"REG-14: Refugee Emergency: Fast track project design on water, wastewater and solid waste (focusing on wastewater and solid waste), 28-29 March 2018

Training Report for Track2: *Solid Waste Management*

Version	Document Title	Author	Review and Clearance
1	"REG-14: Refugee Emergency: Fast track project design on water, wastewater and solid waste (focussing on wastewater and solid waste) - track 2	Ammar Abu Drais	Costis Nicolopoulos

THE SWIM AND H2020 SUPPORT MECHANISM PROJECT (2016-2019)

The SWIM-H2020 SM is a Regional Technical Support Program that includes the following Partner Countries (PCs): Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, [Syria] and Tunisia. However, in order to ensure the coherence and effectiveness of Union financing or to foster regional co-operation, eligibility of specific actions will be extended to the Western Balkan countries (Albania, Bosnia Herzegovina and Montenegro), Turkey and Mauritania. The Program is funded by the European Neighborhood Instrument (ENI) South/Environment. It ensures the continuation of EU's regional support to ENP South countries in the fields of water management, marine pollution prevention and adds value to other important EU-funded regional programs in related fields, in particular the SWITCH-Med program, and the Clima South program, as well as to projects under the EU bilateral programming, where environment and water are identified as priority sectors for the EU co-operation. It complements and provides operational partnerships and links with the projects labelled by the Union for the Mediterranean, project preparation facilities in particular MESHIP phase II and with the next phase of the ENPI-SEIS project on environmental information systems, whereas its work plan will be coherent with, and supportive of, the Barcelona Convention and its Mediterranean Action Plan.

The overall objective of the Program is to contribute to reduced marine pollution and a more sustainable use of scarce water resources. The Technical Assistance services are grouped in 6 work packages: WP1. Expert facility, WP2. Peer-to-peer experience sharing and dialogue, WP3. Training activities, WP4. Communication and visibility, WP5. Capitalizing the lessons learnt, good practices and success stories and WP6. Support activities.

Disclaimer:

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ABBREVIATIONS

ACTED	Agency for Technical Cooperation and Development
CMWU	Coastal Municipalities Water Utility
DG	Director General
ENI	European Neighborhood Instrument
EU	European Union
MeHSIP	Meddittereanean Hot Spots Investment Programme
MENA	Middle East and North Africa
MSWM	Municipal Solid Waste Management
OXFAM	Oxford Committee for Famine Relief
PCs	Partner Countries
PWA	Palestinian Water Authority
SWM	Solid Waste Management
WASH	Water, Sanitation and Hygiene
WP	Work Package

1 BACKGROUND AND OBJECTIVES

Several partner countries are facing increasing challenges with water scarcity (coupled with limited resources in financing the water and wastewater sector) coupled with increases in solid waste generation, which is exacerbated by the influx of the refugees from neighboring countries due to the political unrest in the region. Syria's civil war, almost in its seventh year, has driven more than 60 per cent of its pre-war population from their homes. According to UN estimates, 4.8 million Syrians have fled their country as refugees, seeking safety in Jordan, Lebanon, Turkey, Iraq and beyond. Another 8.7 million Syrians are displaced inside Syria, forced by conflict or insecurity to move homes, villages or even regions, often many times over. The massive exodus of population from Syria has placed enormous pressure on nearby countries.

In Jordan, the addition of more than a million Syrians has skewed demographics to the point where, according to World Bank officials, refugees now constitute a third of the population, which stood at 9.5 million during 2015. In Lebanon, the influx of refugees has resulted in the overpopulation of the camps and cities. According to the UNHCR, there were over a million Syrian refugees who had been registered in Lebanon in 2016. This figure is likely largely underestimated and recent estimates were as high as 1,500,000 people. In Gaza strip of Palestine, cycles of conflict with Israel have required that the Palestinian Water Authority (PWA) and the Coastal Municipalities Water Utility (CMWU) shift funds for development and operations to crisis response. The changes in the demand spurred by the conflict have adversely affected the performance of the water sector in the three countries and have exerted severe pressure on the existing water and wastewater infrastructure. Several cases exist where recently upgraded/constructed wastewater treatment plants were already overloaded upon their handover and the construction of new plants was required. The challenge is to provide the refugee camps and the hosting communities with adequate water and sanitation services under severe water stress; and/or ensure that water supply networks are rebuilt to new specifications that will accommodate the increased flow.

Management of increased solid waste quantities is also a major challenge that existed even before the crisis. The influx of refugees has markedly lowered the level and quality of solid waste management and municipal services while the disposal sites which are neither sanitary nor sufficient to accommodate the total volume of waste produced on a daily basis, lead to acute practical disposal issues and even greater environmental and hygiene impacts.

As part of its work-plan, the EU funded SWIM-H2020 SM project has encompassed in its activities the organization of a sub-regional on-site training "REG-14: Refugee Emergency: Fast track project design on water, waste water and solid waste (focusing on wastewater and solid waste). The training was carried out in Beirut during the period of 26-29 March 2018 and was divided into two tracks, where the first was focusing on wastewater and the second on the design of solid waste management systems. This report is pertinent to the solid waste component of the sub-regional training (i.e. Track 2 and the plenary sessions addressing issues that are common between the trainees of both tracks).

The overall objective of this specific sub regional training is to bring together key stakeholders from four countries: Jordan, Lebanon, Palestine and Tunisia, who are involved in the management and design of municipal solid waste management (MSWM) facilities, introduce them to the relevant technical concepts

and approach for the proper design of such facilities taking also in account the emergency requirements in response to the influx and displacement of refugees. This topic was part of the communicated priorities for Jordan, Lebanon and Palestine during the Fact Finding mission of SWIM-H2020 SM in 2016, while Tunisia expressed interest in participation during the steering committee meeting of Sep. 2016.

The specific objectives of the workshop aim to:

1. Build the capacity of the relevant staff in the four countries through the provision of tailored training in the design of municipal solid waste management facilities. Consideration will be given to management solutions that can be easily adopted in temporary settlements and refugee camps.
2. Examine long term solutions that can be adopted for permanent refugee camps or long term temporary settlements.
3. Sharing of experiences within the sub-region

2 METHODOLOGY AND STRUCTURE OF THE TRAINING

In order to achieve the training objectives, a highly dynamic, interactive, facilitated and participatory approach was adopted, making use of professional learning tools such as:

1. Presentations by trainers and by the participants
2. Facilitated round table discussions
3. Personal and/or National perspectives

The training also took into account pressing interests that are identified during the sessions. The Agenda of the training is presented in Annex 6.1.

Design examples as well as a number of Excel spreadsheets to help master the design theory presented in the course were be provided, in addition to references for further readings.

Post training assessment, included in this report, provides specific feedback on the understanding of solid waste management fundamentals and processes.

Copies of the training material were prepared by the course trainers and provided to all participants on a flash memory. A certificate of attendance was awarded to all participants at the end of the course.

The languages of the Workshop were English and Arabic.

Resources offered to participants included:

1. PowerPoint presentations
2. Groups discussions
3. Case studies and group exercises

Instructors of the course:

1. Ammar Abu-Drais, Engineer and General Manager at GREENPLANS Environmental Consultation Co. Ltd. (Jordan).
2. Faouzi Ben Amor, Environment Expert, European Investment Bank – MEHSIP (Tunisia).
3. Invited speakers:
    - Dima Sader: Economic and Social Fund for Development (Lebanon)
    - Omar Arabiyat: Manager of Env. Studies and Planning Department Greater Amman Municipality - GAM (Jordan)
    - Prasad Bhagwan Sevekari: Regional WASH Advisor – MENA. Oxfam International, Amman, (Jordan)
    - Ciara Noon: WASH Technical Coordinator for ACTED (Lebanon)

Moreover, the overall track 2 training session was coordinated by Costis Nicolopoulos, Head of LDK Consultants Environment Department, with specific expertise in SWM and extensive working experience in the Middle East area (mainly Lebanon and Jordan).

Training Content

The training course was divided into two parts:

Part 1:

This part was dedicated for the technical aspects of solid waste management and design; divided into four (4) sections, with the first section being specific for the case of Jordan and the others for the design of long and short term solutions for SWM.

The training provided an overview and introduction of the different steps, criteria, parameters, standards, calculations and simulations used for the design of municipal solid waste management facilities. The presented materials covered both long and short term solutions. Short term solutions are those that can be adopted for temporary settlements/camps as they would be for long-term temporary settlements and/or permanent settlements.

Below are the subjects that were addressed:

- Determine solid waste quantities and characteristics (existing and projected)
- Compile information for potential sites
- Landfill design including earthworks, civil engineering, sealing, leachate and surface water management, landfill gas management, costs, equipment, operation, etc.
- Transfer station design including sitting, capacity, type, equipment, costs, etc.
- Mechanical biological treatment facilities including capacity, equipment for mechanical and biological processes, operation, costs, etc.
- Landfill closure and long term monitoring
- The components of the national municipal solid waste management strategy
- The way to develop an action (or so-called strategic) plan

- Developing regional technical strategic plans in light of national strategies that reflect the considerations of siting, capacities, facilities and design specifications
- The synergy between institutional arrangements and the real implementation or methodological approach of developed plans on the ground
- The technical aspects and needs for emergency sanitary landfill cells
- The modality of waste recovery options under a participatory approach between the government and the community

Part 2:

Part 2 is a plenary session dedicated to presentation of various experiences from governmental and relief organisations within the sub-region with a view on both organisational / administrative aspects including procedures for applying for funds for emergency water/wastewater/solid waste projects. Sessions related to this part are presented in the training Agenda in Annex 6.1 and included:

- The Jordanian experience with the Syrian refugees' crisis; introducing the process related to the formulation of Jordan's response plan to the refugees crisis (overall coordination),
- Lessons learned from the response to the Syrian Crisis, in terms of the administrative set up (from the side of the Ministry of Municipal Affairs in Jordan)
- How humanitarian aid works and applying for funds from emergency relief organisations (OXFAM and ACTED)

A. Organisational, administrative and planning issues before and during the event

A set of 10 criteria; A1-A10 (See table below) was assessed by the participants, using a qualitative description ranging between "Excellent" to "Poor", with an opportunity to provide suggestions for improvement. For the sake of comparison, the qualitative descriptions are given Series Numbers as follows:

Excellent = 4 Good = 3 Average = 2 Poor = 1

A1	Handling of invitations, visa support, information sharing and smoothing obstacles
A2	Efficient logistics: accommodation, transportation, location of venue and interpretation
A3	Provision of support (if requested) for participants' preparation for the event
A4	Efficient and effective follow-up of preparations and progress towards the event
A5	Planning for the event: selection and design of methodology, programme/daily agenda and work rules
A6	Smooth flow of programme, efficient handling of emerging needs and attentiveness to participants concerns
A7	Presentations correspond and contribute to the planned objectives and are conducive to enhanced shared understanding and participation on addressed topics
A8	Clarity, coverage and sufficiency of concepts, objectives, anticipated outputs and outcomes

A9	The materials distributed were helpful
A10	Efficient and effective facilitation
A11	Overall rating of the event

B. Feedback by participants:

Coverage of the event

In your opinion did the event cover (tick one of the following):

- All the topics necessary for a good comprehension of the subject nothing more
- Some topics covered are not necessary
- Some additional topics should be included

Level of difficulty (tick one of the following):

- Difficult
- Adequate
- Elementary

Length of the training course: In your view the workshop duration (tick one of the following):

- Longer than needed
- Correct
- Shorter than needed

What is the most valuable thing you learned today (knowledge or skills)?

How do you think that the current event will assist you in your future work on the subject? (*Open-ended question)*

Please indicate whether (and how) you could transfer part of the experience gained fm the event to your colleagues in your country. (*Open-ended question)*

What did you like most about this event?

What needs to be improved?

C. Remarks by the trainer

A set of 9 criteria; B1-B9 (See table below) were assessed by the participants, using the same criteria as A above.

B1	Efficient and effective performance and interaction by participants
B2	Efficient and effective cooperation and team spirit

B3	Level of achievement of planned objectives
B4	Did the event contribute to helping participants practice skills or gain knowledge related to course concepts
B5	What worked well during the event
B6	What didn't work well and why
B7	What components/concepts did participants seem to understand well
B8	Were there any components/concepts that participants appeared to not understand
B9	What aspects of the event could be improved and what to be kept

The overall results of the post-training assessment were very positive, wherein participants found that the logistical, administrative and planning prior to and during the event were satisfactory.

2.1 PART A: ORGANIZATIONAL AND ADMINISTRATIVE ISSUES BEFORE AND DURING THE WORKSHOP

Regarding organizational and administrative (Figure 1) aspects, the feedback from the participants was very positive. Future considerations for improvement include:

- Distributing presentation slides and course materials to participants beforehand. It's noted that the course materials were made available on the event's website; however, the participants were not aware of it.
- The feedback is exclusive of the participants who were unable to attend due to visa issues; i.e. the participants who were to come from Palestine. In the future, the political context should be a special consideration to ensure that all invited participants are able to attend, regardless from which country they are arriving.

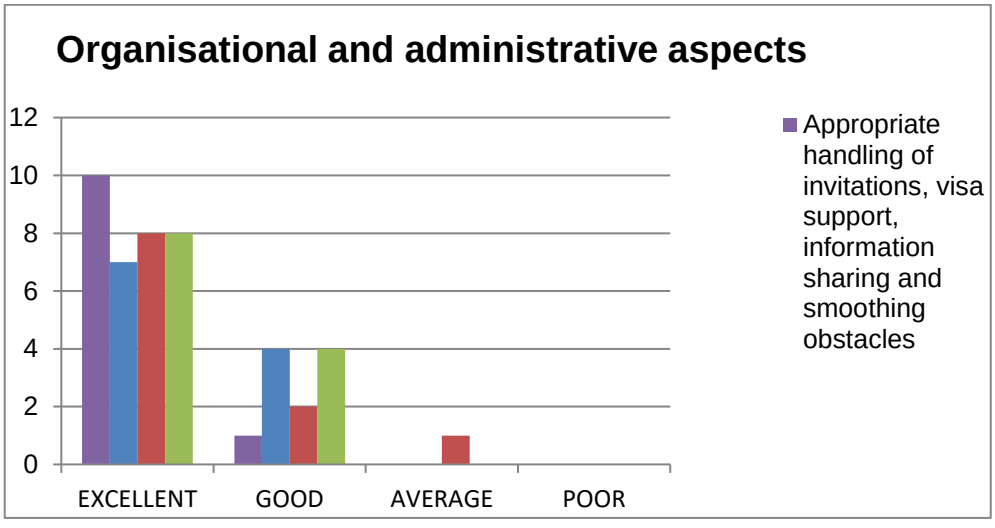

FIGURE 1 - ORGANISATIONAL AND ADMINISTRATIVE ASPECTS

2.2 PART B: EXECUTING THE WORKSHOP

The event planning, program agenda, flow (Figure 2) of the program and adequacy of the presentations largely exceeded expectations of the group.

Considerations, based on participants' comments, include the following:

- Planning for more time for discussion. Given the diverse background of the group, they were largely interested in sharing their experiences as well as gleaning in-depth perspectives from speakers.
- Regarding the point above, the presentations scheduled toward the end of the workshop were condensed, due to the duration of Q&A's between speakers. Future organizational aspects should consider accommodating both speakers' presentations and participants' curiosities in a timely and constructive manner.

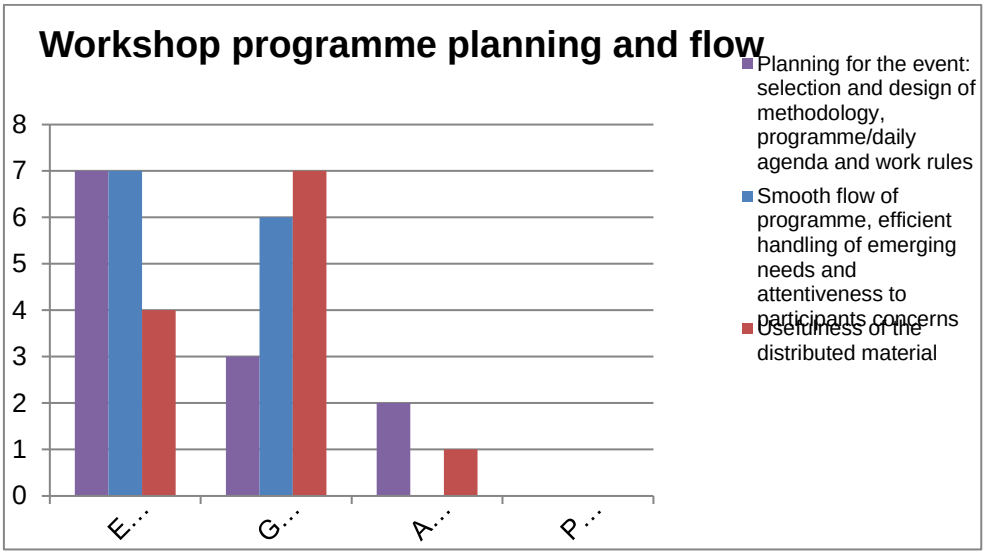

FIGURE 2 - WORKSHOP PROGRAMME PLANNING AND FLOW

2.2.1 Evaluation of the Extent of the Workshop Coverage, Difficulty and Duration of the Workshop

The clarity, coverage and efficiency of the workshop were rated highly by participants (Figure 3). Nuances in this category seem to stem from the diversity of participants'. Professional experience and backgrounds ranged from technical to advocacy. Thus, for those that were advanced in SWM concepts, the content at times was elementary while for others the information was, at times, too technical. Nonetheless, all participants commented that the integrated nature of the content, bridging these spheres, was insightful.

Future considerations may include:

- Additional case studies and examples of application of information included in presentations.
- If the group is representative of various sectors, similar to this workshop, consider facilitating groups/teams work in which groups apply newly gained information and sort through a challenge

in a theoretical context. Tailored activities would enable these individuals to express their various expertise while engaging a common challenge in SWM.

- Include a means for collaboration for knowledge sharing post workshop 1) as a means to follow up and reinforce the network, and 2) by following up on participants' activities the workshop could be further publicized and/or highlight the takeaways of the event in media.

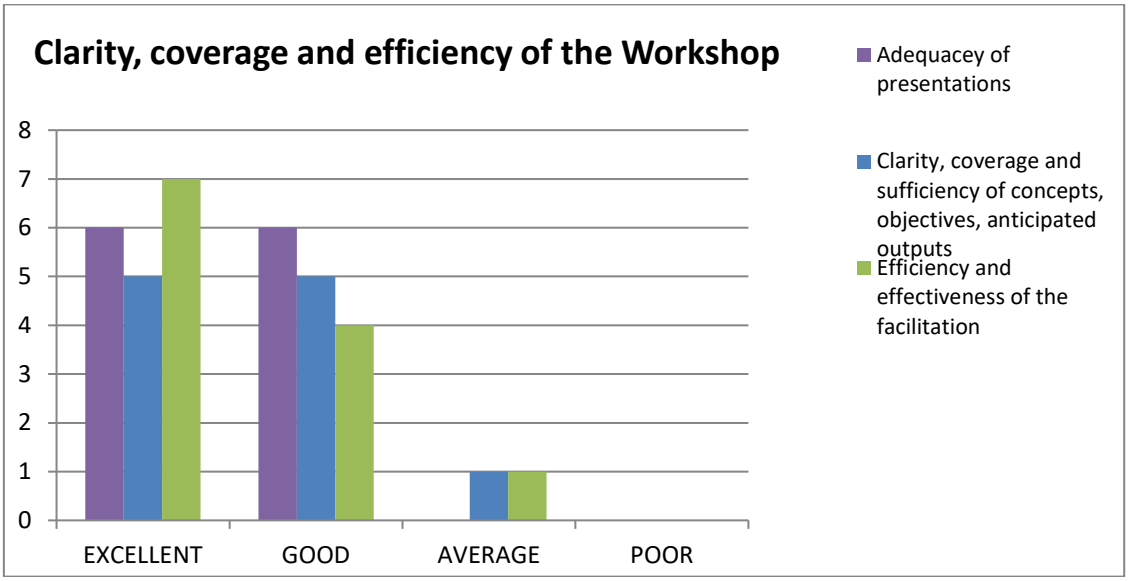

FIGURE 3 - CLARITY, COVERAGE AND EFFICIENCY OF THE WORKSHOP

2.2.2 Potential Impact

Given the diverse backgrounds of the participants (from environmental rangers to those working in policy/advocacy as well as others working directly in the SWM field), the speakers were able to customize presentations to suit the array of interests of the attendees. In this way, the workshop gave the scope of technical considerations as well as a toolbox for navigating the nitty-gritty policy and overall evolution of the SWM sector as it has changed through time to address the needs of the region.

The potential impact of the workshop was on enhancing the knowledge and skills of participants on the planning tools that are used in the design of short and long term solutions for waste treatment options that should be considered. Furthermore, the design and specifications of the sanitary landfills and MBT plants are scientifically introduced. A possibility of knowledge exchange between the participants from different countries are also addressed and might be of significant importance to share the lessons learned from the already implemented projects and/or ongoing ones.

2.2.3 Personal Impressions and Recommendations

Additional efforts should be made in the future to facilitate (and/or allot time for) discussion panels and interactive activities. When the opportunities were given for participants to reciprocate their experiences, concerns, and inquiries, the room was highly engaged. However, there were few opportunities and/or too

little time and this became one of the recommendations for participants – to allow for more knowledge sharing among all in attendance and facilitate discussion.

Including interactive, problem solving components in future workshops, so long as they were appropriately tailored to reinforcing presentations, would be of huge benefit to attendees.

Taking travel logistics, visa restrictions, into account for invited attendees should be highlighted. A number of invited attendees from Palestine were not attend due to visa restrictions when attempting to enter Lebanon. Facilitating the attendance of invited participants is critical for the legitimacy of the workshop as an event that is able to cater to the shared interests of professionals and across political, national boundaries. It is the main critique of this assessment and it reflects on the pre-workshop considerations when incorporating the smooth reception of specialists across the Middle East region.

3 ANNEXES

3.1 AGENDA

Item	Time	Description	Speaker
8:30 – 9.00		**Registration**	
#1	9:00-10:30	Welcoming remarks	Costis Nicolopoulos, Solid Waste Track Coordinator, (SWIM-H2020 SM)
		Setting up Solid Waste Management (SWM) sector Strategy, objectives, targets and Action Plan – Example from Jordan	Ammar Abu-Drais, Solid Waste Consultant (Short term solutions - the case of Jordan); SWIM-H2020 SM
		Translation of the Strategic objectives from the National level down to the project level (siting, capacities of the facilities, design specifications) spatial	
		Institutional arrangements & Mapping of Key Stakeholders and Actors for procurement of long and short term solutions	
	10:30 - 10:45	**Coffee Break**	
#2	10:45 – 12:45	**Design of long term solutions for municipal SWM (Part I)** ▪ Sanitary landfills ▪ Transfer stations	Faouzi Ben Amor, – Solid Waste Consultant (Long term solutions) , MeHSIP-Tunisia
	12:45 – 13:45	**Lunch Break**	
#3	13:45-14:45	**Design of long-term solutions for municipal SWM (Part II)** ▪ Mechanical-Biological Treatment facilities (MBT) ▪ Landfill extension and closure programme	Faouzi Ben Amor
#4	14:45-16:15	**Design of short-term solutions for municipal SWM** ▪ Emergency sanitary landfill cells ▪ Composting units ▪ Recycling / sorting stations	Ammar Abu-Drais
	16:15 – 16:30	**Coffee Break**	
#5	16:30 – 18:00	**Break-out Activity:** Participants form groups to discuss potential issues about design and implementation of SWM infrastructures and their procurement, develop strategies for integrating the role of government and international funders in planning short/long term solutions; answering the questions related to the topics in the training.	All

#6	18:00 – 18: 20	**Post-training assessment** **Workshop evaluation**	All

Item	Time	Description	Speaker
#1	09:00-09:40	**Jordan response to the Syrian Crisis: moving from crisis management to planned response:** - Process/Procedures for the development of Jordan Response Plan (JRP) Q&A	Ammar Abu-Drais, Solid Waste Consultant (Short term solutions - the case of Jordan); SWIM-H2020 SM
#2	09:40-10:20	**Lessons learned from the response to the Syrian Crisis, in terms of the administrative set up (case of Lebanon) How humanitarian aid works** - Presentation by the Economic and Social Fund for Development Q&A	Dima Sader (Lebanon Office)
#3	10:20-11:00	**How humanitarian aid works and applying for funds** - Presentation by Oxfam International Q&A	Prasad Bhagwan Sevekari - Oxfam International Regional WASH Advisor – MENA (Jordan office)
	11:00-11:30	**Coffee Break**	
#4	11:30--12:00	**Municipal peer to peer learning: how best practice in solid waste and wastewater management can be replicated through on the job coaching between municipalities** - Presentation by ACTED Q&A	Ciara Noon: WASH Technical Coordinator for ACTED (Lebanon)
#5	12:30-13:00	**Solid Waste Management plans of the Greater Amman Municipality (GAM)/ The Impact of the Syrian Crisis** - Presentation by Greater Amman Municipality Q&A	Omar Arabiyat: Manager of Env. Studies and Planning Department Greater Amman Municipality (GAM)
#6	13:00-13::30	**Guidelines for Waste Management in Refugee Camps: Case study in Lebanon** - Presentation by Arcenciel Q&A	Arcenciel
		Lunch	

3.2 LIST OF PARTICIPANTS

The participants for the municipal solid waste management course were Technical Staff responsible for the preparation of the technical components and the terms of reference and for reviewing the design of waste management systems, as part of the design and construction of solid waste infrastructures.

The training allowed up to five representatives per participating countries from the directorates/departments responsible for performing/overseeing studies and designs of solid waste management facilities in the waste sector to participate in the training.

Below is the roster of the participants received by the SWM experts:

Country	Type of Institution	Name	Position/Function	Organisation/Institution	Attendance
Palestine	Ministry representative	Mr. Suleiman ABU MUFERREH	D.G. of JSCs directorate	Ministry of Local Government	Denied Entry into Lebanon
Palestine		Mr. Abdel Rahman ISHTAYYEH		Salfeet Governorate	Denied Entry into Lebanon
Palestine	Local authorities	Mr. Nidal MANSOUR	Director of Health and Environment Department in Nablus Municipality / Executive Director of the Joint Services Council for Solid Waste Management in Nablus Governorate	Nablus Municipality / Nablus Joint Services Council for Solid Waste Management in Nablus Governorate	Denied Entry into Lebanon
Palestine		Mr. Yusuf MSALAM		Bethlehem Municipality	Denied Entry into Lebanon
Palestine		Mr. Yahya SALEH		Tulkarm Municipality	Denied Entry into Lebanon
Jordan	NGO representative	Mrs. Hala AL-SHOOHA	Projects Coordinator/ Green Academy Coordinator	Jordan Green Building Council	Present
Jordan	NGO representative	Mrs. Angela EL-FAYEZ	Project Coordinator – Advocacy Director	Jordan Environmental Union	Present
Jordan	Government agency	Mr. Mohammad JARADAT	Chief of Solid Patrols Section	Royal Department for Environment Protection	Present
Jordan	Ministry representative	Mr. Mohamed ALFRAIHAT	Head of Technical Affairs Section	Ministry of Environment	Present
Jordan	Government agency	Mr. Mah'd AL-HABAHBEH	Chief of South Section	Royal Department of Environment Protection	Present
Lebanon	Ministry representative	Mrs. Jamila AL HADI	Environmental engineering	Ministry of Environment	Present
Lebanon	Ministry representative	Mr. Ahmad DAMAJ	Environmental Specialist	Ministry of Environment	Present
Lebanon	Ministry representative	Mr. Ralph SALAMEH	Geologist / Environmental Specialist	Ministry of Environment	Present
Tunisia	Government agency	Mr. Habib GZOUNI		National Waste Management Agency	Present
Tunisia	Government agency	Mr. Faycal BEN DHIEF		National Waste Management Agency	Present
Tunisia	NGO representative	Mrs.Afef ZADDEM			Present

3.3 ASSESSMENT OF THE QUIZ

The participants were wended a small questionnaire to assess their general knowledge related to solid waste management. The questionnaire consisted of the following multiple choice questions.

1. In a municipality with a population of 350000 habitants and growth rate of 2.1% per year, each habitant produces in average 700 grams of solid waste. The municipality has a strategy that ensures that 15% of the waste produced will be diverted each year. The total quantity of waste that the landfill is expected to receive in the 5 years from this municipality is most nearly:
   a. 580 000 tons
   b. 400 000 tons
   c. 435 000 tons
   d. 450 000 tons
   e. 125 000 tons

2. In a landfill the compacted waste density may range from:
   a. 5 to 10 tons/m3
   b. 2 to 2.5 tons/m3
   c. 0.8 to 1.5 tons/m3
   d. 0.15 to 0.25 tons/m3

3. What is the average thickness of the plastic liner inside of sanitary landfills?
   a. 2-4 inches
   b. 12-24 inches
   c. 2-4 feet
   d. 1-2 feet

4. A storm drain inlet for a 10.5 ha area of the landfill final cover is to be designed. The rainfall intensity is 200 mm/hr. and the runoff coefficient is 0.15. The peak discharge, in cubic meter per second, is most nearly:
   a. 0.87
   b. 0.31
   c. 1.13
   d. 0.22

The result of this exercise is summarized in the following table:

Total number of participants	Questionnaires with no answers or 0/4 correct	1/4 correct answer	2/4 correct answer	3/4 correct answer	4/4 correct answer
11	4	1	1	3	2
100%	36.3%	9.1%	9.1%	27.3%	18.2%

Among the participants 3 did not provide answers at all and one had 4 incorrect answers.

Slightly over half of the participants passed the test which was considered a good result given the level of the questions which half of them were very technical to show the real level of the participants. The other two questions were relatively easy, based on common sense and could be answered by closely following the presentations.

3.4 PHOTO GALLERY