APPENDIX 4.1

Record of Main Activities from July 2004 to July 2005

C: Improvement of Final Disposal Planning and Operation

APPENDIX 4.1 RECORD OF MAIN ACTIVITIES FROM JUNE 2004 TO JULY 2005

C: IMPROVEMENT OF FINAL DISPOSAL PLANNING AND OPERATION

C-1: Training for Final Disposal Planning

C-1.1: Training for site selection

Date	Venue	Participants	Activities	Remarks
May 6, 2005	Sisdol, Bandhare Dnada	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Nirmal Acharya Others *GEOCE;* Mr. S. B. Joshi Mr. Ishwor Man Shrestha Mr. Prakash Ulak Mr. Abhishek B. C.	1) Site visit to Sisdol and L/T-LFS at Banchare Danda in Okharpauwa 2) Group discussion involving local people in Banchare Danda for understanding the locally social conditions. 3) Reconnaissance for understanding geological condition in Banchare Danda.	
May 8, 2005	Pharsidol	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Nirmal Acharya *KMC;* Mr. Rajesh Manandhar Others *GEOCE;* Mr. S. B. Joshi Mr. Ishwor Man Shrestha Mr. Prakash Ulak Mr. Abhishek B. C.	1) Site visit to L/T-LFS at Pharsidol North and South 2) Site visit to Panga which was one of candidates for WPF	
May 12, 2005	SWMRMC	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Surya Man Shakya Others *GEOCE;* Mr. S. B. Joshi	1) Discussion on the process for the evaluation of L/T candidate sites.	1) Joint site visit to three candidate sites would be postponed / cancelled. 2) Mr. Nirmal was assigned as a focal point of L/T-LFS.
May 16, 2005	LDTA	JICA Study Team Mr. Shungo Soeda Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;*	Workshop on L/T-LFS IEE was held, with the following agenda: 1) Overview of environmental conditions on three candidate sites (Banchare Danda, Pharsidol North/South).	1) Preliminary ranking showed that Banchare Danda gained the highest score, followed by

Date	Venue	Participants	Activities	Remarks
		Mr. Surya Man Shakya Mr. Ashok Shahi *KMC;* Mr. Indra Man Suwal Mr. Rajesh Manandhar Mr. Deepak Shrestha *LSMC;* Mr. Rudra Prasad Gautam Mr. Pradeep Amatya Others *GEOCE;* Mr. S. B. Joshi Mr. Ishwor Man Shrestha Mr. Prakash Ulak Mr. Abhishek B. C.	2) Technical features of each candidate, such as capacity, lifetime, etc. 3) Preliminary ranking of candidate sites. 4) Development schedule, rough cost estimate, implications of transfer haul cost, etc., of each candidate. 5) Discussion	Pharsidol North, and Pharsidol South. 2) The cultural and religious issues in Pharsidol area were raised, which might be vital conflicts for LF development.
May 20, 2005	KMC	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *KMC;* Mr. Rajesh Manandhar *LSMC;* Mr. Pradeep Amatya Others *GEOCE;* Mr. S. B. Joshi	Discussion on the concerns raised by KMC to be noted when the selection of L/T-LFS.	Internal evaluation would be tried by the focal points of SWMRMC, KMC, and LSMC on 25th May.
May 25, 2005	LDTA	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Ashok Shahi Mr. Nirmal Acharya *KMC;* Mr. Rajesh Manandhar *LSMC;* Mr. Pradeep Amatya Others *GEOCE;* Mr. S. B. Joshi Mr. Prakash Ulak Mr. Abhishek B. C.	Discussion on L/T-LFS IEE practice including: 1) Practice of internal evaluation by Nepalese C/P among three candidate sites using evaluation form of SWMRMC EIA guidelines.	The most scoring obtained by internal evaluation was Pharsidol North, followed by Pharsidol South, and Banchare Danda.
June 22, 2005	KMC	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Nirmal Acharya *KMC;* Mr. Indra Man Suwal Mr. Kiran Ulak *LSMC;* Mr. Pradeep Amatya *KRM;* Mr. British Singh	2nd workshop with the following agenda: 1) Review of preliminary evaluation on selecting L/T-LFS. 2) Explanation of results of draft scoping and TOR for EIA on Banchare Danda and Pharsidol North. 3) Discussion on possible environmental impacts on both LFSs.	1) Front staff of KMC were not yet convinced to steer for Banchare Danda, although its development was decided in Board of SWMRMC.

Date	Venue	Participants	Activities	Remarks
		Others *GEOCE;* Mr. S. B. Joshi		

C-1.2: Training for environmental/social considerations on landfill site

Date	Venue	Participants	Activities	Remarks
April, 26, 2005	BKM, Taikabu	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *BKM;* Mr. Laxman Kisiju Mr. Dinesh Rajdhandari Mr. Moti Bhakta Shresth Mr. Krishna P. Suwal Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Molla Mr. Shresh Shrestha *ENPHO;* Mr. Deepak Shrestha Chairman and two members of Study Assisting Committee	Kick-off meeting for EIA practice of Taikabu LFS was held with the following agenda: 1) Methodology and expected outputs of the practice. 2) Work schedule and inputs from the JICA Study Team. 3) Joint site visit	Locations for boreholes of soil investigation, benchmarks for topo survey, and water sampling were tentatively determined. However, due to local opposition against LFS, the work items were amended late in May, 2005.
May 4, 2005	MOLD	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *MOLD;* Mr. Babu Ram Gautam (Under Secretary, Env. Dept.)	1) Confirmation of procedural progress of approval for scoping and TOR for EIA on Taikabu LFS submitted from BKM.	1) MOLD already approved the document and was ready for forwarding to MOEST. 2) MOLD already decided budgetary allocation to BKM for Taikabu LFS development, such as expenditure for land acquisition.
May 4, 2005	LDTA	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *BKM;* Mr. Dinesh Rajdhandari Others *ENPHO;* Mr. A. B. Gurung Mr. Molla *ERMC;* Mr. Uddab Raj Chaulagain	1) Confirmation of progress on Taikabu LFS EIA performed so far. 2) Discussion on planned support and assistance provided to BKM and ERMC for proceeding EIA study. 3) Confirmation of official procedure of EIA in Nepal. 4) Expected schedule for Taikabu EIA to be conducted by BKM/ERMC.	1) BKM and ERMC recognized to rearrange the schedule for Taikabu EIA, including amendment of their contract.
May 5, 2005	MOEST	JICA Study Team Mr. Norihiko Inoue	1) Resubmission of scoping document and TOR for EIA from BKM	1) Approval by MOEST would be

Date	Venue	Participants	Activities	Remarks
		Nepalese C/P *BKM;* Mr. Dinesh Rajdhandari Others Mr. Bhai Raja Manandhar (MOEST, EIA division)	through MOLD to MOPE. 2) Discussion on IEE/EIA requirements on SWM-related projects.	issued within a few weeks if necessary revision were confirmed in the document.
May 5, 2005	EAST	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *BKM;* Mr. Dinesh Rajdhandari Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Molla	Discussion on how to assist and support BKM and ERMC with EIA study of Taikabu LFS.	Tentative table of contents for EIA recommendation report was discussed and agreed.
June 7, 2005	BKM	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *BKM;* Mr. Badri Nath Ghimire Mr. Laxman Kisiju Mr. Dinesh Rajdhandari Mr. Moti Bhakta Shrestha	Discussion on issues of opposition from local communities around the proposed Taikabu LFS, and how to cope with the issues.	1) An idea to involve Khwopa college was discussed, for the purpose of information dissemination.
June 8, 2005	EAST	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar	1) Progress of the concept design for Taikabu LFS. 2) Discussion on two alternatives for development. 3) Discussion on major technical issues such as leachate collection system and control, liner, associated facilities (composting, resource recovery, office), buffer zone, etc.	1) Draft report for concept design would be compiled by June 25.
June 10, 2005	BKM	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Nirmal Acharya *BKM;* Mr. Badri Nath Ghimire Mr. Laxman Kisiju Mr. Dinesh Rajdhandari Mr. Moti Bhakta Shrestha Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Shresh Shrestha *Khwopa College;* Mr. Rajan Suwal (Principal) Mr. Krishna Sundar Awale	Discussion on concept design for Taikabu LFS EIA, including: 1) Site conditions on topography and soil. 2) Basic design criteria for LFS development. 3) Conceptual layout plan and estimated capacity.	1) Expansion of urbanization around the BKM city area was raised by the college as a concern which might affect the Taikabu LF development.

Date	Venue	Participants	Activities	Remarks
June 16, 2005	BKM	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *BKM;* Mr. Laxman Kisiju Mr. Dinesh Rajdhandari	Discussion on Taikabu LFS especially on a small workshop to be held by Khwopa college. Suggestion from the Team to BKM was to share the technical experiences in Sisdol LF development.	1) The JICA Study Team members would not participate to the workshop.
June 21, 2005	BKM	JICA Study Team Mr. Norihiko Inoue Others *EAST;* Mr. A. B. Gurung Mr. Ashok Turadhar Mr. Molla	Discussion on Taikabu EIA recommendation, including: 1) Progress of the survey and report preparation. 2) Schedule for sharing meeting involving BKM etc.	1) Sharing meeting would be held on June 26. Output to be shared would include brief review of concept design.
June 26, 2005	BKM	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Nirmal Acharya *BKM;* Mr. Badri Ghimire Mr. Laxman Kisiju Mr. Dinesh Rajdhandari Mr. Moti Bhakta Shrestha Mr. K. P. Suwal Mr. Revid Kuswa Ms. Ambika Dhaubnadek Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladher Mr. Molla *Khwopa College;* Ms. Yogita Hada *ERMC;* Mr. Uddab R. Chaulaguin	Presentation and discussion on EIA recommendations for Taikabu LFS including: 1) Brief introduction of concept design. 2) Necessity and purpose of EIA including legal framework 3) Introduction of baseline environment in/around LFS. 4) Examination of conceivable impacts, basic frame of EMP. 5) Recommendation for achieving social consensus toward the project.	1) Experiences of Sisdol LF development and operation would be much helpful to be involved in EIA. 2) CEO stated that i) budgetary support for surrounding VDCs was being discussed, ii) college students would be involve to EIA study, and iii) public notice would be issued to provide an opportunity to raise opinions for the public.

C-2: Training/Practice of Semi-aerobic Landfill (Sisdol Short-term LFS)

Date	Venue	Participants	Activities	Remarks
June 22, 2004	SWMRMC	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan	Discussion on contents of TOR for Sisdol Soil and Topography Surveys and DD Pilot Project	Contents were acceptable to SWMRMC
July 6, 2004	EAST	JICA Study Team Mr. Mahmoud Riad Nepalese C/P Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. P Sharma Mr. Suresh Shrestha Mr. S Gurung	Discussion on urgent technical issues related to natural attenuation system, ground water system and progress of SWMRMC	Site visit to determine surveys will be extent on July 13, 2004
July 15, 2004	Sisdol LFS	JICA Study Team: Mr. Mahmoud Riad Nepalese C/P Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. P Sharma Mr. Suresh Shrestha Mr. S Gurung	1) Bore hole locations were fixed at site. 2) Cross sections for river topography survey were determined. 3) Samples of candidate borrow areas for clay under testing at EAST lab.	Delays in administrative area need to be discussed with SWMRMC
July 19, 2004	EAST	JICA Study Team Mr. Mahmoud Riad Nepalese C/P Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. P Sharma Mr. Suresh Shrestha Mr. S Gurung	1) Discussion on document detailing design elements 2) Discussion on technical transfer components related to site visit to Pokhara and first workshop	
July 19, 2004	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Nepalese C/P Mr. Ram Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. P Sharma Mr. Suresh Shrestha Mr. S Gurung	1) Relocation of borehole position 2) check to draft topography map at the site	SWMRMC explained their works to divert the storm water from the northwest pipe to the perimeter drain outside the site
July 23, 2004	LDTA	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad	*Training for Planning of Landfill Site Selection and Semi-aerobic System* Theme 1: Semi-aerobic system	Received useful comments and lively discussions

Date	Venue	Participants	Activities	Remarks
		Mr. Norihiko Inoue Nepalese C/P Total 14 people Others *EAST;* Total 5 people *ENPHO;* Total 3 people Others; Total 4 people *(See Appendix 4.2)*	introduction Theme 2: Landfill site selection Theme 3: Future workshop program *(See Appendix 4.2)*	
July 24, 2004	Pokhara LFS and existing dumping site	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P Total 12 people Others *EAST;* Total 3 people *(See Appendix 4.3)*	*Site Visit to Pokhara (1st day)* - Site visit to Pokhara Landfill (explanation by local consultants) - Review the facilities - Q&A (site selection, operation system, EIA, etc.) *(See Appendix 4.3)*	
July 25, 2004	Pokhara Sub-Metropolitan City (PSMC)	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P Total 12 people Others *EAST;* Total 3 people *(See Appendix 4.3)*	*Site Visit to Pokhara (2nd day)* - Experiences in planning, designing and constructing of landfill, both internally and with the surrounding community. - Difference in commencing operations - Financial problems resulting from loan conditions and securing budget for O&M costs *(See Appendix 4.3)*	On the whole discussion seemed to be fruitful
July 27, 2004	Sisdol LF	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Kiran Ulak *KRM;* Mr. Bal Krishna Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. S. Rajbandhari Mr. K. C. Rupik *JICA Nepal;* Mr. Kinoshita *ENPHO;* Mr. Dipak Shrestha Other 2 members	Groundwater sampling at BH 2 not possible because hole blocked. EAST to check. EAST suggested excavating some pits to test the water flow conditions at the site and whether the observed water comes from a spring or flows between two layers of old and new geological features. This may be done on July 30.	SWMRMC offered to provide labor to assist in this task.
July 29, 2004	EAST	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan	Volume requirements estimated at 433 thousand m3 for three years. Perimeter storm water cut off system and dam strength need to be checked. Leachate treatment system may not require vert. reed bed system. Should be	

Date	Venue	Participants	Activities	Remarks
		Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. P. Sharma Mr. Suresh Shrestha Mr. S Gurung	checked under options of w/, w/o and replacement with charcoal tanks. Two options need to be considered for truck scale location. Preliminary cost estimates will be provided by mid-August.	
August 25, 2004	EAST	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha Mr. S Gurung	Discussion on the cost estimates for Sisdol Pilot Project.	Area of Phase 1 determined.
August 27, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P: *SWMRMC;* Mr. Ram Sharan Maharjan	Confirmed elements of the design with actual site conditions.	
August 31, 2004	Sisdol LF	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Suresh Shrestha JICA Advisory Committee Dr. Isamu Yokota Dr. Ayako Tanaka	Both members of the monitoring committee visited the Sisdol site and reflected on the elements of the pilot project design. Various comments were received from the Monitoring Committee members to improve the pilot project design.	Leachate collection main pipe diameter increased to 600mm and clay liner applied as necessary
September 7, 2004	EAST	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha	Finalized tender documents for construction of Sisdol PP.	
September 11, 2004	EAST	JICA Study Team Mr. Mahmoud Riad Nepalese C/P: *SWMRMC;* Mr. Ram Maharjan Others *EAST;*	Preparing long list of contractors for construction tender of Sisdol	

Date	Venue	Participants	Activities	Remarks
		Mr. A. B. Gurung Mr. Suresh Shrestha		
September 15, 2004	LDTA and Sisdol LF	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha	Tender call and visit to Sisdol site for site explanation.	Three contractors invited to submit bids.
September 19, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P: *SWMRMC;* Mr. Ram Sharan Maharjan	Site inspection concentrated on Valley 2. Purpose to consider concept for design of the following phase of the Sisdol landfill.	
September 22, 2004	LSMC	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Kiran Ulak *LSMC*; Mr. Rudra Gautam *BKM*; Mr. Laxman Kisiju *MTM;* Mr. Keshav Silwal *KMR;* Mr. Bal Krishna Maharjan	Meeting to explain the ongoing study on safe closure of landfills in Malaysia and prepared the presentation of the Nepalese delegation at the workshop to be held in Kuala Lumpur	
September 23, 2004	EAST	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha	Finalized contents of the Main Report of the detailed design.	
September 23, 2004	LDTA	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P: *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung *Bhairab;* General Contractor	Commenced negotiations with Bhairab contractor, which submitted the best tender out of three tenders.	

Date	Venue	Participants	Activities	Remarks
September 26 to October 2, 2004	Malaysia	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Kiran Ulak *LSMC*; Mr. Rudra Gautam *BKM*; Mr. Laxman Kisiju *MTM;* Mr. Keshav Silwal *KMR;* Mr. Bal Krishna Maharjan	1) Seminar on safe closure and rehabilitation of landfills 2) Workshop on landfill technology 3) Site visits to Puchong LF and Taman Beringi LF 4) Meetings with MHLG, DBKL and Alam Flora *(See Appendix 4.3)*	Visit deepened understanding of participants on sanitary landfill technology.
October 4, 2004	LDTA	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Suresh Shrestha *Bhairab;* General Contractor	Signing of contract with Bhairab Contractor for Sisdol PP. Received the draft work plan prepared by Bhairab.	
November 16, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha *Bhairab;* General Contractor	Excavated spongy area. Discussed with contractor system for drainage of the basement floor. Pump house will be designed and constructed instead of renovating existing house near pond.	Importing of clay materials suspended pending lab results on samples of clay excavated at the site
November 18, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P Mr. Ram Maharjan Others *EAST;* Mr. Suresh Shrestha *Bhairab;* General Contractor	Reviewed drainage system constructed. Decision to fill up former spongy area. Determined site borders. Plantation along road embankment proposed.	
November 18, 2004	SWMRMC	JICA Study Team Mr. Mahmoud Riad Ms. Sachiko Suwa Nepalese C/P *SWMRMC;* Mr. Surya Man Shakya Mr. Ram Sharan Maharjan	Discussed SWMRMC plan to strengthen waste dam. SWMRMC informed that they will contract for dam repair within two weeks. They propose to bolster dam with earthern layer along the upstream face. Also discussed how to proceed on design of Valley 2.	Waste disposal operation to commence from north to south to allow more time for dam improvement work

Date	Venue	Participants	Activities	Remarks
November 18, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. Suresh Shrestha *Bhairab;* General Contractor	Side trenches to be excavated at the bed at a level lower than clay liner to dry up bed area. Path to be prepared to access the leachate pond behind the waste dam with more ease. Agreement to proceed with clay liner placing in northern area of the site.	
November 22, 2004	LDTA	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha	Some design modifications discussed and decided to construct stone soling layer beneath the main leachate pipe, concrete lining of leachate pond floor, etc.	
November 30, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha *Bhairab;* General Contractor	Approved to proceed with clay liner work after visit to quarry area	
December 12, 2004	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. Suresh Shrestha *Bhairab;* General Contractor	Decision to construct a masonry perimeter wall around the leachate pond, enlarge the perforations of the branch pipes, and discussion on location of the weighbridge	
January 12, 2005	Sisdol LF	JICA Study Team Mr. Toshiyuki Ujiie Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. Suresh Shrestha *Bhairab;* General Contractor	Water seepage along northern slope not completely checked by the storm water perimeter drain. Stockpiling areas for cover materials discussed. SWMRMC outlined the schedule and works for the waste dam improvement	
January 13, 2005	LDTA	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ashok Shahi Others	SWMRMC discussed the waste dam improvement works and progress for electricity supply works. Also they explained the progress of the fence and water supply works. Bhairab explained about the	

Date	Venue	Participants	Activities	Remarks
		EAST; Mr. A. B. Gurung, Mr. A. R. Tuladhar, Mr. Suresh Shrestha *Bhairab;* General Contractor	equipments procurement progress	
January 18, 2005	SWM-RMC	JICA Study Team Mr. Mahmoud Riad Nepalese C/P: *SWMRMC;* Mr. Surya Man Shakya Other *Bhairab;* General Contractor	Discussion on proposed revisions to the waste dam improvement work design.	
February 19, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha Mr. Pankas *Bhairab;* General Contractor	SWMRMC explained difficulties in completing fence and other works. Difficulties in aerator procurement discussed.	
February 21, 2005	SWMRMC	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Surya Man Shakya Mr. Ram Sharan Maharjan	SWMRMC explained the progress on establishing the local committee for Sisdol LF and the required agreements to be prepared before starting operations were discussed.	
February 24, 2005	LDTA	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Suresh Shrestha *Bhairab;* General Contractor	Discussions with Bhairab on the issues concerning procurement and transport of weighbridge and aerators	
April 22, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan Others *EAST;* Mr. A. B. Gurung Mr. Ashok Tuladhar Mr. Suresh Shrestha *Bhairab;* General Contractor	Instruction to clear leachate pond and inspect/ confirm manhole and valve operation. Waste dam improvement works completed	
May 24, 2005	Sisdol LF	JICA Study Team Mr. Norihiko Inoue Nepalese C/P	1) Checking the damage of cables of weigh bridge, and recover it. 2) Groundwater sampling from three	1) Cables of weigh bridge were cut by somebody

Date	Venue	Participants	Activities	Remarks
		SWMRMC; Mr. Ram Sharan Maharajan *KMC;* Mr. Deepak Kansakar *LSMC;* Mr. Pradeep Amatya Ms. Sabina Maharjan Other Two staff Others *EAST;* Mr. Suresh Shrestha *ENPHO;* Mr. Dipak Shrestha Other two assistants	boreholes. 3) Site reconnaissance.	who tried to steal them. But the damage could be recovered within a few days.
May 27, 2005	KMC	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *KMC;* Mr. Indra Man Suwal Mr. Rajesh Manandhar Mr. Deepak Kansakar	Discussion on preparation for Sisdol operation.	
May 28, 2005	Sisdol LF	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue Nepalese C/P *MOLD;* Mr. Mukunda (Under Secretary) Others *EAST;* Mr. Suresh Shrestha *Bhairab;* Mr. Gopal Shrestha Mr. Dinesh Two officials from Nepal Standard Bureau	1) Calibration and test of weigh bridge in the presence of Bureau. 2) Puja (completion ceremony) of weigh bridge.	
May 29, 2005	KMC	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharajan *KMC;* Mr. Indra Man Suwal Mr. Rajesh Manandhar Mr. Deepak Kansakar *LSMC;* Mr. Pradeep Amatya	1) Scheduling for commencement of Sisdol. 2) Confirmation of roles and responsibilities of each of SWMRMC, KMC, LSMC, to go forward the Sisdol operation. 3) Arrangement for remaining site works.	The following were tentatively decided: 1) Heavy equipment for Sisdol operation should be transported by 4th June. 2) Operation should be commenced on June 5, 2005.
May 30, 2005	Sisdol LF	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharajan *KMC;*	Jointly checking the site preparation (site office, equipment, etc,)	Remaining works are accommodation utilities of site office, fencing, etc.

Date	Venue	Participants	Activities	Remarks
		Mr. Rajesh Manandhar Mr. Deepak Kansakar Three staff of KMC *LSMC;* Mr. Pradeep Amatya Two staff of LSMC Others *EAST;* Mr. Suresh Shrestha *Bhairab;* Mr. Dinesh		
May 31, 2005	Sisdol LF	JICA Study Team Mr. Shungo Soeda Nepalese C/P *KMC;* Mr. Rajesh Manandhar Mr. Deepak Kansakar Watchmen *LSMC;* Watchmen Others *EAST;* Mr. Suresh Shrestha *Bhairab;* Mr. Dinesh	1) Jointly checking the site preparation. 2) Stationing the watchmen and preparation of accommodation utilities.	
June 3, 2005	Sisdol LF	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *KMC;* Mr. Purusotam Shakya Mr. Deepak Shrestha Equipment operators and administrators Others *EAST;* Mr. Suresh Shrestha *Bhairab;* Mr. Dinesh	Transportation of dozer (KMC) and JCB excavator (LSMC) to Sisdol	
June 5, 2005	Sisdol LF	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue Ms. Toshiko Shimada Ms. Minako Nakatani Ms. Sachiko Suwa Nepalese C/P Most of TWG members Others *EAST, Bhairab, OSLSMCC members, local people*	1) Ceremony for launching Sisdol LF. 2) 15 trucks/compactors of KMC and LSMC from Teku for 1st disposal at Sisdol. 3) Hundreds of local people came to meet the trucks at the site.	
June 9, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *SWMRMC;*	1) Instruction for weigh bridge operation from EAST and Bhairab to SWMRMC. 2) Environmental monitoring, 1st sampling as “after operation”.	

Date	Venue	Participants	Activities	Remarks
		Mr. Ram Sharan Maharajan *KMC;* Mr. Deepak Kansakar One staff of administrator Others *ENPHO;* Mr. Dipak Shreshta *EAST;* Mr. Suresh Shreshta *Bhairab;* Mr. Dinesh		
June 12, 2005	LDTA	JICA Study Team Mr. Mahmoud Riad Mr. Shungo Soeda Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Surya Man Shakya Mr. Ram Sharan Maharajan *KMC;* Mr. Rajesh Manandhar *LSMC;* Mr. Pradeep Amatya Others *OSLSMCC;* Total 2 members	*Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (No.1)* - Discussion on operation progress, manpower and equipment conditions, issues and resolutions *(See Appendix 4.2)*	
June 13, 2005	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Deepak Kansakar	- Operation - Generator problems	
June 15, 2005	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Waste placing operation smooth - Some minor dozer repairs - Generator problem continuing	
June 16, 2005	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Mr. Norihiko Inoue Nepalese C/P *KMC;* Mr. Deepak Kansakar Others *Bhairab;* Mr. Dinesh	1) Test of pumping machine and aerator. 2) Check of the record of in-coming/out-going trucks.	1) Departure of transfer trucks from Teku was delayed due to the drivers' anxiety about the local security.
June 17, 2005	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Trucks accessing waste platform area.	
June 19, 2005	KMC	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue	*Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (No.2)* - Discussion on operation progress,	

Date	Venue	Participants	Activities	Remarks
		Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Indra Man Suwal Mr. Rajesh Manandhar *LSMC;* Mr. Pradeep Amatya Others *OSLSMCC;* Total 2 members	manpower and equipment conditions, issues and resolutions *(See Appendix 4.2)*	
June 21, 2005	Sisdol LFS	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Generator being repaired	
June 22, 2005	SWM-RMC	JICA Study Team Mr. Norihiko Inoue Nepalese C/P *SWMRMC;* Mr. Surya Man Shakya Mr. Ashok Shahi	- Discussion on nominating members of Environmental Coordination Committee (ECC) for Sisdol operation.	
June 23, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Manhole valve maintenance in progress	
June 24, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Last night's rains generated slides - Weighbridge operated - Manhole valve maintenance in progress	
June 25, 205	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Generator problem	
June 26, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *KMC;* Mr. Deepak Kansakar	- Operation - Dozer problem	
June 26, 2005	KMC	JICA Study Team Mr. Shungo Soeda Mr. Norihiko Inoue Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Indra Man Suwal Mr. Rajesh Manandhar *LSMC;* Mr. Pradeep Amatya	*Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (No.3)* - Discussion on operation progress, manpower and equipment conditions, issues and resolutions *(See Appendix 4.2)*	

Date	Venue	Participants	Activities	Remarks
		Others *OSLSMCC;* Total 4 members		
June 30, 2005	Sisdol LF	JICA Study Team Mr. Mahmoud Riad Nepalese C/P *SWMRMC;* Mr. Ram Sharan Maharjan *KMC;* Mr. Deepak Kansakar	- Operation - Discussion on work progress and waste placing plan	

APPENDIX 4.2

Records of Workshop/ Training under the Pilot Project C

APPENDIX 4.2 RECORDS OF WORKSHOP/ TRAINING UNDER THE PILOT PROJECT C

Subject:	**Training for Planning of Landfill Site Selection and Semi-aerobic System (1)**	
Date:	July 23, 2004	
Time:	10:00 - 16:00	
Venue:	Local Development Training Academy Meeting Room	
Participants:	SWMRMC	Mr. Surya Man Shakya, General Manager
		Mr. Ram Sharan Maharjan, Civil Engineer
		Mr. Nirmal Darshan Acharya, Civil Engineer
		Mr. Yogesh Shakya, Assistant
	KMC	Mr. Rajesh Manandhar, Chief, SWM Section
		Mr. Kiran Ulak, Engineer, SWM Section
		Mr. Purusotam Shakya, Chief, Mechanical Section
		Mr. Birendra Malla, Junior Engineer
	LSMC	Mr. Rudra Pd. Gautam, Chief, Planning Section
		Mr. Ram Ratna Shah, Junior Engineer
	BKM	Mr. Laxman Kisiju, Chief, Planning and Technical Section
	MTM	Mr. Satya Narayan Shah, Chief, Planning and Technical Section
		Mr. Surendra Shrestha, Junior Engineer, Planning and Technical Section
	KRM	Mr. Anuj Pradhan, Assistant, Planning and Technical Section
	JICA Study Team	Mr. Toshiyuki Ujiie
		Mr. Mahmoud Riad
		Mr. Shungo Soeda
		Mr. Norihiko Inoue
	East Consult	Mr. Prakash Chandra Joshi, Founder Director
		Mr. Ashok Ratna Tuladhar, Consultant Engineer
		Mr. Suresh Shrestha, Sanitary Engineer
		Mr. Somraj Gurung, Environmental Engineer
		Mr. Prabal Giri, Administrator
	ENPHO	Mr. Roshan Raj Shrestha, Waste Water Expert
		Mr. Dipak Shrestha, Environmental Scientist
		Mr. Basu Dev Kharel, Hydrologeologist
	DMG	Mr. Basu Dev Kharel, Hydrologeologist
	Saitama Package D	Dr. Mahesh Gautam, Director
	Saitama University	Mr. Dinesh Chandra Devkota, Researcher
	(Free)	Mr. Shashi Rajbhandari

1. Agenda

	Time	Program	Facilitator
1	**10:00 – 12:00**	**Theme 1 – Semi-aerobic System Introduction**	
	10:00 – 10:30	(1) Landfill Systems	Mr. Riad
	10:30 – 11:00	(2) Environmental aspects	Mr. Inoue
	11:00 – 11:30	(3) Sisdol PP as Semi-aerobic system	EAST Consult
	11:30 – 12:00	Discussion	
2	**13:00 – 15:00**	**Theme 2 – Landfill Site Selection**	

	Time	Program	Facilitator
	13:00 – 13:30	(1) Long Term LF Site Selection Process	Mr. Riad
	13:30 – 14:00	(2) Environmental/ Social considerations	Mr. Inoue
	14:00 – 14:30	(3) Draft SWM EIA Guidelines prepared for Nepal	SWMRMC
	14:30 – 15:00	Discussion	
3	**15:00 – 16:00**	**Theme 3 – Future Workshops Program**	
	15:00 – 15:20	(1) Draft Program	Mr. Riad
	15:30 – 16:00	Discussion	

2. Record of the Training

A. Contents of LF PP WS 1

Three themes were covered in the work shop as follows:

Theme 1 – Semi-aerobic System Introduction

1) Landfill Systems
2) Environmental Aspects (related with Sisdol LF)
3) Sisdol PP as Semi-aerobic system

Theme 2 – Landfill Site Selection

1) KV Long Term LF Site Selection Process
2) Environmental/ Social Aspects (related with SWM facility site selection)
3) Draft SWM EIA Guidelines prepared for Nepal

Theme 3 – Future Workshops Program

The work shop proceedings were conducted by giving a lecture on each of the topics described above followed by questionnaire and answers.

A summary of the discussions is given in Part B hereafter.

B. Memo of Presentation and Discussions

(1) "Landfill System" by M. Riad

Mr. Riad started his presentation with warm welcome to all the participants. He mainly focused on the mechanism of semi-aerobic landfill system with respect to Anaerobic and Aerobic system. He described the hierarchical chart of landfill function as to reduce, re-use, recover, to treat and disposal with greater affinity for reduction to disposal as the lower one. Our Kathmandu valley is still far away from zero waste and therefore the need for landfill remains. He gave the trend development of MSW Landfill system in US and Europe. In Denmark and Netherlands, more than 80% of the MSW is recycled, composted and incinerated (Source: Environment Agency, Municipal Waste incineration, July 2002). The moisture content of MSW in Nepal is very high so the incineration cost becomes very high.

Talking of regulatory background in Japan, the guideline for Semi-Aerobic system came in 1979. In 1998, Composite liner systems have come as amendment of Technical standard for LF.

The BOD degradation rate in anaerobic system is very slow with respect to Aerobic and Semi-aerobic systems. The Anaerobic system is time consuming but its methane gas production is very good (80%) with respect to semi-aerobic (50%) and aerobic (40%) systems, which can be used as fuel. However this requires provision of facilities for

harnessing the energy potential of methane and high costs may be involved. In Japan and Europe the Semi-aerobic system is favorable but in the case of USA, new technology called bioreactor landfill system is under research in which liquid and air is added to the waste to enhance the microbial activity. At last, he suggested that as the organic content of MSW in the Kathmandu valley is very high (about 70%), the semi-aerobic system of LF might become feasible.

(2) "Environmental Aspects on Landfill System" by Norihiko Inoue

Mr. Inoue talked about the EIA study for Sisdol LF from the Physical, Natural and Social Environment parameters. Between the two options for liner; the geo-membrane and clay liner, he suggested clay liner as the best for the Sisdol LF. For the leachate quality analysis, the leachate sampling from the Gokarna LFS is shown as one of the example. He suggested various Environmental monitoring parameters and their frequencies for the Sisdol landfill PP. One Environmental Monitoring Committee should be organized to confirm effectiveness of environmental countermeasures, to share understandings and information between stakeholders. At last, he presented one legal IEE/ EIA requirement in Nepal on SWM sector for various project types and activities with the EIA law of Japan, which may be very helpful for the Nepalese context.

(3) "Sisdol PP as Semi-aerobic system", by A.R. Tuladhar

Mr. Riad introduced the Sisdol semi-aerobic pilot project to be implemented by the Study.

Mr. A.R. Tuladhar then gave a brief description of the project area; landfill period, type of landfill and the type of waste to be treated by the landfill site. He mainly discussed the concept design of the semi-aerobic system in Sisdol LF, which is new technology for Nepal. In the context of Nepal, he stressed the landfill project should be scientific, technically simple, and cost-effective. For the system, he used the leachate quality parameters from the Gokarna LF. From Gokarna LF experience, the reduction of BOD and COD is quite normal but the reduction of ammonia-nitrogen is very low. He further recommended consideration of installation of a Vertical Reed Bed (VRB) facility in the system for additional leachate pre-treatment. VRB not only reduces ammonia-nitrogen but it also helps to reduce BOD and COD as well. The need for this VRB will be studied in the detailed design. The consultant has previous landfill design experience from the Pokhara Environment Improvement Project (PEIP). The aim of the design is to reduce the effluent quality to 30 mg/l BOD, 250 mg/l COD and 50 mg/l NH4-N by this semi-aerobic system.

Q. The concentration of BOD and COD according to Gokarna Landfill Site (A.R. Tuladhar) is 3500mg/l and 45000mg/l respectively. The concentration of BOD seems very low with respect to COD value. For the biological degradation of organic matter, the ratio of BOD/COD is also one of the parameters to be noted. Is this much BOD sufficient for biological degradation?

A. It is difficult to determine the accuracy of the figures shown for Gokarna leachate because such information as sampling dates and locations and testing methods are not clear. Discussion was held on how to unify the sampling and testing methods and make the values public especially since different international agencies and Nepalese concerns are involved. The Study is taking its own samples and analysis of leachate at Bagmati dump

site and based on those results the detailed design and monitoring of the PP will be implemented. The figures shown today on Gokarna were just for reference.

Q. Due to the high value of ammonia nitrogen (800mg/l, A.R. Tuladhar) in leachate, there is a possibility of formation of nitrate in the presence of oxygen. Dr. Roshan (ENPHO) had warned of excess amount of nitrate not to be directly disposed into the river. For this option, he recommended one unit for the de-nitrification for ammonia-nitrogen.

A. A.R. Tuladhar had shown the ammonia-nitrogen concentration at the effluent to be 30 mg/l, which is safe. Inclusion of Vertical Reed Bed (VRB) which may be helpful in reduction of ammonia-nitrogen shall also be considered. It is not proposed to develop a sophisticated leachate treatment system at Sisdol PP because the associated O&M costs may be very high. The nature of the pilot project is to provide additional data which can help us to evaluate whether the semi-aerobic system is sufficient for our purpose or what we need to add to that system.

Q. In LRP should EC (Electrical Conductivity) be checked or not?

A. Testing for the EC parameter is included in our environmental monitoring program. We will consider this result also in our design.

Q. One of the slides presented showed that the appropriate technology to adopt for landfill in Nepal should be cost-effective. Does this apply to Sisdol LFS when we consider the short operation period, high transport costs and costs for facilities required to operate the site as a semi-aerobic landfill?

A. This remark is very accurate if we are selecting the Sisdol LFS at this time and there are other alternatives. However the pilot project content for Sisdol does not address the site selection of Sisdol, but rather the introduction of the semi-aerobic system in this already selected site. In the selection of the long term site, as shall be discussed in the following presentation, the cost effectiveness of the candidate sites should be closely studied.

Q. Is there consensus to proceed with the proposed pilot project, introducing the semi-aerobic landfill system in Sisdol?

A. Participants agreed that the semi-aerobic system seems promising and the pilot project will be a good way to confirm this.

(4) "Kathmandu Valley Long Term LF Site Selection Process", by M. Riad

Mr. Riad introduced the umbrella concept for the five municipalities in the Kathmandu Valley. It is proposed that the cities share certain SWM facilities in order to ease solving the technical, environmental, land area, and financial aspects that may result. Accordingly he suggested that in the future two landfills be required for the Valley. A view of the 1998 DMG Study then followed. Site selection criteria for the Landfill site were shown in the presentation. Tentative Landfill development schedule for Pharsidol area LF, Taikabu LF and the study process for second landfill were also presented.

Q. As there is agreement on the need to develop two landfills for the valley in the future, which agency should take the lead in identifying sites and site selection studies implementation?

A. Although the two major cities of KMC and LSMC will be the major beneficiaries, it is proposed that the umbrella concept be adopted and that the Central Government, represented by MOLD or SWMRMC takes the major lead in the selection process.

Q. The EIA for Taikabu LF project is now in progress. It is noted that there is no concept design for that site so far. How will this affect the EIA progress and resulting study?

A. The EIA study for Sisdol provides a good example. Because of the lack of a clear concept design the resulting EIA study recommendations was more general than specific and too strict to be practically followed. As a result the detailed design prepared by the SWMRMC deviated somewhat from the EIA report recommendations. And then the actual construction at the site further deviated from both the EIA report and the design. Such a situation should be avoided for Taikabu by setting a concept design for the future landfill site there to be clearly understood by all stakeholders.

(5) "Soil Investigation of Kathmandu valley in 1998", by Basu Dev Kharel

Mr. B. Kharel shared some experiences while doing soil investigations in the Kathmandu valley in 1998 with GTZ. It was a part of presentation to give some hints of what the soil conditions were and how the study was carried out.

Q. Is the testing to a depth of 2m in clay soils sufficient for the dumping site?

A. Actually a thickness of about 5m of clay with low permeability is expected to have very good barrier potential. Clay that has organic material is good for the dumping site soil. In the discussion about good landfill sites in the valley, Panga, Satungal, Bode were found to be have high potential within the Kathmandu valley from the geological map prepared by the 1998 Study. Unfortunately, Gokarna was chosen as landfill site without any soil investigation. It should also be noted that the soil condition is obviously not the only factor that determines the site selection. Landfills located at areas with permeable soils are provided with artificial liner systems. However in the case of Nepal it may be too expensive to construct and maintain elaborate artificial liner systems and therefore wherever possible sites with low permeability soils should be given priority.

Q. What is the type of soil in Sisdol? Is there is soil investigation in Sisdol?

A. The complete soil investigation is presently under way. Preliminary results at holes drilled near the river show that the soil is sandy gravel with thin clay layers and has a high permeability. It is expected that a liner is necessary to be constructed to protect the groundwater and prevent seepage of the leachate downwards. A compacted clay liner (60cm thickness) is proposed for the pilot project. Possible sources for clay nearby the site have been identified. Clay samples from these sources are now being tested at the laboratory.

Q. There are some maps, which show a fault line in the Okharpauwa area, does it affect the Sisdol LF?

A. For the long term proposed site a detailed geological study needs to be conducted and there is fear that an earthquake there may do damage to the facilities constructed in the presence of a fault line. In the case of Sisdol the facilities are not sophisticated and the site will be operated for only 3 years so this danger is not considered here.

(6) "Introduction of experiences in Japan for site selection on SWM", by N. Inoue

Past experience for selection of sites for SWM facilities from YOKOSUKA City and KOMAE City in Japan were introduced by Mr. Inoue. He explained the site selection criteria which involved public participation. In three steps involving negative screening, positive screening and detail screening among the 17 sites listed up in YOKOSUKA city only 3 sites were selected as the best candidate sites. Among these three sites the best one was chosen by Two way application of AHP method.

In KOMAE city for the recycling center for bottles and cans, the site initially chosen was cancelled due to local people's opposition. But after screening using several selection criteria, the initially discarded site was again selected as the final best site. There are various approaches and tools for consensus building among people concerned.

Q. How applicable is the Japanese experience to the Nepalese context?

A. The importance of involving the effected public in the selection process in Nepal as well was also stressed. There was agreement that the benefits provided to communities hosting SWM facilities should not be on a one time basis, such as building a road or hospital, but should be stretched over the operation and post-closure maintenance of the facility in question. The community should continue to enjoy some benefit for accepting the facility construction.

Q. Is it possible to consider setting aside a portion of the tipping fees at the landfill for the community development?

A. This is an important point and should be studied. However it is necessary to study within the larger context of the charge and fee setting system that may be introduced in the future for the overall SWM system.

Q. The slides presented indicate that "Legal jurisdiction" is an important site selection criterion in Japan. In Nepal we observe one city considering construction of a SWM facility within the borders of an adjacent VDC, without any evidence of previous discussions with the concerned VDC. In Nepal therefore is this criterion rather un-important?

A. In Nepal, although in the planning phase there may be insufficient discussions between the benefiting city and potential host VDC, at the time of actual construction the VDC in question may object strongly causing the project to be suspended. Therefore this criterion should also be carefully studied here.

(7) "Draft SWM EIA Guidelines prepared for Nepal", by N.D. Acharya

There are the Solid Waste Management & Resource Mobilization Act, 1987 and Environment Protect Act 1997. Also various EIA guidelines are available for other sectors such as Hydropower, Water Supply, and Forestry, etc. But unfortunately we don't have any IEE/ EIA guidelines for Solid Waste Management in Nepal. Mr. N.D. Acharya, SWMRMC presented the draft report of EIA Guidelines relating to SWM under preparation by the center.

Q. What is the role of MOPE in preparing these Guidelines? And has the draft already prepared been distributed to the concerned Government agencies for review and comments?

A. The Guidelines are being prepared within SWMRMC and MOPE does not have a copy. A seminar will be held within a month and the concerned agencies, including MOPE will be invited to submit their comments. It is recognized that prior to the seminar the invited agencies should have an opportunity to review the guidelines contents. The SWMRMC will endeavor to make the draft report available for them.

Q. The presented Guidelines basically cover the responsibilities of the municipalities. More consideration is required on the responsibilities of the other government agencies as well as the private sector.

A. SWMRMC considered that a good point and decided to provide the required further information related to central government agencies and private sector responsibilities.

3. Distributed/ Used Materials:

1. Presentation Material from the JICA Study Team
- Semi-aerobic System/Sanitary landfill
- Environmental Aspects on Landfill System
- Introduction of Experiences in Japan for Site Selection on SWM

Subject: **Training for Planning of Landfill Site Selection and Semi-aerobic System (2)**
Date: September 13, 2004
Time: 10:00 - 13:45
Venue: Local Development Training Academy Meeting Room

SWMRMC	Mr. Surya Man Shakya, General Manager
	Mr. Ram Sharan Maharjan, Civil Engineer
	Mr. Nirmal Darshan Acharya, Civil Engineer
KMC	Mr. Rajesh Manandhar, Chief, SWM Section
	Mr. Kiran Ulak, Engineer, SWM Section
	Mr. Prasanna Pradhan
LSMC	Mr. Rudra Pd. Gautam, Chief, Planning Section
	Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
BKM	Mr. Laxman Kisiju, Chief, Planning and Technical Section
	Mr. Dinesh Rajbhandari, Sanitation Engineer, Planning and Technical Section
KRM	Mr. Bal Krishna Maharjan, Chief, Planning and Technical Section
	Mr. Gyan Bazra Maharjan, Assistant, SWM/ Accounting
JICA Study Team	Mr. Toshiyuki Ujiie
	Mr. Mahmoud Riad
	Mr. Vikram Basyal
MOPE	Mr. V. Janwali, J. S.
	Mr. M. P. Khanal, V. S.
CEDS/ TU	Mr. Suman Man Shrestha, Lecturer
CEMAT Consultant	Mr. B. M. Shakya, Project Manager
	Mr. Sarad Shrestha, Engineer
	Mr. Niranjan Poudel, Structural Engineer
East Consult	Mr. A. B. Gurung, Director
	Mr. Ashok Ratna Tuladhar, Consultant Engineer
	Mr. Somraj Gurung, Environmental Engineer
	Mr. Suresh Shrestha, Engineer
ESCA Consult	Mr. Sushil Rajbhandari, Managing Director
	Mr. Lokendra Raj K. C., Geotech Engineer
ENPHO	Mr. Dipak Shrestha, Environmental Scientist, ENPHO
IRDS	Ms. Pramila Subedi, Hydrogeologist
Saitama Package-D	Mr. Mahesh R. Gautam, Civil & Environmental Engineer
Saitama University	Mr. Dinesh Chandra Devkota, Environmental Engineer

1. Agenda

Time	Program	Facilitator
10:00 - 10:10	Opening remarks	
10:10 – 10:20	Outline of Sisdol LF PP Package 1	Mr. Riad
10:20 – 10:35	Video showing Semi-aerobic system	
10:40 – 11:00	Explanation of Design Concept for Sisdol LF and Detailed Design for Phase I	Mr. Ram Sharan Maharjan, SWMRMC
11:00 – 11:40	Detailed design review	Mr. AR Tuladhar, EAST
11:40 – 12:00	Considerations on Operational Aspects	Mr. Kiran Ulak, KMC
12:00 – 12:15	Result of baseline survey at Sisdol landfill site	Mr. Deepak, ENPHO
12:15 – 12:45	Discussions	

2. Record of the Training

A. Contents of LF PP WS 1

Three main themes were covered in the work shop as follows:

1) Outline of Sisdol LF PP Package 1
2) Video showing Semi-aerobic system produced by Fukuoka University
3) Introduction and Design Concept
4) Detailed design review
5) Considerations on Operational Aspects
6) Result of environmental baseline survey at Sisdol LF

The work shop proceedings were conducted by giving a lecture on each of the topics described above. After the lectures a discussion session was held.

A summary of the discussions is given in Part B hereafter.

B. Memo of Presentation and Discussions

(1) Opening Remarks by Mr. Surya Man Shakya, GM, SWMRMC

Mr. Shakya explained that preparatory works for both Sisdol Semi-aerobic Landfill Site and Teku Transfer Station improvement have been in progress for a long time now. There was not much more time so he requested the members to provide any comments that they might have at this time. A long term solution is also urgently required, he reminded the participants. Many times the issue of waste had been raised but always there was a failure to solve it. It is a burning issue. He stressed that before being Consultants, the participating members from consulting firms were citizens of Nepal, so it was their responsibility to work honestly before thinking about financial gains. Nepal was also receiving much support from JICA. He emphasized that the participants should be serious and work towards concluding the project successfully. Now it was the stage of do or die. Consultants will receive support from everywhere, so Mr. Shakya asked them to make their best efforts. Finally he wished the participants all the best.

(2) Outline of the Pilot Project

At the start Mr. Riad expressed the team's sympathy for the difficult periods that Nepal had been through at the start of September and which lead to the postponement of the work shop to this date. Unfortunately Dr. Yokota and Dr. Tanaka, respectively the Chairman of the Monitoring Mission and member of the same mission arrived here at the postponed date to give lectures and participate in the workshop, but they could not remain in Nepal to this day.

However at the start of the session, the video brought by Dr. Tanaka was shown to the participants. As the video showed, the semi-aerobic system for landfill has been successfully adopted in Japan and also implemented in developing countries of Malaysia and Iran, with reportedly good results.

Mr. Riad briefly outlined the pilot project to date. The concept, planning and design stages have been completed, and we were now entering the construction phase. Two more workshops would be held to coincide with the construction and operation phases of the project.

(3) Introduction and Design Concept

Mr. Ram Sharan Maharjan of SWMRMC outlined the various steps and processes taken so far at Sisdol LFS by the Nepalese Government. He explained about the works completed to date, land acquisition and ongoing implementation by the center.

Mr. Ram Sharan provided the concept, based on which the detailed design has been prepared. His explanation covered both the facilities construction plan as well as a brief overview of the operational requirements under the semi-aerobic system.

Mr. Ram Sharan also explained the results of the natural conditions surveys on soil and topography at the site, as surveyed by EAST Consult.

(4) Detailed Design Explanation

Mr. Ashok Ratna Tuladhar, a free lance consultant and presently engaged by EAST Consult as team leader for the Sisdol design team explained the detailed design for the site.

Firstly he detailed the site topography and soil features. The site has two distinct valleys, 1 in the north-south direction and 2 in the northwest to southeast direction. Valley 1 was the target of this detailed design. Mr. Tuladhar outlined two alternatives, either of which could be adopted to develop the site; Alt. 1 called for site development in three phases. Under Phase 1 Valley 1 would be developed up to a height of around 8m; Phase 2 would call for disposal of waste in Valley 2 to the same height and Phase 3 would then be implemented over the entire Valleys 1 and 2 areas.

Alt. 2, on the other hand considers development of the site in two phases. Phase 1 would be completed in Valley 1 to an average height of 24m. After that Phase 2 would be started in Valley 2 and completed up to the same level of Phase 1. Adoption of Alt. 2 would require construction of a temporary section dam between both valleys. However Alt. 2 would allow the closure of capping of Valley 1 before proceeding to Valley 2 thereby decreasing amount of generated leachate and hastening waste stabilization in Valley 1 area.

Mr. Tuladhar provided a comparative analysis between the soil conditions at the Pokhara LFS and at Sisdol. In the case of Pokhara LF, the low ground water table and gravelly sand layer to an extended depth warranted the laying of a geo-membrane liner without the need for a groundwater drainage system. In the case of Sisdol, he explained that the existence of clay layer and bedrock and the relatively high groundwater table warrants the construction of a natural liner.

Concerning the designed facilities Mr. Tuladhar explained their details and functions. These facilities included the compacted clay liner (CCL), leachate collection system, gas venting system, leachate retention pond, re-circulation system, aeration system, on-site service road, etc.

Concerning the CCL, as underlying layers of clay and bedrock have been identified upstream the site (BH 3 investigation result) the CCL shall be laid on an area of about 2/3rds of the site starting from the waste dam and moving upstream.

For leachate collection pipes, diameters of 600mm (main) and 250mm (branch) have been selected to satisfy the dual functions of draining out maximum leachate amount estimated as well as letting air pass through the pipes. The collected leachate shall be drained into the retention pond and re-circulated back to the waste area. These will allow for the treatment

of the leachate both aerobically at the pond and under anaerobic conditions within the waste area. Vertical gas vents will also be installed and together with the leachate collection pipes, form the system for conveyance of air into the waste disposal area; i.e. the semi-aerobic system.

(5) Operational Aspects

Although this workshop is dedicated to design aspects, and a separate workshop will be held for the operational aspects later on, Mr. Kiran Ulak of KMC gave a brief introduction of some operational conditions that need to be considered.

Mr. Kiran first briefly explained the current dumping practices at Bagmati dumping site and the pollution being caused to this holy river. He emphasized the need for KMC to be capable to run the whole landfill system and that would require many improvements. He also said that waste minimization must be achieved together with proper landfill. And finally he stressed the importance of application of waste cover.

(6) Environmental Monitoring at Sisdol Landfill Site

Mr. Deepak from ENPHO explained the results of the water samples taken from groundwater and surface water at Sisdol, the leachate taken from Balkhu and samples taken upstream and downstream the present dumping site.

Concerning BH2 groundwater samples results; Mr. Deepak explained that contamination of that water may be due to urinating by children into the borehole. He mentioned that care should be taken to protect the borehole from such menaces. He also mentioned the possibility that oily substances may be entering the Kolpu river from a tributary downstream the site.

Discussions

After the completion of the presentations the participants were invited to make their comments or pose their questions.

Q. MOPE representative commented that the Sisdol EIA report had been conditionally approved. Final approval hinged on two issues that need to be clarified by MOLD band incorporated in the EIA. The first was an evaluation of the different composting systems, and the second called for enhancement of post closure countermeasures.

A. Representative of SWMRMC explained that they had prepared all the necessary documents and were requesting a meeting with MOPE to clarify these two issues.

Q. LSMC representative asked why there was no provision for groundwater drainage in the design.

A. Mr. AR Tuladhar replied that the soil investigation showed that the groundwater level was not high and that no spring water was detected. Therefore it was considered unnecessary to include this costly item.

Q. MTM representative asked about what countermeasures are provided in the design to prevent the blocking of the collection pipes. He also inquired if flushing was possible.

A. AR Tuladhar replied that the collection pipes would be surrounded by gravel materials which will act as a filter to prevent entry of foreign materials into the pipe or block the perforations.

Q. There was more than one comment questioning the sufficiency of the soil investigation done in this Study.

A. The soil mechanics expert of EAST explained that the soil layers were estimated based on the four boreholes and four pit holes implemented in the soil investigation. More soil exploration would have assisted to determine the extent of bedrock and confirm its existence just upstream and downstream the waste dam. Mr. Riad explained that according to the estimate, in theory it is possible to depend on the low impermeability silt and bedrock layers. However these layers are confirmed upstream the site (based on results of BH3 and 4 pit holes) and therefore a clay liner has been included in the pilot project to be laid over 2/3rds of the area from the waste dam and stretching northwards. For the purpose of the Phase 1 detailed design the soil investigation is considered sufficient. However the Nepalese side is advised to make a further soil investigation for Valley 2.

Q. How were the fears of landslide both inside the site and along the access road leading to the site?

A. Concerning the access road, during the rainy season landslides occurred in three major locations and these sections of the road are presently under repair by the SWMRMC. Some damage due to landslide within the site, along the western border is also observed. The SWMRMC is repairing this damage and enforcing the slope protection.

Q. The design does not propose countermeasures or actions necessary during emergencies.

A. An operation plan shall be prepared for Sisdol LF. This plan shall include a section on emergencies and countermeasures required. This may be discussed in detail in the workshop on operation.

General comments:

General recommendations were made by the participants as follows:

- Boreholes for monitoring purposes should be properly locked to protect against damage due to children urinating in them or throwing stones inside them.
- It is advisable when designing the landfill to conduct a comprehensive soil investigation.

3. Distributed/ Used Materials:

1. Presentation Material of Environmental Monitoring on Sisdol Landfill Site

Subject:	**Sisdol Landfill Operation Plan Preparatory Meeting**	
Date:	January 19, 2005	
Time:	14:30 – 17:00	
Venue:	Local Development Training Academy Meeting Room	
Participants:	SWMRMC	Mr. Ram Sharan Maharjan, Civil Engineer
	KMC	Mr. Kiran Ulak, Engineer, SWM Section
		Mr. Birendra Malla
	LSMC	Mr. Rudra Pd. Gautam, Chief, Public Works Division
		Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
		Mr. Birendra Malla, Junior Engineer
	JICA Study Team	Mr. Toshiyuki Ujiie
		Mr. Mahmoud Riad
		Mr. Vikram Bashya
	East Consult	Mr. Ashok Ratna Tuladhar, Consultant Engineer
		Mr. Suresh Shrestha, Sanitary Engineer

1 Discussion items for the meeting

The attached memo was distributed to the participants.

The meeting was held to reach common understanding on the operation plan to be prepared for Sisdol LF Pilot Project.

The main items covered in the meeting were:

(1) Necessity of the Operation Plan
(2) Contents of the Operation Plan
(3) Specific Issues related to the Sisdol LF Operation
(4) Forthcoming schedule

2. Discussions on operation plan necessity and its contents

(1) It was agreed that it is necessary to prepare the operation plan

(2) The contents of the Operation Plan as shown in the attached memo were agreed upon. Concerning the security issue it would be dealt within a separate item and not as a sub-item.

(3) The Operation Plan should clearly identify the responsibilities of each of the parties involved. It was also proposed (by KMC) to have a working committee set-up on the engineer level to coordinate the site activities and visit the site 1-2 weekly to observe the operating conditions. This committee should have the power to make swift decisions in order to avoid any unnecessary delays or interruptions to the site operation.

(4) Cost sharing can be on the ton basis. However this has yet to be worked out. Issues such as should Kirtipur contribute to the cost, how to deal with the cost incurred from disposal of surrounding VDC's wastes, and how to incorporate any revenue that may be obtained from private sector bringing their wastes to the site need to be discussed further.

(5) In view of the above, the Operation Manual may not be able to spell out the cost sharing system but it would list up the expected costs and revenue and then further discussion may be held to finalize the cost sharing.

(6) It was also suggested to estimate the unit cost for disposal so that a tariff may be decided in case of disposal of private sector waste at the site.

(7) Both KMC and LSMC should assign permanent staff to the Sisdol site. SWMRMC should assign a coordinating member to be involved in the working committee and visit the site at a regular basis. KRM need not assign a staff to the site.

(8) Staffing and job description will be addressed in the Operation Plan. A public relations staff should be assigned to the site on a permanent basis. It is better if he is not a person from the surrounding community but he should be from outside (in order not to be compromised). He need not have a technical background but should understand the technical issues.

(9) Concerning public interaction with surrounding community, SWMRMC should continue to play the major role in social infrastructure development. A system for visiting the site and explanatory visits should be prepared but the visiting hours (days) need to be defined. Visits at any time by the public would not be acceptable. Brochures (1-2 pages) may be prepared explaining the site and showing the agencies involved in operation and the beneficiaries.

(10) Operating conditions of the site were discussed for inclusion in the operation manual. Working hours should be from 08:00 to 16:00, with the final waste delivery accepted at the site at 15:00. Reasons for this are difficulty in working in the dark and danger of the road at night.

(11) Operating conditions will also describe type of waste to be accepted at the site which is Municipal Waste. Already SWMRMC have promised the surrounding community that only municipal waste will be accepted. Concerning dead animal bodies, KMC informed that they have agreed with a private contractor to dispose of such waste so there should not be a problem. However it is unavoidable that some dead animal remains may be included in the incoming waste without the knowledge of the municipal collection operator. As for infectious medical wastes and hazardous wastes these also would not be accepted. KMC requested that the Operating Manual consider how to deal with extreme cases when such wastes do arrive. Scavenging activities would not be permitted at the site.

(12) KMC said that signboards should be erected to explain the operating conditions. The site should also be fenced in to ensure controlled access.

(13) Concerning emergencies, it was proposed to consider ambulatory service for injured workers.

(14) Small repairs and maintenance for heavy equipments may be required at the site. A mechanic should also be stationed there. Some equipment would be required as well.

(15) Spraying of EM should be included in the manual (frequencies, etc.) in order to combat the odor.

(16) KMC raised the issue of how to provide evidence in case of works done at the site during operation such as repair of site service road. The materials used in such works are eventually buried in the waste and therefore there would be no evidence of the works done. It is not clear how we can put such a comment in the manual, but the manual may cover the types of works that would be required in the course of operations

3. Discussions on Specific Issues related to Sisdol site

(1) Some discussion was held on defining the major responsibilities and agencies involved and the table presented in attachment was filled up as follows;

Major Activity	MOLD (SWMRMC)	KMC	LSMC	KRM	Working Committee
1. Operation Plan	△	◎	○		◎
2. Daily site operation		◎	○		
3. Budget allocation					◎
4. Heavy equipment procurement		◎			◎
5. Staff allocated to site	○	◎	◎		
6. Local community coordination	◎	◎	◎		◎
7. Environmental Coordination Committee	◎	◎	◎	◎	◎
8. Local development plans	◎	○	○		
9. Post Closure O & M	◎	◎	◎		

Notes:
(1) Deciding responsibility and process for 3. Budget Allocation could not be clearly decided at this meeting. Further consideration is necessary
(2) Same comment as above applied to 4. Heavy Equip.
(3) As land belongs to MOLD (SWMRMC) they should be involved in 9. Post Closure

(2) It was agreed to proceed with the waste disposal from upstream to downstream taking into consideration the site natural conditions.

(3) Waste disposal by reverse movement of the trucks would be done as proposed. A waste platform would be gradually built up to a height of around 2.0. From that platform onwards waste trucks would access the remaining areas of the site.

(4) At the start there would be no need to bring the compactor to the site, relying on the wheel loader and bulldozer. This is preferable to avoid direct movement of the heavy equipment and trucks on the drainage carpet.

(5) Cover materials may be obtained from the nearby valley 2. Excavator should be deployed for that purpose.

(6) The present pipe draining out the water from the site should be blocked at the time of operation in order to avoid leachate draining out from that pipe.

4. Forthcoming schedule

(1) Any comments on today's discussion and attached memo would be submitted to Mr. Ram Sharan Maharjan (SWMRMC) by January 31st, 2005 for delivery to JICA Study Team

(2) A draft Operation Plan will be prepared and discussed in a workshop to be held at the end of February

(3) The Operation Plan should be authorized for use at Sisdol from the beginning of March 2005

Subject:	**Workshop on Long-term Landfill Site for KMC, LSMC and KRM**	
Date:	May 16, 2005	
Time:	14:30 – 17:00	
Venue:	Local Development Training Academy Meeting Room	
Participants:	SWMRMC	Mr. Surya Man Shakya, General Manager
		Mr. Ashok Shahi, Civil Engineer
	KMC	Mr. Indra Man Suwal, Head, Environment Department
		Mr. Rajesh Manandhar, Chief, SWM Section
		Mr. Deepak Kansakar, Engineer, SWM Section
	LSMC	Mr. Rudra Pd. Gautam, Chief, Public Works Division
		Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
	JICA Study Team	Mr. Mahmoud Riad
		Mr. Norihiko Inoue
		Mr. Vikram Basyal
	GEOCE	Mr. Subarna Bahadur Joshi (Team Leader)
		Mr. Ishwor Man Shrestha (Socio-Economist)
		Mr. Prakash Ulak (Geologist)
		Mr. Abhishek B.C (Environmental Engineer)

1. Agenda

I. To review and discuss preliminary environmental evaluation on candidate sites

II. To discuss conceivable consequences of long-term LFS toward overall SWM system

2. Topics Offered

I. Preliminary environmental evaluation on candidate sites

[Banchare Danda, Pharsidol North, Pharsidol South]

1. Methodology General
2. Overview of the environmental conditions of each candidate site
   - Geology, Land use, Socio-economy, etc.
3. Technical features
   - Technical description
   - Capacity, Life time, Rough cost estimate, Unit price
4. Preliminary ranking based on SWMRMC EIA Guideline
5. Topics from JICA Study Team

II. Conceivable consequences toward overall SWM system of Zone A [KMC, LSMC, KRM]

1. Development schedule *Considering the life time of Sisdol
2. Estimated investment cost and disbursement schedule
3. Implications on transfer haul cost

3. Record of Workshop

A workshop was organized by JICA Study Team on May16, 2005 in Local development Training Academy. The workshop focused three proposed sanitary landfill sites namely Banchare Danda, Pharsidol south and Pharsidol north to review and discuss conceivable consequences of long term LFS toward overall SWM system.

HMG/N with the assistance of JICA study team has completed Sanitary landfill site in Sisdol at Okharpauwa for the KMC and LSMC .Since the capacity of the SLF site is for about 3 years period only, HMG/N has identified these three possible SLF sites for long term use. JICA study team is still assisting HMG/N in the selection of the long term LF sites.

The workshop offered following topics-:

I. Preliminary environmental evaluation on candidate sites (Banchare Danda, Pharsidol south and Pharsidol north)

1. Methodology General
2. Overview of the environmental conditions of each site-Geology, Land use, Socio-economy etc
3. Technical features
   - Technical description
   - Capacity, Life time, Rough cost estimate, Unit price
4. Preliminary ranking based on SWMRMC EIA guideline.
5. Topics from JICA study team

II. Conceivable consequences toward overall SWM system of zone A [KMC, LSMC and KRM]

1. Development schedule considering the life time of Sisdol
2. Estimated investment , cost and disbursement schedule
3. Implications on transfer haul cost

The Workshop was chaired by Dr. Surya Man Shakya. The workshop started at scheduled time with the introduction speech by Mr. Norihiko Inoue. He elaborated the purpose and objectives of the workshop. He purpose of the workshop is to disseminate the effort in selecting the long term landfill site for the Kathmandu Valley. The JICA Study Team has hired local consulting firm GEOCE consultants (P.) Ltd for Practice of IEE on Long term Landfill Sites for the SWM of the Kathmandu Valley. He requested Mr. Subarna Bahadur Joshi of GEOCE to preliminary findings of the study.

Mr. Joshi explained the scope of the work of the ongoing study. The study has mainly two components-:

I. IEE evaluation of the proposed three long-term landfill sites
II. Preparation of draft scoping report and terms of references for
   - Banchare Danda landfill site
   - One of the selected Site of Pharsidole landfill Site

He briefly described the physical location of all three sides. He then introduced his study team members and requested them to present the preliminary findings.

Mr. Prakash Ulak(Geologist) presented the detail geological features of all three proposed landfill sites:-

I. ***Banchare Danda Site:*** - It is located in the Tistung formation of the Bhimphedi group comprising of fine grained, dark grey metasandstone and schist. A local fault passes through extreme northern end of the loop. Since there was no indication of the active slide or the slip in the vicinity, the fault could be considered inactive. There are some old slides around the hill slopes. But they are shallow and translation in nature.
The rock of small hillock through which the Kalpu Khola meandered are of low strength and intercalation of thinned bedded schist and metasandstone. Hence excavations of these rocks will not be very difficult.
In general, the rocks are not very fractured in the vicinity of the proposed landfill site with few exceptions at the northern part.

II. ***Pharsidol Sites:***- Geologically, the proposed sites lie in the Chandragiri Limestone of the Phulchauki Group of the Kathmandu Complex, central Nepal. The thick vally fill sediments cobered the bedrocks of the Chandragiri Limestone. The proposed site is covered with the sediments of the Lukundol Formation. The Lukundol Formation is composed of alternation of thick to thin dark brown to black clays and medium- to fine grained micaceous sands with occasional yellow to white diatomous clays. This formation is about 115 m in thickness. The upper part of this formation is Itaiti Formation, frequently found in the proposed sites. The Itaiti Formation is composed of boulder-cobble beds with sandy matrix and fine sands, silty clays and carbonaceous black muds.

In general the both Pharsidol sites are located in geologically sound area.

Mr. Ishwor Man Shrestha explained about the socioeconomic aspect of the three proposed sanitary landfills. His preliminary findings are that the Banchare landfill site proved good enough to be socio-economically viable where as the two sites at Pharsidol south and Pharsidol north may have objection from social and cultural aspects.

The Banchare danda site would require diversion of river, which will change the political and administrative boundary of the Dhading district and Nuwakot district.

The two proposed sites of Pharsidole are located within 100 m and 300 m from Khuipa village and the khuipa village bears high religious and cultural significance. There is a house (temple) assigned God Rato Machindra Nath. On the day of Mata Tirtha Aunshi (Mother's day) in the month of May, the idol of the god is taken to the village and kept for sometime in front of that temple and then taken to Katuwaldaha. On the next day, the idol is bathed and worshiped in Katuwaldaha and taken to Patan for chariot festival. This chariot festival carries high cultural significance to the people of the Kathmandu Valley. The Maharjans of the Khuipa village are culturally and religiously assigned to collect the timber necessary for the construction of the chariot and to construct it.

On the ninth day of Dashai (Nawami), the idol of the god Machindra Nath is brought to the village and kept overnight. On the next morning, a grand Pooja is organized and the Bungmati Jatra is started. Thus, the cultural and religious importance of the village will not allow relocation of the village. And it is not just the matter of the people of Pharsidol, The community of Lalitpur, Kathmandu and Kirtipur will also oppose this project.

After that, Mr. Mahmoud Riad explained Technical and Financial Considerations on Candidate Sites for L/T-LF. He clarified design concept which included parameters like sanitary landfill system, horizontal liner, slope liner, leachate treatment, landfill gas, waste dams and perimeter slope. He presented that the capacity of Banchare Danda, Pharsidole

North and Pharsidole Sourh will be 25 years, 22 years, and 13 years respectively and cost per cubic meter waste disposal will be Rs 154.2, Rs 223.4. and Rs 270.4 respectively.

After that, He elucidated the conceivable consequences toward overall SWM system of Zone A [KMC, LSMC, KRM] which comprised different factors such as -:

1. Development schedule (considering the life time of Sisdol)
2. Estimated investment cost and disbursement schedule
3. Implications on transfer haul cost

Then, **Mr. Subarna Bahadur Joshi** elucidate the checklist for initial environmental examination (IEE) of all three proposed sites which includes parameters like *geology, hydrology, sanitary landfill potential & access, Biotic environments ,socio-economic &cultural environment and sanitary landfill management & general safety* and ranked them with their individual scores. The scores were set as per the EIA guidelines for solid waste management project in the municipalities of Nepal. The final scores were 326 for the Banchare landfill site, 314 for the Pharsidol north landfill site and 302 for Pharsidol south landfill site which enables that Banchare landfill site is superior of all three with a maximum score.

Summary of IEE Evaluation (Preliminary)

Parameter	Relative weightage	Scores			Remarks
		Banchare	Pharsidol North	Pharsidol South	
Landscape/geology	17%	51	79	71	Steep slope, Nos. of gullies and river in Banchare site
Hydrology	20%	45	66	66	River is the drawback for Banchare
Sanitary landfill potential and access	12%	32	38	38	Access is the drawback for Banchare
Biotic environments	10%	36	50	50	Community forest and river is the constraint for Banchare
Socio-economic and cultural environment	23%	76	33	35	Very close proximity of the khuipa village is the constraint (Khuipa village has cultural importance of Rato Machindranath)
Sanitary landfill management and general safety	18%	86	48	42	Very close proximity of the Khuipa village is the constraint
Total	100%	326	314	302	

Between Pharsidol North and Pharsidol South, former site (North) site is found to be better site. The south site is located within 100.0 m distance from the Khuipa Village and the site is also located within 12.5 ^{0} from the Tribhuvan International Airport.

Mr. Riad presented three major and challenging issues for the development long-term landfill sites for the Kathmandu Valley. They were:

I Development of landfill sites would require about Rs 1.1 billion in next 3 years period
II Transportation (haulage) cost of waste would be Rs 1.3 million per month for Pharsidol option and Rs 4.0 million for Banchare Danda option.
III Can these schedule and cost could met

Opinion of the participants:

Dr. Shakya appreciated the findings of the consultant within the short period. He said that the Evaluation weightage given in the Guideline were derived after the through discussion involving number of experts. For the purpose of the evaluation at IEE level given weightage in the guideline holds good and suggested not to alter the given weightage. He showed the concern of social and cultural implication for the Pharsidol sites. However he said it is too early to come to the decision at this stage. He suggested have discussion with some of the key local personals to Pharsidol area for the proposed landfill site. He pointed out that cultural issues are quite critical in the Kathmandu valley. The resident of Khuipu vallage are from the Jyapu community. This community has very strong social bondage and their interest is taken taken care by Jyapu Mahaguthi, which is one of the strongest community in the Kathmandu Valley. He cited an example of abandoning a whole project of Jawalakhel distillery because of cultural importance few years back.

He suggested that the Municipality should work harder and should be active to deal all the problems. Money is not a lone problem as we could find the ways for funds for the transportation cost during implementation phase. We have to find the options like composting. Beyond technical issues, there are so many issues to be concentrated.

Some of the participants did raise the appropriateness of the weightage given in the evaluation of sites. Almost all participants expressed that the transportation cost of the waste to the Banchare Danda is the major constraint. Their opinion was to go for the Pharsidol site if possible. However they said that it the government who has to decide that after Sisdol Landfill site which will the next one. One aspect is that wastes disposal in Bagmati River and Hanumante River may not be possible in future.

The representative from the municipalities said that they have managing the cost of waste disposal including transportation cost in the past.

The participants were very much positive that after the operation of Sisdol Landfill site, there could some positive attitude to acceptance of the Landfill Sites.

The chair person thanked all the participants for their active participation in the discussion. The Workshop was closed at 1.30 P.M.

Subject: **Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (1)**
Date: June 12, 2005
Time: 14:00 - 16:00
Venue: Local Development Training Academy Meeting Room
Participants:

SWMRMC	Mr. Surya Man Shakya, General Manager
	Mr. Ram Sharan Maharjan, Civil Engineer
KMC	Mr. Rajesh Manandhar, Chief, SWM Section
LSMC	Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
OSLSMCC	Mr. Ram Mani Ghimire, Chairman
(Local Committee)	Mr. Shree Ram Dhungana, Treasurer
JICA Study Team	Mr. Mahmoud Riad
	Mr. Shungo Soeda
	Mr. Norihiko Inoue
	Mr. Amar J. Shah

1. Working Days and Waste Amounts

No.	Day	Trucks 1st arrival /last dep. times	Trips	Amount (t)	Remarks
1	'062/2/22 (Sun)		13		2 trips from LSMC
2	'062/2/23 (Mon)		5		3 JICA trucks + 2 KMC compactors
3	'062/2/24 (Tue)		4		3 JICA trucks + 1 KMC compactor
4	'062/2/25 (Wed)		6		3 JICA trucks + 3 KMC compactors
5	'062/2/26 (Thu)	08:05 – 13:50	9		3 JICA trucks x 2 trips + 3 KMC compactors
6	'062/2/27 (Fri)	08:50 – 15:10	11		3 JICA trucks x 2 trips + 3 KMC compactors + 2 tippers (KMC)
7	'062/2/28 (Sat)		6		3 JICA trucks + 3 KMC compactors

2. Waste Working Area

'062/2/22 (June 5, 2005)

'062/2/25 (June 8, 2005)

'062/2/28 (June 11, 2005)

3. Equipment

No.	Equipment	Situation
1	Dozer	
2	Excavator	Broke down on 6/9 for 0.5 days
3	Weighbridge	Handed over to SWMRMC on June 9. No electricity to operate
4	Aerator	Handed over to SWMRMC on June 9. Test operation

No.	Equipment	Situation
5	Re-circulation pump	Handed over to SWMRMC on June 9. Test operation
6	Generator	Handed over to SWMRMC on June 9. Located at leachate pond area
7	Deodorizer Manual Spray Device	In daily use at the site
8	Mechanical roller	Used daily on internal service road. Temporarily on the site.

4. Manpower

4.1 Site Permanent Staff		
1	Mr. Deepak, Site Engineer in Charge, KMC	Daily
2	Mr. Maheswor Bahadur Bhujel, Supervisor, KMC	Daily
3	Dozer operator, KMC	Daily
4	Excavator operator, LSMC	Daily, except (1/2) day
5	Guard (and laborer), KMC	Daily
6	Guard, LSMC	Left site from 2nd day, replacement is being arranged
7	Guard, OSLSMCC appointed	
8	Guard, OSLSMCC appointed	
9	Guard, OSLSMCC appointed	
10	Guard, OSLSMCC appointed	
11	Guard, OSLSMCC appointed	
4.2 Technical Management		
1	Mr. Indra Man Suwal, Environmental Dept. Chief, KMC	On site 1 day
2	Mr. R Manandhar, SWM Section Chief, KMC	On site 5 days
3	Mr. P Amatya, Environmental Engineer, LSMC	On site 2 days
4.3 Technical Advisors		
1	Mr. Surya Man Shakya, GM, SWMRMC	On site 1 day
2	Mr. Ram Sharan Maharjan, Engineer, SWMRMC	On site 3 days
4.4 Operation Monitors		
1	Mr. Jhank Nath Ghimire, OSLSMCC	
2	Mr. Krishna Murari Ghimire, OSLSMCC	

5. Site Visitors

Mr. Riad, Mr. Soeda, Mr. Inoue, Ms. Nakatani, Ms. Shimada and Ms. Suwa from the JICA Study Team.

6. Issues (A: Immediate action necessary, B: Acton required)

No.	Description	A or B
1	Installation of fence *SWMRMC: The appointed contractor is not implementing the works properly. A meeting will be arranged soon between the Center, Contractor and OSLSMCC to finalize the fence works as soon as possible.*	A
2	Urgent weighbridge operation (providing power supply and weighbridge operator)	A
3	Increasing manual workers	A
4	Improving working conditions (allowances, food, water, etc.)	A

No.	Description	A or B
5	Resolving guards problems *SWMRMC: The Center will issue temporary passes to the five (5) locals arranged by the OSLSMCC as guardsmen, as requested by the OSLSMCC.* *LSMC will re-assign a guard to the site soon*	A
6	Handover of Pilot Project equipment (SWMRMC → KMC) *Mr. Indra Man Suwal, of KMC has agreed that the equipments be handed over to KMC.*	A
7	Toilets completion	A
8	Establishment of Environmental Monitoring Committee *SWMRMC will take the necessary steps to set up the committee within the next couple of weeks.*	A
9	Dealing with odor during transport	B
10	Operation Plan *KMC explained its operation plan for the waste placing.*	A

7. Resolutions and Others

No.	Description	Action by
1	Submit schedule for completion of fence, gates and administration area	SWMRMC/ OSLSMCC
2	Electricity supply will be provided within five (5) weeks	SWMRMC
3	Check with electrician on the possibilities to provide electricity power to the weighbridge.	KMC
4	Increased waste amounts dispatch to Sisdol (closing Bagmati D/S morning shift – Need to increase manpower and equipment should be considered	KMC/ LSMC
5	OR meetings to be held on a weekly basis, at least for the first two months. The next meeting shall be held on Monday, June 19th at 14:00. The secretariat for the meetings shall be decided in the next meeting.	KMC, LSMC, and SWMRMC
5	Preparation for Clean-up campaign in the five municipalities is noted and more detailed discussions with the organizers (CKV Study and CEN) is needed. Mr. Rajesh raised the query of time of waste arrival to Teku T/S.	KMC, LSMC, BKM, KRM and MTM
6	LSMC is expected to start using Teku T/S within 2-3 days.	KMC and LSMC
7	LSMC is preparing the budget for Teku operation within the next 2-3 weeks and needs to know the estimates. Basically Mr. Rajesh estimates 15 – 20mln Rs. Will be required annually and LSMC share would be around 25% of that.	KMC and LSMC to discuss further
8	There is a need to develop a record keeping format for submission at monthly meetings (with top officials).	KMC, LSMC and OSLSMCC

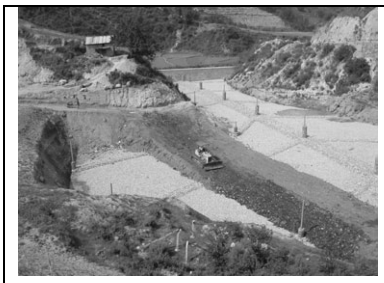
Subject: **Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (2)**
Date: June 19, 2005
Time: 14:00 - 16:00
Venue: KMC Meeting Room
Participants:

KMC	Mr. Indra Man Suwal, Head, Environment Department
	Mr. Rajesh Manandhar, Chief, SWM Section
	Mr. Deepak Kansakar, Engineer, SWM Section
LSMC	Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
OSLSMCC	Mr. Ram Mani Ghimire, Chairman
(Local Committee)	Mr. Shree Ram Dhungana, Treasurer
JICA Study Team	Mr. Mahmoud Riad
	Mr. Shungo Soeda
	Mr. Norihiko Inoue
	Mr. Amar J. Shah

1. Working Days and Waste Amounts

No.	Day	Trucks 1st arrival /last dep. times	Trips	Amount (t)	Remarks
1	'062/2/29 (Sun)		13 (13)		
2	'062/2/30 (Mon)		8 (5)		
3	'062/2/31 (Tue)		14 (4)		3 JICA trucks x 2 trips + 4 KMC compactor x 2trips
4	'062/3/1 (Wed)	08:30 – 15:35	14 (6)		3 JICA trucks x 2 trips + 4 KMC compactor x 2trips
5	'062/3/2 (Thu)	11:45 -	7 (9)		3 JICA trucks + 4 KMC compactors
6	'062/3/3 (Fri)	10:30 -	10 (11)		
7	'062/3/4 (Sat)		7 (6)		3 JICA trucks + 4 KMC compactors
TOTAL			73 (54)		Ave. trip/d 10.4 (7.7)

2. Waste Working Area



'062/2/30 (June 13, 2005)

'062/3/3 (June 17, 2005)

'062/3/4 (June 18, 2005)

3. Equipment

No.	Equipment	Situation
1	Dozer	
2	Excavator	
3	Weighbridge	Handed over to SWMRMC on June 9. No electricity to operate

No.	Equipment	Situation
4	Aerator	Operated 1-2 hours daily since June 15, but could not be operated on June 18th because of generator repairs.
5	Re-circulation pump	Test operation completed. However water pumping to reach the waste area takes a rather long time, because of hose.
6	Generator	Electricity problems repaired by Bhairab (June 15) Fuel tank problem repaired by KMC (June 18) Generator is inside the pump room. KMC recommends some cushioning materials to be put under the generator because of the strong vibration from the solid flooring which effects the machine.
7	Deodorizer Manual Spray Device	In daily use at the site
8	Mechanical roller	Used daily on internal service road. Temporarily on the site.

4. Manpower

4.1 Site Permanent Staff		
1	Mr. Deepak, Site Engineer in Charge, KMC	Daily
2	Mr. Maheswor Bahadur Bhujel, Supervisor, KMC	Daily
3	Dozer operator, KMC	Daily
4	Excavator operator, LSMC	Daily, except (1/2) day
5	Guard (and laborer), KMC	Daily
6	Guard, LSMC	Still awaiting replacement
7	Guard, OSLSMCC appointed	
8	Guard, OSLSMCC appointed	
9	Guard, OSLSMCC appointed	
10	Guard, OSLSMCC appointed	
11	Guard, OSLSMCC appointed	
4.2 Technical Management		
1	Mr. Indra Man Suwal, Environmental Dept. Chief, KMC	On site 1 day (1)
2	Mr. R. Manandhar, SWM Section Chief, KMC	On site 2 days (5)
3	Mr. P. Amatya, Environmental Engineer, LSMC	On site 1 day (2)
4.3 Development Management		
1	Mr. Ram Sharan Maharjan, Engineer, SWMRMC	On site 2 days (3)
4.4 Operation Monitors		
1	Mr. Jhank Nath Ghimire, OSLSMCC	
2	Mr. Krishna Murari Ghimire, OSLSMCC	

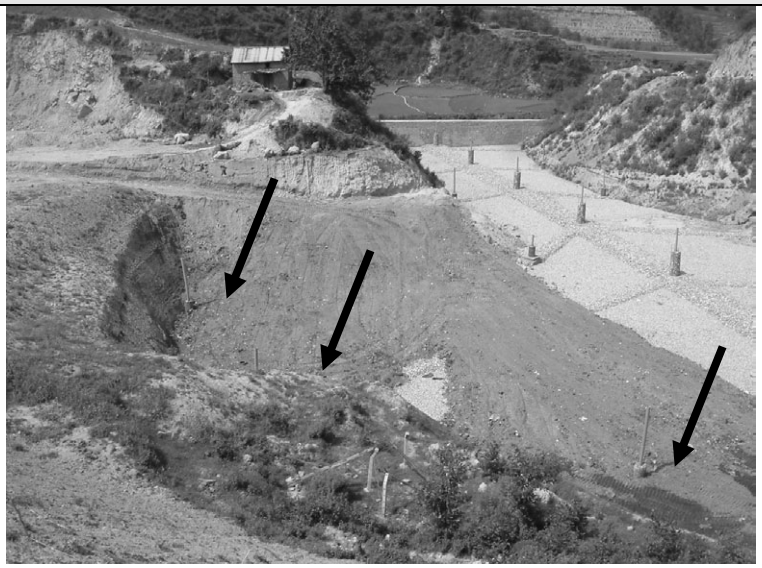
5. Site Visitors

Mr. Riad, and Mr. Inoue from the JICA Study Team

6. Issues (A: Immediate action necessary, B: Acton required)

No.	Description	A or B
A. ISSUES Identified in SOR 1 (and which are still pending)		
1	Installation of fence *SWMRMC: Discussion was held with the contractor and the Center will release funds at intermittent periods to allow the work to progress. On July 2nd the work may start and it would then take 4 – 5 weeks to complete.*	A

No.	Description	A or B
2	Urgent weighbridge operation (providing power supply and weighbridge operator) *KMC: KMC does not have a spare generator. MAW technician will be called to meet with KMC technician to discuss possible solution prior to the arrival of the electricity power.*	A
3	Improving working conditions (allowances, food, water, etc.)	A
4	Handover of Pilot Project equipment (SWMRMC → KMC) *Mr. Indra Man Suwal, of KMC has agreed that the equipments be handed over to KMC. Handover has not yet been done.*	A
5	Toilets completion *SWMRMC explained that the work involved is not so difficult and in order to save time, KMC may complete by itself. KMC did not object provided SWMRMC prepares a letter on the matter, which SWMRMC is not ready to do.* *Anyway it was stressed that the toilets, water supply and electricity in particular, and the overall completion of the site development was the SWMRMC responsibility and they were urged to proceed quickly in order to improve the working conditions for the staff at the site.*	A
6	Establishment of Environmental Monitoring Committee *SWMRMC has yet to take concrete steps in this regard. It was agreed that a separate meeting would be held between the SWMRMC and the JICA Study Team on this matter during this week.*	A
B. ISSUES identified during this meeting		
7	Local residents stopping trucks for rides *KMC explained that this problem was in the process of being solved with the cooperation of the OSLSMCC, and discussions with the drivers.*	B
8	Working conditions during rainy season *KMC explained that the clay layer topping on the internal service road makes the road condition very slippery during the rain.* *As the layer is very thin, KMC will overlay with an aggregate layer to improve working conditions.*	A
9	Waste Placement plan - Landfill gas vents and gabions extension work *KMC explained that the landfill gas vents and gabions extensions may be done.* *However KMC prefers to proceed to the north-west corner, because they would like to compact the laid waste (on the north-east corner). The effect of increasing the area of the waste on the produced leachate, especially during the rainy season was also discussed.* *KMC also mentioned that the installed cover layer at the north-east corner may reduce the leachate amount. KMC will try and provide some sloping as well on that cover material layer.* *Lastly KMC considered to work on the north-west corner southwards to the internal service road then return back to the north-east corner, i.e. the waste would not be laid all the way to the waste dam yet.*	B

No.	Description	A or B
		Three landfill gas vents need extension
10	Leachate pond extension work *KMC agreed to implement this work at a later time.*	
		Increasing height of northern wall of the pond by about 50cm ht x 25 m width (using masonry with mortar)
11	Removal of concrete fence poles from the leachate pond area *SWMRMC explained that they requested their contractor to remove the poles many times, but will do so again.*	A
12	Seminar at the Site on June 28th *It was agreed that on the first day, SWMRMC's Ram Maharjan would explain about the site design and construction, and on the second day, during the site visit, KMC's Rajesh M and Deepak would provide some explanation.*	A
13	Situation of three houses within the site *SWMRMC explained that the owners had already been paid compensations but they are now requesting more money to transport their houses from the site.*	B
14	Guardsmen from OSLSMCC *KMC may be willing to pay the salaries of the guardsmen but it would be better to have 4 at night and 2 in the daytime.*	A

No.	Description	A or B
15	Action in case of detection of pollution in the wellfields *KMC and LSMC requested JICA Study team to consider what steps should be taken in case groundwater samples showed pollution during the environmental monitoring. Some reference to this matter shall be made in the Operation Manual.*	

7. Resolutions and Others

No.	Description	Action by
1	OR meetings to be held on a weekly basis, at least for the first two months. The next meeting shall be held on Monday, June 26th at 14:00. The secretariat for the meetings shall be KMC.	KMC, LSMC, and SWMRMC
2	Joint visits to the site by the three engineers from KMC, LSMC and SWMRMC should be weekly, and on Fridays in principle	KMC, LSMC, and SWMRMC

Subject: **Operation Review Weekly Meeting on Sisdol Semi-aerobic LF (3)**
Date: June 26, 2005
Time: 14:00 - 16:00
Venue: Local Development Training Academy Meeting Room
Participants:

SWMRMC	Mr. Ram Sharan Maharjan, Civil Engineer
KMC	Mr. Rajesh Manandhar, Chief, SWM Section
LSMC	Mr. Pradeep Amatya, Chief, Environment and Sanitation Section
OSLSMCC	Mr. Ram Mani Ghimire, Chairrman
(Local Committee)	Mr. Shree Ram Dhungana, Treasurer
	Two members from OSLSMCC
JICA Study Team	Mr. Mahmoud Riad
	Mr. Norihiko Inoue

1. Working Days and Waste Amounts

No.	Day	Trucks 1st arrival /last dep. times	Trips	Amount (t)	Remarks
1	'062/3/5 (Sun)		0 (13)		Bandha
2	'062/3/6 (Mon)		6 (8)		Rain Monday night
3	'062/3/7 (Tue)	09:50 (within 1 hr. 7 trips)	7 (14)		Heavy rain all day, valve opened at night
4	'062/3/8 (Wed)		10 (14)		Heavy rain Wednesday night, valve opened
5	'062/3/9 (Thu)		14 (7)		Heavy rains on Thursday night
6	'062/3/10 (Fri)		15 (10)		
7	'062/3/11 (Sat)		7 (7)		
TOTAL			59 (73)		Ave. trip/d 8.4 (10.4)

2. Waste Working Area

		
'062/3/07 (June 21, 2005)	'062/3/10 (June 24, 2005)	'062/3/11 (June 25, 2005)
All north-east corner covered	Heavy rains previous day make direct waste trucks access difficult	Work continued on north-east corner, and three landfill gas vents extended

3. Equipment

No.	Equipment	Situation
1	Dozer	
2	Excavator	
3	Weighbridge	Handed over to SWMRMC on June 9. Operated for 2nd trips on 2005/06/24 using small generator borrowed from EAST
4	Aerator	Due to generator problems aerator was operated only 2 days and for around 1-2 hours on each day.
5	Re-circulation pump	Test operation completed. Pump was operated for about one hour on June 24 to drain water from the pond.
6	Generator	On June 20 parts of generator were removed from site for repairs by Bhairab. On June 22 repaired parts were installed. On June 23 there were generator problems again. On June 24 generator was operated for one hour and then a radiator problem developed. Again taken from site. On June 25 there was no generator.
7	Deodorizer Manual Spray Device	Spraying became infrequent.
8	Mechanical roller	Did not observe it being used during my visits.

4. Manpower

4.1 Site Permanent Staff		
1	Mr. Deepak, Site Engineer in Charge, KMC	Daily
2	Mr. Maheswor Bahadur Bhujel, Supervisor, KMC	Daily
3	Dozer operator, KMC	Daily
4	Excavator operator, LSMC	Daily, replacement
5	Guard (and laborer), KMC	Daily
6	Guard, LSMC	Still awaiting replacement
7	Guard, OSLSMCC appointed	
8	Guard, OSLSMCC appointed	
9	Guard, OSLSMCC appointed	
10	Guard, OSLSMCC appointed	
11	Guard, OSLSMCC appointed	
4.2 Technical Management		
1	Mr. R Manandhar, SWM Section Chief, KMC	On site 2 days
4.3 Development Management		
1	Mr. Ram Sharan Maharjan, Engineer, SWMRMC	On site 2 days
4.4 Operation Monitors		
1	Mr. Jhank Nath Ghimire, OSLSMCC	
2	Mr. Krishna Murari Ghimire, OSLSMCC	

5. Site Visitors

Mr. Ujiie and Mr. Riad from the JICA Study Team.

6. Issues (A: Immediate action necessary, B: Acton required)

No.	Description	A or B
A. ISSUES Identified in SOR 1 & 2 (and which are still pending)		
1	Installation of fence *SWMRMC: Discussion was held with the contractor and the Center will release funds at intermittent periods to allow the work to progress. On July 2nd the work may start and it would then take 4 – 5 weeks to complete.*	A
2	Urgent weighbridge operation (providing power supply and weighbridge operator) *KMC: On June 25 KMC provided generator on site to commence weighbridge operation*	A
3	Handover of Pilot Project equipment (SWMRMC → KMC) *Mr. Indraman Suwal, of KMC has agreed that the equipments be handed over to KMC. Handover has not yet been done. Generator problems to be resolved.*	A
4	Toilets completion *SWMRMC explained that the work involved is not so difficult and in order to save time, KMC may complete by itself. KMC did not object provided SWMRMC prepares a letter on the matter, which SWMRMC is not ready to do.* *Anyway it was stressed that the toilets, water supply and electricity in particular, and the overall completion of the site development was the SWMRMC responsibility and they were urged to proceed quickly in order to improve the working conditions for the staff at the site.*	A
5	Establishment of Environmental Monitoring Committee *A separate meeting was held between the SWMRMC and the JICA Study Team on this matter and the committee is now being formed.*	A
6	Local residents stopping trucks for rides *Still continuing but seems to be more organized. "Passengers" are picked up from the site.*	B
7	Working conditions during rainy season *KMC is making effort to put aggregate on the service road. Now it is difficult for waste trucks to access to waste platform.*	A
8	Waste Placement plan - Landfill gas vents and gabions extension work *JICA Study Team contractor and KMC jointly extended the three landfill gas vents in the north-east corner and waste placing continued there.* *The waste continued being placed at the N-E corner in order not to expand the waste disposal area; because of the problems we were having with the generator and inability to operate the aerator regularly.*	B
9	Leachate pond vertical side extension work *JICA Study Team contractor will implement this work within the coming week.*	
10	Removal of concrete fence poles from the leachate pond area *SWMRMC explained that they requested their contractor to remove the poles many times, but will do so again.*	A
11	Seminar at the Site on June 28th *It was agreed that on the first day, SWMRMC's Ram Maharjan would explain about the site design and construction, and on the second day, during the site visit, KMC's Rajesh M and Deepak would provide some explanation.*	A
12	Situation of three houses within the site *SWMRMC explained that the owners had already been paid compensations but they are now requesting more money to transport their houses from the site.*	B

No.	Description	A or B
13	Guardsmen from OSLSMCC *KMC may be willing to pay the salaries of the guardsmen but it would be better to have 4 at night and 2 in the daytime.*	A
14	Action in case of detection of pollution in the wellfields *KMC and LSMC requested JICA Study team to consider what steps should be taken in case groundwater samples showed pollution during the environmental monitoring. Some reference to this matter shall be made in the Operation Manual.*	B
B. ISSUES identified during this meeting		
15	Releasing leachate into river during heavy rain and overflow	NA
16	Problems in generator results in release of un-aerated leachate *It may be better to advice children not to play or swim close to the leachate pond area.*	A
17	Problem of faulty valve at the manhole	A
18	Control of access to site by trucks taking away gravel	A
19	Operation staff should be increased as weighbridge comes into operation.	A
20	Prepare the format for the daily record of landfill activities	A

7. Resolutions and Others

No.	Description	Action by
1	OR meetings to be held on a weekly basis, at least for the first two months. The next meeting shall be held on Monday, July 2nd at 14:00. The secretariat for the meetings shall be KMC.	KMC, LSMC, and SWMRMC
2	Joint visits to the site by the three engineers from KMC, LSMC and SWMRMC should be weekly, and on Fridays in principle	KMC, LSMC, and SWMRMC

APPENDIX 4.3

Site Visits to Pokhara and Malaysia

APPENDIX 4.3 SITE VISITS TO POKHARA AND MALAYSIA

1. Pokhara Sub-Metropolitan City (PSMC) Visit

1.1 Purpose

The visit to PSMC was conducted on July 23 and 24, 2004. Fourteen members participated in the visit as shown in Table A 4.3-1.

Table A 4.3-1 List of Participants of the PSMC Visit

No.	Name	Affiliated organization
1	Mr. Badri Maharjan	SWMRMC
2	Mr. Padaman Joshi	SWMRMC
3	Mr. Ashok Tuladhar	SWMRMC Task Force Member, Independent Consultant
4	Mr. Kiran Ulak	Engineer, Solid Waste Management Section, KMC
5	Mr. Birendra Malla	KMC
6	Mr. Rudra Prasad. Gautam	Chief, Public Construction Division, LSMC
7	Mr. Pradeep Amatya	Chief, Environment and Sanitation Section, LSMC
8	Mr. Laxman Kisiju	Chief, Planning and Technical Section, BKM
9	Mr. Dilip Kumar Suwal	Assistant, Sanitation Sub-Section, BKM
10	Mr. Satya Narayan Shah	Chief, Planning and Technical Section, MTM
11	Mr. Anuj Pradhan	Assistant, Planning and Technical Section, KRM
12	Mr. Kedar Prajapati	Taikabu VDC
13	Mr. Mahmoud Riad	JICA Study Team
14	Mr. Norihiko Inoue	JICA Study Team

The purpose of this visit was three fold:

(1) To visit the only engineered sanitary landfill site constructed in Nepal
(2) To discuss SWM issues with the related PSMC stakeholders
(3) To observe the SWM conditions in the city

To achieve these objectives the following activities were organized:

(1) Visit to the PSMC Sanitary Landfill site
(2) Visit to the present dump site
(3) Meeting with PSMC SWM stakeholders

1.2 Results of the Visit

The results of the visit are summarized in Table A.4.3-2. Participants have prepared individual reports which are attached elsewhere in this report.

Table A 4.3-2 Outcome of PSMC Visit

Description	Lessons	Implication to Kathmandu Valley
1. Visit to PSMC Sanitary Landfill		
Sanitary landfill and sewage treatment plant described as follows: A. Design and construction period: Nov. 1996 to July 2003 B. Main Facilities 1) Total site area is 10.01 hectares 2) Landfill capacity: 476,000 cum 3) Landfill life span: 14-15 years 4) Septage settlement tank: 150 cum 5) Vertical reed bed: 203 sq.m 6) Sand drying bed: 1,693 sq.m 7) Surface water collection basin: 270 cum 8) HDPE Geo-membrane liner, 1.0 mm thickness 9) Gas vents, 13 units 10) HDPE leachate collection perforated pipes (25mm dia.) 11) RC slab waste un-loading platform 12) Internal service road, 750 m 13) Access road to site, 8.56 km 14) Compost plant, windrow type C. Cost: Developed in three packages overall cost for the project was Rs 170.8 million, funded by ADB loan. D. Since handover in July 2003 solid waste and waste water has yet to be treated/ disposed at the plant E. EIA was made based on the ADB guideline.	A. Prolonged construction period including two suspension periods because of social opposition to the site. Detailed social study was required. B. Concerning the main facilities and technical features of the site; 1) The landfill system resembles anaerobic system and therefore natural attenuation treatment of leachate may not be sufficient 2) Leachate collection pipes network layout was not clear from the drawings and diameter may be small 3) Un-loading the waste from elevated platform will create waste scattering problems and dangerous operation conditions 4) Lack of drainage system beneath the laid geo-membrane leaves that liner unprotected from uplift 5) Operation plan for the site is not clear. 6) EIA monitoring system is not in place. 7) Source for cover materials is not identified C. Of the overall cost incurred, about 47% was expended on the access road development. D. Delay in starting operations is reportedly due to lack of heavy equipment and waste transport trucks. Also budget allocation for O&M costs is pending. E. At the time of design, EPA was not yet established and therefore EIA system of Nepal was not followed. MOPE's future role in monitoring this site is not clear.	A. Sisdol short term landfill will provide a breathing space of two years. But the Kathmandu Valley must start from now to develop the much needed long term landfill site in order to avoid delays. Site selection process must also carefully consider social aspects and development benefits to the community. B. Design and construction for the landfill must be comprehensive to cover: 1) Type of landfill system, preferably semi-aerobic system 2) Design and construction based on an operation plan 3) Sustainable facilities, such as installation of clay liner instead of geo-membrane if the costs of procurement and installation of geo-membrane cannot be covered 4) Decision on landfill level at the design stage and preparation of EIA accordingly 5) Design reports and construction documents should be comprehensible and cover closure plan, post closure O&M, and environmental monitoring system C. In tandem with development of landfill site plans for staffing and heavy equipments procurement need to be set up and implemented. O&M budget should also be secured. D. EIA should be prepared based on EPA and guidelines to be established by SWMRMC. EIA should be developed based on preliminary site investigations and concept design.

Description	Lessons	Implication to Kathmandu Valley
2. Meeting with SWM Stakeholders in PSMC		
The meeting participants from PSMC included present and former officials, NGO's, EAST consultant (project designer), and the visiting delegation. The meeting lasted for over three hours, was candid and covered many subjects. Topics covered were; 1) Operation is delayed because of lack of staffing and arrangement of funds for O&M 2) Doubts have been raised by some participants as to the need for the project due to its large costs, while others maintained the need for the project 3) Some complained about the high cost of the project and financial burden on PSMC to repay the loan, while others took the opposite view that a repayment plan was in place and willingness to pay in the part of the PSMC citizens was confirmed 4) Heavy equipment and transport trucks have already been procured but there seems to be a lack of staffing and depots to accommodate these equipments 5) Some participants explained that there was a lack of coordination between politicians, technical staff and the citizens on the project development. 6) Some participants complained that project costs were initially underestimated and that there was a cost increase of 300%. Others explained this was due to many development components that were incorporated into the project to gain the citizens acceptance.	Valuable lessons were learned from this meeting by the visiting KV delegation. These may be summarized as follows: 1) Landfill project is very sensitive and close coordination amongst the stakeholders is desirable 2) From the project concept social surveys are necessary and communications with the effected society should be launched 3) Cost estimates must be properly made and include all costs of design, construction, environmental monitoring, development projects to surrounding residents, as well as O&M costs and post-closure care costs. 4) Operation plan should be prepared from the offset and include manpower and equipment requirements	The Kathmandu Valley is expected to construct two landfills in the coming few years at Taikabu and at Okharpauwa or Pharsidol. Bearing in mind the problems encountered in PSMC and the importance of the project, the following actions are recommended: 1) Project objectives and scale need to be clearly communicated to all concerned; politicians, citizens, media, NGO's etc. For this purpose literature easily understood and targeted at different levels should be developed 2) Under the umbrella concept, future landfills developed in the Kathmandu Valley will be jointly used by more than one municipality. Therefore clear operations plans delineating responsibilities of the co-beneficiaries, in terms of cost sharing, manpower and equipment supply, etc. have to be prepared from the project conception. 3) A detailed EIA should be prepared and extensive social surveys implemented in order to understand the citizens concerns and prepare the social development plans. This should be applied to the ongoing Taikabu landfill EIA study.
3. Visit to existing Dump site		
About 5 tons of solid waste are collected daily and dumped into the river directly. The river is very deep from the bank and the dumped waste cannot be seen. 3-4 scavengers were observed picking the waste before it was dumped.	Unfortunately dumping of waste into the river is common in the Kathmandu Valley as well.	It is hoped that this phenomenon will become extinct in the Kathmandu Valley once the landfills have been developed.

2. Malaysia Visit

2.1 Purpose

The visit to Malaysia was conducted from September 26 to October 2, 2004. Six members from the Nepalese side, representing the landfill Focal Point members and two JICA Study Team members participated in the visit as shown in Table A 4.3-3.

Table A 4.3-3 List of Participants of the Malaysia Visit

No.	Name	Affiliated organization
1	Mr. Ram Sharan Maharjan	Civil Engineer, SWMRMC
2	Mr. Kiran Ulak	Engineer, Solid Waste Management Section, KMC
3	Mr. Rudra Prasad. Gautam	Chief, Public Construction Division, LSMC
4	Mr. Laxman Kisiju	Chief, Planning and Technical Section, BKM
5	Mr. Keshav Silwal	MTM
6	Mr. Bal Krishna Maharajan	Chief, Planning and Technical Section, BKM
7	Mr. Toshiyuki Ujiie	JICA Study Team
8	Mr. Mahmoud Riad	JICA Study Team

This visit was arranged to deepen the understanding of the participants on the sanitary landfill technology. The activities during the visit were broadly as follows:

(1) To attend the second seminar on safe closure of landfill sites in Malaysia arranged by the JICA Study Team and Ministry of Housing and Local Government (MHLG)
(2) To participate in the Workshop on the Landfill Technology sponsored by JICA
(3) To have a series of meetings with SWM stakeholders in Malaysia
(4) To visit some SWM facilities

2.2 Results of the Visit

The results of the visit are summarized in Table A 4.3-4. Participants have prepared individual reports which are attached elsewhere in this report.

Table A 4.3-4 Outcome of Malaysia Visit

Description	Lessons	Implication to Kathmandu Valley
1. Second Seminar on Safe Closure of Landfill Sites in Malaysia		
This 2-day seminar is one of the activities of the JICA study on safe closure of landfill sites in Malaysia which started since two years. Lectures were made by the JICA Study team members on the technical guideline for safe closure prepared by the Study, the pilot projects implemented and the action plan for closure of landfills. Professor Dr. Matsufuji, from Fukuoka University, and one of the developers of the semi-aerobic landfill system and Dr. Nassir Hassan, an expert on landfill in Malaysia addressed the seminar also. Papers were submitted by representatives from seven neighboring countries, including Mr. Surya Man Shakya, GM of SWMRMC on SWM in their respective countries.	1) Abandoned landfills and those not properly closed are very dangerous to the natural environment and public health 2) The proper design, construction and operation of the sanitary landfill will make it easier and less costly to safely close the landfill after operation cease 3) A landfill registration system should be developed in order to ensure that future developers on closed landfills know the former use of the land 4) Four technical levels for safe closure were developed by the JICA Study, and determination of the suitable closure level depends on the polluting danger the site poses on the surrounding environment and critical aspects such as nearby sources for drinking water, etc. 5) These technical levels were developed on the semi- aerobic concept in order to hasten stabilization of the stored wastes and decrease toxicity of the generated leachate 6) SWM conditions in developing countries are quite similar in terms of stress on collection over treatment and final disposal and lack of funds, need for public awareness and hesitation of politicians to tackle the SWM problems	1) It is important from now to consider the post closure activities and develop the fund for them for Taikapu and the long term landfill to be developed in the Kathmandu Valley 2) The design and operation of Sisdol, Taikabu and the long term landfill should be done as optimum as possible to decrease the problems of safe closure and post closure care 3) The safe closure plan for the closed Gokharna landfill site should be re-visited by the SWMRMC to study adoption of semi-aerobic system there in order to reduce potential environmental impacts form landfill gas and leachate 4) The safe closure plan for Bagmati River dump site may be prepared based on the semi-aerobic concept
2. Workshop on Landfill Technology		
This one-day workshop was attended by the Malaysian SWM officials and stakeholders who had attended training in Japan on semi-aerobic sanitary landfill. In addition to the six participants from Nepal, members from Bangladesh also participated. The workshop was chaired by Prof. Dr. Matsufuji. Presentations were made by participants with the theme on how successful they were in applying the knowledge gained in Japan in their own organizations. From the Nepalese delegation, KMC's Mr. Ulak made a presentation on SWM in the Kathmandu Valley, and the Study.	1) Application of training experience back home is very important 2) The former trainees improved a number of disposal sites in Malaysia by applying the semi-aerobic system without incurring excessive costs 3) Training programs should be directed towards how to apply the knowledge gained and not become purely academic exercises	1) The authorities in the Kathmandu Valley should carefully select for training programs technically capable members 2) It was suggested in the workshop that the former trainees form a "network" to maintain contacts together and with JICA. A similar network may be considered for the Nepalese officials whom have trained in Japan in the field of SWM

Description	Lessons	Implication to Kathmandu Valley
3. Meetings with Malaysian public officials engaged in SWM		
The Nepali delegation met with MHLG and Kuala Lumpur municipal authority (DBKL). They also received a briefing from Alam Flora on their services MHLG outlined its plans to take over the SWM services from the local authorities and privatize the services into a number of concessions. MHLG was in the process of drafting the Solid Waste Act that would define the responsibilities of the various SWM stakeholders under this new system. In a meeting with DBKL, the SWM services provided in the capital city were explained. Under the privatization scheme DBKL has entered into a contract with Alam Flora to collect the waste. All trucks previously owned by DBKL and cleansing staff have been transferred to Alam Flora. The role of DBKL is now confined to monitoring Alam Flora services.	1) The Government of Malaysia (GOM) has deemed it necessary to takeover the SWM services because of the large capital investments required to improve the treatment and disposal activities of the system. The local authorities do not have the technical nor financial capabilities to develop these facilities. 2) The privatization of SWM should be developed within a clear institutional framework that regulates the responsible organizations, their duties and responsibilities. 3) Under privatization the local authority's monitoring role is very important and the authority should have the tools (manpower and equipment) to discharge this role.	1) Under the proposed umbrella concept SWMRMC may take the lead in financing and constructing common SWM facilities. However the institutional framework to support this concept should be developed. 2) There is potential for improvement of SWM services under privatization and the Kathmandu Valley municipalities should seriously explore this option. Again the organizational and regulatory frameworks should be put in place to support privatization efforts.
4. Puchong Landfill site visit		
This landfill is located south of Kuala Lumpur in neighboring Selangor state. It has been operating for about 5 years and receives about 3,000 t/d of waste. It is operated by the private sector company, which invested in its construction as well. The land belongs to the state. The landfill is operated as anaerobic system and the landfill gas is recently used for electricity generation. This landfill surroundings are rapidly developing as housing areas and the landfill is scheduled to be closed by the end of this year. Collected leachate is treated by a number of aerators and leachate pond system. There is no chemical treatment of the leachate. HDPE liner was applied at the bed of the landfill.	1) The private company can develop and operate the landfill more easily if the government provides the land 2) The leachate treatment under anaerobic system using leachate pond, aerator and recirculation alone is not sufficient to meet the standards for discharge quality set by the Department of Environment (DOE) 3) A limited number of staff, about 10 members were observed at this large site	1) The semi-aerobic system for landfill is more promising in the absence of sophisticated leachate treatment system 2) During site selection process sites in areas with potential for housing development should be avoided because there will be pressure by the surrounding citizens to close the landfill

Description	Lessons	Implication to Kathmandu Valley
5. Taman Beringi Transfer Station		
This transfer station was constructed with a capacity of 1,700t/d for one shift. It is now operating at 1,900t/d by increasing working hours. The station was constructed to transport the waste generated in Kuala Lumpur to a new landfill to be developed north or the city. However this landfill has yet to be developed. Currently the waste is transported to Puchong landfill site in the south. The transfer station is the compaction type with 5 lines. A control room is provided to monitor and manage operations at the station. Waste is compacted in 40cum containers (to about 17-18 tons per container) at a compaction rate of about 1.2. The station is provided with a small leachate plant to treat the leachate drained from the site. The leachate generated during compaction is designed to remain in the container and be discharged at the landfill site.	1) It is easier to construct the transfer station than the landfill facility from the point of view of community acceptance 2) Installation of a sophisticated compaction system at the station will require providing system for leachate treatment and mechanical maintenance for hydraulic systems 3) The transfer station is well located with access to the main road and this is very important to ensure the smooth flow of traffic 4) The public drop off center constructed within the station is effectively used for storage of separated valuables from the waste stream and their recycling.	1) In selection of a new transfer station for KMC and LSMC attention should be given to smooth access to the site 2) As in the case of Malaysia, the Nepali waste has high moisture and organic content which does not favor the compaction system for the time being. Simple split level and direct discharge, as designed in Teku station improvement pilot project is the most suitable for the time being. 3) Within the Teku TS PP an area has been designated for the activity of the scavengers. With the provision of some compartments for storing separated materials and some arrangement the area may be used successfully as witnessed in the Taman Beringi public drop off facility.

Selected Photo of Activities

- Pilot Project C –

Selected Photo of Activities - Pilot Project C -

C-1: Workshop on Landfill Site
(July, 2004)

C-1: Study Tour to Malaysia
(September, 2004)

C-1: Study Tour to Malaysia
(September, 2004)

C-1: Site Visit to Pokhara
(July, 2004)

C-1: Site Visit to Pokhara
(July, 2004)

C-1: Long-term candidate Landfill site
(Banchare Danda)

C-1: Discussion on environmental/social considerations on Taikabu landfill site (April, 2005)

C-2: Water Quality Survey in Sisdol (July, 2004)

C-2: Soil Investigation in Sisdol (July, 2004)

C-2: Excavation Work at Sisdol Landfill (October, 2004)

C-2: Clay Liner Work at Sisdol Landfill (November, 2004)

C-2: Workshop on Sisdol Landfill (December, 2004)

C-2: Drainage Carpet Work at Sisdol Landfill (December, 2004)

C-2: Leachate Collection Pipes Installation at Sisdol Landfill (December, 2004)

C-2: HDPE Under Main Pipes at Sisdol Landfill (December, 2004)

C-2: (Leachate Pond at Sisdol Landfill Site (December, 2004)

C-2: Water Quality Survey in Sisdol (March, 2005)

C-2: Completion of Improvement of Sisdol Landfill (December, 2004)

C-2: Signing Ceremony for Operation of Sisdol Landfill among Stakeholders (May, 2005)

C-2: Commencement of Waste Disposal at Sisdol Landfill (June, 2005)

C-2: Operation of Sisdol Landfill (June, 2005)

C-2: Operation of Sisdol Landfill (June, 2005)

C-2: Operation of Sisdol Landfill (June, 2005)

C-2: Operation of Sisdol Landfill (June, 2005)

CHAPTER 5

PILOT PROJECT D

PROMOTION OF PUBLIC AWARENESS AND BEHAVIOR CHANGE COMMUNICATION/EDUCATION

CHAPTER 5 D: PROMOTION OF PUBLIC AWARENESS AND BEHVIOR CHANGE COMMUNICATION/EDUCATION

5.1 Background and Strategy

During the Public Hearings (P/Hs) held in each of the five municipalities in March and May 2004 under the Study, a lack of public awareness about the importance of proper solid waste management was highly identified as one of problems. In addition, the lack of a strong sense of responsibilities among the public was pointed out as one of causes of open dumping practices. In order to tackle these problems, the need for effective implementation of public education and awareness has been gradually recognized by all five municipalities.

In light of the widely recognized need to involve the public in solid waste management (SWM), it is obviously substantial for relevant officials in these municipalities and Solid Waste Management and Resource Mobilization Center (SWMRMC) to gain the basic knowledge and skills of strategic planning, implementation, monitoring or supervision, and evaluation regarding awareness and education on SWM. This is also required to put into the practice of Action Plans (A/Ps) on SWM efficiently and effectively since promotion of public awareness and community mobilization on SWM was highlighted as one of strategies in Draft Action Plan (DfA/P) of the five municipalities. Therefore, the Pilot Project on Promotion of Public Awareness and Behavior Change Communication/Education (hereinafter referred as Pilot Project D) was launched under the Study since July 2004. The know-how was transferred directly from the JICA Study Team, local resource persons, qualified local NGOs in these fields through various training and practical activities during the implementation of the Pilot Project D.

5.2 Basic Plan

5.2.1 Project Purpose

The Project Purpose of the Pilot Project D was identified as "Capabilities of relevant staff of five municipalities and SWMRMC regarding public awareness and behavior change communication/ education are strengthened."

5.2.2 Outputs

In order to achieve the Project Purpose, there were three outputs in the Pilot Project D.

As Output 1, the basic knowledge as well as the practical skills related to raising awareness and stimulating the desired behaviors on SWM would be strengthened. Based on the acquired knowledge and skills (Output 1), the municipality staff would put the mass communication and education approach into the practice as a pilot basis (Output 2). In the case of the BKM, they also brought the interpersonal communication and education approach into the practice by mobilizing children and community people in the target communities (Output 3).

Output 1	Basic knowledge about community mobilization including public education in SWM is gained among relevant officials.
Output 2	Know-how of mass communication and education approach is transferred.
Output 3	Know-how of interpersonal communication and education approach is transferred.

5.2.3 Activities

The target groups of Output 1 were relevant staff who were responsible for community mobilization and public education in five municipalities and SWMRMC. The major activities included training and a study tour. The training on Behavior Change Communication (BCC) was provided by local resource persons and members of the JICA Study Team. The three-day study tour to Hetauda, located in the source of Nepal approximately 100 km from Kathmandu, was undertaken since it was relatively famous for innovative community-based SWM activities. The level of knowledge and skills necessary to raise public awareness and promote public education activities varied from one municipality to another. Therefore, it planed to encourage the municipality staff to organize inter-municipality meetings to share ideas and experiences as one of activities of Output 1.

Activities 1 (Pilot Project D-1: Training for Community Mobilization Activities)	
1-1	To provide training regarding community mobilization and public education/awareness on SWM, and hold sharing meetings
1-2	To conduct study tour to Hetauda

The activities of Output 2 were related to mass education and communication. These activities targeting general population were carried out in the five municipalities by relevant staff in collaboration with external organizations and actors.

Activities 2 (Pilot Project D-2: Practice of Mass Communication and Education)	
2-1	To select a mascot of the Study and distribute stickers and posters
2-2	To undertake educational events &exhibition
2-3	To make and broadcast radio commercial
2-4	To make a wall painting
2-5	To carry out competition of clean up in the community

The primary target group of Output 3 was children since it was expected that they could be effective agents as social mobilizers or facilitators in terms of disseminating and reinforcing messages for attitude and behavior changes on SWM among their friends, families and communities. The activities of Output 3 were undertaken by qualified NGO in this field as well as the staff of Social Welfare and Sanitation Section in BKM, in which interpersonal communication and education program was highlighted in its DfA/P on SWM. The major activities are shown below.

Activities 3 (Pilot Project D-3: Practice of Interpersonal Communication and Education)	
3-1	To conduct baseline survey regarding knowledge, attitude and practice on SWM
3-2	To provide counselor training camp for youth and teachers who support children's activities
3-3	To conduct camp , establish "Nature Club" and support small scale SWM activities
3-4	To conduct workshop on resource material development, printing and paper making
3-5	To hold sharing and exchanging meetings among Nature Clubs.
3-6	To conduct impact survey

5.2.4 Plan of Operation

The Plan of Operation (PO) developed for the Pilot Project D is described below.

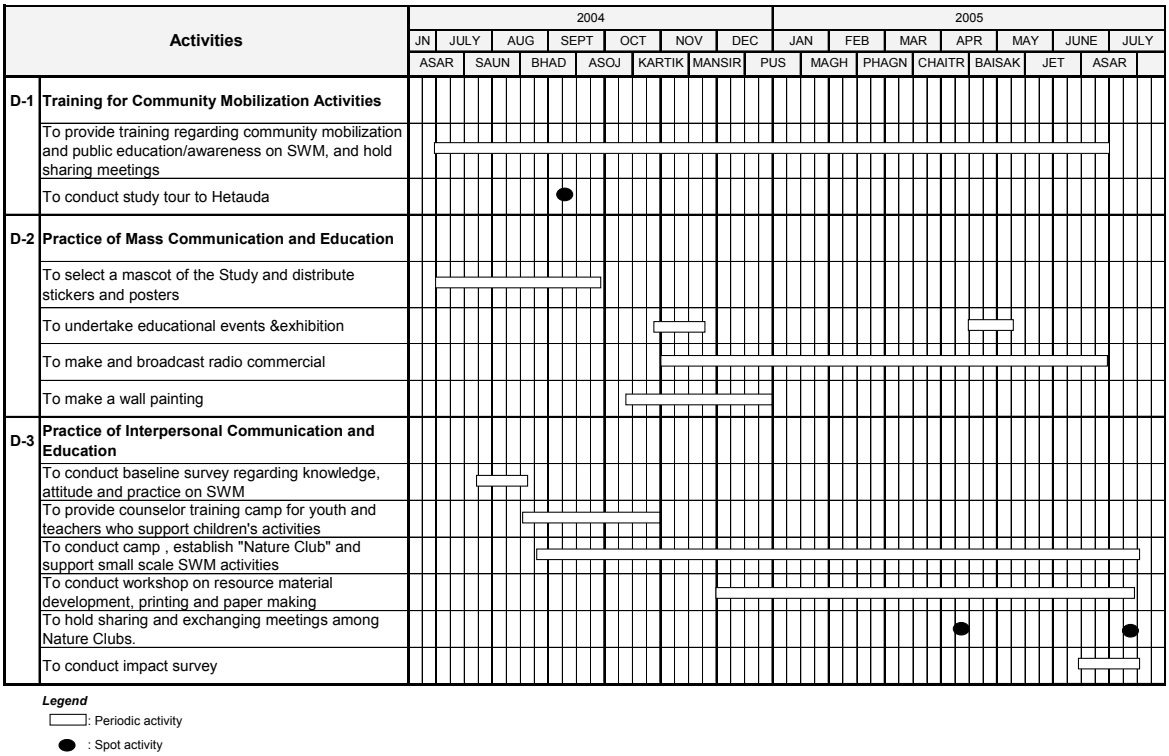


Figure 5.2-1 Plan of Operation for the Pilot Project D (Actual)

Source: JICA Study Team

5.2.5 Inputs and Implementation Organization

The inputs provided from both Japanese and Nepalese sides are shown below.

Japan	Nepal
(1) Personnel • Members of the JICA Study Team - Public Involvement/Social Consideration - Public Relations - Organizational and Institutional Strengthening/Human Resources Development • Local NGOs (2) Operational cost - Professionals of art, radio broadcast - Study Tour to Hetauda	(1) Personnel • Counterparts and other relevant staff - SWMRMC - KMC - LSMC - BKM - MTM - KRM (2) Facilities - Land, buildings and materials

The Pilot Project D was conduced by the following implementation organizations.

Output	Implementation Organizations
Output 1	Focal Points of Pilot Project D, relevant staff in the five municipalities and SWMRMC, and JICA Study Team members
Output 2	Focal Points of Pilot Project D, relevant staff in the five municipalities, and JICA Study Team members in collaboration with Clean Energy Nepal (CEN)
Output 3	Focal Points of Pilot Project D and revenant staff in BKM, and JICA Study Team members in collation with Environmental Camps for Conservation Awareness (ECCA)

5.2.6 Preconditions and Important Assumption

The preconditions referring to the conditions that had to be met before the Pilot Project D was begun are as follows.

Preconditions	▪ Political and security conditions are not worsen.

Important assumptions referring to external factors that were beyond control but would affect the Outputs of the Pilot Project D are described below.

Important Assumptions that might affect the Outputs	▪ Trained staff continue working in municipalities and SWMRMC.

Important Assumptions that might affect the Project Purpose of the Pilot Project D are as follows.

Important Assumptions that might affect the Project Purpose	▪ The importance of public education and awareness on SWM is recognized by high-level officials in municipalities.

5.3 Results of the Activities

The activities conducted until the end of June 2005 under the Pilot Project D are summarized in Appendix 5.1, while the records of workshops/trainings are summarized in Appendix 5.2.

5.3.1 D-1: Training for Community Mobilization Activities

(1) Activities Implemented

1) Kick off Meeting

For Focal Points and relevant municipality staff who were to be involved in the Pilot Project D, a kick off meeting was organized on July 5, 2004. During the meeting, the results of Household Behavior and Attitude Survey conducted in March 2004 under the Study were reviewed. The expectations for the Pilot Project D were also addressed by the participants. Most of participants felt that the Pilot Project D should focus on the enhancement of public awareness and self-responsibility on SWM, and promotion of community-based activities and mobilization. At this meeting, the current activities related to community mobilization, community development and community-based SWM which were being carried out by each municipality were also shared among them (See Appendix 5.2).

In order to assess the knowledge, skills and work experience regarding public involvement in SWM, all the participants were required to fulfill out a questionnaire of Self-Assessment at this kickoff meeting. The results of Self-Assessment are shown in Appendix 5.6.

2) Interpersonal Communication and Behavior Change Communication (BCC) Skill Training

The three-day training on BCC was undertaken on July 21-23, 2004 with resource persons from Youth Initiative. There were 26 participants including the Focal Points of Pilot Project D, other relevant municipality staff and a few of City Volunteers of KMC and MTM. The training covered the concept, roles of interpersonal communication, planning of BCC strategy, development of messages for effective SWM, and action plan of BCC strategy for each municipality. It was conducted by ways of lectures, role-plays, group discussion and presentation (See Appendix 5.2). During the training, the participants discussed and particularly identified housewives and children among the general population as the target audience of the awareness and behavior change communication/education program. In addition, they defined the desired attitude change and the desired behaviors change among the target audience to be focused on under the Study as follows.

Target Audience	General Population (Special focus will be given to *housewives and children*)
Desired Attitude Change:	Self-responsibility of SWM "SWM is not only municipality's responsibility but also our responsibility"
Desired Behavior Change:	3R Activities (Reduce, Reuse, Recycle) "Solid waste should not be just dumped. Waste should be recycled and managed properly."

3) Study Tour to Hetauda

The Study carried out the three-day study tour to Hetauda on September 8-10, 2004 in coordination with Hetauda Municipality. Two staff from each municipality and one staff from SWMRMC participated in this study tour. Since there was a heavy traffic jam due to the landslides on the way to Hetauda, all the programs were carried out on the second day. The participants observed the community-based composting and plastic separation collection, medical waste management, plastic recycling center and municipality's initiative. The participants submitted group reports for each issue and individual reports (See Appendix 5.3).

4) 2nd Term Kick off Meeting

The 2nd Term kick off meeting was held on January 25, 2005 with the participation of Focal Points of Pilot Project D. The planned activities of 2nd Term from January to July 2005 were discussed among the participants (See Appendix 5.2).

5) Training of Trainers (TOT)

There were many requests of TOT from the municipality staff in charge of the Pilot Project D since they had or needed to conduct training on community-based SWM. As a result, a three-day TOT was organized from January 31 to February 4, 2005 by inviting two resource persons from Youth Initiative. The objectives of TOT were to enhance municipality staff's understanding on the concepts of TOT, and to impart knowledge, skills, various tools, methods and techniques on TOT so that the participants would be able to design and conduct training in their respective field. A total of 20 participants including Focal Points of Pilot Project D attended the training. The training covered the concept of training, pedagogy and andragogy, leaning styles, designing of a training program, various training techniques including facilitation skills, writing leaning objectives and designing a training objectives. During the last part of training, participants were divided into pair group and were given to a task to prepare a training session. This practical session was recorded in an audiovisual format. In the end of training, the participants evaluated their performance as a trainer by watching the recoded video (See Appendix 5.2).

6) Social Marketing Training

It has been recognized that Social Marketing is one of the best techniques to achieve public behavioral change by using commercial techniques. The two-day training on Social Marketing Program was conducted on February 20-21, 2005 with the resource person from Social Marketing Distribution. The objectives of training were i) to orient the participants on the basic concept and practice of social marketing approach, ii) to stimulate their interest to apply social marketing approach in their work, and iii) to introduce social marketing format and process. A total of 15 staff, representing KMC, LSMC, BKM, KRM and SWMRMC attended this training and learned the basic concept and key components of social marketing, and the 4Ps theories i.e. Product, Place, Price and Promotion. They also learned how to apply social marketing as a tool to their work through the development of social marketing plans (See Appendix 5.2).

7) Sharing Meetings

There had not been ever a close and active coordination or linkage among those who were responsible for community mobilization and public awareness for SWM in the five municipalities until the Study was launched. It was the first time for them to know relevant activities conducted by each municipality one another at the Kickoff Meeting held on July 5, 2004. Following the meeting, there were requests from several participants to know the details of City Volunteer Program being carried out by Community Mobilization Unit (CMU) of KMC. At their request, the 1st Sharing Meeting on City Volunteer was organized by CMU/KMC on July 27, 2004. Similarly, a total of eight sharing meetings were carried out by the end of Pilot Project.

It was originally assumed that such meeting would be gradually held during the Pilot Project when the target municipality staff became interested in activities such as community mobilization, public awareness and behavior change communication. That was why the number of meetings jointly organized by target municipality staff was set as one of indicators to measure the achievement of Output 1 i.e. Basic Knowledge about community mobilization including public education in SWM is gained among relevant officials in municipalities in PDM. However, the target municipality staff felt that they would like to share relevant activities and lessons learned from other municipalities as soon as possible. Consequently, they took the lead in organizing a series of sharing meetings. The summary of each meeting is illustrated below.

Table 5.3-1 Summary of Sharing Meetings

Topics (Organized/ Facilitated by)	Contents
1st Sharing Meeting City Volunteer (CMU/KMC)	CMU has introduced City Volunteer Program which gives opportunities to young people or students, who are interested in environment issues and have a strong desire to volunteers, to be involved in environment conservation activities done by CMU. CMU invites applicants once a year. Qualified candidates selected work as assistants of the existing City Volunteer for the trial period of three months. After that, the selected candidates will be provided personality development trainings. City Volunteers are not provided any form of monetary remuneration.
2nd Sharing Meeting Women group (CDS/LSMC)	Up to now, about 40 women groups have been established with the support of Community Development Section (CDS)/LSMC and UDLE, which covers all 22 wards. CDS has conducted various group mobilization activities such as awareness program, clean-up program, 3-day training on SWM, income generation, group fund, etc. CDS and women groups explained and shared their experiences with the participants.
3rd Sharing Meeting Women group and community- based SWM (MTM)	Samyukta Mahila Uthan Samittee was formed by local women in Ward 1 of MTM who were mobilized. They have been empowered to involve themselves in community-based SWM such as awareness program, drum composting, and bucket distribution. They shared their experiences focusing on group activities and networking with many external organizations with participants.
4th Sharing Meeting Study Tour to Hetauda (KRM)	The participants of Study Tour shared ideas and lessons learned from Hetauda Municipality and relevant organizations by presenting each group report. Immediately after this meeting, the participants held a meeting with the NEREPA which buys and sells recyclable materials to discuss the possibilities for sale of collected plastic in the Kathmandu Valley.
5th Sharing Meeting Evaluation/Feedback for 1st Public Event (JICA Study Team)	The Focal Points of Pilot Project D gave comments and feedback to each municipality and presented self-evaluation regarding 1st Public Event undertaken as part of Pilot Project D-2. The overall evaluation and the specific comments and feedback to each municipality were also provided by the JICA Study Team.

Topics (Organized/ Facilitated by)	Contents
6th Sharing Meeting Final Preparation for 2nd Public Event (JICA Study Team)	The Focal Points of Pilot Project D shared the current progress of preparation for 2nd Public Event. Each municipality discussed and presented the strategy of 2nd Public Event. The evaluation questionnaire to be distributed to visitors was also discussed and finalized.
7th Sharing Meeting Evaluation/Feedback for 2nd Public Event (JICA Study Team)	The Focal Points of Pilot Project D reviewed their own strategies formulated at 6th sharing meeting. The results of evaluation for other municipal Public Event including feedback and comments were shared among five municipalities, SWMRMC, JICA Study Team and CEN. The comments and feedback of exhibitors and visitors were shared. They raised the issues about the role of Public Event Organizing Committee and discussed solutions for further improvement.
8th Sharing Meeting Nature Club from experience of BKM (BKM)	The experience of formation and mobilization of Nature Clubs being undertaken as part of Pilot Project D-3 were shared. BKM facilitated the meetings and took the participants to the schools in which Nature Clubs were established. At the meeting, the concept of Community Mobilization Network that ensures the continuation of sharing meetings after the completion of the Study was also discussed and finalized.

Source: JICA Study Team

(2) Results of the Activities

1) Feedback of Interpersonal Communication and BCC Skill Training

As Table 5.3-2 indicates, the level of satisfaction of BCC Skill Training was relevantly high in terms of overall training, its topics and content, logistical arrangement and resource persons among the participants. Particularly, most of participants responded that the BCC strategy development and planning were effective and useful. When promotional materials were made as part of mass communication and education component in the Pilot Project D, the staff of the five municipalities who attended BCC Skill Training applied techniques and skills of creating key messages and effective contents. KRM was another example. The staff who gained know-how of developing communication products took the lead in designing and producing a leaflet to promote Plastic Separation Program (Pilot Project B-2).

Table 5.3-2 Level of Satisfaction of BCC Skill Training

Questions (Level of satisfaction)	Scores*	Average (1-5)
1) Overall training	59	4
2) All topics	62	4
3) Overall content	64	4
4) Handout materials	54	3
5) Duration of training	50	3
6) Logistical arrangement	60	4
7) Quality of resource person A	61	4
8) Quality of resource person B	59	4

Note: Total obtainable Scores for each questions is 80. 16 out of 26 responded the above questions.
Source: JICA Study Team

2) Lessons Learned from the Study Tour to Hetauda

It was obvious that the Study Tour to Hetauda encouraged the municipality staff to promote community-based SWM in their municipalities. For example, staff of KRM introduced the simple iron stick called "Suiro" for plastic separation in their Pilot Project B-2.4. Following the Study Tour, they also begun to form women groups and mobilize the existing

youth groups. As summarized in Appendix 5.3, the participants compiled lessons learned from the community-based SWM in Hetauda in their reports.

3) 2nd Term Kickoff Meeting

The 2nd Term Kickoff Meeting provided valuable opportunities for Focal Points to discuss the planned activities for the rest period of implementation of Pilot Project. It was also confirmed i) focus should be given to not only raising awareness but also stimulating behavior change among the public, ii) the effective ways of how to reach and mobilize the target groups should be explored, iii) Ashakaji as a mascot of the Study and promotional materials produced by the Study in cooperation with the Focal Points of Pilot Project D should be well utilized, iv) what Focal Points learned from various training should be put into the practice, v) linkages with local stakeholders should be strengthened, and iv) relevant activities of Pilot Project D should be incorporated into Action Plan on SWM.

4) Feedback of Training of Trainers

Table 5.3-3 illustrates that most of participants were satisfied with three-day TOT. Some of them pointed out that the duration of training need to be more than three days. Others responded that more handout materials should had been provided. The practical session of conducing mini-training was highly evaluated by participants although time was very limited. Since training was one of main activities for participants in their work, they showed keen interest in TOT and actively participated in it. Following TOT, several participants reported that they conducted training on SWM with the use of several training techniques and skills they acquired from TOT.

Table 5.3-3 Level of Satisfaction of TOT

Questions (Level of satisfaction)	Scores*	Average (1-5)
1) Overall training	44	4
2) All topics	44	4
3) Overall content	46	4
4) Handout materials	33	3
5) Duration of training	30	3
6) Logistical arrangement	45	4
7) Quality of resource person A	48	4
8) Quality of resource person B	45	4

Note: Total obtainable Scores for each questions is 55. Eleven Focal Points alone were requested to fill out the assessment for training.
Source: JICA Study Team

5) Feedback of Social Marketing Training

Table 5.3-4 reveals that the training gained fairly high scores in all evaluation items falling between the score of 3 and 4. Many participants particularly perceived that the basic concept of social marketing and the ways of adoption of social marketing in practice were relevant and useful to their work.

Table 5.3-4 Level of Satisfaction of Social Marketing Training

Questions (Level of satisfaction)	Scores*	Average (1-5)
1) Overall training	39	4
2) All topics	37	4
3) Overall content	39	4
4) Handout materials	32	3
5) Duration of training	31	3
6) Logistical arrangement	40	4
7) Quality of resource person A	36	4

Note: Total obtainable Scores for each questions is 50. Ten Focal Points alone were requested to fill out the assessment for training.
Source: JICA Study Team

6) Positive Effects from Sharing Meetings

As previously mentioned, the sharing meetings were held in order to exchange the experiences related to community mobilization and public awareness in the field of SWM among the five municipalities and SWMRMC. There were some positive effects from these meetings. For example, KRM learned the practical strategy of formation and mobilization of women group based on experiences from CDS/LSMC and MTM at sharing meetings in August, 2004. Consequently, KRM formed women groups in the selected communities with the help of existing youth clubs in October 2004 as part of the Pilot Project of Plastic Separation (B-2.4).

City Volunteer Program, being carried out by CMU/KMC, gained much attention and interest from other municipalities. MTM temporarily assigned two young people as volunteers and allowed them to attend several training undertaken by the Pilot Project D-1 together with the municipality staff. They were actively involved in organizing the 1st and 2nd Public Events in MTM. MTM decided to incorporate this City Volunteer Program into the A/P and will begin to implement it in FY2005/06 (2062/63[1]). CDS/LSMC also adopted City Volunteer Program and conducted orientation training for them. They will mobilize these city volunteers in FY2005/06 (2062/63) to be involved in various municipal activities in the community levels.

Nature Clubs, being implemented in CMU/KMC and BKM as the Pilot Project C-3, were also replicated in the rest of three municipalities. They plan to form children clubs in FY2005/06 (2062/63) for the purpose of imparting basic knowledge and information on SWM and other environmental issues and encouraging them to participate in a variety of environmental programs.

A series of meetings and interaction allowed municipality staff not only to share the relevant programs in the area of community mobilization, but also to promote coordination among them. When conducting training on SWM by one municipality, it used to arranging resource persons from external organizations. However, inviting resource persons from one municipality to another was in place among them. The case of field visit of community groups in one municipality to another was increasingly observed.

In accordance with the interactive dialogue and the inter-municipal coordination among Focal Points, they recognized the importance and necessity of continuation of such initiatives. It was confirmed at the 8th Sharing Meeting that they would continue to coordinate and

[1] Nepalese Year

reinforce one another in the filed of community mobilization for sustainable SWM through forming a Community Mobilization Network.

5.3.2 D-2: Practice of Mass Communication and Education

(1) Activities Implemented

1) Mascot Selection

A mascot can generally play a vital role of enhancing awareness and educational program and delivering the desired messages to a number of people. In order to select a mascot for the Study, each municipality held the discussion meetings by inviting local NGOs, CBOs, local clubs and relevant stakeholders in July 2004. During each meeting, it was clearly explained that the mascot should be a simple, identifiable, meaningful, and non-debatable, and lovable character related to SWM. As a result, each municipality proposed two ideas of mascot (See Figure 5.3-1). The Selection Committee, which comprised 12 members including the General Manager of SWMRMC, Focal Points of Pilot Project D from the five municipalities, the members of the JICA Study Team, the artist and the local experts on communication and mass education, discussed and gave scores to each proposed mascot based on the above selection criteria. Finally, a boy named Ashakaji, which literally means hope, was selected. The Committee also decided that this mascot boy would hold a broom, a compost bin or whatever related to SWM to encourage the people to manage solid waste. The process and results of mascot selection were reported at 3rd Public Hearing in each municipality.

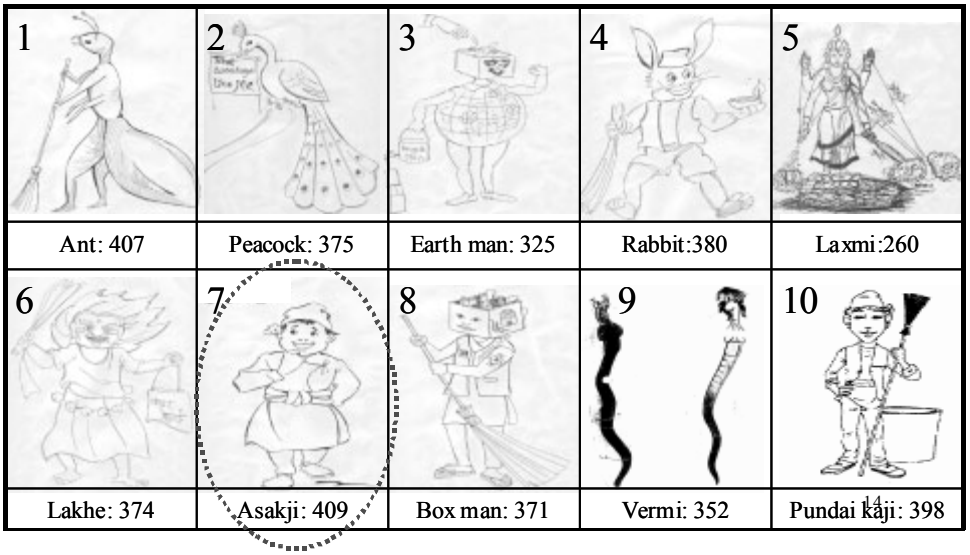


Figure 5.3-1 Mascot Proposed by Each Municipality

Note: Total Scores=600
Source: JICA Study Team,

The mascot, together with the mass education campaign, was launched on August 1, 2004. During the launching ceremony, a short-mime related SWM was performed by five boys who looked like Ashakaji from each municipality. Furthermore, an attractive big-size hoarding board (2.4 m x 4.6 m) imprinted with Ashakaji and the message of "Turn your

waste into cash" was installed at a central location of KMC. The small-size hoarding boards (1.8 m x 2.4 m) which would be given to each five municipality at the public hearing program were also set up. This launching ceremony received considerable publicity by various media such as Kantipur, Himalayan, Kathmandu Post, Hamro Kathmandu TV program and Metro FM.

Figure 5.3-2 Hoarding Board

2) Design and Production of Promotion Materials

Promotional materials are important and useful tools to deliver the desired messages to the public. The Focal Points for Pilot Project D discussed and decided that stickers, notebooks and leaflets would be made to reach children and housewives as primary target groups. They were also involved in creating effective messages on SWM and making contents of each promotion material based on the knowledge and skills which were gained by the BCC Skill Training previously mentioned. They also participated in a pre-test of these materials several times.

3) Participatory Planning Training for Mass Communication/Education

Participatory Planning Training for Mass Communication/Education was conducted on August 25-27, 2004 with the objective of leaning about planning and implementation of Mass Education Campaign, and discussing the program for CKV Mass Education Campaign. There were 26 people including relevant municipality and SWMRMC staff, and a few volunteers or staff of NGOs who were recommended by municipalities.

On the first day, the participants learned the concept, objectives of mass communication and social mobilization. Following the lectures, they discussed possible activities for mass communication and education on the basis of each municipality. The second day was focused on development of action plan for Mass Communication and Education. As a training exercise, the participants set certain topics such as plastic separation, community-based composting, and source separation, and discussed activities, target audiences, desired attitude change, message, communication and media, and intervention strategies. On the third day, the participants made a detailed plan of exhibition on SWM which supposed to be undertaken by each municipality during the Public Events as one of components of the Pilot Project D. At the end of the three-day training, they discussed appropriate messages on SWM to be used for Public Events as well.

4) 1st Public Events

Public Events is a key component of the Pilot Project D-2 to boost awareness and encourage the general population, especially housewives and children, to be actively involved in SWM activities. More specially, 1st Public Events focused on enhancement of self-responsibility on SWM and promotion of waste minimization, waste segregation, making compost, recycling, and safe and appropriate disposal of solid waste. 1st Public Events included i) painting workshop targeting school children, ii) a two-day exhibition program with a drama on SWM as well as hands-on-training on 3R activities, iii) wall painting and art work hoarding board, and iv) radio jingles on effective SWM.

Painting Workshop: Prior to the two-day Exhibition Program, the Painting Workshop was held in each municipality in the middle of October, 2004. The objectives of this Workshop were to familiarize school children with SWM issues, to make them feel their responsibility in SWM, and to explore their talents through art works. There were from 15 to 25 students in 8 to 10 grades from selected private and public schools in each municipality (See Table 5.3-5). During the Workshop, the municipality staff gave a briefing about SWM issues in each municipality. Along the theme of SWM, the students drew the pictures of the current situation and desired one.

Their paintings on the theme of SWM were also displayed in the two-day Exhibition Program and also served as a basis of the concept for the wall painting in LSMC or hoarding boards in the rest of four municipalities.

Table 5.3-5 Summary of Painting Workshops

Municipality	Date	Number of Students	Participating Schools
KMC	October 16, 2004	22	Kanya Mandir H.S.S., Shanti Nikunj M.V. Kumudini H.S., Buddha Jyoti English B.S., Bal Sewa Secondary School, Kathmandu International School, Open House Secondary E.S., New Zenith School, Paropakar A.H.S.S., Jagat Sundar Bwonekuthi, Occidental Public School (11 schools)
LSMC	October 12, 2004	25	Adarsha saral M. V., Shining Stars Boarding School, A.V.M, Shree Mahendra Bhirikuti Secondary School, Tri-Padma M.V., Namuna Machhendra, Ideal Model School, Tika M. V., Pragati Sikshya Sadan, Rupak Memorial, Amar Sishu, Patan, High School, Hindu Vidya Peeth, (13 schools)
BKM	October 16, 2004	15	Shree Ekta English School, Wise Land English School, Shree Samaj Sudhar SS, Shree Gyan Vijaya L.S.S. Jaycees Secondary School, Tara Lower Secondary, Vidhyarthi Niketan M.V., Shree Padma H.S. School, Mahendra Vidya Academy, Mahendra Vidya Ashram, Khwopa Art Pariwal, Samaj Sudhar Secondary School, Gyan Vijaya School, Tara Lower Secondary (14 schools)
MTM	October 16, 2004	19	Bhaktapur Eng Secondary School, Creative Art School, Divya Deep Jyoti Eng School, SOS HGS, New Horizon Eng School, Janak Siddhikali M.V., Om Gyan Mandir, Puja Eng Sec School, Ganesh English School (9 schools)
KRM	October 17, 2004	20	Hill Town International School, Mangal High School, Vaishnavi Ma.Vi., Panga Secondary School, Kirti Secondary School, Bagh Bhairav Boarding High School, Bishow rastriya Secondary School, Rarahil Memorial School, Mangus English School, Pushpa Sudan Boarding School, Bal Kumari Secondary School, Janshewa School, Kirtipur M.V. (13 schools)

Source: JICA Study Team

Exhibition Program: In September 2004, each municipality formed the Public Event Organizing Committee (PEOC) comprising the Chief Executive Officer (CEO), the Focal Points of Pilot Project D, and relevant municipality staff. This PEOC discussed the details of the two-day program including schedule, selection of exhibitors, finalization of contents of drama, and the demarcation line of all necessary logistical arrangement through a series of round consultation meetings. Several volunteers were assigned in each municipality who could help municipality staff since it was the first time, particularly for four municipalities i.e. LSMC, BKM, MTM, and KRM to hold such events on SWM with their initiatives.

BOX 1: Program Highlight

【Day 1st 】
- Inauguration at 10:00 am
- Opening Speech
- Overview of Study
- Exhibition Highlight
- Remarks
- Drama on Solid Waste Management ～*Hamro Phohor, Hamro Jimmewari*～ (11:00 a.m. & 15:00 p.m.)
- Exhibition Program/Hands-on-Training on composting (11:00 a.m.-17:00 p.m.)

【Day 2nd】
- Exhibition Program/Hands-on-Training on composting (10:00 a.m.-17:00 p.m.)
- Drama on Solid Waste Management ～*Hamro Phohor, Hamro Jimmewari*～ (11:00 a.m. & 15:00 p.m.)
- Closing Ceremony at 17:00 p.m.

The Press Conference was organized on October 30, 2004 with the objective of disseminating information on Public Events and delivering the key message-"*Kina Phalne Phohor, Banau Yaslai Mohor* (Why dump the garbage, we can make it money)". Press release was also distributed.

Each municipality also carried out various publicity activities by placing different sizes of banners on the public places, distributing fryers and sending invitation letters to local stakeholders, and joining a FM radio program.

All five municipalities organized more or less the same program, as indicated in Box 1. There were various exhibitors' stalls in which approximately 10 to 12 exhibitors including municipalities, the JICA Study Team, NGOs/CBOs, and local groups displayed different types of community-based composting, paper recycled crafts, products from inorganic waste, eco-sanitation toilets[2], documents and photos of SWM activities. At the exhibition sites, street drama was performed by local youth clubs two times per day, which delivered the messages of "Our waste is our responsibility", and attracted a number of audiences. Hans-on-Training on composting and making paper products was also performed by local women groups and municipalities. Game and quiz for environmental issues were conducted for children. There was a food stall in each exhibition in order to provide traditional food at the reasonable price to the visitors and exhibitors.

[2] They do not use flush but collect the human waste in a special bin which later turns into manure.

Street Drama focusing the message that our waste is our responsibility

Municipality staff explaining how to make vermi-compost

Products from waste attracting children's attention and interest

Figure 5.3-3 1st Two-day Exhibition Program

Source: JICA Study Team

Wall Painting and Art Work Hoarding Board: Wall painting or hoarding board can play a major role of delivering and reinforcing the necessary messages to mass groups of people for a long term. The art works produced by school children at the Painting Workshop were studied and composed by professional artists to make a final product for Hoarding Board and Wall Painting.

Radio Jingles: The radio is one of effective mass communication channels to deliver the messages of the desired attitude and behavior on SWM since it is widely prevalent in Nepal. For radio jingle, the most popular actor of Nepal Mr. Hari Bannsha Acharya and Ms Sabitri Sharma had given their popular vocal. The jingle was aired on the most popular FM stations in Kathmandu Valley such as Radio Sagarmatha, Metro FM, Nepal FM, Star FM, and Paryavaran Chakra ECR FM. This radio jingles delivered the message of "Waste can be managed by responsible citizens" (See Box 2).

BOX 2: Radio Jingles for SWM

(Sound of people and vehicles on street, Male carrying a bag of waste to throw and stopping before a notice)

Male: "Throwing waste here will result in a penalty of Rs. 15,000"! Where should I throw this waste?

(Decides not to throw waste there and arrives at another place to find another notice-)

Male: "People who throw waste here are dogs"! I am not a dog and I can't throw waste here. Where should I go?

(Sound of street being swept)

Male: There used to be a pile of waste here but now it's clean and tidy. I can't throw waste here either. I wonder if people have stopped throwing their wastes altogether.

Female: Yes, people have stopped dispersing their waste. Responsible people manage their waste at home by turning organic waste into compost and also by reusing inorganic waste.

(To listeners) "What about you? How do you manage waste?"

Narration: Solid Waste Management Resource Mobilization Center, CKV /JICA

Artist; Hari Bansha Acharya and Sabitri Sharma Duration; 53 seconds

5) 2nd Public Events

Since Focal Points except for KMC had never had experience in organizing events at the time of the 1st Public Events, the objective from the point of capacity development was to transfer know-how of planning and implementation of such events from the JICA Study Team to them. As for the 2nd Public Events organized from the end of April to the middle of June, it was expected that the five municipalities could take the lead in designing and carrying out mass communication and education activities more actively based on the experiences and lessons from the 1st Public Events. The 2nd Public Events included i) a two-day exhibition program and ii) clean-up campaign.

Exhibition Program: On the occasion of Earth Day on April 22, 2005, the 2nd Exhibition Program for effective SWM was organized by each of five municipalities for two days in the end of April and the beginning of May, 2005. Like the 1st Exhibition Program, five municipalities closely coordinated with SWMRMC. Based on the experiences, feedback and lessons learned from previous Public Events, it was decided that the particular focus of 2nd Exhibition Program would be given as follows:

- Hands-on-Training for compost and recycle will be carried out in order to not only impart knowledge and information on SWM but also provide relevant skills.
- In order to avoid duplicating the items for display, the exhibitors' stalls will be placed according to theme-wise such as general issues on SWM, composting, paper recycle and plastic recycle
- The comprehensive picture like a waste flow need to be presented in order to help visitors to understand the overall SWM issues.

The above points were shared with participants from various media at the Press Conference, which was held one day before the exhibition.

During the exhibition, the exhibitors who had participated in the previous event made a great deal of efforts to display newly-devised items and demonstrate mini-orientation at their stalls. They were very informative and useful for visitors to understand various SWM issues easily. Some municipalities also organized the mini-orientation for making compost and producing materials from plastic and waste paper in coordination with several exhibitors on the stage in order to provide small tips and skills to the audience. It was observed that many visitors filled out the request form for training or purchasing bins in the stalls in which vermi and bin composting were demonstrated. Local groups such as youth clubs and cultural clubs performed the street drama in local language with the messages for stimulating self-responsibility for SWM, and attracted a large number of audiences.

Women group demonstrating for making products from plastic

A number of the audience being attracted by drama

An exhibitor explaining the waste composition by using pie chart

Figure 5.3-4 Two-day Exhibition

Source: JICA Study Team

Kathmandu Valley Clean-up Campaign: Kathmandu Valley Clean-up Campaign was launched in the occasion that Sisdol Landfill (LF) in Okharpauwa came into use on Environment Day, i.e. June 5, 2005. This Clean-up Campaign aimed i) to impart information and knowledge about Sisdol LF among the public, to which solid waste generated daily from KMC, LSMC and partially KRM was taken and ii) to stimulate a sense of self-responsibility for SWM among the public. Each of the five municipalities held several meetings with local stakeholders to identify the areas to be cleaned. Before the Clean-up Campaign, the press conference was organized to disseminate information about the campaign highlights and its detailed schedule, and to give a brief of Sisdol Landfill Site.

The Clean-up Campaign was conducted in certain areas of the five municipalities in the early morning from June 18 to 26, 2005. There were 165 to 350 participants in each municipality including municipality staff, local NGOs and CBOs, women groups, Nature Clubs, city volunteers, youth clubs, colleges and schools. The cap imprinted with Ashakaji and several cleaning tools were distributed to participants.

Most of collected waste which volume was between half truck and six trucks was carried to Teku transfer station and was taken to Sisdol LF for its disposal. Although it was the one-day clean-up campaign, it contributed to encouraging local people to keep their city clean and not to dump their waste haphazardly. It also provided an opportunity that enabled the Focal Points of the municipalities to gain know-how of organizing such campaign effectively.

(2) Results of the Activities

1) Unexpected dispute over Mascot

In August 2004, hoarding boards were removed by the State Minister of Local Development two weeks later after the launching ceremony due to the strong opposition from the Kathmandu Committee of the Jyapu Mahaguthi[3]. According to them, Ashakaji looked like a Jyapu boy holding a broom. Traditionally, Jyapus are farmers and do not carry the broom which is the symbolic tools of Podes and Chyames considered as lower ethnic groups. They claimed that the broom was not suitable in the hands of a Jyapu boy, which would

[3] A group of indigenous Jyapu communities. Jyapu is one of "Newal" ethnic groups who are originally farmers and have been living in Kathmandu Valley.

humiliate their social status. Almost all of municipality staff who had been involved in selection of Mascot belong to Jyapus. As they made a great deal of efforts to ensure the transparency of Mascot selection process as well as criteria, such a strong opposition was really unexpected among the stakeholders of the Study. Once it appeared in newspapers, a number of INGOs/NGOs, students, journalists, and citizens who belong to Jyapu communities sent the supporting messages to the CKV Study Team, and encouraged the use and promotion of Mascot with the objectives of promotion of effective SWM in the Kathmandu Valley.

Through a series of meetings with the Jyapu Mahaguthi, it was concluded that the design of Ashakaji would be changed by taking off all attributes that relate to Jyapu tradition such as the flower on its head, its cap, and color of the dress, knots, and shoes (See Figure 5.3-5). The hoarding board imprinted the new design of Ashakaji was reinstalled in the center of KMC.

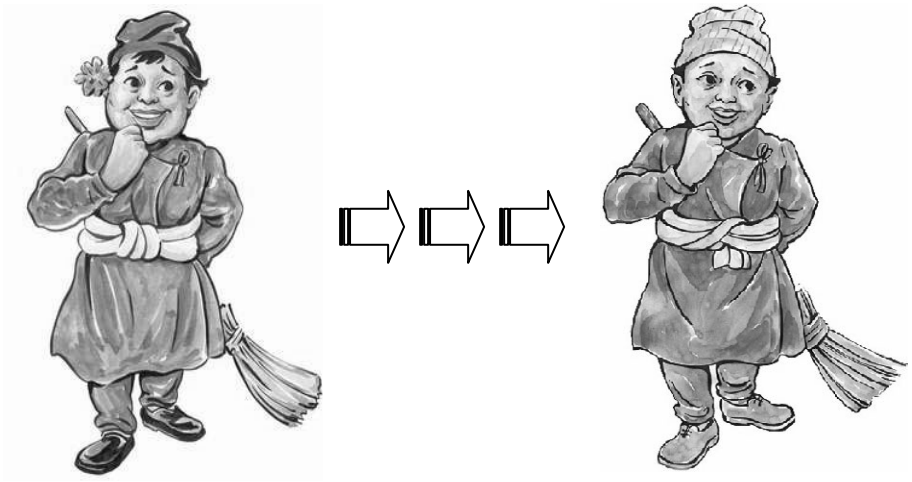


Figure 5.3-5 Old Mascot (left) and New Mascot (right)

Source: JICA Study Team

It was revealed that there was the deep-seated caste segregation in the society of Nepal. The lessons learned from this dispute were that all the stakeholders under the Study should have recognized the current socially- and politically-unstable and frustrated circumstances in which digressionary dispute or debate about politic, ethnic, caste and culture might occur. Furthermore, the most important lesson was that the persistent dialogue among the stakeholders could lead to the better solution. In this regard, it should be noted that not only the decision makers under the Study but also Focal Points of the Pilot Project D as well as TWG members felt a sense of mission and ownership for the Study and made efforts towards settlement of the dispute over the Mascot.

2) Final Products of Promotion Materials

Since the situation or needs of SWM differed from one municipality to another, there were different opinions on the contents of promotion materials. Through several meetings among the Focal Points of the five municipalities and SWMRMC and the JICA Study Team, the design of each promotion material was finalized. The final products are illustrated below.

- **Target Audience**
  - Participants of Training on SWM
- **Major Contents**
  - Introduction of SWM
  - Methods of composting
  - Basic statistics of SWM in the Kathmandu Valley
  - Notebook
- **Size**
  - A5 size
- **Number of production**
  - 5000 copies

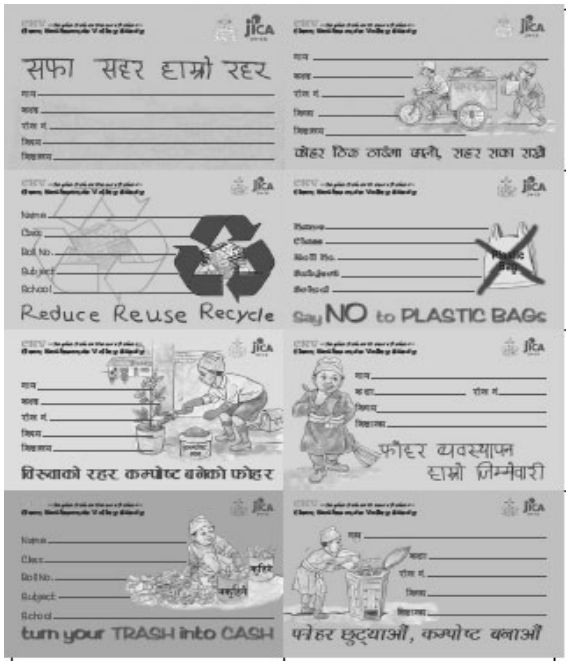
Source: JICA Study Team

Figure 5.3-6 Developed Notebook

- **Target Audience**
  - General Population who are not familiar with SWM at the household level
- **Major Contents**
  - Overview of 3R (Reduce, Recycle, Reuse) Activities at the household level
- **Messages**
  - Why dump garbage, you can make money
  - Our waste, our responsibility
- **Size**
  - A4 size
- **Number of production**
  - 10,000 copies

Source: JICA Study Team

Figure 5.3-7 Developed Leaflet



Target Audience

- Children

Messages

- Clean city is our desire
- Reduce Reuse Recycle
- Plants' desire, use compost made of waste
- Turn your trash into cash
- Dispose of garbage in appropriate places, make our city clean
- Say no to plastic bags
- Waste management, our responsibility
- Separate garbage at source, make a compost

Number of production

- 40,000 sets (1 set = 8 pieces)

Source: JICA Study Team

Figure 5.3-8 Developed Stickers (A)

Target Audience

- Particularly housewives and general population

Messages

- Separate garbage, you can make a compost
- Why dump garbage, you can make money
- (In Newali lanuage) Why dump garbage, you can make money

Number of production

- 15,000 sets (1 set = 3 pieces)

Source: JICA Study Team

Figure 5.3-9 Developed Stickers (B)

3) Feedback and Evaluation of 1st Public Events

For the two-day exhibition, 3,200 to 47,000 visitors were registered in each municipality. It was assumed that many visitors might not have registered due to heavy flow of people in peak time, and that it might attract nearly 4,000 to 5,000 visitors in each municipality. According to the results of rapid questionnaire filled up by some visitors, most of respondents learned about reuse and composting. It was found out that the majority of respondents were willing to participate in training on SWM if such opportunities would be given.

At the 5th Sharing Meeting held on November 21, 2004, Focal Points evaluated the 1st Public Event by themselves and one another. Some feedbacks and comments were also given for each municipality from the JICA Study Team. Although it was the first time for municipalities except for KMC to organize such an exhibition, all municipalities were satisfied with their achievement and gained sort of confidence. Simultaneously, they acknowledged that there was still a room for further improvement in terms of content and management of Public Event. The major comments and feedback for each municipality describes in the Table 5.3-6.

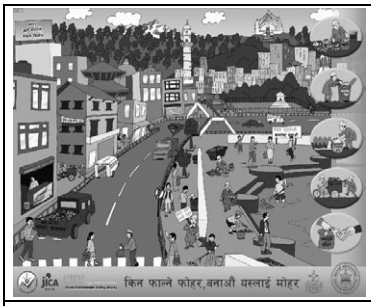
Table 5.3-6 Summary of Evaluation and Feedback for 1st Public Event

Municipality	Positive things observed	Suggestions for further improvement
KMC	- Team work among and commitment from municipality staff were excellent - Various stalls and innovative ideas of ways of exhibition (e.g. model of pie chart of waste composition, demonstration of piling composting, playing a tape recoding of songs related to SWM) - Ashakaji and Ashamaya were good representative - High publicity of media	- The strategy for mobilizing more adults in less-exposed communities should be developed. - Not only community mobilization activities undertaken by CMU but also overall SWM activities such as collection and transportation need to be displayed.
LSMC	- Good mobilization for adults and children due to the identification of appropriate place - Hands-on-Training on composting conducted by WEPCO and CDS was effective - Opening and closing ceremony were well organized	- The municipal roles as an organizer and an exhibitor should be more strengthened. - The more involvement of municipality staff into direct demonstration or orientation activities needs to be considered. - Need to request exhibitors to display and demonstrate more varieties of SWM activities - Ashakaji should have been there for promotion of CKV mascot.
BKM	- Good mobilization for adults and children - The model of compost plant was very attractive and effective - Introduction of municipal activities on SWM including charts, photos, posters and maps was well displayed.	- The municipal role as an organizer should be more strengthened and improved - The more involvement of municipality staff into demonstration or orientation activities need to be considered - Hands-on-training on SWM might be more effective and attractive for children or adults - The opening ceremony should be short and less formal so that the audience can concentrate on it.

Municipality	Positive things observed	Suggestions for further improvement
MTM	- Good mobilization of school children - Team work among, and commitment from municipality staff as an organizer were excellent - Orientation for municipal SWM activities and dissemination of basic information on SWM were effective - Ashakaji was well representative	- The strategy for mobilizing more adults need to be developed - Hands-on-training on SWM might be more effective and attractive for children or adults. - Photos with description might be helpful for the audience. - Waste generated from public events need to be well managed.
KRM	- Team work among and commitment from municipality staff were excellent - The demonstration and explanation on composting from municipality staff were very effective and helpful - Both drama and other performance such as song and dance were attractive for the audience. - Hands-on-training on paper bags was attractive for children	- The more innovative way of display need to be improved. - Waste generated from public events need to be well managed. - The opening ceremony should be short so that the audience can concentrate on it.

Source: JICA Study Team

Regarding the wall panting, it was only carried out at Lagankhel (Wall of Saajha Yatayat) in LSMC due to lack of appropriate places in four municipalities. The size of wall painting was 15 m X 2 m. In case of other municipalities, the art works were composed for the hoarding board (2.4 m X 5 m) imprinted with particular features of each municipality, Ashakaji and the message on SWM. In this hoarding board, Ashakaji showed what each citizen can do for effective SWM. Each hoarding board was hung in the ideal locations of respective municipalities in order to deliver the key message that "why dump the garbage, we can make it money". The final products are indicated below.



KMC

LSMC

BKM

MTM

KRM

Figure 5.3-10 Wall Painting and Art Work Hoarding Boards

Source: JICA Study Team

At the time of 2nd Exhibition Program, visitors were randomly selected in different age groups and asked whether they had listed to the radio jingles produced under the Study. It was found out that a total of 858 out of 1,339 (64%) respondents had ever listed to it. There was no significant difference between male and female in their responses. Some of respondents noted that the radio jingles caught listeners' ears since Mr. Hari Bannsha Acharya's vocal was very famous.

4) Feedback and Evaluation of 2nd Public Events

Focal Points of each municipality reviewed the 1st Exhibition Program and discussed what and how should be improved at the 6th Sharing Meeting held on April 18 2005. Based on the plan formulated on this meeting, each municipality prepared and organized the two-day exhibition. Consequently, a number of people visited it due to rain in some municipalities. It was found that altogether 1,480 to 6,346 visitors were registered in each municipality. If including unregistered visitors, it was estimated that 3,000 to 7,000 people might visit it in each of five municipalities. The results of rapid questionnaire filled up by some visitors revealed that the large number of people were willing to take some actions for source separation and compost making after the exhibition. They also noted that such a program needs to take place once or twice a year. Various media including the majority of daily news papers, local news papers, TV and radio programs covered 2nd Exhibition Program.

The feedback and comments from exhibitors were relatively positive in terms of overall management and content of exhibition, which was shared between exhibitors and municipalities at the meeting, held on May 22, 2005. Most of the exhibitors felt that the management including flow of visitor, space of stalls and identification of venue, the publicity at local levels as well as coordination between exhibitors and municipality need to be further improved. Focal Points also reviewed the exhibition themselves and evaluated one anther at the 7th Sharing Meeting held on May 26, 2005. The Table 5.3-7 summarizes the major comments and feedback.

Table 5.3-7 Summary of Evaluation and Feedback for 2nd Public Event

Municipality	Positive things observed	Suggestions for further improvement
KMC	- Various age groups of visitors - High publicity of media - Good logistic arrangement and support - Appropriate place and sufficient stall space - Waste flow was well presented by KMC - Other various activities (e.g eco-yatra, award) were well conducted for an effective and creative Earth Day.	- The drama on SWM should have been performed - The miking and radio jingles should have been conducted - The mini orientation or hands-on training for composting should have been undertaken at the stage or in the space of stalls - The messages on SWM should have been more emphasized.
LSMC	- Overall logistic arrangement and support were well observed. - Appropriate place and the sufficient space - The municipal activities on SWM were well displayed and presented by staff. - The stage was well utilized by demonstrating mini-orientation and performing song and drama on SWM.	- The more involvement of municipal engineers/volunteers for presentation of municipal activities on SWM need to be considered. - Too many activities at the stage sometimes disturbed the exhibition stalls. The effective ways need to be considered. - The close coordination with various media needs to be improved.

Municipality	Positive things observed	Suggestions for further improvement
BKM	- Good mobilization for adults and children. - The opening ceremony by demonstrating source separation with tricycle was attractive. - Good involvement of Nature Clubs in events. - The municipal activities on SWM were well displayed and presented by staff. - The drama on SWM was attractive.	- The demarcation of responsibilities for logistic arrangement among staff needs to be more clarified and improved. - The source separation, essay contest and Nature Clubs' street drama should have been highlighted on the exhibition days. - The way of dealing with massive groups of school students need to be considered
MTM	- Team work and commitment among municipality staff as an organizer were excellent. - The municipal activities on SWM were well displayed. - The street drama on SWM performed by local children was attractive. - The demonstration on composting performed by NGOs was effective.	- The strategy for mobilizing more housewives need be developed. - The municipal activities on SWM should have been always explained by some staff or volunteers. - The guidance of exhibitors for some newly participated CBOs should have been more given
KRM	- Many local old people visited - Team work and demarcation of responsibility among the municipality staff were excellent. - The miking was very effective. - The drama on SWM was effective and attractive - The mini-orientation of vermi-composting and bin composting in municipal stall was very informative and effective.	- As an organizer, logistic arrangement including preparation need to be improved. - The promotion of plastic collection campaign by municipality should have been more focused - The promotion materials should have been distributed. - The municipal presentation materials should be described in Nepali. - Waste generated from public events need to be well managed.

Source: JICA Study Team

5.3.3 D-3: Practice on Interpersonal Communication and Education

(1) Activities Implemented

1) Preparation Work for Formation of Nature Clubs

Kickoff Meeting: The kickoff meeting was held on July 9, 2004 in BKM in order to discuss and confirm the activities of Pilot Project D-3 with the JICA Study Team and Environmental Camps for Conservation Awareness (ECCA). The concept of formation and mobilization of Nature Clubs targeting school children was presented focusing on that trained children would be good facilitators or peer educators who could impart acquired knowledge and information on SWM to their friends, family and community members through interpersonal communication channels. Through discussions with BKM, it was agreed that the target communities for Pilot Project D-3 Interpersonal Communication and Education should be selected from the same wards in which Pilot Project A-1.1 Practice of Source-separated Collection would be implemented by BKM.

Baseline Survey: The baseline survey was conducted in the end of July 2004 with the objective of assessing the level of knowledge, attitude and practice on SWM among the target communities. The survey covering 156 households (HHs) in five wards namely Ward 13, 14, 15, 16 and 17 revealed that the level of local participation in community-based

SWM activities was very limited although the respondents felt necessity of community participation. The needs for provision of awareness raising program and training on SWM were also identified among the target HHs. Considering positive attitudes towards public involvement in SWM and the collection route, BKM finally decided to select Tanani of Ward 14, Itachhen of Ward 15, and Bharbacho of Ward 17 as target areas for Pilot Project D-3 and A-1.1.

Citizen Workshop and Group Formation: A two-day Citizen Workshop was held in August, 2004. A total of 34 participants including local people, ex-ward representatives, teachers, youth volunteers in three target wards, and municipality staff shared the results of baseline survey and discussed the details of Pilot Project D-3 (See Appendix 5.4).

In order to monitor the activities of Pilot Project D-3 as well as A-1.1 and to give necessary assistance for better results in ward level, the Core Group comprising 11 to 19 members was formed in each target ward. Most of its members were farmers and teachers. They also selected one Group Leader who would make a decision about the community activities including Pilot Projects under the Study and give advice to the Facilitator (to be mentioned in the following section).

Counselor Training Camp (CTC): The Counselor Training Camp (CTC) was held in September 2004 for those who had a strong desire to support Nature Clubs and other SWM activities as Counselors under the Pilot Project D-3. There were a total of 23 participants including university/college students, teachers, and municipality staff living in the target wards. The camp covered various topics like the introduction of the Study, the existing situation and future approaches of BKM on SWM, communication for coordination, 3R (Reduce, Reuse and Recycle) activities, community mobilization strategy and team work. During the camp, one young person was selected as the Facilitator in each of three wards. It was expected that these Facilitators would act as a bridge between the Core Group and Nature Clubs, and help design Nature Club's activities and carry out them. The details are illustrated in Appendix 5.4.

Camp for Children and Formation of Nature Clubs: A three-day Camp was undertaken for school children on September 16-18, 2004. Altogether 24 children attended it from the three schools and the three target toles. They learned the current situation of SWM in BKM and the concept of 3R as well as source separation. They also developed the creative skills by making various products made from waste materials. In the last day of the Camp, they learned the role and task of Executive Committee of Nature Club as well as the duties and responsibilities of other members of Nature Club. Finally, six Nature Clubs were established (See Appendix 5.4). As the Figure 5.3-11 illustrates, three clubs were formed in schools while the rest were formed in each tole.

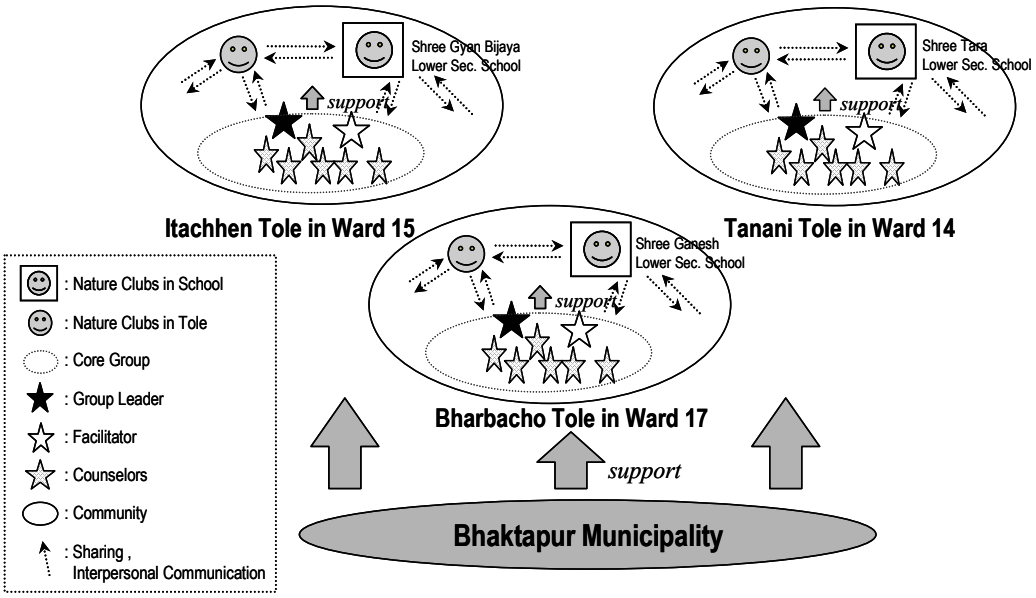


Figure 5.3-11 Nature Clubs and Supporting Stakeholders

Source: JICA Study Team

2) Supporting Program for Nature Clubs

One-day Field Visit: A one-day field visit program for members of Nature Clubs was organized three times on September 26, 2004, April 8 and April 15, 2005 in order to expose them to various initiatives related to 3R activities in the Kathmandu Valley. They visited the paper recycling plant and NGO which provided training of making products from the waste in BKM, the community composting facility in Rato Pool, the vermi-composting site and some households bin-composting in KMC.

Workshop on Product Making from Waste: The Workshop on product making from waste took place for Nature Clubs with the technical support of Prayatna-Nepal, local NGO, on October 1-2, 2004. All together 25 members attended and learned some tips of producing varieties from reusable goods. They enjoyed making various products such as animals, flowers, greeting cards and monument, which were made from waste of plastics or papers. These developed products were displayed at the 1st and 2nd Exhibition Programs held as part of Pilot Project D-2 in BKM.

Distribution of Handbook: It is generally recognized that peer education through interpersonal communication channels can be more effective when peer educators deliver the information and knowledge about the certain issues by using small printing media such as leaflets, booklets and flipcharts. Thus, a handbook on SWM and recycling options with illustrations was developed in coordination with BKM and SWMRMC. The members of Nature Clubs were given this handbook and encouraged to give the information on ways of reducing waste to their friends, family and neighbors.

Interaction with BABA: The interaction program with BABA, i.e. Nature Clubs established in KMC with support from KMC/CMU was held on April 2005. 11 children from BABA and 35 children from Nature Clubs in BKM participated in this program. All the Nature

Club members shared their feeling and the benefit being Nature Club members as well as successful activities. Their challenges and practical solutions were also discussed among the children. In the end of program, Nature Clubs in BKM designed the three-month action plan with the help of BABA

Essay Competition: On the occasion of Earth Day, the On the Spot Inter-School Essay Competition was organized. The program was conducted in two categories, the first one was of class 6-8, and second one was of class 9-10. There were all together 62 students from 19 schools including members of Nature Clubs. The participants were given the following topics separately and wrote the essay for an hour.

- Category I : Role of student in clean up and solid waste management
- Category II : Role of solid waste management in an environment improvement

The papers were checked by a newly-formed committee comprising BKM and external person in the areas of presentation, language, and subject matter. The committee checked the top ten copies in each category and declared the winners. On May 20, 2005, the certificates were distributed to all the participated schools, and the Ashakaji trophy specially designed for the program was given to the winner of both categories.

Talk Program: The first talk program was conducted by inviting an expert for waste management and incinerator on May 7, 2005. A total of 36 members of Nature Clubs attended it and were encouraged to promote waste minimization and source separation at source for effective SWM. The second talk program was carried out on June 14, 2005 in which all together 29 Nature Club members participated. The participants learned the effect of daily produce waste and the ways of prevention and minimization of unnecessary packages.

Installation of Paper Recycling Plant: With the educational objective of giving concept of recycling and SWM, one paper recycle plant was installed at Shree Gyan Bijaya Lower Secondary School in Ward 15. After installation, the two-day hands-on-training on paper making and product was undertaken. The participated members of Nature Clubs learned the methods of making the recycling paper from the waste papers. They enjoyed making the recycling paper and paper products such as bags and photo stands.

Drama: In order to deliver the messages on environmental issues and SWM, the members of Nature Clubs practiced performing the drama. The first drama show was performed on the prize distribution program for essay competition. The message was that the waste could be managed at the household and community levels. They also performed the show at school program and in the communities on the occasion of Environment Day on June 5, 2005.

Nature Club Interaction Program: The interaction program among 6 Nature Clubs was conducted on August 13, 2005 with the participation of 28 Nature Clubs' members, guide teachers, Facilitators of Core Groups. Each Nature Club presented their previous activities and shared the experiences and challenges faced during their activities one another. The Table 5.3-8 illustrates the problems and solutions Nature Clubs discussed.

Table 5.3-8 Problems and Solutions discussed among Nature Clubs

Problem	Solution
Communication Gap	- Joint meeting of all nature club in the regular interval - Submit the report to the core group, school in every three months
Lack in the relation with other nature club	- Participate in the program conducted by other nature club - Regular interaction program among the nature club - Establish joint committee of all nature clubs
No time (regular date) was fixed	- Nature club interaction in every two months
Award for the best performance Nature Club	- Award best nature club every year - helps to motivate other nature club

Source: JICA Study Team

3) Programs for Building a Supporting Mechanism for Nature Clubs

Successful Nature Clubs called for a supporting mechanism in schools or communities. More specifically, the monitoring and guidance from school teachers and community members were required to support their activities. Since Nature Clubs were established in both schools and communities as a pilot, several activities targeting school and community stakeholders were carried out during the implementation of Pilot Project D-3.

School Visit and Orientation for School Teachers: The school visit program to three target schools was conducted in September, 2004 with the objectives of promoting the better understanding of the Nature Club and its activities among the principles and teachers, Core Groups, staff of BKM. It was found that some school was worried about the sustainability of the program in the future and asked BKM to clarify their roles after the completion of the Pilot Project D-3. In order to clarify each role of BKM and target toles, the one-day orientation program was also carried out on October 9, 2004. These programs contributed to building the better relationship with teachers in these three schools.

Interaction with Core Groups: Although the Core Group was formed in each tole, its members, except for Facilitators and several Counselors, were actively involved in various activities for supporting Nature Clubs. Through a series of interaction with Core Groups, it was found that the majority of community people including the members of Core Group were ready to help the Nature Clubs' activities and to promote interpersonal communication and education on SWM voluntarily. In order to make Core Groups to be actively involved in supporting activities for Nature Clubs, it was proposed that the Core Groups would take the responsibility of all planned programs and implement themselves with the help of BKM. The members of Core Groups were very positive towards this proposal and took the lead in organizing field visit, talk program and essay competition in coordination with the concerned people and organizations.

Training on Management of House Waste: One-day training on management of house waste was given to housewives in three target toles separately in the end of December 2004. Since all the participants were from Newar ethnic group and some of them did not understand Nepali, the resource person from CMU/KMC used local Newali language. The participants were very positive with the bin composting and were ready to apply it in their home. As a follow-up activity, the field visit was organized on July 13, 2005 to observe different composting activities in different places. A total of 20 housewives participated in

this program and visited vermi-composting site of KMC, home composting in LSMC, and community composting facility in Rato Pul.

Composting Bin Distribution: The compost bins were distributed to some households and schools in Ward 14, 15 and 17. During the distribution, members of Nature Clubs gave short brief on the use of composting bins. The Sun Shine School in Ward 17 became interested in them after the interaction program with the Ganesh Nature Clubs. On the other hand, it was found that most of households had no sufficient space to keep the compost bin in their home. Only those who had sufficient space started home composting by using bin. BKM decided that the remaining compost bins would be distributed to other households that are not included in the target ward.

Impact Survey: It was originally planned that the same questionnaire would be used for both baseline survey and impact survey under the Pilot Project D-3, and that the results would be compared. However, the baseline survey needed to be conducted to analyze the current situation and identify target areas and target groups rather than to identify the baseline data regarding the level of knowledge, attitude and practice (KAP) of waste management among target groups. Thus, it was not possible to compare the change in KAP regarding waste management among target groups objectively before and after the Pilot Project D-3. Instead, the impact survey was conducted in May 2005 with the objective of identifying the outcome of Nature Clubs in terms of interpersonal communication and education approach. Khwopa College volunteers and local volunteers conducted the field interview for the randomly selected people of different groups with the use of the developed questionnaire (See Appendix 5.5).

Table 5.3-9 Sample Size of Impact Survey

S.N	Item	Ward 14	Ward 15	Ward 17	Total no. of respondents
1	Non nature club member students	0*	20	17	37
2	Nature club members	6	15	12	33
	(Nature Club members in school)	(0**)	(12)	(7)	(19)
	(Nature Club members in community)	(6)	(3)	(5)	(14)
3	Teachers	0*	6	6	12
4	Core Group members	4	6	6	16
5	Community members	21	25	34	80
	Total no. of respondents	25	72	75	178

Note: *Unfortunately, the Impact Survey did not cover these groups without the permission of principal of Tara school.
**In the case of Ward 14, only members of community Nature Club were interviewed due to the above reason.
Source: JICA Study Team

Citizen Level Sharing: In order to review the Pilot Project D-3 and discuss its sustainability, the citizen level sharing meeting was organized on August 12, 2005. There were altogether 51 participants including BKM staff, ex-ward representatives, teachers, youth volunteers, waste collectors, and other key local people of target wards. As a result of the discussion on future approach after the Pilot Project D-3, the participants agreed that they would request BKM to keep having a strong commitment in Nature Clubs. More specifically, they would request BKM to assign one staff as a focal point in charge of monitoring and observation of the Nature Club program and coordination with Core Group.

(2) Results of the Activities

1) Nature Clubs' Activities

Once established, the members of Nature Clubs prepared three-month action plan for group activities. For implementing their activities, Rs 5,000 was given to all the Nature Clubs. The money was handover to the schools or the Facilitator of Core Groups. Based on the action plan, the Nature Club organized a variety of activities with the help of Core Groups and school teachers under the supervision of staff of BKM. The major activities are described below.

Table 5.3-10 Summary of Nature Clubs' Activities

Nature Club		Major Activities
Ward 14	Tara Nature Club (School)	- Quiz context in the school - Visit day care center and observe the cleanness
	Tanani Nature Club (Community)	- Inter Nature Club Quiz contest - Clean up program in tole - Participation in the bucket distribution for Source-separated Collection conducted by BKM under the Study - Participate and involve in the different activities organized by BKM and ECCA - Participate in the exhibition organized by BKM under the Study
Ward 15	Gyan Bijaya Nature Club (School)	- Publishing a magazine covering environmental issues with the support from BKM, the JICA Study Team and other private organization like shop - Clean up program in school premises - Different sport competition inside the school - Prize distribution program - Participate and involve in the different activities organized by BKM and ECCA - Participate in the exhibition organized by BKM under the Study - Sharing program with other school students and teachers after participation in the different activities
	Itachhen Nature Club (Community)	- Tole clean up program - Inter nature club handicraft (made from the waste materials) competition - Prize distribution program of inter nature club handicraft competition - Participate and involve in the different activities organized by BKM and ECCA - Participate in the exhibition organized by BKM under the Study
Ward 17	Shree Ganesh Nature Club (School)	- Quiz competition in school - Various sports competition - Clean up program in surrounding and inside school building - Sharing program with other school students and teachers after participation in the different activities - Clean up program and rally in Ward 14, 15 and 17 organized by BKM under the Study - Interaction program with Sunshine school students
	Bharbacho Nature Club (Community)	- Tole clean up program - Handicraft (product for the waste materials) training to the other friends - Participated in the bin and bucket distribution for Source-separated Collection conducted by BKM under the Study - Organized various sports competition - Sharing program with other friend after participation in the different activities - Participate and involve in the different activities organized by BKM and ECCA - Participate in the exhibition organized by BKM under the Study

Source: JICA Study Team

It should be noted that Sunshine School in Ward 17 was impressed by Shree Ganesh Nature Club during the interaction program, and established Nature Club in their school.

2) Findings of Impact Survey

The results and conclusions drawn from the impact survey are summarized below (See Appendix 5.5).

Although the implementation period was very short, Nature Club in BKM was well recognized and positively appreciated by different categories of respondents interviewed.

It was found that the awareness activities done by the children of Nature Clubs were very effective. The majority of them shared the new things and information among their family members first, and then to their friends and other people. Children can easily deliver the messages and information on SWM to their family members. In order to make Nature Club play a great role of effective agents who can impart knowledge and information on SWM to other friends and community people through interpersonal communication channels, more specific skills including communication need to be provided to them.

As most of Nature Club members pointed out, it was easier for them to carry out various activities in schools rather than in communities. It was found that the support from the teachers and schools helped to make the program of Nature Club more effective and successful. Further, schools could incorporate their Nature Club activities in their school annual calendar.

Most of the respondents in different categories reported that no significant difference between Community Nature Club and School Nature Club was found from point of view of impacts of delivering information and messages on SWM. However, the scope or areas of their activities was different from one to another. The Community Nature Club focuses their activities in the community only while the School Nature Club implements the program in both community and school. The Community Nature Club will be more active if the community or Core Group is actively involved in Nature Club activities.

Nature Club activities brought about positive effects to its members. 67% of respondents interviewed felt that their study was improved, and close to 60% of respondents reported that their self-confidence was enhanced through Nature Club activities. The majority of members interviewed who faced challenges (74%) reported that they solved problems or challenges by discussing among the members first rather than consulting with teachers or other people.

Regardless of wherever activities take place, the supporting mechanism from stakeholders such as school teachers, municipalities, communities or parents is the key to the effective Nature Club. The coordination mechanism with different supporting stakeholders is also essential for sustainability of Nature Club.

3) Sustainability of Nature Clubs after the phase-out of Pilot Project

During the Nature Club Interaction Program, the members of 6 Nature Clubs formed a committee representing two members i.e. the Chairman and Secretary of each club with the objectives of sharing the programs and supporting one another to make the program effective and sustainable. It was also decided that each Nature Club would organize the interaction

program in which other Nature Clubs could participate every two month. On the other hand, for the existing School Nature Clubs, the agreement among BKM and Schools was made in order to continue to support Nature Clubs. It was also decided that the focal point would be assigned as a coordinator from the BKM to continue to monitor the program by utilize developed guideline for Core Groups and Nature Clubs. BKM decided to provide Rs 10,000 to each Core Group as the subsidy for their activities.

5.4 Evaluation of Pilot Project D

5.4.1 Achievement Level

The achievement levels of project purposes and outputs of the Pilot Project D were discussed based on the OVIs as shown in Table 5.4-1. On the whole, most of the OVIs have been achieved during the past one year pilot project implementation period.

Table 5.4-1 Achievement Level of the Pilot Project D

Project Purpose /Outputs	OVIs	Achievement Level
Project Purpose ▪ Capabilities of relevant staff of the five municipalities and SWMRMC regarding public awareness and behavior change communication/ education are strengthened.	▪ The strategies regarding awareness and public education are formulated and incorporated into Action Plans on SWM in each municipality by June 2005.	▪ The strategies regarding awareness and public education were formulated and incorporated into Action Plans on SWM in each municipality by the end of June 2005.
Outputs 1 Basic knowledge about community mobilization including public education in SWM is gained among relevant officials in municipalities.	1-1 80% of target group has participated in training by the end of the Pilot Project. 1-2 The meetings on awareness and public education are jointly organized by target groups three times by the end of the Pilot Project.	1-1 72% of target group had participated in training by the end of the Pilot Project. 1-2 The meetings on awareness and public education were jointly organized by target groups five times by the end of the Pilot Project.
2 Know-how of mass communication and education approach is transferred.	2 An educational event is implemented by target groups in each municipality by the end of the Pilot Project.	2 An educational event was implemented by target groups in each municipality by the end of the Pilot Project.
3 Know-how of interpersonal communication and education approach is transferred.	3 The level of knowledge, attitude, and practice regarding SWM is improved among targeted children or communities.	3 The level of knowledge, attitude, and practice regarding SWM has improved among targeted children or communities.

Source: JICA Study Team

5.4.2 Evaluation

Relevance: Pilot Project D was consistent with Solid Waste Management National Policy (MOLD) that places an emphasis on the need of promotion of public involvement in SWM activities. At the time of evaluation, the target groups of Pilot Project D viewed the series of interventions undertaken under this Pilot Project as valuable opportunities for them to

better understand how a BCC component should be developed and implemented. Through a number of sharing meetings and training, they have also been encouraged to exchange views and experiences with one another. Such approaches were greatly supported by them since the design of Pilot Project enabled them to put what they learned from the training (D-1) into actual practice (D-2 and D-3). It can be said that Pilot Project D met the needs of target groups and had high validity in its approaches.

Effectiveness: The Project Purpose has been successfully achieved. Regarding the attribution of all Outputs to the Project Purpose, Outputs 1 and 2, to a great extent have contributed to the achievement of the Project Purpose. Since Output 3 has been limited by being focused on the staff of BKM, the majority of target groups have not been directly involved in interventions related to Output 3 (Pilot Project D-3). Regarding Output 1, it served as the basis of other outputs since it contributed to improving the level of knowledge and skills of target groups, which would be necessary to raise awareness and stimulate behavior change among the public. Since the target groups acknowledged that they learned through the practical implementation of Pilot Project D-2 and D-3, the effects of these Outputs 2 and 3 to the Project Purpose were also recognized at the time of evaluation.

Efficiency: Most of the necessary inputs have been made as planned from the Japanese side and Nepalese side. Since the Pilot Project is part of the Study, most of the operational cost was borne by the Japanese side. Much effort for budget allocation needs to be made by the Nepalese side when similar interventions are to be undertaken by municipalities in the future. Preconditions and Important Assumptions did not seriously affect the achievement of the Outputs. However, the Preconditions including frequent transfer of decision makers in municipalities and the strike caused by political instability more or less affected the progress of planned activities.

Impacts: Pilot Project D has had significant positive and unexpected impact on municipalities. First, one of the impacts was that Pilot Project D promoted inter-municipal coordination and sharing more than expected. For example, LSMC and MTM plan to introduce a City Volunteer Program being undertaken by KMC. For training on SWM, the resource persons from municipal staff have very often been exchanged under intra-municipal coordination during and after Pilot Project D. Not only the target five municipalities but also other municipalities such as Hetauda and Dharan municipalities visited the public events organized under Pilot Project D and adopted the idea to hold an exhibition as part of public awareness activities. Second, Pilot Project D contributed to considerably strengthening the linkage and network between municipalities and stakeholders working in the area of SWM such as NGOs/CBOs, universities/colleges, schools, local clubs and groups, media and local communities. Third, Pilot Project D has had positive impact on the public. More specifically, it could be said that this Pilot Project successfully stimulated the public to create a demand for information and skill training on SWM through public events and other interventions.

Sustainability: Regarding technical aspects, it is well recognized that Pilot Project D has improved the relevant knowledge and skills on public awareness and education as well as behavior change among the target groups through various training sessions and actual implementation of activities together with OJT. For example, it was observed that the

target groups took the initiative in organizing the relevant programs on the occasion of Environment Day in 2005, besides Pilot Project activities. It is, therefore, expected that the effects of Pilot Project D could be sustained from the technical point of view if the necessary budget and the appropriate allocation of staff were to be secured.

The prospect for sustainability of the effects of Pilot Project D with respect to the organizational and financial aspects considerably differs from one municipality to another. Since KMC/CMU and LSMC/CDS are independent units and sections respectively, they have a certain amount of budget and are able to make decisions on most of the planned activities themselves. Although MTM/CDSS is an independent section, two staff who were in the target groups of Pilot Project D are occupied by various other responsibilities. In the case of KRM, there is a shortage of time on the part of staff and budget for relevant activities, which might affect the sustainability of the effects aimed at by Pilot Project D. The relatively rigid organizational structure of BKM might limit the sense of ownership and responsibility for the programs and discourage innovative ideas from the targeted two staff. It should be noted that an enabling environment needs to be ensured by each municipality, otherwise the acquired knowledge and skills among the target groups through Pilot Project D cannot be effectively and efficiently utilized for municipal SWM activities.

In order to sustain the effects of Pilot Project D from an institutional aspect, it is ultimately important for municipalities to institutionalize and utilize the A/Ps for SWM, in which a BCC component including public awareness and education as well as community mobilization was included. The example of municipal initiatives on the occasion of Environment Day without the support of the Study illustrated that there is a good prospect of the sustainability of the effects of Pilot Project D.

5.5 Lessons Learnt from Pilot Project D

It is commonly understand that mass communication and education is a valuable approach to influence many people promptly and effectively. Particularly in the field of solid waste management, it was learnt that these approaches could contribute to raise the public awareness, to give the practical solutions for solid waste problems, and to disseminate the educational messages and fundamental information regarding the solid waste management. Since the municipal staff provided skills for 3Rs attempts at the public events, many people showed deep interest in SWM. Especially it should be noted that request for purchasing the home composting bins or for participating the SWM training course was significantly increased after the public event held as one of the mass communication and education activities. The network between the municipalities, NGOs, CBOs, universities, schools and media has been also strengthened through the activity.

Regarding the promotion of behavior change, interpersonal communication and education was recognized rather effective way of interactive communication so that behavior change could be accelerated through the exchange of communication among individuals or group members. Actually it was observed that children who were members of Nature Clubs told what they learned about basic information or skills/knowledge of SWM to their family first and then to their friends. In addition, interpersonal communication by children was quite effective in BKM where it was considered to be difficult to establish such communication framework due to the social background.