PARTICIPATORY WASTE MANAGEMENT APPROACH FOR CLIMATE CHANGE MITIGATION:

THE CASE OF BATTAMBANG CITY

June 2018

This case study identified the following factors as critical for replication:

- Participatory Planning – generates sense of ownership and commitment
- Political commitment from top figures – the key for sustained implementation
- Training in closed environment – effective and efficient for building foundation of trust and shared vision
- Technical support and facilitation by international partners – effective for building confidence and competence
- Measures for visualising incentives (i.e., profits, awards, etc.) – crucial in promoting participation

1. SUMMARY

As with many other cities in Cambodia, Battambang Municipality faces huge challenges in managing its waste. With no consistent annual budget allocated to waste management services, the city relied on the private sector for municipal waste collection and disposal services based on user fees collected from residents. However, with low service quality of the service provider on one hand, and inability and unwillingness to pay the service fee, open burning and uncontrolled disposal of waste were commonplace among citizens, severely affecting public health and the living environment as well as damaging public confidence in the government and the service provider.
In order to overcome these problems, Battambang launched a participatory waste management initiative in 2011, with technical support from the Institute for Global Environmental Strategies (IGES) and a local NGO and partner, the Cambodian Education and Waste Management Organization (COMPED), through strategically combining a series of projects supported by the technical cooperation and financing schemes of various development partners. The initiative broadly addressed diverse waste streams while primarily focusing on MSW. In its entirety, it aimed at setting up community-based planning and

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implementation of climate friendly waste management based on a 3R (reduction, reuse and recycle) approach, as well as building capacity and enhancing partnerships between the municipal government and local stakeholders. The initiative was also complemented by the conditional and limited national fund which was made available to the municipality for the improvement of its waste management services. With the strong political support and leadership of the Municipal Governor and key stakeholders, as well as moderation and technical assistance provided by external organisations (including international organisations, IGES, and Phitsanulok Municipality) and ongoing efforts of the stakeholders (the municipality, local NGOs, private companies and community members), the waste management situation in Battambang has gradually improved over the years.

2. BACKGROUND

Development of Waste Management in Cambodia and Battambang up to the Present Day

2.1. Basic City Profile

Battambang Municipality is located on the Sangkae River in Northwestern Cambodia close to the border with Thailand, and covers an area of 115.44 km^2 with a total population of 152,117[1]. Battambang is well known as a leading rice-producing province in the country, with agriculture being the main industry taking up approximately 74% of municipal land (85.6 km^2). Battambang Municipality is at the centre of Battambang province, and the province is divided into 10 administrative Sangkats (sub-districts: former communes of Battambang district) (Figure 1).

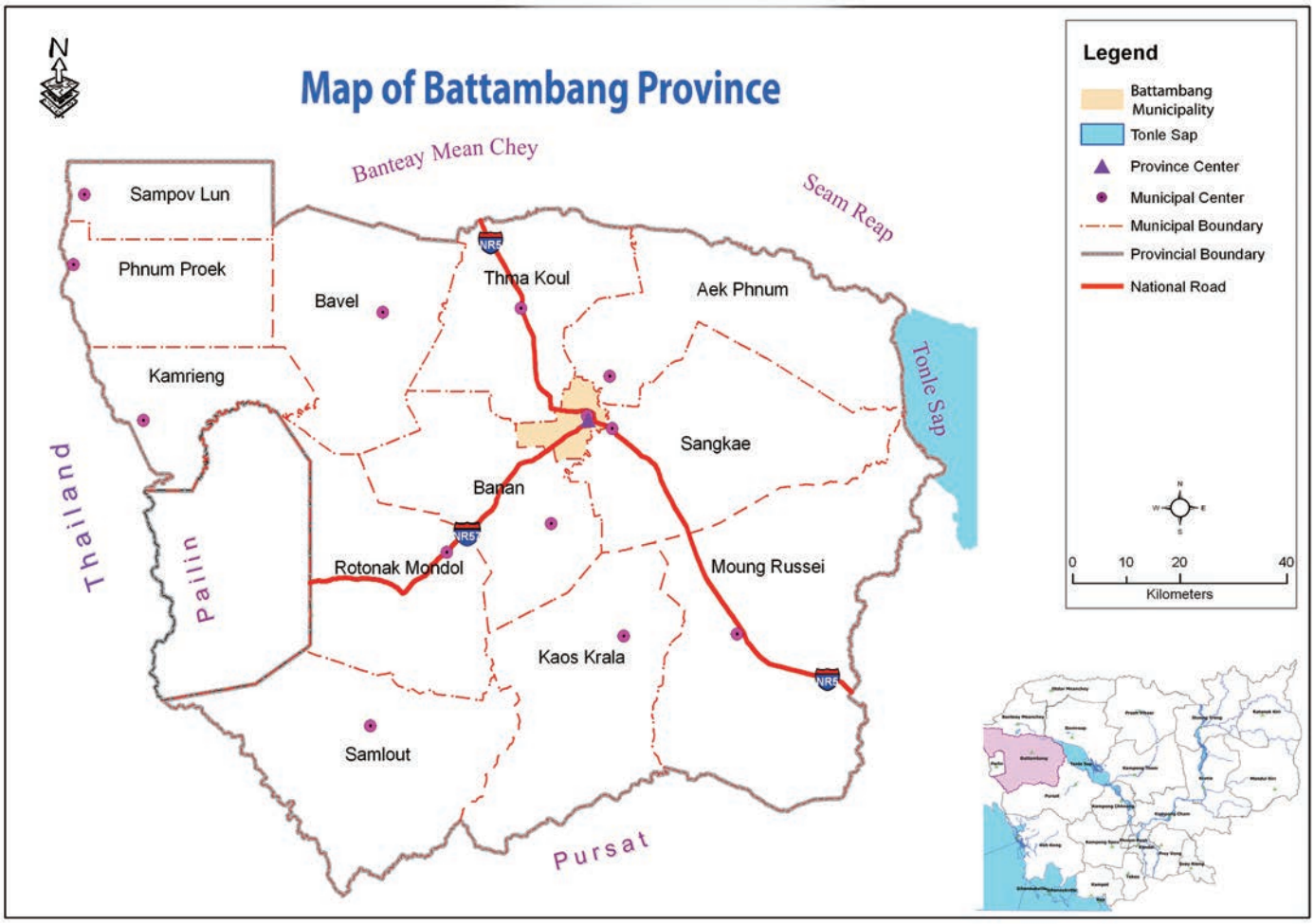

Figure 1: Map of Battambang Province and Location of Battambang Municipality

The municipality is headed by a Municipal Governor nominated by the Ministry of Interior (MOI) for a period of four years and a maximum of two terms. The legislative body of the municipality consists of a Municipal Council elected by Sangkat (commune) councillors for a five-year term (number of councillors varies from seven to 21). The commune councillors are elected directly by citizens in the communes (number of councillors varies from five to 11 depending on the population size of the commune/Sangkat). Three commissions assist the council in its decision-making and implementation: Technical Coordination, Women's and Children's Affairs, and Procurement (each commission has around 15–20 members appointed by the council, members of the board of governors and council staff). Their administrative functions are headed by an Administrative Director appointed by the Ministry of Interior (Hor et al., 2012). In Battambang Municipality, administrative functions are divided into five municipal offices, namely: Municipal Development Office; One Window Office; Administration and Finance Office; Sangkat Support and Planning Office; and Municipal Beautification and Waste Management Office (Figure 2). In Cambodia, only three municipalities have separate administrative offices for waste management: the Municipality of Phnom Penh (Waste Management Affair Department), Battambang Municipality, and Stung Treng City (Solid Waste Management Agency of Stung Treng).

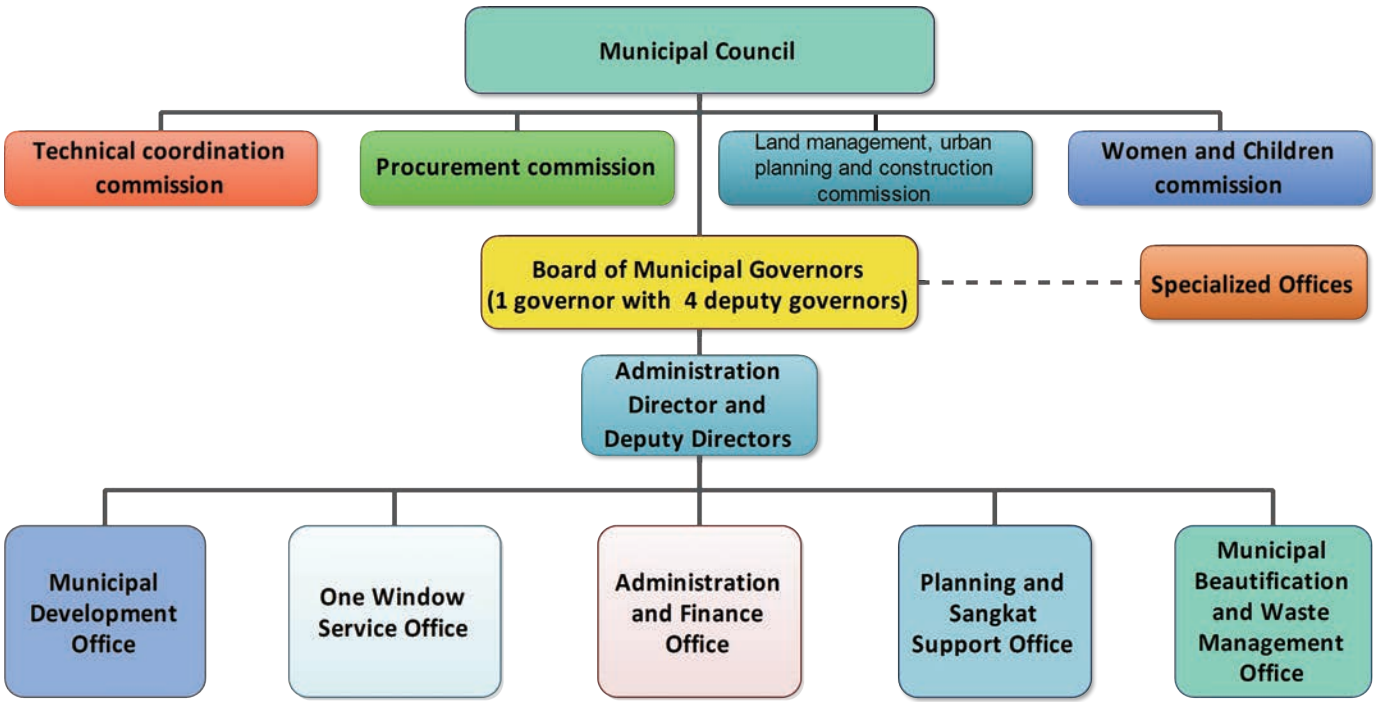

Figure 2: Administrative Structure of Battambang Municipality

2.2. Waste Management Context – National Level

INSTITUTIONAL SETUP

At the national level, direct responsibility for waste management falls on the General Directorate of Environmental Protection of the Ministry of Environment (MOE) for municipal solid, industrial, hazardous, construction and demolition waste. In addition, the involvement of some other ministries is required for managing the specific types of waste such as medical waste (the Department of Hospital and Provincial Department of Health of the Ministry of Health), and waste related to pesticides and fertilisers (the General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries (MAFF). Further, the Ministry of Interior (MOI) is responsible for implementation of waste management at local levels, including provincial and municipal levels (Figure 3).

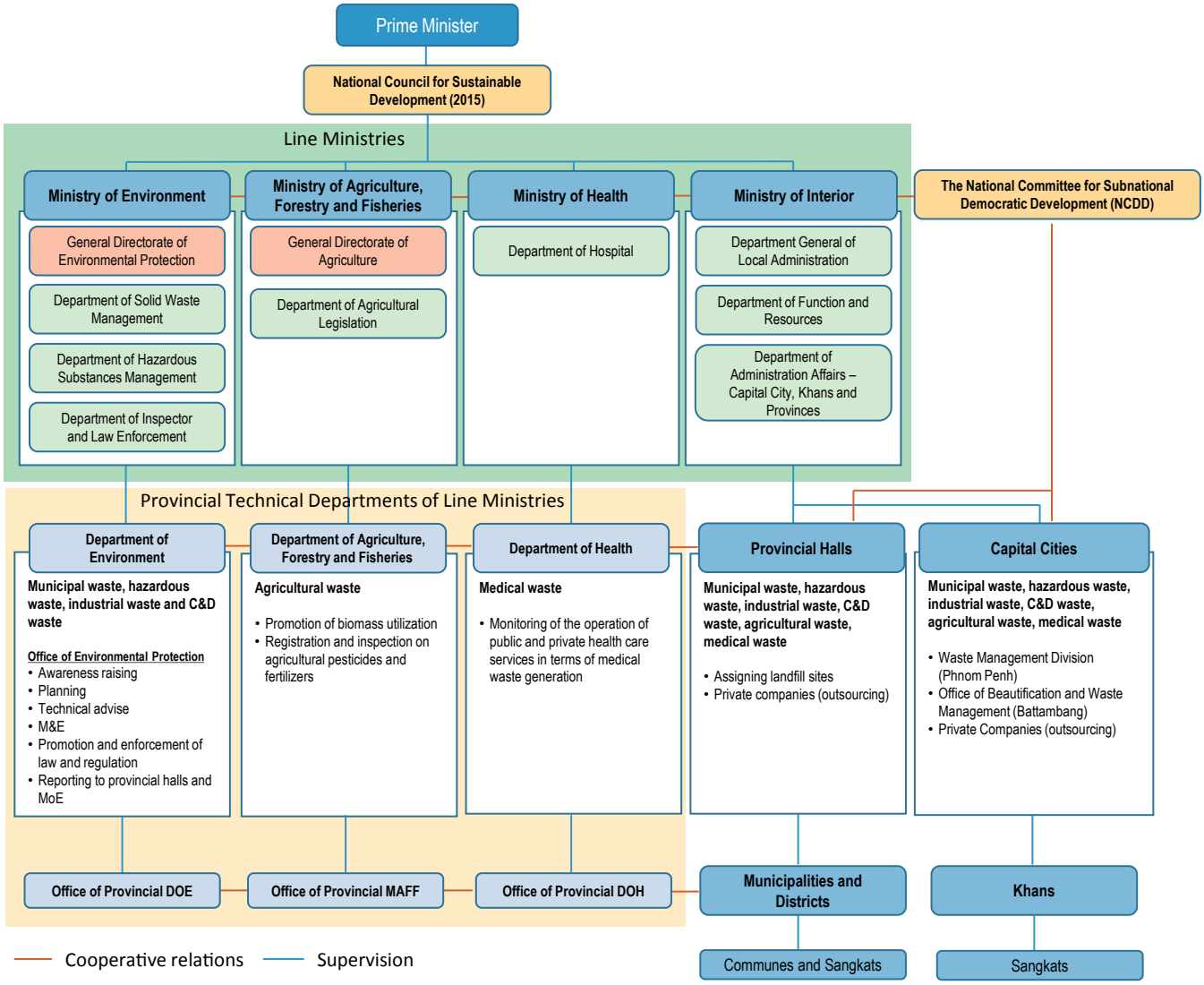

Figure 3: National Institutional Setting Related to Waste Management (IGES, 2016)

LEGAL FRAMEWORK

In 2015, the Government of Cambodia enacted its national *Sub-Decree on Urban Solid Waste Management (Prakas 113)* to improve the management of municipal solid waste in terms of effectiveness, transparency and accountability, as well as to ensure sound public health and environment conditions. While the scope of this Sub-Decree was limited to municipal solid waste and did not include other types of waste such as industrial and hazardous waste, it did promote 3R implementation (reduce, reuse, recycle) at the local level, including encouraging the use of recycled products. Furthermore, it aimed to prohibit open dumping and open burning (Royal Government of Cambodia, 2015).

Under the Sub-Decree, the municipal and district administrations are responsible for directly contracting with waste management companies, thus enhancing private sector involvement in delivering public waste management services. The law also transferred authority, from provincial administrations to municipal and district administrations, to revise the existing waste management service contracts to ensure the service was delivered effectively. This new approach was intended to empower local authorities and aimed to improve the current municipal solid waste management through decentralisation and deconcentration, but major results remain to be seen.

NATIONAL WASTE MANAGEMENT POLICIES

Few national policies and initiatives on waste management exist at the national level, although some complementary measures were taken preceding enactment of Sub-Decree 113 – for example, in response to shortages of human and budgetary resources for waste management at the municipal level, the Ministry of Environment of Cambodia (MOE) initiated a new

subsidy programme with the allocation of approximately US$1.25 million in 2015 and US$2 million in 2016 in support of waste management service implemented by sub-national governments. This scheme allocates national budget in accordance with proposals submitted by municipalities for improving waste management in their respective cities[2].

At the time of writing, MOE, with the support of the United Nations Environment (UN Environment) - International Environmental Technology Centre (IETC) and the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET), was developing the National Waste Management Strategy and Action Plan based on the Holistic Waste Management approach, to provide a comprehensive national policy framework and to bridge existing laws and implementation.

2.3. Waste Management Context – Battambang Municipality

INSTITUTIONAL SETUP

Established by the Ministry of Interior in 2012 as an office under Battambang Municipality, the Office of Battambang Beautification and Waste Management assumes primary responsibility for maintaining the environment and waste management, and acts as coordinator and interface for development partners and private sector companies, while serving the municipal council and municipal governor. Currently, the city outsources waste collection and disposal via a service contract whose fulfilment is supervised by the Municipal Administration[3]. However, contrary to expectations, operations are limited by a lack of budget and human resources.

LEGAL FRAMEWORK

In June 2017, Battambang Municipality was the first city in the country to draft a local regulation (*Deika*) on waste management. It received technical support from Konrad-Adenauer-Stiftung (KAS), a German-based NGO in Cambodia, as a result of a request from the Ministry of Interior and Battambang Municipality. The draft regulation was disseminated as an exemplary city action for implementing Sub-Decree 113 during the *National Workshop on Deika Development Process in the Implementation of Solid Waste Management (SWM)*, organised by MOE in June 2017. The ministry is encouraging municipalities in Cambodia to develop such legal tools to translate the Sub-Decree into local contexts.

2.4. Implementation of Waste Management Service through Partnership

From collection, transport to final disposal, the implementation of waste management services in Battambang has long been executed through partnership with various non-governmental actors.

COLLECTION

Since 2010, waste collection in the municipality has been handled by CINTRI, which covers eight of the 10 Sangkats, the remaining two of which are covered by Leap Lim (Figure 4). The contract with CINTRI, a major waste collection company, involved providing a collection service based on a concession contract, and has been financed solely and independently by waste collection fees paid by the residents. However, the service was considered inadequate in terms of quality and coverage, particularly in two Sangkats where no waste collection service was provided due to the low paying capacity of the residents.

Battambang was successful in securing approximately US$87,000 in late 2015 and US$140,000 in 2016 from the national budget programme under Sub-decree

Figure 4: Waste Collection Service by CINTRI (up) and Leap Lim (down)

113 mentioned above. This allowed the municipality to expand its waste collection service to the two outlying Sangkats, by awarding a service contract[4] to a new waste management company, Leap Lim, for minimal waste collection service in the peri-urban area, and for a road cleaning service in the inner city. However, the sustainability of these projects is questionable due to concern over whether the national subsidy programme and the related budget will continue.

In this scheme, residents directly pay waste collection fees to CINTRI on a monthly basis based on a formal rate agreed upon between the local authority and the waste collection company (ranging from US$1-30 for apartments, restaurants, hotels, markets and so on). Data from the Office of Municipal Beautification and Waste Management of Battambang Municipality shows that approximately 90 tonnes of waste is collected daily by both companies, including 80 tonnes/day by CINTRI and 10 tonnes/day by Leap Lim. The municipal waste comprises about 73% organic, 12% plastic, 4% paper, 2% glass, 2% textile, 0.1% metal and 7% other waste (Figure 5). The collected waste is then transported and disposed of at an open dumpsite owned and operated by CINTRI in Sangkat Slaket (Figure 6).

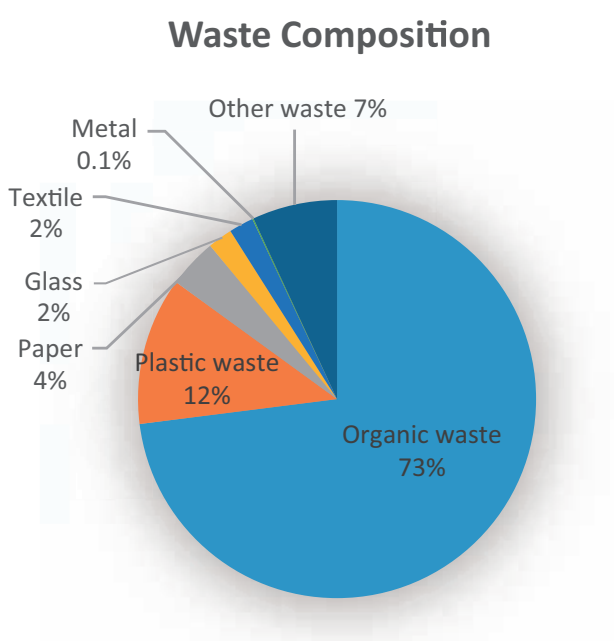

Figure 5: Waste Composition of Battambang Municipality

Figure 6: Designated Open Dumpsite Operated by CINTRI in 2017

INTERMEDIATE TREATMENT

COMPED, a local NGO which operates a composting plant in one corner of the final disposal site (Figure 7), plays a prominent role in the present waste management system in Battambang where no other intermediate treatment solutions existed. This plant was established with the financial support of the Federal Ministry of Economic Cooperation and Development (BMZ) and Thuringian-Cambodian Association (TKG) of Germany in 2009, and continues operations up to the present day. Between three and five workers, who originally made their living as waste pickers at the city's landfill, are employed at the composting plant for operations such as organic waste separation. A local project manager was also recruited to manage the overall operation of the composting project.

Figure 7: Composting Plant Operated by COMPED

FINAL DISPOSAL

Final disposal has also been managed by CINTRI, which owns and operates the final disposal site in the city based on a contract since 2010. While there is no subsidy from the municipality, the company employs the polluter-pays-principle to generate revenue for operations. Ownership of the final disposal site was transferred to the Battambang Provincial Administration at the provincial meeting attended by the General Director of CINTRI, the Provincial Governor of Battambang and other stakeholders in June 2017, with the aim of providing opportunities for future landfill development projects.

However, in reality, the landfill is still operated by CINTRI. With the start of collection service by Leap Lim in 2015, the amount of waste brought into the final disposal site has dramatically increased, while the amount of organic waste diverted for composting has also grown as a result of a waste management initiative, described later (Table 1).

Table 1: Transition of Incoming Waste Amount at Final Disposal Site and Composting Facility (tonnes/day)

Year	2014	2015	2016	2017
Landfill	59	90	140	170
Compost	1.2	2	3	3.5

INTERNATIONAL COOPERATION

It is important to highlight that the current state of Battambang's waste management system as described above is the result of gradual and continuous efforts of the municipality, as directed through the strategic engagement and resources of local as well as external stakeholders. In this respect, in addition to the local resources and subsidies from national governments, international cooperation projects financed by external development partners[5] also played an instrumental role in improving the waste management system.

In 2011, Battambang, with the support of IGES and COMPED, initiated a participatory waste management initiative aimed at building local capacity for improving its waste management service through a community-based approach. This subsequently evolved into a series of activities including development and implementation of a waste management work plan which guided its actions towards reducing Short-Lived Climate Pollutants (SLCPs) in its waste sector. The progress of development is further elaborated below in section 3.

In addition, in 2015, EXO Foundation supported a pilot project to utilise used plastic bottles as bricks for house construction by integrating education and awareness-raising on waste management issues into local communities (Figure 8). This project was aimed at minimising the negative environmental impact of plastic waste disposal by clearing illegal dumpsites, and promoting recovery of plastic bottles by providing a financial incentive to local waste pickers and communities. Under this project, empty plastic bottles were collected, filled with littered inert waste (plastic bags, cigarette butts, Styrofoam, aluminium foil) also collected from public spaces, and used as bricks in the construction of buildings (both schools and residences).

Figure 8: Use of Plastic Bottle Bricks for Construction at the Composting Centre

In 2017, ADB launched a pilot project in Battambang to expand the lifetime of Battambang's final disposal site by increasing the recycling rate through the installation of a Waste Sorting Centre utilising 0.24 ha of the disposal site. The centre with the daily capacity of 60tons/day is expected to be operational by 2019 under the management of the Battambang Municipal Administration.

1 Office of Battambang Beautification and Waste Management (2016)
2 Phnom Penh Municipality alone is not eligible for this programme due to its strong financial standing.
3 Previously, the Provincial Administrations had the authority to approve contracts between municipal administrations and private service providers, but currently such authority rests with the Municipal Governor based on consultations with Provincial Administrations.
4 In this arrangement, the service fee was directly paid to the contractor by the municipal government based on the limited national fund made available, unlike the concession contract awarded to CINTRI whose operation is sustained by the service fee paid by the residents.
5 The development partners included, for instance, the Federal Ministry of Economic Cooperation and Development (BMZ, Germany), Thuringian-Cambodian Association (TKG, Germany), the Ministry of Environment of Japan (MOEJ), and the Asia Pacific Network for Global Change Research (APN), through implementing organisations such as the Institute for Global Environmental Strategies (IGES), KAS and COMPED.

3. Participatory Waste Management Initiative

3.1. Participatory Waste Management Initiative for Climate Change Mitigation

In 2011, under the strong leadership of the Municipal Governor, Battambang initiated a series of projects with the support of IGES and COMPED who acted as coordinators in building local capacity to improve waste management services through a community-based approach. Whereas waste management policymaking had traditionally been recognised and managed exclusively by the municipal government, the government opened its doors to active participation from key stakeholders in the areas of project planning, decision-making, implementation, as well as monitoring and evaluation.

This effort was further expanded in 2014, when Battambang Municipality joined the Municipal Solid Waste Initiative of the Climate and Clean Air Coalition (CCAC-MSWI)[6] – the first Cambodian city to do so – and received technical support to conduct assessment of SLCP emissions from the waste sector. In 2015, with the support of CCAC, the municipality developed a work plan on reducing short-lived climate pollutants (SLCP) from municipal solid waste management. The work plan was developed through a participatory process involving all the key stakeholders, and finalised in early 2017. It has four major components:

i) promoting waste separation at source for utilisation through public private partnership,
ii) improving final disposal site,
iii) integrating preservation of urban heritage and municipal solid waste management, and
iv) improving accountability of SLCP emissions from municipal solid waste management.

The activities implemented during the Participatory Waste Management Initiative are visually presented in Figure 9 and further described below.

TRAINING PROGRAMME THROUG CITY-TO-CITY COOPERATION

Phitsanulok, a municipality located in Northern Thailand, is home to 72,027 citizens. The total annual waste generation is estimated at 54,750 tonnes/year with an average per capita generation of 303 kg/year (CCAC). Faced with multiple waste management challenges similar to Battambang, Phisanulok had previously also exerted much effort to overcome them, which yielded success and good practices, particularly in adapting a community-based approach to waste management. With such similarities in mind, city-to-city cooperation between

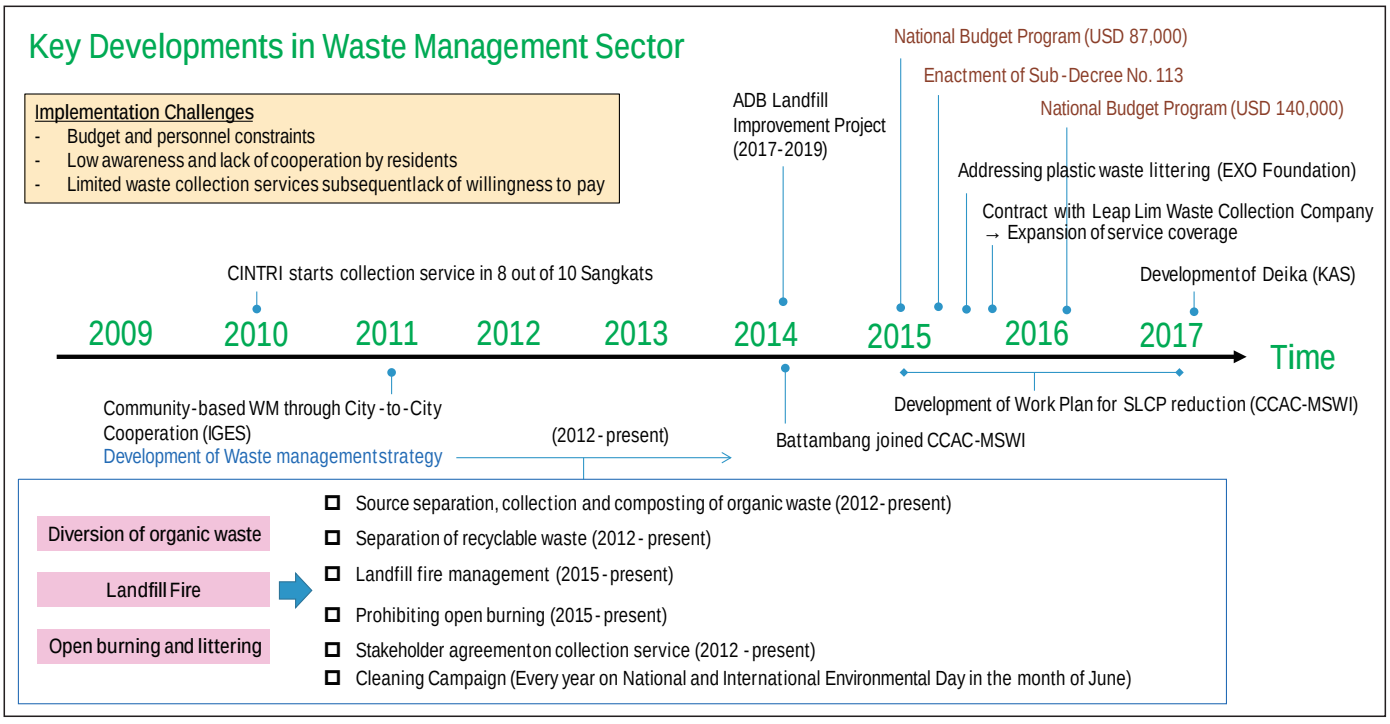

Figure 9: Key Activities under Battambang's Participatory Waste Management Initiative

Phitsanulok and Battambang municipalities was proposed by IGES, whose main component included on-site intensive training on how this type of participatory waste management could succeed in Battambang. To ensure strong political commitment to the bilateral cooperation, a Memorandum of Understanding (MOU) was signed in initiating the technical cooperation. Through this scheme, a total of 22 participants from Battambang Municipality received training (Figure 10).

During the training programme, participants were encouraged to work together in order to draft a strategy for addressing the waste management challenges of the city. With the subsequent implementation stage in mind, the training placed strong emphasis on motivating the participants to reconsider their responsibilities and possible contribution to make the strategy work upon their return to Battambang. The drafted strategy was later submitted to the Municipal Governor of Battambang for approval, while the trained participants were officially nominated as members of the Working Group on implementation of the waste management strategy. In addition, the recognition shared among the participants on the importance of awareness-raising and enforcement indirectly led to the development of a local regulation for waste separation at source, which was drafted in support of the strategy and later introduced to pilot areas in Boeng Chhouk Market, 13 Makara, and Central Market for trial.

Figure 10: On-site Training and Participatory Learning in Phitsanulok Municipality

As countermeasures to overcome the shortage of personnel and budget allocated for waste management services, Battambang Municipality has further enhanced its efforts to promote a participatory approach and expanded its activities through expanded and deepened cooperation with many actors, including academics, Sangkhat offices, relevant government organisations, business enterprises, religious organisations and others. Such collaborative efforts on thematic challenges are described below:

INTRODUCTION OF SOURCE SEGREGATION, TRANSPORT AND COMPOSTING OF ORGANIC WASTE

Due to the high percentage of organics (73%) in the waste stream and the availability of a pre-existing composting facility (managed by COMPED), the basis was formed for the key direction of Battambang's new strategy: prioritisation of source separation of organic waste. In 2012, a pilot project was implemented by COMPED (composting plant operator), CINTRI (waste collection company), and three local markets – Boeng Chhouk Market, 13 Makara and Central Market (waste generators) – as a test case for separation, collection and composting of organic waste.

Since the pilot project was successful in establishing a practical and reliable treatment route, in 2016, the source segregation of organic waste was further expanded to Phuo Puy market, a new wholesale market for vegetables and fruits (Figure 11) based on the experience of preceding markets. In the beginning, Phuo Puy market had a direct contract with COMPED for collection of separated organic waste while also maintaining the contract with CINTRI (waste collection company) for the collection of residual wastes. However, as COMPED was not being paid a reasonable fee for the treatment of organic waste, its collection and transportation were imposing a financial and operational burden on the company's composting business. After taking this matter into consideration, CINTRI decided to take part in transporting the organic waste as well.

Figure11: Separated Organic Waste Collection at Phou Puy Market (Waste transportation: up – COMPED, down – CINTRI)

Introduction of this arrangement resulted in securing a stable supply of organic waste input to the composting plant operated by COMPED both in terms of volume and quality: the amount of incoming waste increased from 1.2 tonnes/day in 2014, to 1.5–2 tonnes/day in 2015 to 3.5 tonnes/day in 2017, and the volume of contamination (non-compostable materials) has gradually decreased with the introduction of source segregation.

The system in operation at the composting centre includes manual separation of non-compostable waste and piling the separated organic waste into the form of windrow composting using a back truck. Each compost pile is then turned over two-to-four times (Figure 12) within a 3–5 month period. Large items of waste such as coconut shells (husk) are used for moisture balance in the composting process and as a bio-filter against odour and insects. Once the degradation process is complete, the compost is sieved using a compost screen tunnel machine. The average monthly turnout of compost is six tonnes/month, which is sold to local farmers in Battambang province and other provinces of Cambodia at a price of US$120/tonne. Historically, prices have grown from US$50/tonne during 2000–2006 to US$75/tonne during 2006–2009, then US$100/tonne during 2009–2013, but even this price does not reflect on the real production costs involved.

Figure 12: Windrow Composting of Organic Waste

MANAGING LANDFILL FIRES

The present final disposal site of Battambang is located in the middle of a paddy field with an area of 8 ha, and is approximately 6 km from the downtown area. It is a simple, deep, open dumping site without lining nor leachate treatment system, posing a high risk of underground water contamination. Landfill fires also occur occasionally, in some cases due to the actions of landfill operators, waste pickers, or farmers who want to reduce volume, and in other cases due to self-ignition of e-waste brought into the landfill (Figure 13). Once a fire starts, it can continue for several months, causing air pollution and affecting children at the learning centre, waste pickers at the disposal site and residents of nearby communities. In addition, emissions of Short Lived Climate Pollutants (SLCPs) such as black carbon and methane gas that occur during the burning are also considered problematic due

to their high global warming potential.
This issue of open burning was treated as a high priority by municipal officials who sought cooperation by relevant stakeholders including the site operator, waste pickers and farmers around the dumpsite in an attempt to devise effective countermeasures. A special training session on fire extinguishing, which included components both on fire extinguishing as well as the health and environmental impacts of landfill fires, was also conducted for waste pickers who voluntarily agreed to support this initiative.
In addition, Battambang Municipality attempted to reduce the volume of waste to be disposed at the landfill by working with residents to promote waste separation at source. The municipality also constructed a bio-fence by planting trees around the landfill aiming to reduce the environmental impact. With the cumulative waste volume approaching the maximum capacity of the final disposal site, the municipality is currently also seeking out new land to develop an environmentally-friendly disposal site.

Figure 13: Extinguishing Landfill Fire using Water and Soil

COMBATTING OPEN BURNING AND LITTERING THROUGH IMPROVED COLLECTION SERVICE

Inappropriate treatment of waste by residents was another challenge. Due to the poor waste collection service and effectiveness, open burning has been a common practice among the residents as a way of disposing of their waste (Figure 14). A sample survey carried out by the authors in 2016 found that approximately 5,700 households, 21 schools, 10 pagodas, 4 shops, 1 market and 1 restaurant regularly rely on open burning as frequently as several times a week, which amounts to approximately two tonnes/day on average.

Figure 14:Open Burning Practices in Battambang Municipality

After the survey, the municipality attempted to tackle the problematic practice of open burning by seeking cooperation from residents and waste collection companies (CINTRI and Leap Lim). A series of discussion meetings was organised among these parties. CINTRI agreed to improve its waste collection service and residents agreed to pay their waste collection fees on time, aiming to stop burning waste in open spaces.
The improved collection service was also effective in solving the waste littering and burning occasionally observed in public spaces such as rivers, streets and

parks. The issue was problematic and affected the hygiene and scenery of the municipality. The municipality responded by introducing multiple interventions: while prohibiting waste littering in the public areas, much emphasis was placed on supporting measures such as installation of new waste bins and signage (prohibiting waste littering and burning), as well as conducting regular cleaning campaigns to raise awareness.

6 The Climate and Clean Air Coalition (CCAC) is a voluntary partnership of governments, intergovernmental organisations, businesses, scientific institutions and civil society organisations committed to improving air quality and protecting the climate through actions to reduce short-lived climate pollutants. The Municipal Solid Waste Initiative is one of the activity components under the CCAC, which aims to reduce SLCP emissions and attain development objectives through improvement of waste management. http://www.ccacoalition.org/en

4. KEY ACHIEVEMENTS AND BENEFITS

4.1. Environmental Benefits

Overall, the level of hygiene of the municipality has improved, with less waste littering and less waste burning, as shown in Figure 15. The condition of the landfill has also improved with no landfill fires and less organic waste, resulting in minimised negative environmental impact and extend lifetime of the landfill. The volume of incoming waste for composting that had been diverted from the landfill site, has increased from 36 tonnes/month to 52.5 tonnes/month in 2014, and to 105 tonnes/month in 2017. This contributed to reducing GHG (methane)[7] from the landfill from 35 tCO2-eq/month to 52 tCO2-eq/month and 104 tCO2-eq/month in the same period.

(Before) (After)

Figure 15: Reducing Waste Littering and Burning along the Riverside and Streets

4.2. Social Benefits

The participatory waste management initiative of Battambang has brought some social benefits as well, particularly in rebuilding a partnership among key stakeholders including the Battambang Municipal Hall, COMPED (a local NGO), CINTRI (waste collection company), Sangkat offices, local markets, business enterprises, pagodas, residents. While cooperation among stakeholders was rarely observed previously, the intensive participatory training in Phitsanulok and the experience of co-developing the waste management strategy brought the key participants together for sustained collaboration based on a shared vision and common goals of improving waste management. Improvements in health and working conditions of waste management workers have also been observed. As a result of promoting waste separation at source, the quality of organic waste delivered to the composting centre has been improved (Figure 16), making it easier for the staff working at the composting plant to segregate non-compostable waste, and also reducing their exposure to organic waste resulting from manual segregation. In addition, living and working conditions of waste pickers at the landfill site, staff at the composting centre and residents near the landfill site have been improved, as a result of reduced organic waste as well as fewer air pollutants from landfill fires (Figure 17).

Figure 16: Improved Quality of Organic Waste Delivered to Composting Facility (Before - up, After - down)

Figure 17: Improving Living/Working Conditions at the Final Disposal Site (Before - up, After - bown)

4.3. Economic Benefits

The economic sustainability of the waste management system also needs to be considered from the micro-perspective, since the financial and operational sustainability of each waste management actor also directly influence the sustainability of the system itself. For instance, a simple profit/loss (P/L) statement of COMPED (Table 2) shows that, with the current market price for compost, the plant needs to produce at least 10.4 tonnes/month to cover the operational cost of US$1,248/month and reach break-even point. Despite the increased flow of incoming organic waste to their plant, operational and business challenges still remain: the high moisture content of the input raw materials (watermelons, cabbages, pumpkins, etc.) is suppressing the production of compost (input-output ratio: 12:1), and the NGO needs to compete with another organic waste recycler (animal feeding) over segregated contaminant-

free organic waste, which is still limited in amount. The new organic recycler buys up raw materials at the rate of US$3/tonne and quickly established itself as a growing waste management actor. Further promotion of source separation of organic waste would benefit Battambang's waste management system in order for both organic waste solutions to operate, as increased recyclable organic waste is critical for the sustainability of all the recyclers.

Table 2: Estimated Monthly Profit/Loss Statement of Composting Operation by COMPED

Description	Unit	Cost per Unit (US$)	Total (US$)
Operational cost			
Staff (2 staff: Manager, team leader)	1	450	450
Workers (3 workers)	1	400	400
Diesel (Litres)	320	0.8	256
Packaging bags for compost	6	7	42
Maintenance	1	100	100
Subtotal			1,248
Income			
Selling of compost	6	120	720
Total income			720
Profit			-528

4.4. Bettambang as a Model City

With the strong political support and leadership of the Municipal Governor and key stakeholders, as well as moderation and technical assistance by external organisations (including international organisations, IGES, and Pisanulok City), and continued efforts by stakeholders (the municipality, local NGOs, private companies and community members), the waste management situation in Battambang has gradually improved over the years. Recognising these positive achievements, Battambang Municipality received the Certificate of Recognition for Clean Air on the sidelines of the 15th Informal ASEAN Ministerial Meeting on Environment (IAMME) in 2014 in Vientiane, Lao PDR. Battambang also won first prize in the national awards on cleanliness for cities in 2015. In 2017, the municipality finalised its city strategy on reducing short-lived climate pollutants from waste management under the Climate and Clean Air Coalition (CCAC) – Municipal Solid Waste Initiative (MSWI), which focuses on increasing the utilisation of organic waste, reducing waste entering disposal sites, prohibiting open burning and littering of waste in water areas and public spaces, and thus minimising environmental impacts on soil, water and air.

7 This reduction includes the contribution from potential GHG savings from the use of composting and replacement of chemical fertiliser for cultivation.

5. Overcoming Barriers for Project Implementation

5.1. Rebuilding Trust and Cooperation among Local Stakeholders

In the initial stage of the project, the project team found it difficult to bring the local stakeholders (municipality, private service providers and citizens) together due to a past history of conflict. The main reasons for this were:

1.) poor service provision by the waste collection company (CINTRI);
2.) low willingness-to-pay among waste generators as a result of poor service quality; and
3.) inaction by the municipality (no countermeasures such as penalties or enforcement were introduced) to improve service quality.

Other factors also made it difficult for the government to coordinate discussions with the waste management company: One was that CINTRI's Battambang office was a regional branch and lacked the authority to make operational decisions on its own, and another was that Battambang Municipality lacked the authority to issue penalties to CINTRI as CINTRI's contract was with the Provincial Administration.

Given the above circumstances, it was critical to take careful steps to bring the key decision-makers to the discussion table in order to produce tangible, feasible solutions, and to rebuild trust among the stakeholders. IGES, as an external organisation without vested local interest, was best positioned to approach key political figures and facilitate the stakeholder dialogue, and was successful in inviting a team of high-level representatives of key organisations to the on-site training course conducted in Phitsanulok Municipality. The team included senior officials of Provincial Hall, the Vice-Governor of Battambang Municipality, the Vice President of CINTRI Phnom Penh headquarters, the owner of a private market in Battambang (Boeng Chhouk), representatives from management committees of major public markets in Battambang, and the manager of the composting facility (COMPED). This enabled participants to engage in substantive discussion based on a deep understanding of their own management opportunities, challenges and interests.

Prepared components of the 5-day training programme, which started with an ice-breaking session and included a site visit, interaction with Phitsanulok Municipality staff and communities, and brainstorming sessions, were also effective in assisting the team to overcome their past differences and engage in intensive discussions (Figure 18). Through this programme, participants were able to identify waste management challenges, and could agree upon a vision and targets for improving waste management, as well as propose project activities to be implemented back in Battambang. These results were later compiled as a waste management strategy, which greatly assisted in improving the working relationship among local stakeholders, so they could share the same ultimate development goals.

Figure 18: Brainstorming Session during Training Course on Participatory Waste Management in Phitsanulok Municipality

5.2. Inducing Negotiation and Commitment to overcome Budget Shortage

Through the training course in Phitsanulok, a pilot project plan was developed to introduce source separation of organic waste in three markets for composting. While the project budget partially covered pilot project implementation, it could not cover the entire cost of the plan, which included purchasing the necessary equipment. However, this encouraged determined participants to further negotiate on potentially co-financing and/or providing in-kind contribution to the project in the form of a public-private partnership. As a result, CINTRI and Boeng Chhouk Market expressed their intention to contribute both human and financial resources in support of the project implementation (Figure 19). Meanwhile, CINTRI agreed to provide waste bins for separated organic waste and cleaning equipment, and Boeng Chhouk Market distributed small baskets to all its tenant shops in the market and trained staff to teach shop owners how to separate the waste in collaboration with COMPED. This decision was a critical milestone towards the success of the project.

The pilot project implementation was successful in Boeng Chhouk Market because the market owner itself was responsible for cleaning and transporting the separated waste to the landfill. The market owner expressed their support for source separation, but lacked the financial resources for additional investment in equipment and staff to cover the additional work required of the project. Moreover, the market owner had to pay a disposal fee to the landfill operator, which was also CINTRI. To resolve this, the market owner requested COMPED, Battambang Municipality, and IGES to act as intermediary with CINTRI. A proposal for a discounted disposal fee was put forward, since the amount of waste brought in to the CINTRI landfill was expected to decrease with organic waste diverted to composting through source segregation, which was agreed on by CINTRI management. This enabled the market to secure the budget to purchase equipment (a truck) for the collection and transportation of the separated organic waste based on the extra funds released by the discounted fees, which was essential for sustaining the uninterrupted waste flow.

Figure 19: Separated Organic Waste Collection Services by CINTRI (up) and Boeng Chouk Market (down)

5.3. Conducting Follow-up Actions to Complement Insufficient Experience of Local Stakeholders

The trained participants were strongly committed to implementing the pilot project, though were faced with some challenges throughout the course of implementation – such as the problems of residents not separating waste and the waste collector mixing previously separated waste prior to transportation. In order to cope with these unanticipated challenges, regular monitoring and evaluation was carried out every three months by a taskforce comprising representatives from Phitsanulok Municipality as a successful model city, COMPED as local NGO, and IGES as the programme facilitator, to provide additional guidance in response to day-to-day implementation challenges on the ground (Figure 20).

Figure 20: Regular On-site Monitoring and Evaluation by Technical Support Team and Local Stakeholders in Battambang Municipality

5.4. Emergence of Competing Recycling Options for Source-segregated Organic Waste

When the project was initiated and the commercial and residential waste generators in the pilot areas started to separate the organic waste properly at source, a new business opportunity emerged for organic waste recyclers (farmers and intermediaries) to collect organic waste for animal feed. The separated organic waste then started to be collected, for a fee of US$3/tonne, and it was found that approximately 3.74 tonnes/day is now collected for this purpose (Figure 21). As a result, the volume of organic waste arriving at the composting plant did not reach the target level, while the volume of organic waste to be landfilled was reduced.

The introduction of source segregation has turned what was once organic *waste* into a valuable *resource*, while its scarcity (of segregated waste) has resulted in market competition among different organic waste recyclers. While this was not initially expected by the stakeholders at the planning stage, the municipality and COMPED agreed not to take any action against this practice as they see the emergence of new organic waste recyclers as a positive trend to enhance its utilisation for *reuse*, which is considered a preferred action above *recycle*, based on the waste hierarchy principle. In parallel with this, an awareness-raising campaign to promote organic waste separation at source was expanded to other markets and residential areas.

Figure 21: Collection of High Quality Organic Waste from Markets and Restaurants for Animal Feed

5.5. Low Awareness and Cooperation of Residents

As is often the case for many cities, low awareness of residents was identified as one of the key challenges hampering waste management in Battambang, which was also the primary reason for their lack of willingness to participate in the waste management programme carried out by the municipality.

To overcome this challenge, a series of awareness-raising programmes was conducted, including distribution of brochures, voice announcements, community workshops, and a pilot project was implemented (Figures 22). A street cleaning campaign was also organised with the participation of students from local schools and universities, as well as staff of public organisations and local business enterprises as volunteers, with the aim of inviting citizens to join Battambang's actions on waste management. During this campaign, the Provincial Governor and Municipal Governor played key roles as public figures in leading the volunteers by setting an example of much-needed behavioural change on an individual level (Figure 23). Data from Battambang office shows that the number of people participating in waste separation increased from 10% in 2016 to 15% in 2017.

In addition, for the purpose of providing a legal tool to assist implementation, a new local regulation to promote waste separation at source was announced with a given time frame to apply a penalty scheme, which recently went through consultations with the public through social networks by the Office of Municipal Beautification and Waste Management on 4 July, 2017 to receive public comments before the enforcement.

Figure 22: Public Consultation and Awareness-raising Campaign

Figure 23:3 Street Cleaning Campaign led by Provincial and Municipal Governors

6. CONCLUSIONS AND LESSONS LEARNT

This case study presented the experience of a participatory waste management initiative by Battambang Municipality and its efforts towards improving its waste management system based on a participatory approach. The above lessons demonstrate that various measures undertaken for building partnerships with different local stakeholders not only expanded their level of participation but were successful in inducing collective action based on shared responsibility and shared costs among the key stakeholders. This commitment beyond mere participation was instrumental in overcoming the main resource limitations of budget and personnel, and in improving the efficiency and effectiveness of Battambang's waste management service, while achieving environmental, social and economic benefits.

It is also important to stress that the successful implementation of the participatory waste management approach depended on continuous efforts by key local stakeholders, and that such commitment was driven by the shared vision and common goals agreed on by the stakeholders themselves. In the case of Battambang, the common goal motivating all the key stakeholders towards collaboration was to achieve first prize as a clean city in the national awards. Further, strong political commitment by the high-level managers of key institutions as well as regular on-site monitoring and evaluation based on a participatory approach to support implementation on the ground were also contributing factors to the successful outcome of the participatory waste management projects.

Key Lessons:

- Participatory Approach – inviting stakeholders to participate in strategy development/project design from an early stage is critical in nurturing a sense of ownership among local stakeholders involved, and in inducing their commitment to implementation of the planned activities. In Battambang's case, this resulted in voluntary financial and human resources commitment by the service implementers as well as generators that went beyond reliance on external support.

- Incentives and measures for visualising them are both crucial for promoting stakeholder participation towards project implementation. In Battambang's case, tangible benefits such as business profits, and psychological incentives such as national awards were effective in ensuring participation of the key actors and mobilising the general public towards implementation of the waste management strategy.

- Strong commitment and support of top management and senior representatives from key stakeholders is crucial to sustain the introduced policies, strategies and activities both during and after implementation of the project.

- On-site visits and participatory training programmes held in distant locations can be very useful in improving personal relationships amongst the key stakeholders. In Battambang's case, such visits and training were indispensable first steps to initiate constructive dialogue and to build trust towards goal setting based on a shared vision for improving the state of the city's waste management.

- Technical support and guidance from international facilitators through a regular monitoring and evaluation programme has high impact on building confidence and competence of local stakeholders for project implementation.

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REFERENCES

[1] Hor Peng, Kong Phallack, and Jörg Menzel. (2012): "Introduction to CAMBODIAN LAW." (2012): n. pag. 502. Printed.
[2] IGES. (2016): Draft Baseline Report for National Strategies on Holistic Waste Management in Cambodia. UNEP-CCET (Holistic Waste Management).
[3] Royal Government of Cambodia. (2015): Sub-Decree on Urban Solid Waste Management, Pub. L. No. 113.
[4] Office of Battambang Beautification and Waste Management. (2016): Sangkat demography data. Feb.
[5] Climate and Clean Air Coalition. (2013): "Solid Waste Management City Profile – Phitsanulok Municipality, Thailand." http://www.waste.ccacoalition.org/sites/default/files/files/city_profiles/Phitsanulok-City%20Profile%20_CCAC%20FINAL_03072014_EF-JS.pdf (Retrieved on 28 November 2017).
[6] Nirmala Menikpura and Janya Sang-Arun (2013): "GHG calculator for solid waste ver. II-2013." https://pub.iges.or.jp/pub/ghg-calculator-solid-waste-ver-ii-2013 (Retrieved on 7 May 2018).

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