is considered for being included in the draft of Government Regulation on Waste Minimisation.
- Technology development, adoption, and adaptation: almost no new technology was applied, only the informed choices catalogue (ICC) was introduced to stakeholders; the ICC provides options at the household level, collection level, MRF level and transporting



waste to landfill options. ICC was introduced in a systematic way based on affordable, applicative and rational technology.

It is in fact feasible to invite the government to get involved in the project hardware financing as long as the project can be fitted into the government budget timeframes. Governments tend to favor financing the infrastructures but not the community empowerment activities, despite the fact that they are aware that without an empowerment component, the project will not be sustainable.

#### **vi) Lessons Learned**

##### **OBJECTIVE 3:**

- The city selection stage is proven as one of the key components for project implementation. Without co-financing and commitment from LGs, KIPRAH implementation is difficult.
- LGs involvement is crucial for the sustainability of the system and future programs of the city.
- The timing for the roadshow and introduction of KIPRAH to LGs needs to be adjusted according to the budgeting timeline. May-July is the best time to promote new programs to LGs. This way they can list the program in their fiscal budget for the following year during the budget and project planning process in July-August.
- Not all LGs which were invited to the launching workshop continued and expressed their interest. A more intensive approach and lobbying is required to get the LGs' commitment.
- Once the commitment has been confirmed, a MoU or agreement needs to be signed between the parties to ensure the continuation of the project.
- With regards to the economy of scale, ideally, the minimum coverage should serve approximately 1000 HHs or an area of approximately 5-10 ha. Due to this, more time has to be planned for extensive interaction with stakeholders compared to the time needed for fewer households.
- To find land for the locations of the Material Recovery Facilities (MRFs) in urban areas is not easy. A minimum area of 400 m<sup>2</sup> should be secured and should become part of village or LG contribution.
- Combining the service, domestic waste and commercial/private/individuals, could increase the revenues of the management.
- Decentralized solid waste management can be implemented only if co-financing support is gained from stakeholders, be it from the central government, local governments, private sector, village heads or the beneficiaries. Community and village contribution for infrastructure and construction mostly entail land provision, laborers and the monthly fee for the operation and maintenance stage.
- Contributions from the central government and local governments can be channeled in form of in-kind materials as well as cash which is transferred to a CBO joint account. The result of KIPRAH co-financing in all project sites is shown in the next table.

Table 1. KIPRAH Project Co-financing Scheme

No.	Locations	Central Gov. (CAD)	LGs (CAD)	Private Sector (CAD)	Community (CAD)	Project (IDRC + BORDA) (CAD)	SUB-TOTAL (CAD)
	<b>2006</b>						
1	Ubung, Denpasar, Bali	-	15.695	-	-	30.467	46.163
2	Telaga Bestari, Tangerang	16.588	-	16.588	-	16.588	49.764
	<b>2007</b>						
3	Sidoarjo, East Java	55.295	27.647	-	-	11.462	94.404
4	Tarakan, East Kalimantan	-	19.141	-	1.659	19.906	40.706
	<b>2008</b>						
5	Makassar, South Sulawesi	45.847	-	-	-	14.327	60.175
6	Blitar, East Java	57.309	17.193	-	-	-	74.502
7	Badung, Bali	22.924	-	-	5.731	5.731	34.386
	<b>TOTAL</b>	<b>197.963</b>	<b>79.676</b>	<b>16.588</b>	<b>7.390</b>	<b>98.481</b>	<b>400.099</b>
	<b>Percentage</b>	<b>49,5%</b>	<b>19,9%</b>	<b>4,1%</b>	<b>1,8%</b>	<b>24,6%</b>	<b>100,0%</b>

Source: data compilation from 7 cities, 2008

- Financial subsidy for the KIPRAH system operational was only conducted for 6 months. During those 6 months, monthly retributions were still not collected 100% in several places, adjustment and adaptation were needed.
- On average the projects provide support for approximately 30% of the operational costs. After 6 months, operational and labor costs could have already been covered due to efficiency in several projects and by optimizing the community retributions.
- The economic perspectives of the project empower the poor to be more self sufficient, gain knowledge and profit from their social services.

#### OBJECTIVE 8:

- Waste management as stated in the Act on Solid Waste No.18/2008 is considered a public service. Local governments are responsible for public services. To provide service for all, LGs have to be creative. KIPRAH can be adopted in the city's waste management mainstream approach.
- The Act on Solid Waste No.18/2008 clearly emphasizes waste minimisation and separation from source. LGs can improve their waste management strategy by improving and prolonging their landfill lifetime through waste minimisation and waste treatment at the cluster level by using the KIPRAH approach.
- The important point is to convince the government that community involvement is the main principle. Also the waste separation and treatment at the temporary facility need to be expanded to waste minimisation and composting at the Material Recovery Facility (MRF), which will be linked up to the city system. LG then pick up the residues at the MRFs and bring them to the landfill only once a week.

- Government perspectives and paradigms on waste management shifted from the centralized approach only to a combined decentralized-centralized approach.
- Initially community-based waste management was perceived as an insignificant project, which is difficult to replicate. Through KIPRAH, community-based waste management becomes a module which can be replicated, implemented and co-financed by any party.

## **vii) RECOMMENDATIONS**

### **1. For the project**

The approach on how to upscale the pilot activities for mass dissemination has to be included in the project. This involves the co-financing schemes from national, provincial and local governments. As the complexity of the research project increases with the involvement of new stakeholders, changes in the timing and allocation of project budgets without changing total budgets and the distribution of budget within the main positions will occur.

A potential Programmatic of Action from Community-Based Solid Waste Management can be assessed or further studied to gain more incentives as well as revenues from methane avoidance activities in the waste sector.

### **2. For Governments**

Community-based solid waste management like KIPRAH is proven to be implemented and operated under cost recovery. To reduce the cost burden for local governments and increase the involvement of communities in solid waste management, as well as reducing the waste generation at the source level, KIPRAH-type programs must be accommodated in further planning. An incentive scheme must be enacted in order to increase the sense of ownership and appreciation to the efforts made by citizens to improve the city's cleanliness and waste problems. The KIPRAH approach also increases the citizens' enthusiasm and confidence to be aware and more actively involved in municipal solid waste management.

### **3. For the communities**

Community-based waste systems like KIPRAH can be upgraded as local community-managed enterprises to meet local needs, increase social capital and contribute to local welfare. More capacity building activities could improve the knowledge and performance of the CBOs who manage the MRFs.

Support from local leaders, formal as well as informal, would boost the neighborhood improvement. \*\*\*

