

Strengthening Local Governance Through Effective Waste Management: The “Sustainable Environmental Practices and Policies” Program in South Lebanon and the Bekaa Valley

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Abstract

In response to the critical lack of solid waste and wastewater management facilities in towns and cities around Lebanon, the YMCA of Lebanon implemented the Sustainable Environmental Practices and Policies (SEPP) program from 2003 to 2009. The overall goal of the SEPP program was to improve environmental practices and policies for the management of both solid waste and wastewater in rural Lebanon. This included the Ain Baal solid waste treatment plant (SWTP) serving the city of Tyre and nine wastewater treatment plants in municipalities in southern and central areas of the nation. The project built the capacity of local governments, and it ensured the use of reliable, low cost, low maintenance technologies that improve long-term sustainability. The project attests to the hard work of national civil society organizations to improve environmental practices and increase the accountability of local governments. This project has helped reduce tensions between communities and foster more democratic participation at the local level.

Author's Note

Currently completing his MPA in Environmental Science and Policy at Columbia University's School of International and Public Affairs, Andrew worked for two years in Beirut, Lebanon as a Project Development Consultant to nonprofit organizations and authored freelance articles for multiple Lebanese publications. He is interested in sustainable development policy and the importance of small-scale democratic governance in meeting basic community needs.

Keywords: Waste management, south Lebanon, wastewater treatment, Tyre, local democratic participation.

1. Introduction

In the preparation for the United Nations' Conference on Sustainable Development in Rio de Janeiro this summer, world leaders are focusing their attention on the possible outcomes of the negotiations, specifically in regard to green governance, sustainable development goals, and the green economy. While these are noble pursuits, the terminology is ambiguously defined and too often overused.

Within this context, it is important to identify successful projects and “best principles”¹ that provide concrete examples of what should be meant by sustainable

development. The Sustainable Environmental Practices and Policies (SEPP) Program was implemented in Southern and Eastern Lebanon from 2003 to 2009 during a tumultuous period of post-war reconstruction and international conflict. Lebanon had emerged from more than 15 years of civil war (1975-1990) with no meaningful resolution to the country's pressing political questions and deep internal divisions. An already unstable Lebanon broke down in 2005 when Prime Minister Rafik al Hariri was assassinated, and again in 2006 when Israel invaded southern Lebanon and bombed national infrastructure (bridges, oil refineries, Beirut airport) in response to a Hezbollah attack on its soldiers.

Although Lebanon is a small country, it possesses an incredible diversity of ecosystems and climatic zones, ranging from sea level to 3,000m. The rapid changes in topography present a challenge for infrastructural development; when coupled with a weak central government, this results in many regions lacking basic services such as regular grid electricity supply and solid waste and wastewater management systems. Lebanon is classified as an upper middle-income country. While most of the wealth is centralized in Beirut, there are pockets of poverty in rural areas and smaller towns.

The past four decades of instability have hindered environmental protection. This has led to crisis in some areas where inadequate waste management practices, deforestation, and soil erosion present major long-term challenges. Specifically, the absence of proper solid and wastewater treatment and disposal methods has exacerbated the waste problem. Increasing production of waste, minimal available land for storage and disposal in rural areas, and the limited development of appropriate strategies and legislation for waste management has led to a state of severe environmental degradation in many parts of the country.

2. The Wastewater Management Context

In many areas of Lebanon, solid waste is discarded in open dumps. One infamous example is “The Makab” on the outskirts of the southern city of Sidon.

“The Makab” started as a dumping ground for building rubble, but slowly became a 40m high pile of trash on the Mediterranean Sea, visible on the bottom right of the photo. A new composting facility for organic waste was completed in 2010, but has not opened due to political disagreements and the tipping fees that the private company requested in order to accept city waste.²

In the case of wastewater, household sewage connection rates in some towns are as low as 4%³. In many villages and small towns, there are no wastewater facilities. This lack of infrastructure poses a significant danger to public health and the environment. Moreover, government responses at the national level fail to address communities away from large cities. Therefore a locally initiated, managed, and sustained solution presents a viable alternative to many of the existing waste management strategies.

The YMCA identified three priorities that were to frame the project:



Open Air Dump on the Mediterranean Sea, outside the city of Sidon (Source: Google Maps)

Dissemination of knowledge on environmental management practices: The YMCA was to conduct a comprehensive environmental education program to strengthen the capacity of municipalities and local communities in environmental management. The program targeted children because a new generation of environmentally conscious citizens can contribute to social change in the medium and long term. Another key target were women, who often run the household and are responsible for managing the disposal of residential waste.

Physical infrastructure for solid waste and wastewater management: The YMCA would build wastewater treatment systems that require low operational costs and minimal inputs, like electricity, which are often unstable in these regions. The

project would also develop a solid waste treatment facility capable of accepting a large portion of waste from the southern city of Tyre. This technology must be financially sustainable and must minimize the need for land fills.

Engaging in dialogue and influencing policy on environmental management:

The YMCA would implement an ambitious high-visibility policy dialogue to re-direct national policies on waste management from centralized approaches to locally appropriate and cost-effective technologies. This required engaging the Ministry of Environment, the principle national body responsible for managing municipal solid waste, as well as the Ministry of Public Health and other political leaders at the local and national level.

These three priorities were essential to the broader goal of increasing the capacity of municipalities in managing their own waste and increasing the accountability to constituents. Any intervention on waste would also require an educational aspect to ensure an understanding of the risks of trash and raw sewage.

3. Mobilization of Resources

There have been instances of international nonprofit organizations receiving funding from major donors, such as the US and EU governments, to build wastewater facilities that are never completed or operate below capacity due to financial constraints. MercyCorps, a US-based organization, built eight plants in rural Lebanon, four of which are not operating due to a lack of local commitment and capacity to provide funding for operational costs⁴.

Even though the YMCA received \$3.7 million dollars in grant funds from USAID for the project, it also designed the project to ensure long-term sustainability and local ownership of waste facilities from the beginning. Therefore, it spent a significant amount of time working with the municipalities to gather local contributions greater than 50% of the total development cost. The YMCA also selected technologies that required minimal maintenance and inputs, which are in short supply in the implementation areas.

The municipalities provided land and services, such as the excavation of sewage networks and installation of pipes, concrete work. In the table below, the different inputs of the municipalities are listed.

Figure 1: Local Contribution to Wastewater Treatment Plants

Facility	Capacity (m ³ / day)	Local Contribution		
		Acquired private /secured public land	Covered cost of building and maintaining new access road	Covered cost of new sewer system installation (length)
Wadi Jezzine	150	Acquired	n/a	4,100 m
Haitoura	100	Secured	Yes	500 m
Snayyah	60	Secured	Yes	2,743 m
Al Aaychieh	150	Secured	Yes	4,416 m
Ghobbatieh	250	Secured	n/a	5,500 m
Bakka 1	100	Secured	Yes	4,370 m
Bakka 2	60	Secured	Yes	2,000 m
Rashaya	600	Secured	n/a	13,452 m
Al Hosh	100	Secured	Yes	4.098 m

To meet the operating and maintenance costs, municipalities used different approaches. One municipality initiated eco-tourism projects to raise funds, while others used direct taxation. Other municipalities received funding from other aid agencies such as the Hariri Foundation for Rural Development. In the case of the Al Hosh WWTP, the Ministry of Energy and Water committed to provide funding, but due to broader national political turmoil, its budget was frozen and the municipality had to raise funds to cover the Ministry's share. In total, these municipalities raised \$959,977 and many exceeded the 50% requirement.

In the case of the solid waste treatment facility, the Union of Tyre Municipalities (UTM) initially agreed to assume all costs associated with land leveling, the construction of the buildings and even some of the facility's equipment while the YMCA was responsible for purchasing the waste processing equipment. In February 2006,

UTM signed a contract with the Office of the Minister of State for Administrative Reform (OMSAR) agreeing to cover the cost of the concrete foundation, large-scale truck weighing equipment, bio-filter unit, and large hangars for composting waste. It also agreed to assume all outstanding costs associated with the purchase of the



2,000 Meters of New Sewers in the town of Bakka

remaining equipment and the infrastructure networks. In total UTM provided over 75% of the total funds.

What makes this especially significant is that it all took place during the July 2006 conflict, during which there were delays of more than 6 months to the bidding and contracting processes. There were genuine concerns that the facilities would be bombed and some of the equipment was moved off-site to avoid destruction.



The compost curing bays at Ain Baal before opening in 2009

4. Participatory Planning Process

The YMCA held public meetings in individual communities prior to the start of work. In those meetings, plans were described in detail and the program directors fielded questions and concerns. This discussion improved the plan for Ain Baal solid waste treatment plant.

The organization worked with community leaders and arranged outreach programs for communities to voice their concerns and receive answers for their questions. One repeated worry was the proposed location of a given treatment plant, which was sometimes changed to meet local concerns. In several instances, communities simply refused the project idea for political or economic reasons. When this happened, the YMCA was forced to find alternate locations and/or municipalities.

The municipal officials were deeply involved in the activities, and they developed a clear sense of ownership for the wastewater treatment plants. They identified sources for covering the annual expenses of these facilities. Some decided to collect additional taxes from the households, while in the case of one project, leaders contacted relatives in Canada and elsewhere for donations. In the towns of Al-Hosh and Ghobbatyeh, the mayors gave much of their time to the supervision of the facilities: in the town of Rashaya, which had the largest WWTP, the municipality required that all households connect their wastewater to the newly established sewers and pay connection and annual maintenance fees. Small municipalities, such as Snayyah, Aychiyeh and Al-Hosh, planned to establish eco-tourism activities to cover the operating costs. In summary, the local governments adopted the responsibilities of the projects and met the operating standards established in specifically written operational manuals.

In the case of the solid waste treatment plant, the YMCA had originally intended to build three facilities; however, two could not be built because these municipalities relied on financing from the Council of the South. This was problematic because the Lebanese government's budget for 2005-2006 was not officially approved. In fact, 2005 was the last year a national budget was approved⁵. Furthermore, in one of the towns, political tensions and polarization between two factions led to an impasse and the project had to be stopped.

At the national level, there were several major obstacles unrelated to the project. This included: (1) the municipal elections of 2004, because officials did not have the mandate to make decisions three months prior to elections, and several newly elected members changed the agreements that were signed with previous councils; (2) the assassination of Prime Minister Rafic Al-Hariri in February 2005 paralyzed the country for months; and (3) the July 2006 war with Israel affected all parts of Lebanon and stopped all activities for more than 2 months.

5. Context Appropriate Technology

As described above, long-term sustainability in the rural Lebanese context mandated that any technical solution be affordable, low-maintenance, and durable. In response to this obstacle, the YMCA identified three simple wastewater treatment processes implemented by local Lebanese



Low-Cost Gravity Fed WWTP in Snayyah

companies. The team was able to take advantage of the hilly landscapes in most of the villages by using gravity as the primary driving force for moving water in lieu of electric pumps.

For example, Wadi Jezzine used the Polytech Bio-Process for Wastewater Treatment that involved aerobic digestion of wastewater by using ecological products extracted from plants. The Bio-Process eliminates diseases and reduces the level of BOD, nitrogen, phosphorus, toxic substances and other pollutants. It also treats the water to a secondary level, defined by the Ministry of Public Health as suitable for discharge into nature. The sludge is recycled multiple times such that no sludge disposal is required.

In Haitoura and Rashaya, they used the Grossimex company's two-stage trickling filter technology, which incorporated a mix of anaerobic and aerobic processes. Each of the two WWTPs contain two trickling filters, a primary separation tank, a secondary clarifier (anaerobic pond), and a sludge drying bed. The wastewater flows gravitationally through the system without any specific maintenance or electric power and is treated by aerobic bacteria and partly by anaerobic bacteria found in the wastewater stream. The process significantly reduces the coliform bacteria, BOD, nitrogen, phosphorous, toxic substances and other pollutants found in the wastewater, thus allowing for safe discharge into nature (as above).

The wastewater treatment technology used in Snayyah, Bakka, Aichiyeh, Al Housh and Ghobbatieh villages was the International Business Consultant's (IBC) Advanced Integrated Wastewater Pond Systems (AIWPS) technology. This uses gravitational pressure without mechanical maintenance necessary to treat wastewater by natural processes in anaerobic and aerobic ponds. The anaerobic reactor forms the key stage in the process. In this phase, the water is kept for 20 days to reduce the

coliform bacteria, BOD, nitrogen, phosphorus, toxic substances and other pollutants to a secondary level, like the other two processes.

The solid waste treatment facility in Ain Ball utilizes a Siemens/IPS Composting System as the primary in-vessel composting technology. The system affords immense flexibility for long-term

management of the region's solid waste and produces a quality range of compost products that can be beneficially used by lower end projects, such as daily landfill cover to higher end projects like landscaping and soils blending.

Comprised of ten parallel bays, the composting facility can dedicate each individual bay to specific organic recycling materials for breaking down organic waste by using forced air, mechanical agitation (stirring) and aerobic bacteria. Each bay acts as an independent composting vessel so that yard-waste, source-separated and/or pre-consumer food residuals can be segregated and processed from the remaining mixed solid waste. The higher quality organics can bypass the pre-processing operation and go directly into the designated bays. The organic material is mixed daily to accelerate the composting process by providing an optimal movement of air to create aerobic conditions and a more uniform distribution of temperature in the compost mass. After the mixture has been conveyed through the system, it is discharged for further refining and curing.



Ain Baal SWTP serving over 300,000 people in the Union of Tyre Municipalities, South Lebanon

6. Public Awareness and Policy Dialogue

To increase the visibility and long-term success of the project, a 3-year environmental awareness campaign on sustainable waste management was conducted targeting women, youth, and students. The effort benefited 10,000 students and teachers in 94 schools, as well as more than 50 NGOs, women's groups, and local institutions 88 communities. The YMCA targeted the areas of implementation and focused on basic information about waste treatment and its links to environmental and public health. In many cases, this involved creating games that encouraged the youth to think about the problems associated with waste and how to reduce their environmental impact. An emphasis was placed on sorting waste, but because the SWTP was far from completion, additional sessions would have been useful at the completion of the project.

Furthermore, the YMCA organized several activities related to policy dialogue on waste management, including two tours to waste treatment plants sites and a roundtable workshop on policy issues. In each of the tours, representatives from the Ministries of Environment, Agriculture, Education and Planning participated along with mayors from the concerned towns. A member of the Ministry of Environment emphasized that the YMCA's activities should comply with the Council for Development and Reconstruction's broader plan and that the WWTPs should meet the treatment standards set by the Ministry. The concern was that municipalities might not have the capabilities and resources for maintaining the facilities.

In the spring of 2006, following the site visits, the YMCA organized a roundtable discussion at the Meridian/Commodore Hotel in Beirut. The objectives of the roundtable were to discuss key planning, construction, operations and management issues that related to solid waste and wastewater management in Lebanon, and to develop a draft Memorandum of Understanding (MOU) outlining the guiding policy principles for running and managing the plants and facilities. The MOU was completed in July 2006 and was distributed by mail to all participants, as the war with Israel prevented the team from hosting a press conference as originally planned.

7. Short and Long-term Project Impacts

The creation of the treatment centers are currently enabling communities to save money and reuse resources. For example, residents in the villages of Bakka and El-Hosh had been forced to drink bottled water until the project enabled them to once again drink from their natural springs. In the village of Aychiyeh, treated wastewater is being used to irrigate olive trees. Social problems, such as disputes among neighbors in the towns of Bakka, Rashaya and El-Hosh, have stopped since the operation of their treatment plants. In Aychiyeh, children were often ill because of the over-flowing septic tanks on the streets of the town; this also has dramatically decreased since the opening of the WWTP.

These impacts fall into three main categories. First, in terms of social impacts, there have been health improvements, reductions in insects, elimination of smell from over-flown septic tanks, elimination of disputes among neighbors due to waste problems, and development of sense of participation in problem solving. Secondly, the economic impacts include the development of ecotourism and other enterprises in towns, as well as increased incomes through the leasing of summer homes (which had not been possible earlier due to the level of pollution). Finally, the environmental impacts included the elimination of the principal sources of fresh water contamination, forest rehabilitation, and increased awareness on environmental issues across all layers of society.

The municipalities became owners of the plants and therefore ensured their long-term support and interest in the project. The projects boosted their annual budgets and brought increased credibility and capacity to their local governing bodies. In addition, the facilities are signs of environmental achievement.

8. “Best Principles”

The SEPP project demonstrates how foreign aid and locally implemented development can overcome political and social challenges and contribute to long-term environmental and economic sustainability. The emphasis on low cost, simple and reliable technologies allowed the project to succeed where others have failed. Using gravity instead of expensive and unstable electricity has made a big difference. Secondly, the financial and human resources needed to operate a treatment center should be secured at the start of the project. This ensured that the municipalities took ownership of the facilities and actively contributed to all phases of planning, construction, and operation. Thirdly, an effective awareness-raising campaign should have actions at all levels in order to develop environmental sensibilities on a broad scale. Finally, international and national development plans should integrate with localized waste management plans and develop with input from key stakeholders, so that these groups can clearly understand the project goals and provide additional support.

In recognition of its accomplishment, the YMCA was awarded the 2010 Dubai International Prize for Best Practices for the Living Environment by UN HABITAT and the Municipality of Dubai. It out-scored competing projects from 22 Arab states and received the award and \$30,000 cash prize. It is not currently working on any new waste management projects, but is focusing on waste and climate change awareness among youth around the country.

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¹ Professor Elliott Sclar, Director of the Center for Sustainable Urban Development (CSUD) at Columbia University's Earth Institute, often makes the distinction between “best practices” and “best principles”; he argues that the former cannot often be applied to different county contexts, and thus it is more important to focus on the principles (an example would be pro-poor bias in the design of a project).

² Republic of Lebanon Ministry of Environment, UNDP, and ECODIT. 2011. *State and Trends of the Lebanese Environment 2010*. Page 279

³ Republic of Lebanon Ministry of Environment, UNDP, and ECODIT. 2011. *State and Trends of the Lebanese Environment 2010*. Page 68

⁴ <http://www.dailystar.com.lb/News/Local-News/Sep/08/Water-waste-treatment-plants-sit-idle-as-pollution-problems-mount.ashx#axzz1qhpNQGr5>

⁵ <http://www.dailystar.com.lb/Business/Lebanon/2012/Feb-09/162698-cabinet-crisis-complicates-budget-bid.ashx#axzz1qq94szpg>