

Best Practices for Municipal Solid Waste Management in South Asia: A New Knowledge Product

I. Basic Data

A.	Project Officer(s)	Mr. Ron Slangen and Mr. Norio Saito
B.	Executing Agency	Asian Development Bank (ADB)
C.	Implementing Agency(ies)	Urban Development Division, South Asia Department
D.	Prioritized Areas	Urban infrastructure and service delivery
E.	Types of Outputs	Information Dissemination
F.	Coverage (Country/Regional)	Regional (Sri Lanka, Bangladesh, Nepal, and India)
G.	Amount Requested	\$300,000
H.	Implementation Period	September 2009 - July 2010

II. Proposed Project

A. Background and Rationale

1. **Urbanizing South Asia:** Rapid urbanization in South Asia¹ is creating an increasing strain on overburdened infrastructure, as well as more demand on limited public services. In Sri Lanka, Bangladesh, Nepal, and India, these trends are acutely noticeable as urban population growth rates exceed total growth in each country (sources: CPS).

2. **Municipal Solid Waste Management (SWM):** The most visible implication of rapidly urbanizing South Asian countries is the increasing generation of municipal solid waste.² A highly neglected problem with severe health and environmental implications, local governments are desperate to find highly effective, practical solutions for improving solid waste management (SWM) with limited budgets. Only 20% of households in urban areas in Bangladesh have access to a solid waste collection system. In India, about 90% of waste is currently disposed of by open dumping,³ with similar situations occurring throughout the region. The result is either collected waste that is burned or disposed of in uncontrolled dumpsites; and uncollected waste (typically, 33-66% of waste generated is not collected) that is dumped in streets and drains, contributing to polluted waterways, flooding, and breeding of insect and rodent vectors. These unmanaged waste disposal practices also contribute significantly to greenhouse gas emissions. Moreover, the urban poor suffer disproportionately from bad environmental sanitation, particularly informal waste collectors and recyclers, resulting in illness caused by water- and vector-borne disease. Therefore, SWM has a vital role to play in achieving the Millennium Development Goals in health and environmental sustainability. Economic costs include impacts to tourism, health care, and overall quality of life of urban residents. Although a costly and complex issue, effective delivery of waste management infrastructure and services is essential to improving the health, environment, and overall quality of life for all urban residents.

3. **Key Issues:** With limited financial resources, low-cost highly effective solutions are vital to sustainable urban waste management in South Asia. Increasing citizen participation in SWM

¹ In South Asia, 29% of the region's population living in urban areas (World Bank Group, Sri Lanka at a Glance, 24 September 2008)

² The term municipal solid waste refers to solid waste from houses, streets and public places, shops, and offices. It also includes hospitals; however, medical waste is not covered under this project, as it is a specialized area of waste management. Industrial and hazardous waste are also specialized areas and not covered herein.

³ Narayana, Tapan. 2008. *Municipal Solid Waste Management in India: From Waste Disposal to Recovery of Resources*. June 2008. Waste Management 29 (2009) 1163-1166. Journal of Waste Management.

activities, particularly source segregation, is also important. These, and the following, are key issues faced by cities throughout the region when confronting solid waste management: how to maximize the 3Rs (reduce, reuse, recycle) to reduce waste for disposal (shifting from disposal-centric to recovery-centric paradigm); how to increase collection efficiency within limited budgets; how to safely dispose of waste at landfill sites in a cost-efficient manner; and how to finance such waste management improvements and take advantage of Clean Development Mechanism (CDM) schemes.

4. Cities throughout South Asia and the rest of the developing world are creating innovative solutions (i.e., technological and management) to address these issues. Although low cost solutions are often the most viable options for poorer countries, higher and more expensive levels of technology, including waste-to-energy schemes (which could be CDM), might be adopted in places where there is greater interest in the opportunity to partially recover operation and maintenance costs from these schemes. An assessment of emerging waste management patterns, identification of adequate and successful strategies/methods, and innovative interventions, including CDM, to deal with these challenges would influence effectiveness and outcomes of waste infrastructure and service delivery for rapidly urbanizing South Asia.

5. **Knowledge Sharing and Dissemination:** City officials often have limited access to practical, affordable and effective solutions to overcome the collection, transportation, treatment and disposal of municipal solid waste. Though there are no one-size-fits all solutions, waste management approaches around the region can be examined and adapted to fit local contexts. Innovative approaches include (but are not limited to) community-based primary waste collection schemes and the use of films to create SWM awareness in India, small transfer stations in China, 'garbage banks' in Thailand, waste picker associations in the Philippines, or banning plastic bags for packaging in Dhaka which are emerging practices that may be adapted throughout the region. The project will highlight these emerging trends as well as technological innovations including specially designed waste bins, compactors, trucks, and transfer stations, which are being adapted to improve collection efficiencies. Moreover, a number of pilot projects underway may provide replicable lessons elsewhere.

6. There are currently no ADB publications addressing SWM in South Asia. External publications⁴ addressing the subject are country, issue, or case-specific. The value-added benefit and core strength of this project is its regional scope. By making available a comprehensive assessment of locally developed, successful SWM practices in South Asia as well as relevant international practices, the project aims to facilitate the transfer of knowledge and techniques to city officials throughout the region and enable them to replicate or adapt these viable approaches in their own municipalities.

7. **Links to Strategy 2020 and CPS:** Strategy 2020 commits to assisting DMC municipalities improve systems for solid waste management as well as facilitating the transfer of knowledge and new technologies. Solid waste management is also a key area of ADB assistance noted in the most recent Country Partnership Strategy (CPS) of Bangladesh, Sri Lanka, Nepal, and India. The government of Sri Lanka, for example, aims to increase the frequency of solid waste collection in 15 local authorities and enhance safe collection and disposal of about 275 tons of waste by 2011. Bangladesh aims to increase solid waste collection and transport from 20 to 75% by 2021, support master planning of SWM, develop a

⁴ Improving Municipal Solid Waste Management in India, World Bank, 2008; Municipal Solid Waste Management: Bangladesh Perspective. Academic Press and Publishers Library, 2008; An Overview of the Issue of Solid Waste Management in Sri Lanka, Department of Geography, University of Madra, 2003.; Municipal Solid Waste Management in Nepal: Practices and Challenges. Pokhrel D, Viraraghavan T. Waste Management. 2005;25(5):555-62. Review.

model to provide carbon finance support for municipal SWM, and enable private sector investment in SWM. In Nepal and India, ADB assistance in the urban sector will continue to focus on integrated urban infrastructure improvement, including solid waste management, complimenting efforts of other donor agencies working in the sector. Lessons from previous ADB experience in the urban sector indicate the need to incorporate participatory processes and local government involvement in project designs.

B. Impact and Outcome

8. The expected impact is new and/or improved SWM projects in Bangladesh, Nepal, Sri Lanka, and India with increased numbers of municipalities implementing such practices. The expected outcome is government officials that are more equipped with new knowledge and awareness in identifying, advocating, designing, and implementing improved SWM systems.

9. Potential spin-offs include cross border knowledge exchanges and creating 'pride' within cities successfully managing and advocating their own SWM approaches. The publication will add value to ongoing ADB programs and projects with municipal solid waste components by filling the knowledge gap for successful practices and creating a menu of options for addressing local challenges.

C. Scope of Work/Outputs

10. **Scope of Work:** The final output is a new publication (**Appendix 6**) to facilitate regional learning in SWM by documenting successful, innovative technological and management practices (i.e., 'best practices') in Bangladesh, Sri Lanka, Nepal, and India as well as other developing and industrialized countries, wherever relevant. The publication will analyze and present successful experiences in the following areas of municipal SWM: segregation, primary and secondary waste collection and transportation, treatment including composting, final disposal such as landfilling, formalization of informal waste collectors, public awareness, community-based approaches, SWM in urban slums, experiences in hill vs. plateau towns, low-cost technology, capacity building, environmental management, financing SWM, the incorporation of the "3R" principle and legal and regulatory framework. It will also present private sector participation successes and highlight cities utilizing CDM.

11. Participatory workshops will be held in each of the countries (four national workshops) to engage key stakeholders to gather information on successful and emerging SWM experiences that cover the spectrum of issues identified above, and obtain feedback on initial project findings. In addition, one regional workshop will be held in one of the selected countries to enhance regional knowledge exchange and further evaluate project findings. Findings of the workshops are to be incorporated into the final publication as well as summarized in summary workshop reports (see **Appendix 2** – Design and Monitoring Framework).

12. The following are the expected outputs of the proposed project:

- (i) New knowledge product (and its dissemination) assessing and highlighting best practices in SWM for city officials in selected South Asian countries; including regional and international case studies highlighting relevant success stories in SWM. This will be a publicly-accessible, professionally published on-line (downloadable) document to be produced in accordance with ADB's standards.
- (ii) Five participatory workshops (4 national and 1 regional) for enhancing local and regional understanding for improved SWM.

D. Activities with Milestones

13. The proposed project will engage a reputed international solid waste management expert (Team Leader), experienced in the region for 4 person-months. Four national consultants, one for each country (Bangladesh, Sri Lanka, Nepal, and India), will support data collection, workshops, and detailed analysis as guided by the international Team Leader. Individual consultants will be recruited as the Team Leader and four national consultants who have successfully completed similar assignments and who are uniquely familiar with SWM in the region. The Outline Terms of Reference (TOR) is in **Appendix 4**. The project is planned for nine months which includes a two month contingency allowance. **Appendix 5** outlines the Implementation Schedule with expected activities and milestones for the proposed project. Disbursements under the TA will be made in accordance with *ADB's Technical Assistance Disbursement Handbook* (January 2008, as amended from time to time).

E. Project Evaluation and Information Dissemination

14. There will be four participatory stakeholder/beneficiary workshops, and one Regional forum to increase awareness and discuss/evaluate project findings. The final outputs of the project will be disseminated through the ADB website.

The following are evaluation and dissemination activities for the project:

- (i) Five participatory stakeholder/beneficiary workshops
- (ii) ADB Final Review
- (iii) Website dissemination (downloadable)

F. Scope of Replication/Use in other Developing Member Countries (DMCs)

15. The final on-line publication will present successful approaches in solid waste management that are replicable and/or adaptable by localities throughout South Asia. The regional approach of the publication can be duplicated in other parts of Asia, particularly in Southeast Asia and the Pacific region where geographical differences present varying challenges in waste management.

G. Cost Estimates and Financing Plan

16. The proposed cost of the project is \$300,000 and will be financed under RETA No. 6337 Development Partnership Program for South Asia, which is financed by the Government of Australia through the Australia-ADB South Asia Development Partnership Facility. See **Appendix 3** for Cost Estimates and Disbursement Schedule.

H. Proposed Project Management System

17. The Executing and Implementing Agency will be the ADB. Within the ADB, executing/implementing functions are expected to be undertaken by two Urban Development Specialists (R.Slangen and N.Saito) in the South Asia Urban Division. Outputs will be reviewed by SAUD staff as well as urban specialists from the ADB Urban Community of Practice (CoP) who will also provide guidance on the project.

Appendixes

1. Design and Monitoring Framework
2. Cost Estimate and Financing Plan
3. Outline Terms of Reference
4. Details of Implementation Schedule
5. Tentative Outline of Proposed Publication

APPENDIX 1: DESIGN AND MONITORING FRAMEWORK
Best Practices for Municipal Solid Waste Management in South Asia:
A New Knowledge Product

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p>Impact Improved SWM projects in Bangladesh, Nepal, Sri Lanka, and India.</p>	<p>Increased number of municipalities implementing improved SWM practices.</p>	<ul style="list-style-type: none"> • Statistics and reports of participating governments • Annual reports of multilateral organizations 	<p>Assumptions</p> <ul style="list-style-type: none"> • The governments are committed to sustainable improvements in solid waste management • The governments pass enabling policies and rules in support of SWM. <p>Risks</p> <ul style="list-style-type: none"> • There is a lack of funding available at the municipal level for planning and implementing SWM projects.
<p>Outcome Government officials equipped with new knowledge and awareness in identifying, advocating, designing, and implementing integrated solid waste management projects.</p>	<ul style="list-style-type: none"> • Increased policy dialogue between selected South Asian countries and ADB. • Increase in the number of urban sector projects that address the issue of solid waste management and incorporate best practices, where feasible. • Information posted on government website and the number of web sessions generated. 	<ul style="list-style-type: none"> • Consultation with governments and state/local and regional institutions • Continued mention in ADB CPS • Feedback from participating governments 	<p>Assumptions Government officials obtain and read the knowledge product, and apply new concepts learned.</p> <p>Risks Officials may not have adequate motivation and commitment to learn from good practices.</p>
<p>Outputs</p> <ul style="list-style-type: none"> • New knowledge product developed (and disseminated) highlighting best practices in SWM for city officials in 	<ul style="list-style-type: none"> • All key government agencies obtain a copy of the publication through hard copy or ADB website (downloadable). 	<ul style="list-style-type: none"> • Consultant assessment reports • TA review • Feedback from workshop participants 	<p>Assumptions</p> <ul style="list-style-type: none"> • Selected governments and local authorities are favorable to new knowledge product • Relevant data collections are feasible within the

Design Summary	Performance Targets and/or Indicators	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p>selected South Asian countries; including regional and international case studies highlighting success stories in SWM</p> <ul style="list-style-type: none"> Workshops for enhancing the understanding of improved SWM 	<ul style="list-style-type: none"> ADB website and the number of web sessions generated. Total of 5 workshops with total of 100 stakeholders participating. 		<p>time limit</p> <ul style="list-style-type: none"> Appropriate stakeholder consultation takes place <p>Risks</p> <ul style="list-style-type: none"> Key stakeholders fail to support the process
<p>Activities with Milestones</p> <ol style="list-style-type: none"> 1.1 Consultants Recruited (by August 2009) 1.2 Framework by International consultant in consultation with ADB (first 4 weeks) 1.3 Data collection and analysis by National consultants in accordance with the framework developed in 1.1 (8 weeks) 1.4 Compiling the work by International consultant (4 weeks) 1.5 ADB review (2 weeks) 1.6 Workshop and draft final report (4 weeks) 1.7 ADB final review (2 weeks) 1.8 Report finalization (3 weeks) 1.9 Final report edited, proof-read, and approved by ADB Department of External Relations (DER) (8 weeks) 1.10 Knowledge product disseminated and published on ADB website within 36 weeks of commencement. 1.11 TA outputs disseminated through ADB website (1 week after finalization) 			<p>Inputs</p> <ul style="list-style-type: none"> DPPSA Grant for \$300,000 Consultant inputs (1 International—4.0 person months, 4 National—3.0 person months each)

ADB = Asian Development Bank, CPS = Country Partnership Strategy, DPPSA = Development Partnership Program for South Asia (DPPSA), SWM = Solid Waste Management, TA = technical assistance.

APPENDIX 2: COST ESTIMATE AND FINANCING PLAN

COST ESTIMATES AND FINANCING PLAN

Item	Total Cost
A. Asian Development Bank Financing	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants	\$96,500
ii. National Consultants	\$68,000
b. International and Local Travel	\$17,500
c. Reports and Communications	\$ 9,000
2. Training, Seminars, and Conferences	
a. Facilitators	\$10,560
b. Training Program	\$21,440
3. Surveys	\$32,000
4. Miscellaneous Administration and Support Costs	\$5,000
5. External Auditing ¹	\$1,000
6. Contingencies	\$39,000
Total	\$300,000

Note: The proposed project will be financed under RETA No. 6337 Development Partnership Program for South Asia, which is financed by the Government of Australia through the Australia-ADB South Asia Development Partnership Facility. Total amount also includes ADB's administration fee, audit cost, bank charges and provision for foreign exchange fluctuations (if any), to the extent that these items are not covered by the interest and investment income earned on this grant or any additional grant by the Government of Australia.

¹ As required by the DPPSA Guidelines

Source: Asian Development Bank estimates.

APPENDIX 3: OUTLINE TERMS OF REFERENCE

A. Objective and Scope of Assignment

1. The primary objective of this assignment is to facilitate regional learning by documenting practical, affordable and innovative solutions to help overcome municipal solid waste challenges in four selected countries of South Asia (Nepal, Bangladesh, Sri Lanka, and India). Each country will be screened to: (i) assess key challenges in municipal solid waste management (SWM), and (ii) to explore and document successful, innovative technological and management practices ('best practices') in SWM.

2. Two outputs are expected: (i) the primary output is a new knowledge product (and its dissemination) highlighting best practices in municipal solid waste management (SWM) for city officials in these selected countries including regional and international case studies highlighting relevant success stories in SWM. Issues addressed in the publication will include: segregation, primary and secondary waste collection and transportation, treatment including composting, final disposal such as landfilling, formalization of informal waste collectors, public awareness, community-based approaches, SWM in urban slums, experiences in hill vs. plateau towns, low-cost technology, capacity building, environmental management, financing SWM, the incorporation of the "3R" (reduce, reuse, recycle) principle, and legal and regulatory framework. It will also present private sector participation successes and highlight cities utilizing the Clean Development Mechanism (CDM). This will be a publicly-accessible, professionally published document (on-line and hard copy) to be produced in accordance with Asian Development Bank's (ADB's) standards. The second output is five workshops (four country-specific, and one regional) for enhancing local and regional understanding of improved SWM practices. The purpose of the country workshops are to gather and share information on successful SWM experience covering the range of issues identified in the initial screening, and obtain feedback on initial project findings. The purpose of the regional workshop is to create regional knowledge sharing amongst key stakeholders and further evaluate project findings. Findings of the workshops will be incorporated into the final publication as well as summarized in summary workshop reports.

B. Consultants

3. The project will require 16 person-months of consulting services: 4 international and 3 national each in 4 countries. The proposed project will engage a well-reputed and respected international solid waste management expert (Team Leader), experienced in the South Asia region, for 4 person-months. Four national consultants (one for each country, 3 person-months each), will support data collection and the organization and facilitation of country-specific workshops as guided by the international Team Leader. The Team Leader and four national consultants will be recruited as Individual Consultants for this assignment.

4. Specific tasks of the consultants include: (i) an assessment of country-specific challenges (situation analysis) in municipal SWM; (ii) conduct research and field studies (within South Asia) to identify practical, affordable and innovative solutions in municipalities within South Asia, other developing countries, and other relevant cases throughout the developed world; (iii) organizing workshops to facilitate knowledge exchange in SWM; and (iv) compiling, documenting, and presenting information into a high quality publication to ADB standards.

5. The terms of reference of the consultants will include, but not be limited to, the following:
- (i) **Municipal Solid Waste Management Specialist – Team Leader (International, 4 person-months).** The consultant will be an experienced international expert with qualifications and specialization in solid waste sector planning, infrastructure, and services delivery in developing countries with experience in South Asia. The consultant should have an adequate technical background and detailed knowledge of innovative solutions (low cost methods, community-based, technology, CDM, private sector participation etc.) in SWM. Experience in publishing similar works is highly desirable. Sound writing skills and familiarity with ADB publications and presentation style is mandatory. The Team Leader will guide, coordinate, lead, direct and supervise the four national consultants to carry out necessary data collection, compiling information, organizing workshops, and drafting relevant country sections of the final publication. He/she is required to visit each country and meet with the national consultant and collect any necessary data, including visiting selected model cities identified by the national consultant. The International Consultant will also do the following: (i) conduct comprehensive survey of current international innovative practices in SWM including technology and management approaches; (ii) identify what data and information are needed for the publication; (iii) develop a knowledge framework to guide data collection by the national consultants (the framework will also act as a working outline for publication); (iv) assess solid waste scenarios in the region based on the available publications, data, and national consultant input; (v) establish criteria for identifying 'best practices' in SWM and identify and evaluate them and their replicability throughout the region; (vi) organize and facilitate regional workshop; and (vii) draft a high quality publication highlighting best practices in SWM in South Asia (the key deliverable of the International Consultant) based on workshops and national consultant input.
 - (ii) **Municipal Solid Waste Management Experts (4 National, 3 person-months each).** The consultant will have extensive experience in municipal solid waste management in the respective country (Nepal, Bangladesh, Sri Lanka, and India). The national consultants will perform their tasks under the close supervision of the international consultant guided by the framework developed by him/her including any further work identified by the Team Leader. National consultants will initiate all the tasks in the terms of reference and prepare high-quality outputs so that the limited inputs from the international consultant will suffice to achieve the expected output at an international standard. The detailed tasks of the national consultants include: (i) provide country overview of municipal solid waste; (ii) document best SWM practices throughout respective country based on knowledge framework and 'best practices' criteria developed by international consultant; (iii) visit cities to compile data meeting with key stakeholders; (iv) organize and facilitate country-specific workshop to facilitate data collection and to share initial project findings; and (v) write findings and report to international consultant.

C. Output/reporting requirements:

- (i) Knowledge framework by International Consultant
- (ii) Draft assessment reports by each national consultant, finalized by International Consultant, and further refined upon ADB comments.
- (iii) Draft synthesis report (prepared by International Consultant based on the Draft Assessment
- (iv) Country-specific workshop summary notes (prepared by National Consultants, refined by International Consultant)
- (v) Regional workshop proceeding report
- (vi) Draft Final Publication prepared by International Consultant based on inputs from National Consultants and workshop findings.
- (vii) Final Publication incorporating ADB comments/suggestions

APPENDIX 4: DETAILS OF IMPLEMENTATION SCHEDULE

Activities	Milestones	Inputs	Calendar Weeks Elapsed from Commencement and Anticipated Disbursements
Framework by International Consultant in consultation with ADB	Framework report	4 weeks International	By end of week 4 (1 st Disbursement)
Data collection and analysis by National Consultants in accordance with the framework	Reports of National Consultants in line with Framework	2 weeks International; 8 weeks National	By end of week 12
Compiling all work by International Consultant	Draft Final Report	4 weeks International; 1 weeks National	By end of week 16 (2 nd Disbursement)
ADB review	Edited Draft Final Report		By end of week 18
Workshop and draft final report	5 Workshops (4 National and 1 Regional)	3 weeks International; 2 weeks National	By end of week 22
ADB final review	Final Draft Publication		By end of week 24
Report finalization	Final Report	3 weeks International; 1 week National	By end of week 27 (Final Disbursement)
Final report edited, proof-read, and approved by ADB Department of External Relations (DER) (8 weeks)	Final Publication	8 weeks (ADB DER)	By end of week 35
TA outputs posted and published on ADB website within 36 weeks of commencement	Final Publication posted on ADB website		By end of week 36

Notes: Consultant inputs (1 International—4 person months & 4 National—3 person months each).

Expected timeframe is September 2009 – July 2010. This includes 2 months for contingency allowance.

APPENDIX 5: TENTATIVE OUTLINE OF PROPOSED PUBLICATION

Best Practices for Municipal Solid Waste Management in South Asia: A New Knowledge Product

- A. Overview of Publication
 - a. Need and Purpose
 - i. Challenge of solid waste management
 - ii. Need for regional knowledge exchange in SWM practices
 - b. Methodology
 - i. Research and fieldwork
 - ii. Four (4) national workshops
 - iii. One (1) regional workshop

- B. Municipal Solid Waste Management in South Asia: Existing Conditions and Challenges
 - 1. Country overview – Bangladesh
 - 2. Country overview – Sri Lanka
 - 3. Country overview – Nepal
 - 4. Country overview – India

- C. Bangladesh
 - a. Legal and regulatory Framework
 - b. Primary and secondary collection and transportation
 - c. Treatment and disposal
 - d. Other advances (CDM, waste-to-energy, etc.)

- D. Sri Lanka
 - a. Legal and regulatory Framework
 - b. Primary and secondary collection and transportation
 - c. Treatment and disposal
 - d. Other advances (CDM, waste-to-energy, etc.)

- E. Nepal
 - a. Legal and regulatory Framework
 - b. Primary and secondary collection and transportation
 - c. Treatment and disposal
 - d. Other advances (CDM, waste-to-energy, etc.)

- F. India
 - a. Legal and regulatory Framework
 - b. Primary and secondary collection and transportation
 - c. Treatment and disposal
 - d. Other advances (CDM, waste-to-energy, etc.)

- G. Regional Assessment and Prospects
 - a. Considering best practices throughout the region
 - b. Future prospects: emerging technologies
 - c. Identifying reasons for success and policy implications
 - d. Challenges ahead