The International Conference on Environmental Performance of Tourist Accommodation Sector in Euro-Med Countries (CEPTA)

July 2\textsuperscript{nd} - 4\textsuperscript{th}, 2008, Mövenpick Hotel, Petra, Jordan

Editors
Dr. Mousa Mohsen
Dr. Mairna Mustafa
Dr. Yahya Ali
This book contains the proceedings of the International Conference on Environmental Performance of Tourist Accommodation Sector in Euro-Med Countries (CEPTA), held in the Mövenpick Hotel, Petra, Jordan (July 2nd - 4th, 2008).

Coordination:
Editor in Chief: Dr. Mousa Mohsen
Deanship of Scientific Research and Graduate Studies,
Hashemite University,
P.O. Box 330127,
Zarqa 13133, Jordan.
Tel: (962) 5-390-3333 ext. 4147
Fax: (962) 5-3903338
Email: msmohsen@hu.edu.jo

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Preface by the Editor in Chief…

I would like to extend my deepest gratitude to his Excellency Dr. Abd el-Raheem al-Hniti, the President of the Hashemite University for graciously supporting this conference and agreeing to hold it at the Movenpick Hotel in Petra. The main objective of the conference is to present and disseminate the results and outcomes of the GREEN-TAS Project: "Development of Methods and Tools for the Establishment of Good Environmental Performance of the Tourist Accommodation Sector in Jordan-Implementation of Pilot Studies". The outcomes of this project will help in developing a number of strategies and solutions to improve the environmental performance of hotels in Jordan. The conference also aims at bringing together researchers and professionals in the fields related to tourism accommodation sector sustainability, where they will present their research and experience.

Tourism has been growing as an important sector in the Jordanian economy, such growth was combined with an increase in services and facilities, and hotels are one of them. About 476 classified, unclassified hotels and other types of accommodation are distributed all over Jordan. These hotels are causing some serious impacts on the environment. These impacts include overuse of energy sources and water, different forms of pollutions, inappropriate disposal of both waste water and solid waste, and degradation of surrounding landscapes. All these impacts make it necessary to develop plans to ensure sustainability in hotels.

The GREEN-TAS Project aims at addressing problems and impacts caused by tourism accommodations in Jordan. This will help in developing a number of strategies and instruments that will ensure sustainable development of tourism accommodation sector.

A guiding tool and an e-training module are designated by the project to ensure further implementation of environmental management and sustainability procedures in hotels and other stakeholders in the tourism sector. This material will be available to hotel managers and engineers even after the termination of the project.

The GREEN-TAS Project is supported by the European Commission through its environmental instrument “LIFE Program”. We would like to present our best thanks to the European Commission for this support, and to all partners of the project for their distinguished efforts and work.

We hope that this proceedings book will be a very useful reference to those who are concerned with achieving sustainability in the establishments and facilities in their regions…

Dr. Mousa Mohsen
Hashemite University
Zarqa, Jordan
Project Website: http://www.just.edu.jo/green_tas
## Project Partners & Organizing Committee

### The Hashemite University (HU), The Beneficiary

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<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Department/Institute</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Mousa Mohsen</td>
<td>Professor and Dean Scientific Research and Graduate Studies</td>
<td>Hashemite University Zarqa 13115 Jordan</td>
<td>Tel: +962 5 390 3333, Fax: +962 5 390 3338, Mobile: +962 79 9050772, <a href="mailto:msmohsen@hu.edu.jo">msmohsen@hu.edu.jo</a></td>
</tr>
<tr>
<td>Dr. Yahya Ali</td>
<td>Assistant Professor &amp; Chair</td>
<td>Department of Humanities and Social Sciences Faculty of Arts The Hashemite University P.O. Box 150459, Zarqa 13115, Jordan</td>
<td>Tel: +962 (5) 3903333 (ext. 4453), <a href="mailto:yali@hu.edu.jo">yali@hu.edu.jo</a></td>
</tr>
<tr>
<td>Dr. Mairna Mustafa</td>
<td>Assistant Professor</td>
<td>Department of Sustainable Tourism Queen Rania Institute of Tourism &amp; Heritage P.O. Box 330127, Zarqa 13115, Jordan</td>
<td>Tel: +962 (5) 3903333 (ext. 5103), <a href="mailto:mairna@hu.edu.jo">mairna@hu.edu.jo</a></td>
</tr>
</tbody>
</table>

### Ministry of Environment (MOE)

**www.moenv.gov.jo**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. Khaled al-Fayez</td>
<td>Ministry of Environment</td>
<td>P.O. Box 1408, Amman 11941, Jordan Tel: +962 (6) 5560113, <a href="mailto:Alfkld@yahoo.com">Alfkld@yahoo.com</a></td>
</tr>
</tbody>
</table>

### Mövenpick Hotels (MP) in Jordan

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<table>
<thead>
<tr>
<th>Name</th>
<th>Moevenpick Hotel/</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Ahmad Badr</td>
<td>Dead Sea</td>
<td>Mobile # ++ 962 79008535, <a href="mailto:Ahmad.Badr@moevenpick.com">Ahmad.Badr@moevenpick.com</a></td>
</tr>
<tr>
<td>Mr. Mahmoud Farajat</td>
<td>Petra</td>
<td>Mobile # ++ 962 799929 388, <a href="mailto:Mahmud.Farajat@moevenpick.com">Mahmud.Farajat@moevenpick.com</a></td>
</tr>
<tr>
<td><strong>Jordan University of Science and Technology (JUST)</strong></td>
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<tr>
<td><strong>Dr. Munir er-Rusan</strong></td>
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<td></td>
</tr>
<tr>
<td>Faculty of Agriculture, JUST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO Box 3030 Irbid 22110, Phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+096227255118 (H), 7201000 EXT 22460 (Office)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:mrusan@just.edu.jo">mrusan@just.edu.jo</a></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Dr. Khaled M. Hameed</strong></td>
<td></td>
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<tr>
<td>Faculty of Agriculture, JUST</td>
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<td><a href="mailto:kmhameed@just.edu.jo">kmhameed@just.edu.jo</a></td>
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<tr>
<td><strong>Dr. Despo Fatta Kasinos</strong></td>
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<tr>
<td>University of Cyprus</td>
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<td>Kallipoleos Avenue 75</td>
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<td></td>
</tr>
<tr>
<td>1678 Nicosia, Cyprus</td>
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<td></td>
</tr>
<tr>
<td>Tel: (+357) 22 892295</td>
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<tr>
<td>Fax: (+357) 22 892275</td>
<td></td>
<td></td>
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<tr>
<td><a href="mailto:Dfatta@ucy.ac.cy">Dfatta@ucy.ac.cy</a></td>
<td></td>
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<tr>
<td><strong>Miss. Margarita Vatyliotou</strong></td>
<td></td>
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</tr>
<tr>
<td>University of Cyprus</td>
<td></td>
<td></td>
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<tr>
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<tr>
<td>Tel: (+357) 22 452486</td>
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<tr>
<td>(+357) 99 788243</td>
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</tr>
<tr>
<td>Fax: (+357) 22 892295</td>
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<tr>
<td><a href="mailto:mvatyl@ucy.ac.cy">mvatyl@ucy.ac.cy</a></td>
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<tr>
<td><strong>Solis Ioannou</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aeoliki Ltd., 41 Themistokli Dervi Str., 1066 Nicosia, CYPRUS</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tel. +357-25-335801, Fax +357-25-335798, Email: <a href="mailto:sioannou@aeoliki.com.ucy">sioannou@aeoliki.com.ucy</a></td>
<td></td>
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<tr>
<td><strong>Ioannis Glekas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aeoliki Ltd., 41 Themistokli Dervi Str., 1066 Nicosia, CYPRUS</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tel. +357-87-570722, Fax +357-22-757778, Email: <a href="mailto:lglekas@aeoliki.com.ucy">lglekas@aeoliki.com.ucy</a></td>
<td></td>
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</tr>
</tbody>
</table>
# Participants of the Conference

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Contact Information</th>
</tr>
</thead>
</table>
| Dr. Mahmoud Abu-Allaban     | Department of Water Management and Environment, Hashemite University | Tel: 962-7-99748009
mlaban@hu.edu.jo           |
| Mr. J. Abu Rajab            | Department of Earth and Environmental Sciences, Hashemite University | jafars@hu.edu.jo                                                                     |
| Mr. N. al-Atiyat            | Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan | Tel: + 962 6 53 44 701 ext 2475
Fax: + 962 6 53 40 373       |
| Mr. Munther Badriyah        | Department of Statistics                      | monther1@dos.gov.jo                                                                  |
| Mr. Amir Bakir              | Faculty of Business, University of Jordan.    | amirbak@ju.edu.jo                                                                    |
| Mr. J. Haddad               | Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan | Tel: + 962 6 53 44 701 ext 2475
Fax: + 962 6 53 40 373       |
| Mr. C. Buser                | University of Applied Sciences                |                                                                                      |
| Mr. B. Hayek                | Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan Environment Research Center | Tel: + 962 6 53 44 701 ext 2475
Fax: + 962 6 53 40 373       |
| Mr. Elias.Imsis             | e-kineticx l.l.c                               | Tel: +962 6 5820599
Fax: +962 6 5820598
Mobile: +962 79 6010600
P.O.Box 960785
zip code 11196
Sweifieh, Darweish Center, Build # 8
Second Floor, Office # 3
Opposite to Abu Ghazaleh hardware Shop
Amman-Jordan
ei@e-kineticx.com            |
<p>| Dr. Ma'amoun Al-Jedaih      | Department of Earth Science &amp; Environment, Hashemite University |                                                                                  |
| Ayed Radi Khanfar           | King Khalid University, College of Science, Biological Science Department, P.O.Box-9004- Abha, 61413 – Assir, Kingdom of Saudi Arabia |                                                                                  |
| Miss. Umaima Al-Majthoub    | Short Programs Director /Lecturer              | <a href="mailto:u.almajthoub@jau.edu.jo">u.almajthoub@jau.edu.jo</a>                                                              |
|                             | Jordan Applied University                      |                                                                                      |
|                             | College of Hospitality and Tourism            |                                                                                      |
|                             | Tunis Street , 4th - 5th Circle                |                                                                                      |
|                             | P.O Box 950271                                |                                                                                      |
|                             | Amman 11195, Jordan                           |                                                                                      |
|                             | Tel: 00-962-0(0)6-5680090/89, 5629232          |                                                                                      |
|                             | Fax: 00-962-(0)6--5671133                     |                                                                                      |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Department/Institution</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dr. Ahmad al-Malabeh</strong></td>
<td>Department of Earth Science &amp; Environment, The Hashemite University</td>
<td></td>
</tr>
<tr>
<td><strong>Dr. Ishmael Mensah</strong></td>
<td>Department of Geography and Tourism; University of Cape Coast</td>
<td><a href="mailto:aprakof@yahoo.com">aprakof@yahoo.com</a></td>
</tr>
<tr>
<td><strong>Mr. G. Meylan</strong></td>
<td>Sustainable Business Associates (SBA), Switzerland</td>
<td><a href="mailto:meylang@gmail.com">meylang@gmail.com</a></td>
</tr>
<tr>
<td><strong>Mr. M. Mosa</strong></td>
<td>Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan</td>
<td></td>
</tr>
<tr>
<td><strong>Mr. D. Mutz</strong></td>
<td>University of Applied Sciences Northwestern Switzerland (FHNW), Switzerland</td>
<td><a href="mailto:dieter.mutz@fhnw.ch">dieter.mutz@fhnw.ch</a></td>
</tr>
<tr>
<td><strong>Dr. A. Al-Naga</strong></td>
<td>Department of Water management and Environment, Hashemite University, 13115 Zarqa, Jordan</td>
<td><a href="mailto:elnaga@hu.edu.jo">elnaga@hu.edu.jo</a></td>
</tr>
<tr>
<td><strong>Dr. Ziad el-Nasser</strong></td>
<td>Department of Pathology and Microbiology, Jordan University of Science and Technology, P.O. Box 3030, Irbid- 22110, Jordan Phone: 962-2-7201000-Ext. 23460, Fax: 962-2-7201071</td>
<td></td>
</tr>
<tr>
<td><strong>Mr. Aiman Suleiman</strong></td>
<td>Aqaba Special Economic Zone Authority (ASEZA), Aqaba, Jordan</td>
<td></td>
</tr>
<tr>
<td><strong>Dr. Ismail Saadoun</strong></td>
<td>Department of Applied Biological Sciences University of Science and Technology P.O. Box 3030, Irbid- 22110, Jordan Phone: 962-2-7201000-Ext. 23460 Fax: 962-2-7201071</td>
<td><a href="mailto:isaadoun@just.edu.jo">isaadoun@just.edu.jo</a></td>
</tr>
<tr>
<td><strong>Dr. Ibraheem Ali al-Tayyar</strong></td>
<td>Department of Applied Biological Sciences University of Science and Technology P.O. Box 3030, Irbid- 22110, Jordan Phone: 962-2-7201000-Ext. 23460 Fax: 962-2-7201071</td>
<td></td>
</tr>
<tr>
<td><strong>Mr. M. Semlali-Wazner</strong></td>
<td>Sustainable Business Associates (SBA), Switzerland</td>
<td><a href="mailto:sba@sba-int.ch">sba@sba-int.ch</a></td>
</tr>
<tr>
<td><strong>Mr. K. Zain</strong></td>
<td>Sustainable Business Associates (SBA), Switzerland</td>
<td><a href="mailto:sba@sba-int.ch">sba@sba-int.ch</a></td>
</tr>
<tr>
<td><strong>Mr. Adnan al-Zoubi</strong></td>
<td>Ministry of Water and Irrigation</td>
<td>Adnan_Al-Zuobi%<a href="mailto:MWl@mwi.gov.jo">MWl@mwi.gov.jo</a></td>
</tr>
<tr>
<td><strong>Mr. M. El-Waheidi</strong></td>
<td>Freelance Geophysicist. P.O.Box 184168, Amman 11118 –Jordan, email: <a href="mailto:drwaheidi@gmail.com">drwaheidi@gmail.com</a></td>
<td></td>
</tr>
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واقع التعليم الفندقي والسياحي في وزارة التربية والتعليم

محمد عبد الله المسعود و غالب عقلة الشوبكة
Topic1: Environmental Management and Sustainability
Environmental Management Schemes and the Hotel Sector in the Middle East

Giannis Glekas\textsuperscript{(I)}, Solomon Ioannou\textsuperscript{(I)}

\textsuperscript{(I)} Aeoliki Ltd., 41 Themistokli Dervi Str., 1066 Nicosia, Cyprus

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Gratitude is expressed to the Ministry of Environment for the provision of the relevant legislation, the Ministry of Tourism and the Ministry of Water for their provision of relevant data. Many thanks are expressed to Dr Yahya Ali from the Hashemite University and Dr. Khalid Hameed from Jordan University of Science and Technology for joining the mission in setting up the environmental management schemes and in providing training sessions to the employees of the Mövenpick Resorts. Appreciation is expressed to all the staff and the management teams of the Mövenpick resorts in the Dead Sea and in Petra for working hard in the setting up and passing through the verification process of their environmental management schemes. Special thanks to the Environmental Managers of both Mövenpick resorts and to the directors Mr. Bruno Huber and Abedrabo Twaissi for their commitment in both the GREEN-TAS Project and the EMAS verification process.

Abstract
Tourism has been growing around the world as a major source of income and employment to many countries. In Jordan it is the largest export sector, its second largest private sector employer, and it's second highest producer of foreign exchange. Tourism contributes more than US$800 million to Jordan’s economy and accounts for approximately 10% of the country's gross domestic product (GDP).

However, it exercises much pressure on the environment and this is one of the very basic reasons why hotels with environmental management systems are responsibly contributing to environmental protection while increasing their competitiveness through economising on resources such as energy, raw materials, water and waste. The adoption of voluntary self-regulatory initiatives such as the eco-management and audit scheme (EMAS) and the ISO 14001 environmental standard can provide the hotel sector with pollution prevention practices that improve its environmental performance.

All these initiatives have been developed for all sort of business including small and medium-size enterprises, but the rate of applicability is very small, due to a number of barriers such as bureaucratic and often complicated environmental managements systems. In addition the perception that ISO 14001 is commercially better than other similar environmental certification schemes often seems to have misled the management decisions of business around the globe.

Very recently an “easy” version of the EMAS environmental management scheme has been developed aiming to overcome the majority of the previous mentioned barriers. This paper presents the application of the EMAS-easy methodology to two hotels in Jordan within the framework of the project “Good Environmental Performance in the Tourist Accommodation Sector in Jordan – GREENTAS”.

Adapting EMAS requirements in a simple, transparent and participatory methodology, known as EMAS “easy”, the project followed a step by step approach in setting up an
environmental policy, environmental action plan with clear and tangible objectives, environmental indicators in monitoring resource consumption and an internal environmental check up and monitoring system. In no more than 10 days, on 10 pages and in 10 major steps the project managed to register the Mövenpick resorts as the very first EMAS verified organizations in the Middle East.

The project was co-finance between the European Union and the project partners, namely, the Hashemite University, the Jordan University of Science and Technology, the Mövenpick Hotels and Resorts Jordan, the Jordanian Ministry of Environment the University of Cyprus and Aeoliki Ltd. Technical support with regards to EMAS “easy” was provided by Aeoliki Ltd, the only EMAS verified environmental consultancy in Cyprus.

Introduction
Business is all about survival and in order to survive, businesses need to generate profits. By doing so, businesses depend on ecosystem services, notably for resource regeneration and waste assimilation capacities. Yet, many ecosystems are being impoverished by unsustainable activities. Resources are being consumed at a rate far exceeding their natural levels of replenishment and current waste streams are exceeding ecosystems’ waste assimilation capacities. The natural capital is therefore being exhausted and for this many businesses have recognized that long-term sustainable development requires good environmental and social performance.

Tourism can bring many benefits to arid areas like those of Petra and the Dead Sea in Jordan, where few other options exist for development and economic activity. However, such fragile territories require a particular care when tourism products are developed and tourism operations are managed. Sustainable tourism is specific to such areas, taking into account their special characteristics, their fragility, and their wealth of natural, human, cultural, archaeological and historical resources.

Tourism accommodations that maximize efficiency and reduce waste are more cost-effective than their competitors. They use large amounts of energy to keep people cool in hot climates, and warm in cold ones. In some destinations, they place an additional, sometimes unsustainable, demand on local water resources and generate large quantities of food and packaging waste.

The purpose of this paper is to identify the best suited environmental scheme in establishing a good environmental performance for two hotels (the Mövenpick Resort & Spa in the Dead Sea and the Mövenpick Resort Petra) in the Hashemite Kingdom of Jordan, and to present the process adopted to apply the environmental management systems, the pros and cons and the revealed opportunities for the involved enterprises, the environment but also the local infrastructure and the society more generally.

The paper is divided in the following sections:

- A description of the ecological and archeologically uniqueness of the area in which the Mövenpick resorts are located is provided. This case is an interesting one as the paper attempts to describe how effective environmental management schemes are the best option forward with regards to sensitive environmental and cultural sites.
A brief description of the different environmental management schemes is given with a focus on a comparison between ISO 14001 as the most familiar environmental management system and EMAS as the most advance environmental management scheme presently available.

Finally, a step by step approach to set up EMAS is described in order to demonstrate the effectiveness, transparency, simplicity and adaptability of such scheme in areas where environmental management schemes are rare.

This paper concludes with the successful verification process of the Mövenpick Resorts that makes them the very first EMAS registered organizations in the Middle East. The ecosystems

Perhaps the most interesting aspect of the environmental certification of the two selected hotels (Mövenpick resorts in the Dead Sea and in Petra) is the fact that one is located at a world significant and unique ecosystem (i.e. the Dead Sea) while the other is located at a world significant cultural heritage site (i.e. Petra).

The Dead Sea area has become a major center for health research and treatment for several reasons. The mineral content of the waters, the very low content of pollens and other allergens in the atmosphere, the reduced ultraviolet component of solar radiation, and the higher atmospheric pressure at this great depth each have specific positive health effects. The Sea is called "dead" because its high salinity means no fish or macroscopic aquatic organisms can live in it. However, the Sea is home of green algae (Dunaliella) that are rich in Vitamins, Proteins and Amino Acids. The mineral content of the Dead Sea consists of 53% magnesium chloride (MgCl), 37% potassium chloride (KCl) and 8% sodium chloride (NaCl). The concentration of sulfate, $SO_4^{2-}$, ions is very low, and the bromide ion concentration is the highest of all waters on Earth. The main threat to the Dead Sea is the substantial change of its characteristics. Mining and agriculture have been the causes of the shrinking of the Dead Sea level. Mining consists the extract of potash, elemental bromine and sodium chloride while the Jordan River, which provides about 90% of the total flow of sweet water into the Dead Sea, is been diverted for agricultural purposes.

Graph 1: Mövenpick Resort & Spa Dead Sea- CO$_2$ emissions per energy source per guest night$^1$

$^1$ Jordan emission factor CO$_2$ 700kg x kwh/1000; LPG emission factor 67.8 g/MJ x 86.1CV x Litres/1000, Diesel emission factor 76.2 g/MJ x 41.1CV x Litres/1000
Since 1981 the yearly evaporation from the Dead Sea has exceeded the yearly precipitation and runoff, which lead to a decline of the water level, leaving behind salt and other minerals. From an elevation of 395m below sea level in 1970 it fell from 23m to 418m below sea level in 2006, reaching a drop rate of 1m per year. Consequently, the salinity gradient of the upper layers had surpassed that of the deep water resulting from the decline in the water level. The Dead Sea water became saturated with respect to sodium chloride and other salts, leaving behind a higher portion of the more soluble salts, especially magnesium chloride of which the Dead Sea is particularly rich. This has resulted to a decrease in salinity which has been recorded at 0.26 g (salts)/kg (water) per annum.

Graph 2: Mövenpick Resort & Spa - Selected Chemical Consumption in kg per guest night

In Petra on the other hand, the growth of tourism has brought about a large increase in the numbers of tourists visiting Petra and places at risk the sensitive environment of the area. It raises the question on the physical limits the area has in order to accommodate large number of visitors.

This unique city, with its monumental facades sculpted out of solid rock, is a large, open art gallery built during the Nabataean times. Archaeological research has revealed traces of human use of the area across all periods, but show that it is during the time of the Nebataeans that Petra became the intriguing place presently known. Petra's architecture is influenced from Assyrian, Egyptian, Persian and Hellenic (Greek) influences. Most of the free-standing structures that once stood beside the rock-cut wonders have toppled. There are over one thousand burial monuments in Petra and several hundred others in the other burial cities. Ever since its re-discovery, Petra has been a tourist attraction. The hotels that have been constructed in Wadi Musa prior to any Management Plan have also caused degradation to the site. Ten years ago there were fewer than five and presently there are over 39 hotels.

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2 Toxic waste was measured in litres; the density factor is 0.96 kg/l.
Petra’s natural sandstone rock is highly erosive and is under enough strain from natural elements such as wind and water. Tourists when they climb Petra’s monuments such as the Monastery or the High Place of Sacrifice, they are walking on original Nabataean hand cut stone stairs. Walking, touching, leaning and rubbing the surfaces cause wear of the archaeological monuments. Souvenir sand bottles of natural colours of sandstones from the Archaeological Park, is another deterioration of the tourists visiting the area. Graffiti cannot be removed while littering is one of the worst offences in Petra. In addition to noise pollution, helicopter flights have a negative visual impact and reduce the visitor experience. Under pressure from tourism and in the absence of a local tradition of site restoration, conservation may be the most pressing issue.

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3 Jordan emission factor $\text{SO}_2$ 1kg x kwh/1000; LPG emission factor 0.00029g/MJ x 86.1CV x Litres/1000, Diesel emission factor 0.0065g/MJ x 41.1CV x Litres/1000.
Choosing the Best Environmental Scheme
The emergence of ISO 14001 has helped raising general awareness of environmental management schemes. While ISO 14001 remains the most widely known scheme, EMAS is the most advanced EMS presently available. The two schemes are complementary but EMAS is more rigorous in some areas. Other voluntary environmental schemes for business include Ecolabel and Greenglobe. Ecolable is a labeling system for consumer products that are made in fashion to avoid detrimental effects on the environment while Greenglobe is a worldwide benchmarking and certification system for the travel and tourism industry.

The Eco-Management and Audit Scheme (EMAS) is designed for organizations committing themselves to evaluate, manage and improve their environmental performance. EMAS is currently the most credible and robust environmental management scheme on the market and goes beyond the requirements of the international standard ISO 14001 by adding four additional pillars:

- Continual improvement of the environmental performance;
- Compliance with environmental legislation ensured by government supervision;
- Public information through annual reporting;
- Employee participation.

EMAS is open to all types of organisations in the public and private sector that want to improve their environmental performance. EMAS is also designed to meet the needs and strengths of Small and Medium Enterprises.

EMAS “easy” is a way to implement EMAS which is proportional to the size, financial capacity and organisational culture of small business. It assists, using a number of new features, with compliance with ISO 14001 and EMAS but still focusing on what matters – environmental protection.

EMAS “easy” for small business has been developed by Heinz Werner Engel with the support of the European Union and is a way to implement EMAS which is proportionally to the size, financial capacity and organizational structure of small business. The challenge of EMAS easy was to adapt the proven concepts of Ecomapping into a certifiable EMAS and ISO 14001 without loosing the simplicity. The EMS process still had to be adult learning oriented and needs to cluster several small companies because all have to share the easy and simple documentation system.
Table 1: Key Differences between ISO 14001 and EMAS

<table>
<thead>
<tr>
<th></th>
<th>EMAS - easy</th>
<th>ISO 14001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Regulation of the European Council and the European Parliament under legal bases in the European Union and European Economic Area countries</td>
<td>International standard under private law. No legal bases</td>
</tr>
<tr>
<td><strong>Environmental Policy</strong></td>
<td>Include commitment to continual improvement of the environmental performance of an organisation</td>
<td>Does not include commitment to the environmental performance of the organisation but only of the management system</td>
</tr>
<tr>
<td><strong>Initial environmental Review</strong></td>
<td>Obligatory</td>
<td>Recommended</td>
</tr>
<tr>
<td><strong>Environmental aspects</strong></td>
<td>Identification and evaluation of environmental aspects in order to establish the environmental status of an organisation</td>
<td>Requires only a procedure that aims at identifying the environmental aspects</td>
</tr>
<tr>
<td><strong>Legal Compliance</strong></td>
<td>Full compliance is obligatory. There is a legal compliance audit during verification audit</td>
<td>Requires only a commitment to comply with applicable legal requirements.</td>
</tr>
<tr>
<td><strong>External communication</strong></td>
<td>Open dialogue with the public through a verified Environmental Statement.</td>
<td>Requires only to respond to dialogue by interested parties</td>
</tr>
<tr>
<td><strong>Continual improvement</strong></td>
<td>Required annually and verified</td>
<td>Requires periodical improvement without a define frequency</td>
</tr>
<tr>
<td><strong>Management Review</strong></td>
<td>Requires a wider evaluation of the environmental performance of an organisation within the society as such</td>
<td>Requires an evaluation of the environmental management system and not the performance of the organisation</td>
</tr>
<tr>
<td><strong>Employee involvement</strong></td>
<td>Active involvement of employees and their representatives</td>
<td>Requires only one environmental representative</td>
</tr>
<tr>
<td><strong>Collaboration with authorities</strong></td>
<td>Obliged to submit a verified Environmental statement each year</td>
<td>No obligation to inform authorities</td>
</tr>
<tr>
<td><strong>Public Accountability</strong></td>
<td>Accountable to the public to do what it is agreed and verified in the Environmental Statement each year</td>
<td>No such requirement</td>
</tr>
</tbody>
</table>

Although, the Mövenpick resort hotels are not considered SME’s (the Mövenpick Resort and Spa Dead Sea employs more than 500 staff while the Mövenpick Resort Petra employs over 200); EMAS “easy” was seen as a simple and tangible tool to introduce an environmental certification scheme for the following reasons:

- There is a very short tradition in Jordan with regards to environmental management scheme. The country presently has only 14 organizations certified with ISO 14001 and none with EMAS, Eco-label or Green globe. Introducing the environmental management schemes to the management of the Mövenpick Resorts was therefore a challenge and for this EMAS “easy” was a simple
paperless method of setting up an environmental management scheme through which such challenge could be addressed;

- Traditional ISO14001 “culture” generates - in the process of setting up the environmental management system – lengthy procedures and unnecessary forms which make the implementation of such scheme difficult and bureaucratic. Introducing such a scheme to the Mövenpick Resorts was risky as this Swiss based hospitality management organization has already established well tested procedures. What was needed was a scheme like EMAS “easy” which adapted to the existing procedures while addressing compliance to the EMAS and ISO 14001 requirements;

- EMAS easy can be delivered in 10 days. Having all the recorded data in no more than 10 pages, the scheme concentrates almost exclusively on measurement of the organization's environmental performance. It is an adaptable method which can be set in any given organization without a heavy burden on the management. Introducing it for the first time to new tourism destinations such as that of Jordan made it feasible;

- With the maximum of 10 people on 10 pages in 10 days, EMAS “easy” is based on the Eco-mapping© concept, where the business is mapped – in terms of both location and internal processes – to identify its environmental aspects. This very visual approach of such methodology made it easy for the management and the staff of the Mövenpick resorts to identify the real environmental hotspots of their organization. EMAS “easy” created a certain ownership and identification while choosing another method such as that of ISO 14001 would have been regarded more as something foreign to those who would have been responsible to implement the environmental management scheme;

- EMAS “easy” has been developed by Heinz Werner Engel, executive director of the Belgian based consultancy, Eco-Conseil Enterprise and supported by the Directorate General Environment of the European Commission. Introducing it as the preferred method to set up the Mövenpick environmental management scheme was preferred in lieu of the EU’s Life funding support to the GREEN-TAS project;

- Aeoliki Ltd consultants have demonstrated competence in implementing EMAS “easy” as the company is the first environmental consultancy in the Middle East to be certified with EMAS using this particular methodology. Aeoliki’s participation in the GREEN-TAS project was seen as an opportunity to make use of EMAS “easy”.

Finally EMAS “easy” assisted in using a number of new features complying with ISO 14001 and to the EMAS regulation and for this, it was chosen as the best way forward in monitoring and improving the environmental performance of the Mövenpick Resort and Spa Dead Sea and the Mövenpick Resort Petra.
Setting up EMAS “easy”
Setting up an environmental certification scheme considering EMAS “easy” methodology lowers the bureaucracy, the barriers of knowledge and excessive consulting and certification costs. In other words, EMAS “easy” was delivered at the Mövenpick resorts in ten days, on ten pages in 10 main steps.

These steps included:
1. Initial environmental review;
2. Identification of environmental aspects;
3. Legal compliance;
4. Environmental objectives and responsibilities;
5. Environmental Indicators;
6. Environmental policy;
7. Environmental audits;
8. Management reviews;
9. Environmental statements;
10. Verification audit.

4.1 Environmental review
The Initial Environmental Review took place through the use of a site map – also known as the ecomap - on which employees were asked to mark down what they have considered environmental hotspots based on their everyday working experience. These included water leakages, excessive energy use, spillages of dangerous substances, waste disposal, noise pollution, aesthetic and air polluting sources.

Employee participation during the initial environmental review was essential in making EMAS a more transparent and participatory environmental scheme. At the same time employees were asked to fill out an opinion questionnaire that essentially gave the environmental perception of all the staff from the top management to the front line employees. This opinion played later an important contribution in the evaluation of the environmental impacts of the organisation’s activities.

Main difficulties:
- Most of the Heads of Departments were not able to spot down what were the environmental hotspots of their areas. This was mainly due to the lack of basic environmental awareness;
- Head of Departments did not always involve their staff in recording the environmental hotspots. They have regarded such task as their own.

Positive developments:
- Clear and precise instructions on the definition of an environmental hotspot was needed prior to the commencement of such task; This has resulted to identifying effectively the environmental hotspots which assisted in preparing the ground for the formulation of the environmental action programme;
- The allocation of 2 hours was sufficient in identifying environmental hotspots. This has assisted in proceeding more efficiently with regards to the already restricted time the consultant had in view of their short visit in the Country.
Table 2: Example of Ecomapping on the Generation of Waste

| Initial review          | Waste |

4.3.1 Problems, environmental aspects linked to activity

1) Paper waste at the Front Office is excessive and not recycled (400 sheets per day)
2) Waste in the bars is not separated and not recycled.
3) Waste in the receiving area is not separated and not recycled.
4) IT room generates excessive waste of cartons which is not reduced or recycled
5) Waste in the main restaurant is not separated and not recycled
6) Waste in all kitchen production areas is not separated and not recycled
7) Broken glass waste is stored for 2 years generating filth
8) Wood needed for maintenance are stored in the staircase by the exit from the painting store to the pool and can be a cause of an accident.
9) Waste behind the main kitchen on the way to the pool area is not properly managed and generates bad smells
10) Waste in the main receiving area smells as doors are left open of the air-conditioned waste disposal room.
11) Waste in laundry is not reduced or separated and recycled

4.3.2 Environmental legislation headlines relevant to the environmental aspects

- Environmental Protection Law 1/2003
- Regulation 27/2005 Management of Solid Waste
- Regulation 24/2005 Management Transportation and Handling of Hazardous Substances

4.5.1 How to measure indicators (liters, kg, m³)

<table>
<thead>
<tr>
<th>Kg of waste non recycled</th>
<th>Reduce non-recycled waste by 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of broken glass waste</td>
<td></td>
</tr>
<tr>
<td>Number of staff trained on recycling</td>
<td></td>
</tr>
</tbody>
</table>

4.3.3 Operational objectives for the year

<table>
<thead>
<tr>
<th>4.3.3 Environmental action programme</th>
<th>4.4.1 Responsible</th>
<th>End Date</th>
<th>Budget JD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4) Ask suppliers of cartons to reduce waste by providing products in reusable containers – ensure enforcement</td>
<td>Food and Beverage</td>
<td>31/08/72007</td>
<td>50</td>
</tr>
<tr>
<td>1, 2, 3, 5, 6, 11) Install bins in the main receiving area and two in each production area in all departments. One bin is recyclable material and the other non-recyclable material</td>
<td>Maintenance</td>
<td>31/09/2007</td>
<td>20.00</td>
</tr>
<tr>
<td>8) Re-organise and place in a safely place the wood in the stair case</td>
<td>Maintenance</td>
<td>31/12/2007</td>
<td>50</td>
</tr>
<tr>
<td>9) Re-organise and place proper bins with lids the waste areas of the kitchens</td>
<td>Kitchen</td>
<td>31/08/2007</td>
<td>200</td>
</tr>
<tr>
<td>1, 2, 3, 5, 6, 11) Organizing training sessions on waste management and recycling</td>
<td>Human Resources</td>
<td>30/9/2007</td>
<td>400</td>
</tr>
</tbody>
</table>

4.4.2 Trainings

<table>
<thead>
<tr>
<th># of Participants</th>
<th>Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is recycling and good practice on management of waste</td>
<td>31/9/2007</td>
<td>1-2 hours</td>
</tr>
</tbody>
</table>

Date: Name & signature: Update Nbr: 

21
Identification of Environmental Aspects

All environmental hotspots were grouped into major global environmental aspects. An environmental aspect can be anything that interacts and have an impact on the environment. This could be a number of issues like a specific activity, the use of a chemical, a piece of equipment, an operational practice, a plant component, a specific process, an emission or a discharge.

The identification of environmental aspects is important towards recognizing the impacts on the planet. This proves helpful in setting and formulating objectives, targets, and other programs that may be directed towards solving environmental problems.

The following environmental aspects were considered:

- Air (emissions);
- Water (discharge, leakages);
- Waste (recycling, disposal);
- Toxicity (contamination risks);
- Urban (impact outside the boundaries of your organization);
- Raw materials (use of);
- Resources (energy consumption).

An example of water as an environmental aspect included the environmental objective set to change the disinfection systems of the Mövenpick Resort and Spa Dead Sea swimming pools from chlorine to ozone. This has eradicated the dangerous substances of the backwash water originally discharged into the Dead Sea. While salinity levels of the Dead Sea are high enough to minimize any environmental impact from such discharged water; the Resort has moved forward by endorsing the discharged backwash water into its own sewage management programme.

Another example of an environmental aspect is a resource based, the endemic Tamarisk shrub (*Tamrix jordanis- palaestina*) known to grow along the eastern coast of the Dead Sea. To encourage its growth which is currently under threat from the increase construction of tourism accommodations in the area, the Management added another environmental objective to turn 2% of its garden into a tamarisk shrub habitat.

Main difficulties:

- The identification of environmental aspects followed a pattern that restricted the management from thinking globally but more within the geographical boundaries of their organizations. For example the number of quests visiting nature parks or archaeological sites had a significant environmental impact on such sites especially in the case of the Mövenpick Resort Petra.

Positive development:

- Incorporation of global environmental issues like biodiversity and cultural heritage into the environmental action programme has increased the image of the performance of both Resorts both socially (i.e. on a community level) and environmentally.
Legal Compliance and Environmental Evaluation

Once all environmental aspects were recorded discussion with the competent authorities took place to identify the legal requirements both resorts must comply with. Examples of such requirements included water management permits, boreholes permits, sewage treatment plan permits and others. An evaluation of the environmental impacts stemming from the activities and services of the resorts was then carried out.

Such evaluation took the following into consideration:

- Legal requirement: When an activity required a permit then the evaluation gave it a high ranking;
- The frequency of the environmental impact recorded in the ecomaps. The more hot spots that recorded, for example, water leakages, the higher ranking water received as an important environmental impact;
- The importance of resources depletion. Taking into consideration the geophysical characteristics of the area, water depletion, for example, received a higher ranking than biodiversity degradation;
- The practice followed. Immediate corrective action received a higher ranking from an action that could be completed over a longer period of time. For example, water resource depletion due to water leakages received higher ranking since corrective action was due immediately;
- The opinion of the staff recorded in the questionnaires. The more times staff recorded, for example, water leakages, the higher the ranking water resource depletion received.

Main difficulties:
- Enforcing legal compliance to some environmental aspects such as water is a political issue;
- Employees were not always willing to share an honest opinion of the environmental performance of their organisation. In some instances they were of the opinion that recycling was indeed in place where in practice was not implemented.

Positive developments:
- Avoiding political issues was the best way not to frighten the ownership and management of the organizations in question. Politicization of the environmental action programme could have lead to a complete stasis of the entire process;
- The outcome of the employee’s opinion on the existed environmental performance of their organization has brought in some instances a common understanding on the significant environmental impacts. For example there was almost a consensus that the guests visiting Petra had an impact on the deterioration of the archaeological site.
<table>
<thead>
<tr>
<th>No</th>
<th>Process</th>
<th>Main Activities</th>
<th>Environmental Aspects</th>
<th>Environmental Impact</th>
<th>No. of ecomaps</th>
<th>F</th>
<th>Lx3</th>
<th>I x2</th>
<th>P</th>
<th>O</th>
<th>Total</th>
<th>Priority No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kitchen/Spa/Village</td>
<td>STP/Lifting/Drainage</td>
<td>Atmosphere/Health</td>
<td>Smells</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Engineering/Kitchen/Spa/Village</td>
<td>No recycling</td>
<td>Waste Management</td>
<td>Loss of resources</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Food &amp; Beverage</td>
<td>Conferences/Events</td>
<td>Energy</td>
<td>Loss of energy</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Kitchens</td>
<td>Main kitchen/Pool kitchen</td>
<td>Health</td>
<td>Accidents</td>
<td>4</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td></td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Kitchen/Laundry</td>
<td>Food preparation/Washing linen</td>
<td>Health</td>
<td>Working ambience (hot)</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>Kitchen/Spa/Village</td>
<td>Food preparation/facilities/restaurants</td>
<td>Resources</td>
<td>Loss of water</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Kitchen/Restaurants</td>
<td>Food preparation/ restaurants</td>
<td>Health</td>
<td>Cleanliness</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Maintenance</td>
<td>Pool water (Spring)</td>
<td>Resources</td>
<td>Legal compliance</td>
<td>1</td>
<td>1</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Maintenance</td>
<td>Potable water (ground water table)</td>
<td>Resources</td>
<td>Declining</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>Maintenance</td>
<td>Gardening</td>
<td>Biodiversity</td>
<td>Loss of engendered species</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Maintenance</td>
<td>Hot water/Steam generation</td>
<td>Atmosphere</td>
<td>Climate Change</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td></td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>

**Citation**


**Date:**

**Name and signature:**

**Version:**
Environmental Policy, Objectives, Indicators and Responsibilities

Once the impacts were evaluated the enterprises were in a position to set out their environmental action plan. Before doing so an environmental policy was written and endorsed by the Directors of both resorts. In this policy the leading environmental principles of the Mövenpick Resorts were recorded and communicated to all the staff.

On the basis of the environmental policy and the identified environmental aspects a number of defined objectives were recorded with clear responsibilities assigned to employees and allocated budgetary resources. Annual, biannual and triennial deadlines were set that gave a clear framework while indicating the complexity and importance these environmental objectives entailed.

Resources to complete the environmental action plan were also recorded together with environmental indicators set to assist in the measurement of the environmental performance.

Table 4: How to Measure Indicators

<table>
<thead>
<tr>
<th>Resources</th>
<th>Indicator</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Cubic meters</td>
<td>m$^3$</td>
</tr>
<tr>
<td>Petrol/gas/diesel</td>
<td>liters</td>
<td>Lt</td>
</tr>
<tr>
<td>Electricity</td>
<td>kilowatts</td>
<td>kWh</td>
</tr>
<tr>
<td>Air emissions</td>
<td>Tons</td>
<td>t</td>
</tr>
<tr>
<td>Biodiversity/culture</td>
<td>Number of guests</td>
<td># of pax</td>
</tr>
</tbody>
</table>

Main difficulties:

- Formulating yearly objectives did not always include the existing hotel investment plan. Major investments directly related to the improvement of the environmental performance such as the replacement of all burners from diesel to LPG ones were initially left out.
- The environmental policy was not necessarily regarded as one of the entire organisations but more that of the Directors General. It was therefore seeing as an order and not as a common policy by which all the employees would aim to achieve;
- The assignment of the environmental manager responsible to oversee the overall effective implementation of the environmental management system should not have been assigned to persons with no commitment. This has left many environmental actions incomplete within the first quarter of implementation and placed much risk in failing to succeed the final EMAS verification audit;
- The assignment of responsibilities within the environmental action programme was not always equally distributed mainly because some Department Heads felt that they were overloaded with much work.

Positive developments:

- It was important that the management of the Resorts understood that improving environmental performance goes beyond mere housekeeping and maintenance of equipment. The ongoing investment with regards to the upgrading of the Resorts facilities should be included in the environmental action programme in order to be
followed more closely and be linked to the measurement of the consumption of resources. Essentially this would assist in a clearer picture of the environmental performance;

- The environmental policy must be written in a simple, clear and precise manner so that it is clearly understood by all levels of education amongst the employees of the organizations.

**Environmental Audit**

A three month period was given to onset the implementation of the environmental action plan. During this period each of the management team responsible to carry out the environmental objectives began implementing its own tasks. On the third month an internal audit took place to check the progress made. This tool was used to monitor the activities, measurements and compliance of the environmental performance, all of which were recorded in only one page. The environmental audit assisted in spotting out possible delays or dysfunction of the environmental management scheme and gave an early alert to the management to take immediate corrective action. A second environmental audit took place on the sixth month since the commencement of the environmental scheme.

All results were communicated to all management teams and discussion took place to analyze how possible obstacles to the implementation of the environmental action plan could overcome.

**Table 5 Selected Examples of the Audit Results**

<table>
<thead>
<tr>
<th>Weakness</th>
<th>Source</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production of waste generated by the Resort is not measured</td>
<td>Negligence of the F&amp;B and Kitchen Departments</td>
<td>As agreed at the Initial Review, the F&amp;B and the Kitchen Department will come up with a method of measuring waste so that this can later be assessed to see how much of this will be recycled.</td>
</tr>
<tr>
<td>All Ozone Depleted substances such as Halon fire extinguishers and R12 cylinders in the engineering room must be removed and disposed in accordance to the legal requirement of the Jordanian Ministry of the Environment</td>
<td>lack of communication of legal requirements</td>
<td>Engineering will obtain objective evidence on the deadlines and possible derogation Jordan may has obtained with regards to the implementation of the Montreal Protocol.</td>
</tr>
<tr>
<td>Decisions taken with regards to improving environmental performance such as renovation of village, new LPG boilers, and</td>
<td>Understanding of how the EMS works</td>
<td>All investments shall be incorporated into the Environmental Programme to show the Hotel’s decision towards environmental improvement</td>
</tr>
<tr>
<td>Issue</td>
<td>Difficulty/Action</td>
<td>Solution/Response</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>New ozone swimming pools of the Hotel are not incorporated into the Environmental Programme</td>
<td>Difficulties encountered by the Engineering Department to find the source in view of the high salinity levels of the water</td>
<td>Engineering to intensify this action and come up with a permanent solution before the verification date by the end of February. If solution requires substantial renovation, Engineering shall report this to the Director and come up with a realistic pipeline implementation plan.</td>
</tr>
<tr>
<td>While some progress has been observed with regards to water leakages under the swimming pool areas of the Spa, substantial water waste has been observed.</td>
<td>The Environmental Statement was not communicated and understood to all front line staff</td>
<td>All Heads of Departments shall ensure that the Environmental Statement is communicated and clearly understood by their staff.</td>
</tr>
<tr>
<td>The Environmental Manager was absent on business trip during the scheduled internal check</td>
<td>Setting priorities and badly arrange time management</td>
<td>The Environmental Manager shall set the future date of internal check and fix it on his calendar so that he avoids double activity booking. If need to have a change he shall reschedule a new date. In any event one internal check shall be done prior to April 2008.</td>
</tr>
<tr>
<td>The waste recycling programme has not been launched.</td>
<td>Very expensive quotation from one prospective contractor</td>
<td>Organize a meeting and discuss this idea with other hotels and the Authority.</td>
</tr>
<tr>
<td>The Engineering room in the basement is untidy and poses a threat to both safety and fire hazard.</td>
<td>Negligence by the Engineering Department</td>
<td>The storage room shall be organized and cleaned.</td>
</tr>
<tr>
<td>No air curtains for saving energy of the walk in refrigerators have been installed</td>
<td>Negligence by the Engineering Department</td>
<td>Engineering department to come up with a proposal and concrete deadline of when such action can be implemented.</td>
</tr>
</tbody>
</table>

Main difficulties:
- The results generated from the internal checks were not always regarded as those of the employees but often seen as criticism of the Department Heads. This has generated a certain degree of antagonism between the Departments Heads;

Positive developments:
- In large organization the applicability of frequent short and time efficient internal checks of the environmental management systems have proven to be more
effective. The preferred time framework for such internal checks should have been less frequent than every 6 months.

Management review
After each environmental audit, a written two page management review, was communicated to the directors and managers of both resorts. This assisted to evaluate the environmental management scheme through assessing the environmental performance of the resorts. Considering the environmental indicators an assessment of the latest consumption measurements took place. This helped in providing a picture of the trends of resource consumption. Note is made that a better and more accurate picture of such trends is more clear when assessed annually as opposed to quarterly. Nevertheless, the management review provided an interim perception of the environmental performance of the resorts.

Main difficulties:
- Management reviews were not always understood what they have entailed in view of the fact that in the environmental manager responsible to oversee that these were carried out were either new in their job responsibilities as environmental managers or not committed to the entire process.

Positive developments:
- The environmental management reviews gave a good picture of the overall environmental performance. Section 5 of this paper provides further insight to the outcomes of these reviews.

Environmental Statements and Verification Audit
With the completion of two environmental audits and management reviews the Mövenpick resorts collected enough information to demonstrate their ability to improve their environmental performance through monitoring consumption of resources and implementation of concrete tangible environmental objectives.

Since Jordan is not a member of the European Union, the identification of an accredited EMAS verifier could only take place within the EU. Much experience lies with the German National Accreditation Body (Deutsche Akkreditierungs Rat - DAR) and an agreement with a German verifier familiar with the EMAS “easy” methodology was reached. The verification audits took place in April 2008 both of which reached successful results. The Mövenpick Resort and Spa Dead Sea became the first EMAS verified organization in the entire Middle East while the Mövenpick Resort Petra was given a period of 2 months to complete some of its environmental action prior to becoming the second organization in the Middle East with EMAS registration.

With the completion of both verification audits the Resorts have prepared their first environmental statement. This statement lays down the environmental activities taken annually while it portrays a commitment towards improving environmental performance by economizing on resources consumption.
Table 6: Barriers and Benefits during the Implementation of EMAS “easy”

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inability to spot down the environmental hotspots due to basic environmental awareness and lack of involvement;</td>
<td>1. The applicability of frequent short and time efficient internal checks of the environmental management systems have proven to be more effective.;</td>
</tr>
<tr>
<td>2. Results from the internal checks of the environmental management system generated antagonism between the employees;</td>
<td>2. The environmental management reviews gave a good picture of the overall environmental performance.</td>
</tr>
<tr>
<td>3. Major investments directly related to the improvement of the environmental performance were left out from the action plan;</td>
<td>3. It was important that the management of the Resorts understood that improving environmental performance goes beyond mere housekeeping and maintenance of equipment.</td>
</tr>
<tr>
<td>4. The environmental policy was seeing as an order and not as a common policy;</td>
<td>4. The environmental policy must have been written in a simple, clear and precise manner so that it is clearly understood by all;</td>
</tr>
<tr>
<td>5. There was no commitment by the environmental managers to see the overall successful implementation of the environmental action programme;</td>
<td>5. Incorporation of global environmental issues like biodiversity and cultural heritage into the environmental action programme has increased the image of the performance;</td>
</tr>
<tr>
<td>6. The assignment of responsibilities within the environmental action programme was not always equally distributed;</td>
<td>6. Avoiding political issues was the best way not to frighten the ownership and management of the organizations in implementing the environmental management system;</td>
</tr>
<tr>
<td>7. The identification of environmental aspects followed a pattern that restricted the management from thinking globally but more within the geographical boundaries of their organizations.</td>
<td>7. The outcome of the employee’s opinion on the existed environmental performance of their organization has brought in some instances a common understanding on the significant environmental impacts of their organization.</td>
</tr>
<tr>
<td>8. Enforcing legal compliance was at time a political issue;</td>
<td></td>
</tr>
<tr>
<td>9. Employees were not always willing to share an honest opinion of the environmental performance of their organization.</td>
<td></td>
</tr>
</tbody>
</table>
Impacts and Results of the Environmental Management Scheme
The following table summarizes the preliminary outcomes of the Environmental Performance of the Mövenpick Resorts after having examined the actual consumption of resources against the concrete environmental targets set out with clear environmental indicators:

1. **Target: Energy reduction by 5%**
The target to reduce kWh consumption was assessed per guest night. In October 2006 the kWh consumption per guest night was 88 kWh/per guest night while in the same month of 2007 went down by 17 kWh/per guest night. This target did not take into consideration the temperature and size of our Resort’s facilities.

2. **Target: Comply with CO₂ quota for Jordan**
Bus fleet and boiler burners have been replaced. Decision and approved budget for replacing the petrol boiler burners with LPG ones has been taken with a deadline the end of 2008. This is expected to reduce the CO₂ emissions substantially.

3. **Target: Reduce Waste by 5%**
This target is expected to be assessed by the end of 2008 when the existing launching of the recycling programme has been successful. Recycling contractors have been found and the creations of two new posts for individuals who will sort out waste have been created.

4. **Target: Reduce water consumption by 2%**
The water consumption stayed about the same level from 0.69 m³/per guest night in 2006 went down to 0.63 m³/per guest night in 2007. As in the case of electrical energy consumption this method of assessment is not taking into consideration the temperature and size of the Resort’s facilities.

5. **Target: 20% usage of environmentally friendly detergents**
Evidence has been obtained from the main supplier that all of the housekeeping chemicals are environmentally friendly. Such evidence includes Material Safety Data Sheets.

6. **Target: Train at least 20% of staff on Environmentally related issues**
This target has been achieved. Two training sessions have been organized for the Head of Departments and another with their assistants.

7. **Target: Better aeration of the STP and effective load of lifting station**
The lifting station has been through maintenance and is sealed off better to avoid smells. The smells of the STP are generated from the point where the sewage is being discharged into the STP. The STP has been sealed with silicone and all smells have been eradicated.

8. **Target: Replace 100% all fire extinguishers that contain Halon**
This target has not been achieved. Engineering Department shall obtain objective evidence on the deadlines and possible derogation Jordan may has obtained with regards to the implementation of the Montreal Protocol.

**Conclusions**
Within the scope of GREENTAS project the international known chain of Mövenpick Resorts became the first organization in the Middle East to be registered with the worlds most advance environmental management scheme – the Eco Management Audit Scheme (EMAS). Thanks to a very simple and paperless environmental
management scheme; EMAS “easy” was set up in just 10 days, on 10 pages and in 10 basic steps while verified in just 6 months time.

The Mövenpick Resort and Spa Dead Sea and the Mövenpick Resort Petra are a prime example of how far can a serious organization reach when implementing tangibly environmental management schemes. The implementation of EMAS at the Dead Sea created 3 new job posts required during the sorting of waste that needed to be recycled. In a country like Jordan where unemployment reached 12% (28% unofficially), EMAS contributed to the social stability of the area. The Mövenpick Resort Petra managed to involve Petra’s regional authorities in setting up a regional recycling hub that contractors may use to store temporarily waste material in lieu of the long (i.e. 230 km) and uneconomical distance they have to cover coming from Amman.

EMAS is not just about monitoring the environmental systems within the geographical boundaries of an organization. It is about monitoring the environmental performance of an organization within the wider society as such. EMAS is about being accountable to the public to do what it is agreed and verified in the Environmental Statement each year.

The creation of jobs, the initiation of waste management programmers in places where recycling schemes are absent, the three year investment plans to replace old dishwashers with energy and water efficient ones, the replacement of old diesel burners with new lower CO₂ emission LPG ones as well as the recognition that visitors of the Resorts do contribute to the archeological degradation of important cultural sites, are only few examples which demonstrate that environmental performance is not just about measuring resources but also about being corporately accountable.

Mövenpick Resorts in the Dead Sea and in Petra have now joined the “club” of EMAS verified organizations. This essentially means that they are now accountable to improve their environmental performance through collaboration with competent authorities and by having their employees involved throughout such process while being transparent.

The challenge of long-term benefits generated from an effectively implemented environmental management scheme is yet to be determined in a world that tourism sector remains to be the most important economic contributor to peoples of arid and semi arid regions of the globe. In the meantime enhancement of environmental performance is essentially an improvement of business profitability and competitiveness. While resources are being monitored, environmental savings go hand in hand with financial benefits.

References

- Flash flood–producing rainstorms over the Dead Sea: A review. Uri Dayan and Efrat Morin
- TED Case Studies. Number: 429. Mnemonic: DEADSEA.
- Conservation of Medicinal and Herbal Plants Project. Jordan. 20/3/2003
- Dunaliella Culture Collection. Dr. Jürgen E.W. Polle at Brooklyn College of CUNY.
- The National Energy Foundation. Davy Avenue. Milton Keynes, UK
- Greenhouse Gas Pollution in the Stratosphere Due to Increasing Airplane Traffic, Effects On the Environment
- Katta G. Murty Department of Industrial and Operations Engineering 2000.
- Information on Fauna and Flora. Jordan University of Science and Technology
Sustainable Development Indicators for Tourism Destinations and Businesses in Cyprus

J.P. Glekas(1), V. Nikodemou, S. Ioannou(1)
(1)Aeoliki Ltd., 41 Themistokli Dervi Str., 1066 Nicosia, Cyprus

Abstract
Sustainable tourism development requires the informed participation of all stakeholders as well as strong political leadership to ensure wide participation and consensus building. Achieving sustainable tourism is a continuous process requiring monitoring and control of impacts as well as of the implementation stage of corrective sand mitigation measures and the effect of policy responses. This process can be very efficient if quantitative indicators are used that describe in an unbiased way the changes that are of importance for tourism development and management. This paper describes the identification of potential sustainable indicators for tourism destinations and enterprises in Cyprus, and their pilot application to a well known tourism destination in Cyprus, i.e. Ayia Napa, to develop and implement an Environmental Management System for Sustainable Tourism in the area.

Keywords: Environmental performance evaluation; Sustainable indicators; Environmental management systems; Tourism industry

Introduction
Tourism industry has become during the last decades a major sector of the world economy, especially in relation to the international trade in services. Until recently tourism has been misleadingly considered as having no environmental impacts because there was little knowledge about its real social, cultural, and environmental impacts. It is well known now days that the tourism affects the conditions of destinations and host communities, and more broadly the future of ecosystems, regions and nations.

With this position in the world economy, tourism has a moral responsibility to take the lead in making the transition to sustainable development. It also has a vested interest in doing so. This is because of its unique dependency on quality environments, cultural distinctiveness and social interaction, security and wellbeing. Tourism can be a tool to aid or drive regeneration and economic development as well as enhancing the quality of life of visitors and host communities. Making tourism more sustainable will contribute significantly to the sustainability of European society.

Sustainable tourism is directly related to [1]:

- **Sustainable destinations**, since the involvement of all the responsible stakeholders is more efficient at this level;
- **Sustainable businesses**, since sustainable tourism cannot be achieved if the tourism businesses do not embrace sustainability in their operations, and

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*European states recorded in excess of 440 million visitor arrivals in 2005. An even greater amount of tourism activity occurs in the form of domestic tourism and day trips. Tourism, directly and indirectly, accounts for around 10% of European GDP and 20 million jobs. It is a major economic force, generating worldwide in 2005 an estimated €5 trillion in gross output, creating employment for 305 million people, producing 11.4% of world gross domestic product (GDP), investing €1.1 billion in new facilities and equipment, and contributing more than €1.2 billion in tax revenue.*
- **Responsible tourists**, since tourists must react in a sustainable manner in their travel choice and behavior.

Sustainable tourism development requires the informed participation of all relevant stakeholders, as well as strong political leadership to ensure wide participation and consensus building. Achieving sustainable tourism is a continuous process and it requires constant monitoring of impacts, introducing the necessary preventive and/or corrective actions/measures whenever necessary. As a result planners and academics in many nations and specific destinations have been working to develop indicators suitable to provide unbiased information on the measurement of changes that are of importance for tourism development and management [2].

Indicators are information sets which are formally selected to be used on a regular basis to measure:

a) Changes in tourism’s own structures and internal factors;
b) Changes in external factors which affect tourism, and
c) The impacts caused by tourism.

In order to classify indicators several frameworks have been proposed [3]. The OECD developed the Pressure-State-Response framework in the late eighties [4], the UN adapted it to the Driving force-State-Response framework [5], and the European Environment Agency (EEA) introduced the Driving force – Pressure – State – Impact – Response (DPSIR) framework [6].

The DPSR framework identifies cause – effect relationships and allows for the separation of categories of issues and provides flexibility for usage and analysis. The DPSR categories are defined as follows:

- **Driving force indicators** reflect pressures exerted by natural phenomena and anthropogenic activities that, in general, cannot be easily manipulated but provide essential information to understand the regional context.
- **Pressure indicators** reflect the pressures exerted on environment of a region, as a result of the driving forces.
- **State indicators** assess the current status of the environment.
- **Responses** related to the social response via policies, laws, measures etc.

The constituents of a State of tourism environment, as can be seen in Figure 1, are the Drivers and Pressures that are applied on the system. That State in itself leads to impacts on the human and natural environment, the Responses to which feed back onto the Drivers and Pressures.
Various international initiatives have resulted with a number of indicators for sustainable development that can be applied to tourism destinations and enterprises [7], [8], [9], [10], and [11]. All these indicators are based either on available records and directly measurable data or rely on surveys of tourists, businesses and permanent population. A recent work on indicators by EUROSTAT, UNWTO, and the VISIT project [12] resulted in a set of indicators reflecting the three aims of the proposed EU Sustainable Development Strategy – SDS [13]:

- Economic prosperity;
- Social equity and cohesion, and
- Environmental and cultural protection.

From these a set of 50 indicators are more relevant and achievable to be applied in tourism destinations and businesses and are presented in Table 1.

**Methodology**

Ayia Napa is located at the southern eastern coastal zone of Cyprus, and is a well known tourist destination worldwide. The area contains a variety of ecosystems which may be affected by tourist use, including fragile dune and beach systems, areas subject to erosion and adjacent marine ecosystems as well as historic communities which can be tourist attractions.
<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Purpose – what the indicator shows</th>
<th>Collected by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total visitor arrivals or bed nights per month</td>
<td>Tourism volume and seasonality</td>
<td>Records from accommodation establishments</td>
</tr>
<tr>
<td>2</td>
<td>Total day visitor estimate per annum or per month</td>
<td>Tourism volume and seasonality</td>
<td>Counts and visitor survey at arrival points/ key sites</td>
</tr>
<tr>
<td>3</td>
<td>Number of bed spaces (by accommodation type)</td>
<td>Tourism capacity and basis for calculating volume.</td>
<td>Existing records or regular audit</td>
</tr>
<tr>
<td>4</td>
<td>Annual average % bed space and bedroom occupancy of accommodation</td>
<td>Enterprise performance and basis for calculating volume.</td>
<td>Business records or survey</td>
</tr>
<tr>
<td>5</td>
<td>% of enterprises reporting growth in business over previous year</td>
<td>Relatively robust measure of growth and competitiveness</td>
<td>Business survey</td>
</tr>
<tr>
<td>6</td>
<td>Average spending per head</td>
<td>Economic return from tourism</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>7</td>
<td>Local spending (or GDP) generated by tourism</td>
<td>Tourism value and contribution to local economy</td>
<td>Visitor survey showing spend plus business survey on occupancy (or local TSA process)</td>
</tr>
<tr>
<td>8</td>
<td>% of bed spaces available all year</td>
<td>Seasonality</td>
<td>Existing records, regular audit or business survey</td>
</tr>
<tr>
<td>9</td>
<td>Ratio of average occupancy (or total bed nights) between busiest and least busy 3 months</td>
<td>Seasonality</td>
<td>Business records or survey</td>
</tr>
<tr>
<td>10</td>
<td>Number of bed spaces per 1000 local population</td>
<td>Potential imbalance and pressure on community and resources</td>
<td>From indicator 3 and population records</td>
</tr>
<tr>
<td>11</td>
<td>Ratio of number of tourists to local population</td>
<td>Potential imbalance and pressure on community and resources</td>
<td>From indicators 1 and 2 and population records</td>
</tr>
<tr>
<td>12</td>
<td>Average length of stay</td>
<td>Value to the community as against impact of transport</td>
<td>Visitor and business surveys</td>
</tr>
<tr>
<td>13</td>
<td>% tourism enterprises accessible by public transport</td>
<td>Potential to accommodate non-car access and need for improvement</td>
<td>Facility audit and business survey</td>
</tr>
<tr>
<td>14</td>
<td>% of visitors arriving by means other than car or plane</td>
<td>Trend in transport modal change – effect on carbon emissions</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>15</td>
<td>% visitor use of public transport when in the destination</td>
<td>Trend in transport modal change – effect on carbon emissions</td>
<td>Visitor survey</td>
</tr>
</tbody>
</table>
Table 1. Destination Indicators (EU Sustainable Development Strategy)

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Purpose – what the indicator shows</th>
<th>Collected by</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Total employment in sector as percent of total employment</td>
<td>Relative importance of tourism jobs and balance in the economy</td>
<td>Industry sector records/codes</td>
</tr>
<tr>
<td>17</td>
<td>% of tourism jobs that are seasonal only</td>
<td>Job quality and seasonality</td>
<td>Business survey</td>
</tr>
<tr>
<td>18</td>
<td>Average hourly earnings in tourism as ratio of all industry hourly earnings</td>
<td>Job quality</td>
<td>Business survey and comparative sector figures</td>
</tr>
<tr>
<td>19</td>
<td>% employees with vocational qualifications in tourism</td>
<td>Job quality and career conditions.</td>
<td>Business survey</td>
</tr>
<tr>
<td>20</td>
<td>% residents indicating that they are satisfied with local impact of tourism</td>
<td>Community acceptance and benefit from tourism</td>
<td>Residents survey</td>
</tr>
<tr>
<td>21</td>
<td>% residents identifying that they are directly benefiting from local tourism and % believing that it adds to overall quality of life</td>
<td>Community benefit from tourism</td>
<td>Residents survey</td>
</tr>
<tr>
<td>22</td>
<td>% of enterprises with recognized environmental certification</td>
<td>A robust indication that action is actually being taken</td>
<td>Records from certification schemes and/or business survey</td>
</tr>
<tr>
<td>23</td>
<td>% of enterprises reporting that they are taking environmental management measures</td>
<td>Wider (but less robust) indication of environmental management irrespective of reaction to certification</td>
<td>Business survey</td>
</tr>
<tr>
<td>24</td>
<td>Amount and proportion of waste sent to landfill (Total or sum from tourism)</td>
<td>Resource efficiency and land pollution</td>
<td>Municipal measurement or sum of data submitted by tourism enterprises</td>
</tr>
<tr>
<td>25</td>
<td>% of waste recycled by tourism enterprises</td>
<td>Commitment to resource efficiency</td>
<td>Business survey</td>
</tr>
<tr>
<td>26</td>
<td>Sewerage discharge (Total or sum from tourism)</td>
<td>Pollution potential</td>
<td>Municipal measurement or sum of data submitted by tourism enterprises</td>
</tr>
<tr>
<td>27</td>
<td>% tourism enterprises not connected to efficient sewerage treatment</td>
<td>Pollution potential</td>
<td>Municipal records and business survey</td>
</tr>
</tbody>
</table>
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</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Water consumption (Total or sum from tourism) – total and at busiest period</td>
<td>Resource efficiency and community impact</td>
<td>Municipal measurement or sum of data submitted by tourism enterprises</td>
</tr>
<tr>
<td>29</td>
<td>% water recycled by tourism enterprises</td>
<td>Commitment to resource efficiency</td>
<td>Business survey</td>
</tr>
<tr>
<td>30</td>
<td>Water quality (sea and freshwater areas)</td>
<td>Nature conservation and attractiveness of environment for local people and tourists</td>
<td>Regular water sampling</td>
</tr>
<tr>
<td>31</td>
<td>Total energy consumption (or CO₂ emissions) from tourist facilities</td>
<td>Resource efficiency and pollution</td>
<td>Sum of data submitted by tourism enterprises</td>
</tr>
<tr>
<td>32</td>
<td>Air quality</td>
<td>Attractiveness of environment for local people and tourists</td>
<td>Regular air purity sampling</td>
</tr>
<tr>
<td>33</td>
<td>Quantity of strewn litter at selected sites</td>
<td>Attractiveness of environment for local people and tourists</td>
<td>Observation, Visitor and residents surveys</td>
</tr>
<tr>
<td>34</td>
<td>Number of people at selected sites on busiest days</td>
<td>Pressure on community and environment</td>
<td>Visitor counts and survey</td>
</tr>
<tr>
<td>35</td>
<td>Environmental state of selected sites</td>
<td>Damage to landscape and biodiversity</td>
<td>Observation, Visitor and residents survey</td>
</tr>
<tr>
<td>36</td>
<td>Number and size of protected sites and land area</td>
<td>Natural and cultural heritage quality and ability to withstand pressure</td>
<td>Recorded designations</td>
</tr>
<tr>
<td>37</td>
<td>Percentage of selected types of precious landscape area (e.g. length of coastline) that is built upon</td>
<td>Reduction in attractiveness</td>
<td>Land use records and observation</td>
</tr>
<tr>
<td>38</td>
<td>Percentage of area subject to land use planning and development control</td>
<td>Ability to withstand pressure</td>
<td>Land use plans</td>
</tr>
<tr>
<td>39</td>
<td>Contribution of tourism enterprises and visitors to conservation</td>
<td>Support from tourism for conservation</td>
<td>Visitor survey, business survey. Monitoring of specific schemes</td>
</tr>
<tr>
<td>40</td>
<td>% tourism enterprises participating in quality</td>
<td>Business engagement, quality and competitiveness</td>
<td>Records from schemes. Business survey</td>
</tr>
</tbody>
</table>
Table 1. Destination Indicators (EU Sustainable Development Strategy)

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</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>% visitors indicating that they are satisfied with overall experience</td>
<td>Destination quality and visitor satisfaction</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>42</td>
<td>% visitors who are on a repeat visit and % who say they will return</td>
<td>Destination quality and visitor satisfaction</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>43</td>
<td>% tourism enterprises meeting specified accessibility standards</td>
<td>Ability to provide a visitor experience without discrimination</td>
<td>Inspection scheme records, Business survey</td>
</tr>
<tr>
<td>44</td>
<td>% of visitors with a physical or sensory disability</td>
<td>Relative social inclusion of the destination</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>45</td>
<td>% of visitors from lower socio-economic groups</td>
<td>Relative social inclusion of the destination</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>46</td>
<td>% of visitors who are benefit from a supported holiday scheme</td>
<td>Importance of social tourism to the destination</td>
<td>Visitor or business survey</td>
</tr>
<tr>
<td>47</td>
<td>Level of satisfaction of visitors with a physical or sensory disability</td>
<td>Relative social inclusion of the destination</td>
<td>Visitor survey</td>
</tr>
<tr>
<td>48</td>
<td>Presence of a destination management organization that involves different stakeholders</td>
<td>Inclusive approach to destination management</td>
<td>Presence/absence against definition</td>
</tr>
<tr>
<td>49</td>
<td>% of businesses that belong to local tourism association</td>
<td>Degree of engagement by the private sector in destination management</td>
<td>Membership records</td>
</tr>
<tr>
<td>50</td>
<td>Existence of an agreed and monitored sustainable tourism strategy and action plan</td>
<td>Commitment to sustainable destination management</td>
<td>Presence/absence against definition</td>
</tr>
</tbody>
</table>

As with nearly all destinations, the area share the issue of control of shore and building, issues of crowding of some specific localities in (peak) season, erosion, removal of solid waste from beachfront areas, seasonality of water demand and waste production, identification and protection of fragile habitats, and seasonality of use. Based on the DPSR analysis (Figure 1) sustainable tourism indicators for the destination and the enterprises in the area were selected based on measurable and observable data. The selected indicators for the tourist destination provide information about sustainable tourism aspects and are focused on the local economy and tourism development (local jobs, economic benefits from tourism), the society and culture (visitor fulfillment, local management control) and the environmental richness and
protection (environmental resources, biodiversity) aspects of sustainable tourism policy and management. Consequently, the proposed sustainable tourism indicators for the enterprises, are focused on the level of integration in the local economy (local jobs, economic benefits from tourism), promotion of local society and culture (local culture promotion, integration with community) and environmental protection (measures for the protection of natural resources, local environment integration).

**Identification of indicators**

From the identified 50 potential indicators (Table 1), the final selection of the indicators was performed applying the method proposed by EEA [14] and VMM [15] which is based on the fulfillment of six criteria:

- **temporal coverage**: the indicator should illustrate continuous or semi-continuous (i.e. discrete data, but frequently sampled) data;
- **spatial coverage**: the indicator should be applicable to the whole country or region;
- **availability**: the data for the indicator should be available and routinely allocated;
- **methodology**: the indicator should be significantly quantified, based on a well-founded method;
- **target reaching**: the indicator should allow to assess policy targets;
- **policy relevance**: the indicator should illustrate what is perceived as a sustainable environmental issue

In total 24 indicators were selected:

- 8 indicators related to local economic aspects;
- 8 indicators related to society and cultural aspects;
- 8 indicators related to environmental aspects

From them 2 can be considered as pressure indicators, 8 as response indicators and 14 as state indicators.

The proposed indicators are shown and analyzed in the next Table 2.

### 3.1 Ratio of tourism employment to total employment

The indicator shows the relative importance of tourism jobs and balance in economy. Total employment in tourist sector as percent of total employment is calculated as the ratio of the number of employees which are occupied in the tourism industry (hotels and restaurants) to the employees which are occupied in other industries such as: agriculture, construction, education etc.

### 3.2 Ratio of part time to full time employment in tourism

The indicator refers to the job quality and seasonality. Percentage of part time to full time jobs in tourism employment is calculated as the ratio of the number of employees who are occupied in the tourism industry (hotels and restaurants) in part time jobs to those employees which are occupied in full time jobs.

### 3.3 Total fees collected by community for access/use of community attractions

The Municipality of Ayia Napa collects fees from the Municipal Museum of Marine Life. All other community attractions are free of charge.

### 3.4 Revenue from to tourism business permits licenses or concessions and taxation
3.5 Percentage (%) of tourism establishments open all year (of all kind)  
The indicator refers to the seasonality of the tourist product.

3.6 Number of local people(men/women) employed in tourism enterprise

3.7 Tourist spending/spending per tourist  
The indicator refers to the achieved economic return from tourism. An incremental trend of the indicator reflects the long term competitiveness and prosperity of tourism enterprises and destinations.

3.8 Occupancy rates in accommodation establishments per year  
The indicator refers to the tourist business performance.

3.9 Perception of value for money by visitors  
The indicator refers to the destination quality and visitor satisfaction.

3.10 Existence of Public Transport Means  
Trend in transport modal change- effect on carbon emissions. The aim of this indicator is to minimize pollution and degradation of the global and local environment and the use of scarce resources by tourism activities.

3.11 Percentage (%) of return visitors  
The indicator refers to the destination quality and visitor satisfaction. Half of the tourist gave the higher rating (5) that they will return to Ayia Napa but one out of the five said that it is unlikely to return (1).

3.12 Existence of local development plan with specific goals for tourism  
This indicator refers the commitment of the local authorities to the sustainable destination management.

3.13 Number of cultural events throughout the year  
The indicator refers to the level of importance of the cultural activities as a tourist promotion means for the local authorities. The indicator is calculated as the number of the events that take place in the area of Ayia Napa to expose the culture and the customs of the region.

3.14 Historical sites/buildings, monuments temples, churches ruins  
This indicator refers to the preservation and protection of historical and cultural heritage of the destination.

3.15 Number of tourist industry businesses using local products

3.16 Number of tourist visiting cultural sites or attending cultural activities (ratio to total visitors)  
The indicator refers to conserving and giving value to natural and cultural heritage.

3.17 Percentage (%) of waste water or grey water recycled  
The indicator refers to the commitment of the local authorities to resource efficiency. The reclaimed water volume produced is used for irrigation (public green areas, hotels, gardens, football playgrounds, etc).
3.18 Solid waste volume produced by the destination (m³) by month or year
The indicator refers to resource efficiently and land pollution.

3.19 Number of protected areas/ecosystems
The number of protected areas/ecosystems refers to the areas/ecosystems that are in danger from pollution and other contagious factors so that the governments need to take measures to protect them. It can be used to minimize pollution and degradation of the global and local environment and the use of scarce resources by tourism activities.

3.20 Number of tourism activities related to the biodiversity of the area (number and type of tours)
It refers to the natural and cultural heritage quality of the destination and its ability to withstand pressure. It is useful to maintain and strengthen cultural richness and biodiversity and contribute to their appreciation and conservation.

3.21 Number of tourism establishments recycling their own waste
A robust indicator that action towards environmental management is actually being taken.

3.22 Percentage (%) of businesses using renewable energy resources
A robust indicator that action towards environmental management is actually being taken.

3.23 % of establishments in the destination with formal certification (in each or all EMAS, ISO 14001, HACCP)
A robust indicator that action towards environmental management is actually being taken.

3.24 Number and type of tourism activities related to environment offered by the region
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pressure</th>
<th>State</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Destination</strong></td>
<td>Tourist Employment/Total Employment (EcDS1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of part time employment in tourism (EcDS2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Revenues from tourism for community (EDS3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total fees collected by community (EcDS4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td>Business seasonality (EcBS1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occupancy rates (EcBS2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of local people employed in tourism businesses (EcBS3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tourists spending (EcBS4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Destination</strong></td>
<td>Ratio of tourists to locals (SDS1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>% return of visitors (SDP1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perception of value for money by visitors (SDS2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existence of public transportation system (SDS3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td>Number of businesses using local products (SBS1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of historical sites, etc (SBS2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of cultural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destination</td>
<td>Solid waste produced (EDP1)</td>
<td>Number of protected areas (EDR1)</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of tourism activities related to biodiversity of the area (EDR2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of waste water recycled (EDR3)</td>
<td></td>
</tr>
</tbody>
</table>

**Business**

| % of business using renewable energy (EBR1) |
| Number of tourism establishments recycling their waste (EBR2) |
| % establishments with formal certification (ISO 14001, EMAS, HACCP) (EBR3) |
| Existence of local plan development with specific goals for tourism (EDR4) |
**Indicators assessment**

**Economic aspects**

Almost 30% of the labour force of the Ayia Napa area is occupied in the tourism industry, with variations related to the business seasonality (Figure 2 - Indicator EcDS1). During the winter time almost half of them are occupied in other economic activities. The business seasonality is a major issue of concern for the local authorities and the local association of tourism businesses especially if it is taken into account that less than 10% of the labour force is working as part time personnel (Figure 3 - Indicator EcDS2), almost 90% are locals (Indicator EcBS3) and only 1/3 of the businesses are open all time of the year (Figure 4 - Indicator EcBS1).

<table>
<thead>
<tr>
<th>Quarters</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-Mar.</td>
<td>13.45</td>
<td>15.07</td>
<td>14.16</td>
<td>13.49</td>
</tr>
<tr>
<td>Jul-Sept</td>
<td>24.36</td>
<td>27.28</td>
<td>28.18</td>
<td>26.09</td>
</tr>
<tr>
<td>Oct-Dec</td>
<td>22.12</td>
<td>24.77</td>
<td>26.94</td>
<td>21.08</td>
</tr>
</tbody>
</table>


**Figure 2.** Indicator EcDS1 - Ratio of tourism employment to total employment (2003 – 2006)

<table>
<thead>
<tr>
<th>Quarters</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-Mar.</td>
<td>9.93</td>
<td>9.65</td>
<td>9.87</td>
<td>9.37</td>
</tr>
<tr>
<td>Apr-Jun</td>
<td>9.79</td>
<td>9.51</td>
<td>9.72</td>
<td>8.46</td>
</tr>
<tr>
<td>Jul-Sept</td>
<td>9.34</td>
<td>9.08</td>
<td>9.48</td>
<td>7.40</td>
</tr>
<tr>
<td>Oct-Dec</td>
<td>9.53</td>
<td>9.27</td>
<td>10.08</td>
<td>7.52</td>
</tr>
</tbody>
</table>


**Figure 3.** Indicator EcDS2 - Ratio of part time to full time employment (2003 – 2006)
Social and cultural aspects

The key principles underlying the regional tourism policy of the Ayia Napa area [16], include:

- sustainability;
- value rather than volume;
- focused investment;
- selective and targeted marketing, and
- profitability.

The Ayia Napa area strives to remain price competitive in the face of competition. This is best delivered by value-added elements and year-round pricing inducements to tour operators. With successful repositioning, product enhancement and a gradual shift to more direct distribution channels, the price point should improve, removing some pressure on price competition and refocusing on value.

The Challenges that the local authorities and the involved stakeholders have to cope with include:

- The image and perception of the area in the primary source markets, due to the publicity associated with Ayia Napa during the peak summer months (Figure 5 – Indicator SDP1);
- The seasonality issue, since most businesses close during the winter period due to lack of demand (Figure 4 – EcBS1);
- The quality of some older guest accommodation and the overall environmental management (Table 3 – Indicator EBR3);
- Increasing competition from within Cyprus, and the newer Mediterranean resorts in other countries;
- Reflecting market trends, an opportunity exists to attract visitors on a year-round basis and to improve the competitiveness of the area by means of expanding the range of ‘attractors’ and improving the service quality and value;
- While tourism to the area is concentrated at Ayia Napa and Protaras, there is a strong view that the surrounding hinterland offers the potential to establish the Free Famagusta Area as a holistic tourism destination exposing the natural, historical and cultural attractions of the area to visitors staying at the resorts (Table 4 - Indicator SBS4).
Table 3. Percentage (%) of establishments with formal certification (ISO 14001, EMAS, HACCP)

<table>
<thead>
<tr>
<th>HOTELS</th>
<th>ISO 14001</th>
<th>5.5 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMAS</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HACCP</td>
<td>8%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Number of tourists visiting cultural activities (2006 – 2007)

<table>
<thead>
<tr>
<th>Cultural events</th>
<th>Total visitors</th>
<th>Tourist visitors</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural winter 9/11/2006-22/3/2007</td>
<td>300 (Per day)</td>
<td>250</td>
<td>84</td>
</tr>
<tr>
<td>Christmas event</td>
<td>1000</td>
<td>500</td>
<td>50</td>
</tr>
<tr>
<td>Flood Fair 26/5/2007-28/5/2007</td>
<td>1st day 3000</td>
<td>1500</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>2nd 10000</td>
<td>3000</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>3rd 3000</td>
<td>1500</td>
<td>50</td>
</tr>
<tr>
<td>Children’s Festival</td>
<td>1000</td>
<td>400</td>
<td>40</td>
</tr>
<tr>
<td>Medieval Festival 8/7/2007-16/7/2007</td>
<td>300 (per day)</td>
<td>270</td>
<td>90</td>
</tr>
<tr>
<td>Cultural summer 7/1/2007-26/7/2007</td>
<td>10000 (per night)</td>
<td>800</td>
<td>80</td>
</tr>
</tbody>
</table>
Environmental aspects
Ayia Napa is located at the south eastern coastal zone of Cyprus, and is a well known tourist destination worldwide. Tourists, arriving at Ayia Napa, seek for several types of activities, including:

- Beach activities – swimming, sunbathing, sports;
- Viewing and photography of landscapes;
- Boating;
- Fishing;
- Touring – by motor vehicle, bicycle, riding animals, or on foot;
- Temperature (moderation)

The area contain a variety of ecosystems which may be affected by tourist use, including fragile dune and beach systems, areas subject to erosion and adjacent marine ecosystems, as well as natural beauty areas and historic communities which can be tourist attractions (Table 5 - Indicator EDR2).

Table 5. Number of tourism activities related to biodiversity of the area

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picnic Sites</td>
<td>2</td>
</tr>
<tr>
<td>Natural Trails</td>
<td>6</td>
</tr>
</tbody>
</table>

As with nearly all destinations, the area share the issue of control of shore and building, issues of crowding of some specific localities in (peak) season, erosion, solid waste generation (Table 6 – Indicator EBR2) and removal of solid waste from beachfront areas, seasonality of water demand and waste water production and recycling (Table 7 – Indicator EDR3), identification and protection of fragile habitats, and seasonality of use. In addition, due to these reasons – notably high use and limited seasons, it also tend to have issues related to employment, training, retention of services out of season, and provision of funding for infrastructure which is heavily used only for parts of the year.
Table 6. Municipal solid waste volume (m$^3$)

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>600</td>
<td>600</td>
<td>500</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>February</td>
<td>600</td>
<td>700</td>
<td>520</td>
<td>360</td>
<td>600</td>
</tr>
<tr>
<td>March</td>
<td>600</td>
<td>600</td>
<td>650</td>
<td>550</td>
<td>650</td>
</tr>
<tr>
<td>April</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>850</td>
<td>900</td>
</tr>
<tr>
<td>May</td>
<td>1800</td>
<td>1800</td>
<td>1700</td>
<td>1750</td>
<td>1800</td>
</tr>
<tr>
<td>June</td>
<td>2200</td>
<td>2200</td>
<td>2100</td>
<td>2150</td>
<td>2250</td>
</tr>
<tr>
<td>July</td>
<td>2700</td>
<td>2700</td>
<td>2360</td>
<td>2340</td>
<td>2540</td>
</tr>
<tr>
<td>August</td>
<td>2800</td>
<td>2800</td>
<td>2800</td>
<td>2850</td>
<td>2850</td>
</tr>
<tr>
<td>September</td>
<td>2700</td>
<td>2700</td>
<td>2650</td>
<td>2850</td>
<td>2850</td>
</tr>
<tr>
<td>October</td>
<td>2000</td>
<td>2700</td>
<td>2600</td>
<td>2500</td>
<td>2500</td>
</tr>
<tr>
<td>November</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>650</td>
<td>650</td>
</tr>
<tr>
<td>December</td>
<td>600</td>
<td>600</td>
<td>550</td>
<td>500</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18200</td>
<td>19000</td>
<td>18030</td>
<td>17650</td>
<td>17990</td>
</tr>
</tbody>
</table>

Table 7. Percentage (%) of waste water or grey water recycled

<table>
<thead>
<tr>
<th>Period</th>
<th>% recycled water</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 August –December</td>
<td>12</td>
</tr>
<tr>
<td>2003 January–December</td>
<td>51</td>
</tr>
<tr>
<td>2004 January–December</td>
<td>65</td>
</tr>
<tr>
<td>2005 January–December</td>
<td>74</td>
</tr>
<tr>
<td>2006 January–December</td>
<td>74</td>
</tr>
<tr>
<td>2007 January–December</td>
<td>53</td>
</tr>
</tbody>
</table>

The analysis of the indicators shows that the main challenges for the area towards the sustainable development are its image and perception in the primary source markets, due to the publicity associated with Ayia Napa during the peak summer months, and the seasonality of operations as most businesses close during the winter period due to lack of demand. On the other hand locals depend heavily on the tourist industry their majority working on a full time basis.

The same conclusion was the result of the most recent “Tourist satisfaction barometer” of the Cyprus Tourist Organization (2006), according to which Ayia Napa is placed 6th among the other tourist locations in Cyprus, better only from Pafos and Polis, in relation to the protection/preservation of the environment and the variety and quality of the activities and entertainment opportunities offered in the area. This is directly related to socio-cultural issues (preservation of the local character, monuments, built environment, trips, entertainment). The same conclusion resulted from the discussions with the local stakeholders.

---

5 The criterion is the result for the “Highest 5” assessment parameter
Conclusions
In developing sustainable development programmes, the use of indicators that describe the response of tourism activities to environmental problems at the level of tourism destinations and businesses is still at the very first steps. However, their use can be of valuable help since their use can help [17]:

- For better decision making and minimizing of risks or costs;
- To identify emerging issues allowing prevention;
- To identify impacts allowing corrective actions and mitigation measures when needed;
- To measure the performance of the implementation of plans and management activities and to evaluate the progress in the sustainable development of tourism;
- To reduce the risk of planning mistakes and to identify limits and opportunities;
- To provide greater accountability and credible information for the public and other stakeholders of tourism;
- To continuous improvement.

This paper presents the pilot application of a number of sustainable indicators for tourism destinations and businesses in a well known tourism destination in Cyprus, i.e. Ayia Napa, in order to develop and implement an Environmental Management System for Sustainable Tourism in the area.

The methodology presented in this paper can be applied in other tourism destinations and businesses in the country but in other countries as well. Performing the same exercise in different destinations a benchmarking process can be initiated that would help the various stakeholders for better planning and to improve their environmental behaviour.

References


[12] The VISIT Project


Abstract
There is growing interest in ecological footprint analysis in aiding our understanding of societal demands upon the biosphere. Increasingly, attention is being focused on potential new applications of the technique. Tourism is one of the world's largest industries and can play a major part in encouraging more consumerist lifestyles. It is now widely accepted that tourism development may have profound impacts on local environments, and that, consequently, the sustainable development of tourism at destination areas is an important issue. However, sustainable tourism studies rarely look beyond the destination area, and there has been no substantive recognition of the wider ecological footprint of tourism activities. The Sustainable tourism refers to a broad range of recreational activities occurring within the context of a natural environment. An emerging consensus is that sustainable tourism has identifiable niche markets, each with a unique set of characteristics. Ecotourism, wilderness use, adventure travel, and car camping are popular outdoor recreation activities and are the four niche tourism markets examined. Because of the many people involved in these activities, a tourism industry has developed around each of these four groupings. In most studies of sustainable tourism, these four categories are merged into one grouping, usually called "ecotourism," "adventure tourism," or "sustainable tourism." Four such niche markets tourism, wilderness use, adventure travel, and car camping, discussed within the context of extrinsic and intrinsic motives, environmental attitudes, social motives, demographics, economics, social constraints, environmental impacts, travel profile development, business cycle, use levels, key management issues, and market opportunities.

Key Words: Sustainable, tourism, green hotels, environmental management.

Defining Eco-Tourism
The term ecotourism was coined by Héctor Ceballos-Lascurain in 1983, and was initially used to describe nature-based travel to relatively undisturbed areas with an emphasis on education. The concept has, however, developed to a scientifically based approach to the planning, management and development of sustainable tourism products and activities. Ecotourism is "responsible travel to natural areas that conserves the environment and sustains the well-being of local people." Sometimes it is defined as a sub-category of sustainable tourism or a segment of the larger nature tourism market.

It includes an interpretation/learning experience, is delivered to small groups by small-scale businesses, and stresses local ownership, particularly for rural people. It is an enlightening, participatory travel experience to environments, both natural and cultural, that ensures the sustainable use, at an appropriate level, of environmental resources and,
whilst producing viable economic opportunities for the tourism industry and host communities, makes the use of these resources through conservation beneficial to all tourism role players.

It is not a marketing ploy, nor is it scenic or nature-based travel. It is an approach that creates a variety of quality tourism products that are:

- environmentally/ecologically sustainable
- economically viable
- socially and psychologically acceptable

The result of which reflects:

- an integrated and holistic approach to product development
- capacity building in host communities
- a sense and uniqueness of place
- commitment to the greening of the tourism industry

Eco-tourism focuses on local cultures, wilderness adventures, volunteering, personal growth and learning new ways to live on our vulnerable planet. It is typically defined as travel to destinations where the flora, fauna, and cultural heritage are the primary attractions. Responsible ecotourism includes programs that minimize the adverse effects of traditional tourism on the natural environment, and enhance the cultural integrity of local people. Therefore, in addition to evaluating environmental and cultural factors, initiatives by hospitality providers to promote recycling, energy efficiency, water re-use, and the creation of economic opportunities for local communities are an integral part of ecotourism.

Historical, biological and cultural conservation, preservation, sustainable development etc. are some of the fields closely related to Eco-Tourism. Many professionals have been involved in formulating and developing eco-tourism policies. They come from the fields of Geographic Information Systems, Wildlife Management, Wildlife Photography, Marine Biology and Oceanography, National and State Park Management, Environmental Sciences, Women in Development, Historians and Archaeologists, etc (Eagles, 1992). Ecotourism is considered the fastest growing market in the tourism industry, according to the World Tourism Organization with an annual growth rate of 5% worldwide and representing 6% of the world gross domestic product, 11.4% of all consumer spending - not a market to be taken lightly. Filion and others (1992) estimated that worldwide in 1988 there were 235,000,000 international eco-tourists.

**Some Definitions, Views, Statements and Objectives**

Tourism is changing rapidly as nature, heritage, and recreational destinations become more important, and as conventional tourism is forced to meet tougher environmental requirements. This presents a challenge to government and private enterprise to develop new approaches to the tourism market. Successful tourism must benefit local populations economically and culturally to give them incentives to protect the natural resources which create the attraction (Robinson, 1994). Strategies must be economically feasible if private investors are to support the projects.
Our goal is to enable people to enjoy and learn about the natural, historical and cultural characteristics of unique environments while preserving the integrity of those sites and stimulating the economic development opportunities in local communities. Specifically, we believe that successful ecotourism projects must:

- effectively promote the preservation of entire local ecosystems, not just individual species, vistas or sites;
- be economically viable in order to attract financing and be sustainable;
- be well planned, financed, managed and marketed in order to meet the stringent environmental and recreational demands of a true ecotourism development.

Ecotourism is cultural tourism (a cross-cultural experience), nature tourism (assisting with conservation programmes), a travel-learn experience (discover how we are coping with modernity), a little bit of soft adventure (just being here is an adventure), and benefiting the well-being of indigenous peoples. Around the globe, eco-tourism is quickly becoming one of the most popular forms of vacationing. In an era of heightened environmental consciousness and accessibility to exotic locales, countries are busily promoting their natural resources as lures for tourists. The trick with ecotourism is to preserve the natural resources while also promoting them and accommodating volumes of tourists. Businesses are creating camps and eco-lodges, and natural resource managers are designing trails and tours (Murray and others 1994; Ontario Provincial Parks 1992).

Most of the popular eco-travel destinations have fragile eco-systems, however, so it is important to maintain a careful balance between preservation and promotion -- "sustainable development" -- in order to ensure the long-term health of both the eco-systems and the tourism economies.

What is the Difference between Ecotourism and Nature-based Travel?
While nature-based tourism is just travel to natural places, ecotourism provides local benefits - environmentally, culturally and economically. A nature-based tourist may just go bird watching; an eco-tourist goes bird watching with a local guide, stays in a locally operated eco-lodge and contributes to the local economy (Foot, 1990).

What is Sustainability?
The term 'sustainability' is widespread, and has many dimensions. It often relates to persistence of a resource, or a process - such as socio-economic development - over time. However, the time-scale over which sustainability is measured is seldom defined or agreed. It also has a space component since natural resources do not exist in just one location, but may be linked to other natural features. Other important concepts include 'carrying capacity': to what extent will the physical, biological, and economic and human resources accommodate new development? This reflects the economic, environment and social/institutional dimensions of sustainability, and takes into account that natural, as well as human-induced, change occur all the time.

The question is what change can be supported by natural, economic and social systems? Which trade-offs are acceptable between the different components? For this reason, we
have to support the efforts to improve understanding and to translate knowledge into action.

**What is Sustainable Tourism?**

*It's informative.* Travelers not only learn about the destination, they learn how to help sustain its character while deepening their own travel experiences. Residents learn that the ordinary and familiar may be of interest and value to outsiders.

*It supports integrity of place.* Destination-savvy travelers seek out businesses that emphasize the character of the locale in terms of architecture, cuisine, heritage, aesthetics, and ecology. Tourism revenues in turn raise local perceived value of those assets.

*It benefits residents.* Travel businesses do their best to employ and train local people, buy local supplies, and use local services.

*It conserves resources.* Environmentally aware travelers favor businesses that minimize pollution, waste, energy consumption, water usage, landscaping chemicals, and unnecessary nighttime lighting.

*It respects local culture and tradition.* Foreign visitors learn about and observe local etiquette, including using at least a few courtesy words in the local language. Residents learn how to deal with foreign expectations that may differ from their own.

*It does not abuse its product.* Stakeholders anticipate development pressures and apply limits and management techniques to prevent the "loved to death" syndrome. Businesses cooperate to sustain natural habitats, heritage sites, scenic appeal, and local culture.

*It strives for quality, not quantity.* Communities measure tourism success not by sheer numbers of visitors, but by length of stay, money spent, and quality of experience.

*It means great trips.* Satisfied, excited visitors bring new knowledge home and send friends off to experience the same thing - which provides continuing business for the destination.

**Principles of Sustainable Tourism**

Increasing evidence shows that an integrated approach to tourism planning and management is now required to achieve sustainable tourism. It is only recently that there has been a growing recognition of the importance of combining the needs of traditional urban management (transportation, land use planning, marketing, economic development, fire and safety etc.) with the need to plan for tourism.

Some of the most important principles of sustainable tourism development include:
- Tourism should be initiated with the help of broad-based community-inputs and the community should maintain control of tourism development.
Tourism should provide quality employment to its community residents and a linkage between the local businesses and tourism should be established.

A code of practice should be established for tourism at all levels - national, regional, and local - based on internationally accepted standards. Guidelines for tourism operations, impact assessment, monitoring of cumulative impacts, and limits to acceptable change should be established.

Education and training programmes to improve and manage heritage and natural resources should be established.

Where does Sustainable Tourism fit in?

Sustainable Tourism embraces all segments of the industry with guidelines and criteria that seek to reduce environmental impacts, particularly the use of non-renewable resources, using measurable benchmarks, and to improve tourism’s contribution to sustainable development and environmental conservation (Valentine, 1993).

Sustainable Ecotourism;

- Minimizes environmental impacts using benchmarks
- Improves contribution to local sustainable development
- Requires lowest possible consumption of non-renewable resources
- Sustains the well-being of local people
- Stresses local ownership
- Supports efforts to conserve the environment
- Contributes to biodiversity

Tourism Destination Management

Managing tourism destinations is an important part of controlling tourism’s environmental impacts. Destination management can include land use planning, business permits and zoning controls, environmental and other regulations, business association initiatives, and a host of other techniques to shape the development and daily operation of tourism-related activities.

The term "destination" refers broadly to an area where tourism is a relatively important activity and where the economy may be significantly influenced by tourism revenues. Destination management is complicated by the fact that a single, recognizable destination may include several municipalities, provinces, or other government entities - in island environments it may be the entire country.

Participating governance structures led by local authorities, with the involvement of local NGOs, community and indigenous representatives, academia, and local chambers of commerce, make up what are known as "Destination Management Organizations" (DMOs). Often DMOs take the form of local tourism boards, councils, or development organizations. The network of local tourism businesses (hotels, attractions, transportation services, service providers such as guides and equipment rentals, restaurants, etc.) are also a significant part of a destination.
Application of Risk Assessment and Management
Good techniques are available and should be applied to assess environmental and other risks associated with the sitting of new developments in hazardous areas, such as unstable islands. Assessment should include physical safety and security and ecological sensitivity of aquatic systems, as well as investment and financial risks. Recently concluded research collaboration among two SE Asian and four European partners entitled ‘Prediction of the resilience and recovery of disturbed coastal communities in the tropics’ studied sensitivity to and recovery from disturbance of coastal plant communities in Vietnam and the Philippines.

Awareness of Environment-Development Interdependence
Limited understanding about resource benefits can lead to degradation and loss of development opportunities. In Egypt, important resources (mangroves) have been lost to hotel developments, which happened despite legal protection, since mangrove distribution had not been mapped and shown to developers or planners and their value was not fully appreciated.

Capacity Building and Institutional Support
Capacity building is a cornerstone of enabling policies for sustainability and social empowerment. Support and greater awareness are important at all levels. Often management difficulties rather than insufficient technical (or other) information impede coastal governance. Natural resources, institutions and human management capacities all need to be resilient and endure over time.

Good Practice Examples
SimCoast is an integrated information system to facilitate decision-making and improve coastal zone management. It allows planners to take into account conditions and interactions between natural, social and economic elements prior to initiating actions to achieve environmental protection and sustainable multiple use of resources (Bottrell, and Morris 1999). Special features of SimCoast include its ability to use low-resolution, qualitative information, and its user-friendly PC based interface and applicability to both general and specific contexts. The system was initially developed at the University of Warwick (UK) through an international collaboration with other European and Asian partners, with the Commission supporting its early development and several applications. Workshops and collaboration facilitate information exchange between resource users, managers and scientists from ASEAN and EU countries.

Sustainable forms of tourism focus and lead to identification of objectives and actions as well as resources and partners necessary to encourage the provision of products and services, which enhance rather than destroy the environment and culture. Unfortunately the rewards for short-term profit still predominant in business today and are often associated with some form of unsustainable exploitation of natural resources. The most effective manner to achieve profits for today and the future is through sustainable development, which has been defined as ”meeting the needs of the present without putting at risk the ability of future generations to satisfy their needs.” It is really the comprehensive, strategic planning and management of the total resources base. It is
recognizing the “triple bottom line” which captures an expanded spectrum of values and criteria for measuring organizational (and societal) success - economic, environmental and social.

Sustainable development is a systematic approach to long-term survival and is even more critical when we consider that current trends in global trade and environmental management will be inevitable requirements of trade in international markets. Sustainability has to do with equality. In order for future generations to have equal opportunity to obtain wealth and well-being from land, fresh water, forests, oceans and climate, we must not degrade these natural resources to the point that future generations can no longer effectively use them. Hence, if we want future generations to have opportunities equal to ours, we must find ways to use our natural resources in a sustainable manner.

The environmental friendly operations reflect the increasing preference for holistic lifestyles of more and more people who equate this criterion with quality of life. They want to enjoy and experience nature, the country, the culture and understand it and enjoy it. They do not want to enjoy their holidays at the expense of the environment.

Among the unique beneficial characteristics of the “Green Traveler” is its ability to network, to shop, and to spend. They use modern communication systems and spread the news of what is good. The consumers and the media become salespersons.

The other very profitable aspect of this market is that these consumers are willing to pay well for products and services, which offer the value they are seeking. Businesses succeed when customers spend money. These customers have money to spend and are willing to spend it unhesitatingly at higher levels than the regular tourist market, if the confidence in the services and product is there. Thus, with only 10 rooms we are still able to operate our business and achieve the same results with half the number of room nights than perhaps a regular, standard operated property does. This means less work, less wear and tear – and of course less use of irreplaceable resources! And that should be the principle along which we strive to achieve profits.

It is clear that we cannot avoid producing waste, despite trying to minimize it. However, we try and make sure that all our waste serves as raw material for another process, so that the waste has value for other usages so that almost everything is either reused or recycled. Business has three basic issues to face: what it takes, what it makes, and what it wastes and the three are intimately connected.

Sustainable tourism is not just a product or an attraction. It is a value and an awareness, which permeates planning, policy, product development, marketing and services. A change in habits goes hand in hand with changes in our way of thinking about how business can be conducted. Futuristic technologies are not the most important focus for solving environmental problems, although they are invaluable. Rather, we must change our way of thinking by acknowledging that economic and ecological systems are interdependent. It is only by widespread and profound changes in our thinking that we
can effect change by making it generally popular and acceptable. If we want to create a moral and socially responsible business, then we have to be responsible for the common good as well as for profit. Respecting this principle is the fundamental challenge in changing the nature of business – and ensuring its success in the future.

**Hotels Make Profits through Environmental Protection**
Aims to attract "closer guests for a longer stay" - obviously a difficult undertaking. An easier goal would be to make immediate reductions in environmental pollution in the hospitality sector. Greater sustainability of the tourism product i.e. more regional products, less noise and emissions, less waste and unpurified sewage - means the creation of jobs and quality of life for the local population, and an improved quality of holidays for the guest.

**Sustainability and Quality in Tourism are Two Sides of the Same Coin.**
Protecting the environment and the people and places we visit is a top priority for Insight. We want to help ensure these remain for future generations to enjoy. We are committed to ensuring we minimize the environmental impact of our own operations around the world and believe that together we can truly make a difference.

**Our Responsibility**
Every time we travel, whether by car, train, plane or coach, we are burning fossil fuels and contributing greenhouse gases into the atmosphere. This grid below shows you the amount of carbon dioxide emitted per km for a passenger traveling on various forms of transport which clearly shows coach transport as emitting significantly less carbon dioxide than other forms of transport. With carbon dioxide being one of the main causes of global warming, it's good to know that buying an escorted tour holiday is a better way to travel (Table, 1).

<table>
<thead>
<tr>
<th>Method of Travel</th>
<th>Kilograms of CO2 per passenger/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car*</td>
<td>0.1330</td>
</tr>
<tr>
<td>Air</td>
<td>0.1313</td>
</tr>
<tr>
<td>Rail</td>
<td>0.0602</td>
</tr>
<tr>
<td>Coach**</td>
<td>0.0227</td>
</tr>
</tbody>
</table>

* Car assumes national average of 1.56 people per car.
** Assumes average of 36 passengers.

**You can Make a Difference**
It's the carbon emissions in the atmosphere that are slowing warming our planet and causing climate change. Reducing these emissions is up to each of us and can be done by turning off appliances, driving less, and buying local produce. For those emissions that can't be reduced carbon neutralizing allows you to contribute to projects that are greening the planet in other ways.
This voluntary scheme invites you to pay a contribution based on the amount of carbon likely to be generated from your travel. You can choose to offset your flight, coach travel or the energy consumed staying in your hotel accommodation.

**What Else You Can Do:**
There are many things you can do while traveling to minimize your environmental impact.

- When you've finished with your holiday brochures, pass them onto a friend or recycle them
- Minimize waste by bringing your own water bottle and reusing it, and refuse or reuse plastic bags when shopping
- At your hotel use water sparingly, take short showers instead of baths and hang towels for drying and reuse
- Separate paper from plastic and try to recycle as much as possible
- Switch lights off & air conditioning off if you are not in the room or don't need them.
- Turn off your TV instead of leaving it on standby
- Leave as much packaging at home from goods you buy for your trip and recycle as much of this as possible

**Climate Change & Carbon Offsetting: How do I Impact on Climate Change?**
Greenhouse gases like carbon dioxide (CO₂) are emitted when fossil-fuels are consumed. Each time we drive a car, fly in a plane, use electricity, or generate waste these fossil fuels such as oil, gas and coal are burnt and CO₂ is added into the atmosphere warming the earth and causing climate change.

**What Can I do to Help Avoid Climate Change?**
We can all take simple steps to reduce the amount of CO₂ we produce and for those emissions we can't reduce we can neutralize the rest. Neutralizing means paying someone to reduce CO₂ in the atmosphere on your behalf. In that way we can pay for the damage we are causing and the money helps to fund transition to a lower-carbon world.

**Will Going Carbon Neutral Really Make a Difference?**
By neutralizing your carbon emissions you are supporting projects which lower the amount of carbon in the atmosphere. Some of the most effective ways to do this is by supporting energy efficiency projects and the development of renewable energy sources such as those offered by our partner carbon offset organizations.

**How Do I Know the Carbon Projects are Effective?**
Each of the carbon projects we support are independently audited and meet high quality standards such as the Gold Standard or the Kyoto Clean Development Mechanism (CDM). The [Gold Standard](#) is an independently audited, globally applicable best practice methodology for project development that delivers high quality carbon offsets.

Sustainable and community-based tourism has to be approached like a business, not a niche or cause. Consider it a brand, and all the lodging, tours, services that qualify are
products under the brand. Some sort of universal “responsible” certification code must be adopted and accepted, and then, it needs a marketing plan.

At present, it’s impossible to tell the total amount of funds and resources that are going into developing sustainable travel and tourism. But it seems quite clear that a lot more money is going into research and development than goes into building and sustaining the businesses once they’re built. For example, the people the funds and resources wind up benefiting are usually the people who build the infrastructure, not the community invested in the project.

Each development should be based on a hotel-chain-type business model with annual reports and budgets that factor in marketing and promotion the same way hotel chains do. The marketing and promotion budget should go into the branding and keeping the listings and technology up to date.

Judging by what I’ve seen, much of the funds (at least on the government side) are going towards redundant studies and conferences. There should be some sort of oversight over all of them to ensure the funds are being used effectively within a sustainable business model.

**Conclusion**

After my research, I’m fully convinced that incorporating community-based/responsible destinations into my next itinerary will enhance my experience. However, I’ve also concluded that sustainable tourism will not be truly sustainable until mainstream tourists can reach the same conclusion I have. So, we need for more research to be undertaken on the activities and enduring involvement of the four niche markets. An understanding of the conflict and agreement points among the four markets is necessary for planning and management. A better understanding of the uniqueness and of the overlap of the niche markets would be useful. Higher levels of environmental protection and higher levels of satisfaction will occur when the supply and demand elements of this industry are better coordinated.

**References**


Analyses of the Environmental Impacts Caused by the Tourist Accommodation Sector, Case Study: Jordan*

Maria Monou(1), Solomon Ioannou(2), Margarita Vatyliotou(1), Dimitris Glekas(2), Ioannis Glekas(2), Despo Kassinos(1)*

(1) Civil and Environmental Engineering Department, School of Engineering, University of Cyprus, 75 Kallipoleos Str., 1678 Nicosia, Cyprus, dfatta@ucy.ac.cy.
(2) Aeoliki Ltd, 41 Themistokli Dervi, Hawaii Tower, Office 706, 1066 Nicosia, Cyprus.

Abstract
The present study focused on three main objectives for the Jordanian Tourism Industry: to assess the current situation, to assess the environmental impacts and to develop methods to encourage the improvement of the environmental performance of the tourist accommodation sector, with reference to environmental legislations and policies. Two representative hotel pilot cases were used for this purpose. This study was performed as part of a LIFE project aiming to develop strategies and instruments to pro-actively address the problems caused by increasing tourism in order to ensure a sustainable development of the sector in Jordan.

Introduction
The tourism sector has developed into one of the most important and largest global industries. Its rapid growth has exceeded the global domestic product for the past thirty years [1]. According to the World Tourism Organization (WTO), the global tourism market will triple in size by 2020. Although tourism has many benefits, such as substantial contributions to local economies by creating employment and investment opportunities, its rapid growth has been the main cause for many adverse social, environmental and economical impacts. The tourism industry in arid and semiarid regions of the world has the potential to impose a threat to the sustainability of natural resources such as water and biodiversity. The World Tourism Organization (WTO) published data showing that demand to visit such regions is increasing, recognizing the strains this will bare on natural resources. The first international conference on Tourism and Climate Change (2003) pushed for commitment towards sustainability of the tourism sector.

The tourism industry for the economy of Jordan is significant. Tourism is the largest export sector and second largest private sector employer and producer of foreign exchange. Moreover, it contributes to more than US$800 million to the national economy and accounts for approximately 10% of the country’s gross domestic product [2]. Jordan’s prime destinations: Petra, Wadi Rum and the Dead Sea are directly dependent on the rich natural and cultural resources in the area. However, Jordan has been subject to environmental pressure from tourism due to unsatisfactory performance in protecting the environment [2]. It is therefore crucial for the sustainability of the country to protect and preserve these natural sites. In light of this, the present study focused on three main objectives for the Jordanian Tourism Industry: to assess the current situation, to assess the
environmental impacts caused and to develop methods to encourage the improvement of the environmental performance of the tourist accommodation sector.

**Environmental Review of the Current Situation**

An overview analysis of the tourism industry in Jordan and of the prevailing environmental opportunities and constraints related to the hospitality sector was achieved through the distribution of relevant questionnaires to tourists, hotel administrations and tour operators. Eight hotels of different rating were selected from Petra and the Dead Sea areas for this purpose. The indicators used within the questionnaires included the consumption of resources and the impacts of the hotel on the surrounding environment. Focus was placed on energy consumption and saving, water usage and management, waste generation and management, air quality, hazardous chemicals and safety issues.

The results revealed low levels of environmental awareness and lack of environmental policy plans that existed in hotels. Most hotels were unaware of the legislations related to hotel environmental practices and environmental management systems. Although they followed a general environmental policy for energy conservation and water management, over-consumption was difficult to assess due to lack of sub meters. Energy management practices included replacement of common incandescent light bulbs with fluorescent or halogen incandescent lamps, installation of energy saving devices to lighting systems in common indoor or outdoor areas, installation of a central Building Management System for simultaneous control of high energy consuming systems and control of fuel leakage. Water management practices included the installation of water-saving irrigation systems, garden irrigation at suitable times, installation of water-saving toilet flushing systems and installation of water saving devices in taps and showers. Waste management procedures were applied only by a few hotels and included wastewater treatment, separation and collection of kitchen oils, refillable dispenser installations and collection of hazardous waste materials. However, the quantity of toxic waste could not be determined as chemicals were not monitored. Lenient control of air emissions mainly included frequent maintenance/adjustment and monitoring of boiler systems, installation of refrigerators and air conditioning plants with environmentally friendly coolants and frequent maintenance of ventilators. Control of noise was managed by planting outdoor trees, purchasing low noise equipment and regular maintenance of equipment, machines and cars. Finally, staff training and information notices were provided for the use of detergents and chemicals, separation of waste and hazardous waste, energy saving, water consumption and other general environmental issues. These results are based on the study conducted by Shideifat et al. [3] within the framework of the LIFE project.

**Analyses of the Environmental Impacts**

The environmental impacts related to the hospitality sector were assessed through pilot studies using two hotels; the Mövenpick Resort Petra (MRP) and the Mövenpick Resort & Spa Dead Sea (MDS). The hotels are located in globally unique and significant archaeological and ecological sites respectively. The Environmental Impact Assessments (EIAs) examined all hotel activities to ascertain the relevant magnitude and the potential effect on resources. This was determined according to the significance of the environmental impacts, the hotels’ policy and the potential for non-compliance with
environmental regulations. The methodology and benchmarks used are defined in [4,5]. The overall purpose of the EIAs was to identify the best suited methodology in establishing a good environmental performance for the hotels.

The main environmental impacts identified, discussed below, are summarized in Table 1.

*Climate Change* - Transportation, heating, cooling and cooking consume energy and directly contribute to climate change. One main problem is the high energy consumption caused by air conditioning (HVAC), lighting and fuel for heating systems. This is due to lack of insulation techniques, sensors and renewable energy sources (RES). Jordan’s energy production relies almost solely on combustion of fossil fuels, whilst RES account for only approx. 2% of the total energy consumption.

*Water* - The tourism industry generally overuses water resources for hotels, swimming pools and personal use of water by tourists. Tourists use on average 1/3 more water per day than local inhabitants. Water resources in Jordan are scarce and inadequate to meet increasing demand. Desertification as a problem is surmounted by the critical situation of water shortage, over-pumping of groundwater and deteriorating of water quality. According to By-Law 85/2002 [6vi], all groundwater resources are owned by the state and any activities relating to pumping must be accompanied by the relevant license. The Jordan Valley Development Law [6x] does not allow any activity to pollute the Valley waters or cause its pollution by bringing in any material from any source.

*Solid and Toxic Waste* - Tourism generates large amounts of waste, imposing a threat to natural resources. Solid waste management (SWM) is the responsibility of the local municipalities under the umbrella of the Ministry of Rural Affairs and the Environment. Financial constraints, shortage of adequate and proper equipment and the limited availability of trained and skilled labour have contributed to the poor SWM programs. Low level of awareness and education in communities regarding health and environmental impacts of improper management has also made it difficult to implement recycling and disposal programs. Currently, solid waste is collected in containers and transported to an intermediate dump station. The local municipality councils are usually responsible for providing the collection services. Collected commercial waste is separated at landfill sites on an add hoc basis and transported to recycling industries by private initiatives. However, hotels have yet to adopt a recycling scheme. Toxic waste from chemicals used in maintenance, cleaning and catering services can cause pollution to environment and is a safety hazard. Currently, toxic wastes from the hotels are treated by the sewerage plants. None of used chemicals contain substances that are either banned or restricted in accordance of Table 2 of the Regulation No. 24/2005 [6iv] regarding the Management, Transportation and Handling of Harmful and Hazardous Substances.

*Noise/Odour/Aesthetic Pollution* - The source of noise pollution at MDS arises from the construction of new hotels and open air entertainment activities and at MRP, from overcrowded tour buses. Under Article 12(c) of Environment Protection Law–Interim Law 1/2003 [6ii], vehicle or machinery owners that cause noise can be fined. Concerning odour pollution, the sewage treatment plant at MDS is located far from the premises,
however, sometimes due to wind direction, odours have been noticeable. Aesthetic pollution is apparent when structures fail to integrate with the natural features and indigenous architecture of the destination. Not enough information was available for the EIA regarding the environmental specifications of materials used during construction.

Biodiversity / Ecosystems / Culture – The concentrations of chlorides, sulphates and bicarbonates from the untreated backwash water discharged into the Dead Sea from the MDS, are well above the limits defined under the Environment Protection Law Interim Law 1/2003 [6ii]. However, these limits do not take the unique ecosystem of the Dead Sea into account. Specific legislation for the Dead Sea is under consideration. The quality of the treated water from the sewage treatment at the MDS plant used for irrigation, falls well below the applicable limits as described by law. Tourism development requires resources that constitute the very basis of ecosystems structures. Biodiversity is affected by tourism activities; tourist construction sites and activities cause habitat loss of often threatened and endangered species. At MPR, Bedouins (desert-dwellers), the traditional inhabitants in the region and currently protected by the National Law 61954 [6xii], have become a tourist attraction, thus directly encountering the benefits and threats of tourism.

Health and Safety – Terrorism attacks over the past two years in Amman and naturally occurring disasters (fires, floods and earthquakes) are the most significant risk sources. Some of these major environmental impacts have been caused retroactively well prior to the scope of this Environmental Assessment. However, there are solutions to each of these impacts that can be addressed without necessarily major investment.

Development of Methods to Improve Environmental Performance
A number of environmental management systems and schemes have been implemented worldwide by hotels in order to reduce the environmental impacts, which result from their activities. In Europe, the most widely known environmental schemes are the international ISO-14001, the European Eco-Management and Audit Scheme (EMAS) and the European Eco-label scheme. Eight hotels in Cyprus, Greece and Spain, which successfully implemented such schemes, were examined. The selection of these regions was due to their similar environmental and tourism characteristics to those of Jordan.

Assessment of the various systems and actions, established within the framework of the European hotels’ environmental programs demonstrated that environmental benefits do not always come at the expense of business benefits; a win-win situation is possible. Some of the main initiatives taken from the tourism sector in Europe are [7,8]:

1. Energy management. Energy power saving systems, e.g. key/card for power supply in guest rooms, replacement of incandescent lamps with lower energy consumption lamps and timer control systems. Moreover, savings in fuel consumption were effectively achieved by high-efficiency heat recovery chillers, solar water heaters, installation of electricity/fuel consumption monitoring systems and control of fuel leakage.

2. Water management. Connection with the local sewage treatment plants and reuse of treated water within the hotels’ premises for irrigation purposes, installation of water-
saving irrigation systems, irrigating at suitable times and use of endemic plants. Moreover, water aerators, new toilet flushers, water monitoring programs (frequent maintenance and checks, installation of consumption meters), installation of timers and “change per request” program for sheets and towels reduced the water consumption.

3. Waste Management. For example, purchase of products in bulk quantities, use of returnable containers and use of dispensers in public washrooms and guest rooms, waste separation for recycling purposes and treatment of hazardous wastes.

4. Use of Chemicals. Quantities used for hygiene and cleaning purposes can be reduced from the use of dosing devices, purchase of concentrated detergents, introduction of chemical-free cleaning methods and preference for environmentally friendly chemicals.

5. Air Emissions. Regular monitoring of boilers combined with frequent maintenance and proper adjustments ensure high efficiency levels emitting less carbon pollutants to the atmosphere. Fluorocarbon emissions may be reduced by replacing old freezers and air-conditioning systems with new ones using Freon-free coolants.

6. Guest and staff awareness towards environmental matters should be promoted via notices and training thus ensuring the effectiveness of the systems applied.

Following these results and conclusions, EMAS was encouraged as an environmental management tool from which both hotels can monitor the impact on the environment generated from their activities. Aiming for EMAS verification, these hotels would essentially be the very first hospitality sector organizations in the Middle East to be EMAS verified. However, the adoption of the described systems is not an easy task as many factors can inhibit the implementation and subsequent running of an EMAS. Table 2 summarizes the main outcomes and obstacles faced as a result of the EMAS in the two hotels. The constraints and problems arising from any situation can be resolved or avoided through flexible management. Key parameters for successful implementation include: early and methodological planning of the implementation procedure both in regards to time and in regards to cost, commitment from top management and involvement of staff at all levels, continuous staff training, raising the environmental awareness of guests and stability in the organizational structure at the management level and for the core staff.

Conclusion
This paper analyses all of the environmental impacts caused by the two hotel pilot cases and outlines methods to overcome them, with reference to environmental legislations and policies. There are solutions to each of these impacts that can be addressed without major cost and reduction of environmental impacts will make these organizations more cost-effective than their competitors while being environmentally and socially responsible.

A synopsis of the environmental impacts of both hotel pilot cases is:
- Destruction of biodiversity,
- Destruction and alteration of unique ecosystems (i.e. the Dead Sea),
• Non sustainable utilization of waste and renewable resources such as water,
• Degradation of local Bedouin culture and of archeological world heritage.
This study was performed as part of the LIFE project “Development of methods and tools for the establishment of good environmental performance in the tourist accommodation sector in Jordan (GREENTAS)” aiming to develop strategies and instruments to proactively address the problems caused by increasing tourism in order to ensure a sustainable development of the sector in Jordan.

* This paper was accepted in: Protection and Restoration of the Environment IX Conference, PRE9, Kefalonia, Greece, 29 June – 3 July 2008; and was also presented in this conference (CEPTA).

References

[6] Jordan Regulations and Legislations:
  [i] Regulation 29/2005 Protection of the Air
  [v] Montreal Protocol
  [vi] By-Law 85/2002 Underground water Control
  [viii] Regulation Protection of Water
  [x] Jordan Valley Development Law (Amended Law 30/2001)
  [xii] The Nationality Law 61954 (amended 1987)
  [xiii] Civil Defense Law 18/1999
  [xiv] Prevention of Terrorism Act (PTA) 1/2006
Table 1: Hotel Activities and their Environmental Significance (Mj = Major, Md = moderate, Mn = Minor)

<table>
<thead>
<tr>
<th>Environmental issue</th>
<th>Biodiversity / Ecosystem</th>
<th>Climate Change</th>
<th>Pollution</th>
<th>Water Resources</th>
<th>Health / Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>i, ii</td>
<td>Mj</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Hot water</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Cooking gas</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Solid waste/sewage</td>
<td>ii-v</td>
<td>Mj</td>
<td>Mj</td>
<td>Mn</td>
<td>Mj</td>
</tr>
<tr>
<td>Chemicals</td>
<td></td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Fire extinguishers</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mn</td>
<td>Mj</td>
</tr>
<tr>
<td>Drinking groundwater</td>
<td>ii, vi-x</td>
<td>Mj</td>
<td>Mj</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Water consumption</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Groundwater well</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Spa pool / pool</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Backwash/</td>
<td>ii</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>runoff</td>
<td></td>
<td>NSArray</td>
<td>Mn</td>
<td>Mn</td>
<td>Mn</td>
</tr>
<tr>
<td>Sewage Treatment</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Plant</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Environmental issue</td>
<td>Law</td>
<td>Biodiversity / Ecosystem</td>
<td>Climate Change</td>
<td>C/ S</td>
<td>Pollution</td>
</tr>
<tr>
<td>Beach landscaping</td>
<td>ii</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Excursions</td>
<td>ii,x</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Construction</td>
<td>ii</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Architecture</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Changing Bedouin</td>
<td>xii</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>culture</td>
<td></td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Hazards</td>
<td>xiii</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
<tr>
<td>Terrorism</td>
<td>xiv</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
<td>Mj</td>
</tr>
</tbody>
</table>

Table 2: The main outcomes and obstacles of the EMAS implementation in Jordan

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Obstacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Environmental Policy written and endorsed by Top Management (TM).</td>
<td>1. Lack of environmental legislation (e.g. no legislation for the Dead Sea).</td>
</tr>
<tr>
<td>2. Environmental program developed with concrete objectives and time framework.</td>
<td>2. Lack of environmental awareness amongst employees (e.g. towel replacement procedure not followed).</td>
</tr>
<tr>
<td></td>
<td>3. Lack of visitor environmental sensitivity</td>
</tr>
</tbody>
</table>
3. Environmental targets developed and endorsed by TM:
   - Reduce electricity by 5%,
   - Use of environmental detergents by 20%,
   - Reduce water consumption by 2%,
   - Reduce waste by 5%,
   - Reduce CO₂ emissions,
   - Eliminate souvenirs from Petra site by 100%,
   - Ensure guest awareness on Petra by 100%,
   - Replace Halon 1211 fire extinguishers.

4. Monitoring, Review and Reporting to TM:
   - Internal inspection every 6 months,
   - Assess environmental targets.

4. Lack of governmental infrastructure (e.g. littering, vandalism).
   - Internal inspection every 6 months,
   - Assess environmental targets.

5. No collaboration amongst competent bodies (e.g. between the Ministry of Tourism and the Jordan Valley Authority regarding tourism building permits).

6. EMAS/ISO-14001 are foreign ideas to the Jordanian business sector. (e.g. the spring water used by MDS was illegal. Through the EMS, it was requested to apply to the Ministry of Water for permit. Although the Swiss General Director of MDS agreed, the Jordanian shareholders refused in concern that the Ministry of Water would be intolerable to such a demand. This resulted in closing the spring and relying on the purchase of water from an external supplier).

K. Zein (1), M. Semlali Wazner (1), G. Meylan (1), B. Hayek (2), M. Mosa (2)

(1) Sustainable Business Associates (SBA), Switzerland
(2) Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan

Abstract
Tourism is one of the main sources of revenue in the Mediterranean region, sustaining its economic and social development. The Mediterranean countries accommodated 228 million tourists in 2002 with a forecast of 396 millions in 2025 (World Tourism Organisation, The Blue Plan). However, the number of tourists in the region endangers its natural resources and ecosystem balance. Tourism development on a large scale results in landscape degradation and concreting of the coastline where tourism facilities concentrate. In order to preserve the local environment and thus tourism activity, a new approach should be adopted following the principles of sustainable development. Hence, the different components of tourism industry should be included in a global strategy of environmental protection. Since the hotel sector is at the heart of tourism activity, it is important to assess and reduce its environmental impacts. For example, an efficient water and energy management in hotels allows mitigating environmental damages as well as significantly reducing costs.

The Guide for Best Management Practices in Hotels proposes cleaner production and eco-efficiency measures adapted to the hotel sector of Mediterranean countries with the aim of reducing its environmental impacts. Low-cost and easy to implement measures constitute a first step towards sustainable tourism. The specifics objectives of the Guide are to integrate environment as a component of day-to-day hotel management, to prioritize significant measures in the fields of water, energy, waste, product purchases, logistics, noise, landscape, air quality and ensure their implementation in the long run, to promote rational and eco-efficient use of natural resources and to allow hotels to do a first step towards an environmental management system. The Guide is addressed to all hotel categories willing to improve their environmental performance with the ambition of implementing more systematized environmental management tools. The Guide contains four interrelated instruments: 1) check-lists, allowing to identify environmental problems, to select measures, prioritize them and define who is responsible for their implementation; 2) state-of-the art assessment, giving a thorough and figured insight into the hotel activities where measures are to be taken according to the check-lists; 3) economic calculations, assessing potential savings achieved through the selected measures; 4) action plan, synthesizing the selected measures with an implementation plan (responsible, means, expected savings, timeframe). The application of the Guide by the hotel responsible requires approximately two days.

* In January 2004, the Cleaner Production Unit (CPU) was established at the Royal Scientific Society of Jordan. The initiative is undertaken with the support of the Swiss Secretariat for Economic Affairs (secod) and the technical support of Swiss Reference Center comprising the University of Applied Sciences Northwestern Switzerland (FHNW) and Sustainable Business Associate (SBA), Switzerland.
Introduction

Context
The Mediterranean is a holiday destination for tourism because of its historical, cultural and natural heritage. Considered an “ecoregion”, it brings together many plant and animal species, some of which are indigenous. In 2002, the Mediterranean countries welcomed 228 million visitors, a number that is forecast to rise to 396 millions in 2025, according to the World Tourism Organization’s (WTO) and Blue Plan’s projections.

The region’s climate and resources enable economic and social development that result from tourism. On the other hand, the number of tourists heading for the region represents a threat to its natural resources as well as to the balance of its ecosystems. The Mediterranean Action Plan (MAP) has stressed the existence of the risk of economic non-sustainability linked to the development of mass tourism. The consequence of this phenomenon is a decline in territorial quality and the artificial modification of coastlines. Indeed, tourism is concentrated in the coastal areas, increasing the pressure on the coastline and causing its degradation.

In order to conserve local biodiversity while sustaining the tourism industry, a new approach involving sustainable development must be implemented. To achieve this, the different components of the tourism industry need to be integrated into a global strategy of environmental protection. Since the hotel industry is at the heart of tourist activity, it is important to evaluate and assess its environmental impact. The goal is to avoid compromising the development of the southern Mediterranean regions and placing their potential at risk.

The main objectives of the Guide are:

- To integrate the environment as one component of day-to-day hotel management
- To identify significant and priority measures for hotels, enabling their implementation and ensuring sustainability over time
- To promote rational and eco-efficient use of resources
- To give hotels the opportunity to make the first steps towards an integrated environmental management system

The Best Environmental Practices (BEP) provided in the Guide are based on the literature listed in the bibliography section and on testing them in different hotels of the Lake Geneva Region in Switzerland, whose results and outcomes are presented in the section “Testing of the BEP Guide”.

Target audience
The BEP Guide for hotels is intended for hotels of all types that wish to better manage their impact on the environment and that have the longer term ambition to implement more systematized environment management tools (such as environmental costs management, environmental management system, environmental labelling, etc.). The Guide can be used by hotel directors and managers, as well as by technical executives and/or their teams.
Methodology

Concept of best environmental practices in the hotel industry
The use of the BEP Guide for hotels is intended to be simple and practical. The Guide provides hotel personnel with the means to identify, in the different departments of a hotel, opportunities for optimising its activities while reducing its operating costs and its environmental impacts. The proposed measures are not exhaustive and are implemented on a voluntary basis. In addition, the reader will find practical advice that can be adapted to suit the hotel’s context and expectations. To ensure adequate understanding and application of the Guide, concrete examples are provided throughout the document as shown in Figure 1. These examples show a direct link between theory and practice.

Figure 1: An example of waste generated by the production and disposal of a dish

In brief, the Guide’s approach aims at:
- Rationalizing the use of raw materials, including water and energy
- Reducing the volume of wastes and improving waste management
- Adopting a more ecological purchasing policy and improving logistics
- Improving the quality of the hotel’s direct environment, which imply air quality and noise level
- Making the staff aware of the importance of environmental issues

In addition, the adoption of the Guide’s principles can also act as a profitable marketing tool for the hotel. The hotel can improve its image in the perceptions of its stakeholders and guests, who are increasingly conscious of environmental protection.

The Guide’s instruments
To enable the hotel to integrate the BEP, the Guide offers four tools:
- **Checklists:** To identify the environmental problems in each of the hotel’s departments; to become aware of the necessity of targeted actions; to establish priorities and to determine responsibilities for ensuring the implementation and the sustainability of corrective measures
- **Detailed environmental assessment:** To measure and monitor the hotel’s activities by undertaking a thorough environmental analysis
- **Economic calculations:** To estimate the potential savings of the identified corrective measures; to assess their return on investment and to serve as a decision-making tool
- **Action plan:** To summarize the chosen corrective measures within an action plan (which includes responsibilities, means, expected savings and deadlines) that will be communicated to the persons concerned.
The combination of the Guide’s tools reveals the interrelationships between the hotel, its resources, and its environment. More concretely, it helps the implementation of environmental actions that meet the hotel’s expectations and preoccupations. For a more targeted approach, the action plan enables the planning and management of the corrective and preventive measures that were chosen in order to reach the environmental goals that have been set by the hotel.

**Necessary means**

The approach proposed by the Guide can be implemented by the management, its technical executive or a qualified resource person. Management must first adhere to the Guide’s objectives and involve the relevant staff. Moreover, for a greater involvement of the staff, information concerning correct practices should be circulated to all the hotel’s levels and departments. Simple and practical procedures can be developed, applied, and integrated into the daily operations of the hotel to bolster the BEP measures. Depending on the availability of information, the application of BEP requires one to two days. If internal expertise were insufficient for undertaking this task, the assistance of an external consultant for a day would be worthwhile.

**Checklists**

Checklists enable the identification of priority environmental domains and the measures to be taken. They are non-exhaustive lists of actions (such as possible corrective measures) that can be undertaken to improve the environmental performance of the hotel. Checklists also require brainstorming to promote more focused actions and to encourage the monitoring and the correct application of the corrective measures. The completed checklists should be communicated to the various concerned departments of the hotel in order to ensure their implementation. Before each checklist is prepared, specific questions are provided by the Guide in order to assess the hotel’s environmental situation and to determine if the environmental domain in question is of importance to the hotel. Indeed, the answers given to this self-assessment allow the hotel to identify practical measures for implementation. The BEP Guide has six checklists and each is dedicated to a specific environmental domain with an introduction to the domain in the optic of Mediterranean tourism: water, energy, waste, purchasing policy, logistics, as well as noise, air quality and landscape integration. Figure 2 shows an excerpt of the checklist covering the purchasing policy domain.
2.4. La politique d’achats | aspects écologiques


Auto-évaluation

- Optez-vous des produits locaux dans la mesure du possible ?
- Privilégiez-vous des produits biodégradables, recyclables ou réutilisables ?
- Etes-vous sensibles au type de conditionnement des produits ?
- Achetez-vous des équipements qui consomment peu d’eau et d’énergie ?
- Acceptez-vous de payer un léger surcoût pour respecter l’environnement et diminuer les coûts fonctionnels ?
- Vous renseignez-vous auprès de vos fournisseurs pour connaître leurs pratiques en matière de respect de l’environnement et des conditions de travail ?

Si vous répondez par une majorité de réponses négatives, il est important que vous changiez votre comportement d’achat.

Check-liste ‘POLITIQUE D’ACHATS’ (suite)

<table>
<thead>
<tr>
<th>Action à entreprendre</th>
<th>Priorité (1 à 3)</th>
<th>Nom du Responsable</th>
<th>Echéance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Administration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Acheter des cartouches d’imprimantes et des toners réutilisables et pouvant être retournés aux fournisseurs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Acheter des fournitures en papier avec au moins 50 % de fibres recyclées, ou bien en papier non blanchi ou blanchi sans chlore gazeux</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Privilégier des équipements avec une faible consommation d’énergie, intégrant des matériaux recyclés ou recyclables et d’une durée de vie élevée</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Utiliser les fonctions ‘économie d’énergie’ (pour mettre l’appareil en mode veille s’il n’est pas utilisé pendant un certain temps) et ‘correction’ pour interrompre l’impression en cas d’erreur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Privilégier les piles rechargeables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Jardins</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Utiliser des fertilisants et des produits de traitement organiques ou biologiques pour les espaces verts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exemple**

<table>
<thead>
<tr>
<th>Aspect sensible</th>
<th>Achat et utilisation de portions individuelles de confitures d’une contenance de 22 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesure</td>
<td>Mise à la disposition de la clientèle de différentes variétés de confitures préparées par l’hôtel dans de grands récipients avec une présentation soignée</td>
</tr>
<tr>
<td>Investissement</td>
<td>Minimal</td>
</tr>
<tr>
<td>Amorancement</td>
<td>Immédiat avec une économie annuelle de USD 19'000</td>
</tr>
<tr>
<td>Impact environnemental</td>
<td>Réduction des déchets générés et rationalisation des achats</td>
</tr>
</tbody>
</table>

Figure 2: Excerpts from the checklist covering the field of purchasing policy including an introduction to the topic, the self-assessment, the list of measures and a concrete example
**Detailed environmental assessment**

To go further with the environmental evaluation of the hotel, it is possible to undertake a more in-depth analysis of the most important environmental aspects. Thus, the detailed environmental assessment section will enable the hotel to prepare an environmental balance sheet of the hotel’s management and consumption practices. The specific objectives of the detailed environmental assessment are to document economic and ecological deficiencies, so that strategic measures can be undertaken. It serves also as a mean to promote communication and environmental awareness.

To obtain a more accurate assessment, data must be obtained from various sources — internally (accounting, technical department, purchasing department, etc.) and externally (suppliers, subcontractors, etc.). The hotel’s environmental analysis can thus be further refined.

is designed for the acquisition of data on the different types of energy sources Table 1 in the hotel, whereas

Table 2 enquires the energy consumption per hotel departments.

**Table 1: Total energy consumption sorted into energy sources**

<table>
<thead>
<tr>
<th>Période (mois, trimestre, semestre, année)</th>
<th>Type d’énergie</th>
<th>Consommation (m³, litre)</th>
<th>Coût (unité monétaire)</th>
<th>Commentaires ou actions en cours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricité</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gaz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mazout</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charbon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.....</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autres</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consommation totale en kWh</td>
<td></td>
<td></td>
<td></td>
<td>Coût total (unité monétaire)</td>
</tr>
</tbody>
</table>
Table 2: Energy consumption of hotel services

<table>
<thead>
<tr>
<th>Service</th>
<th>Consommation (kWh)</th>
<th>Coût (unité monétaire)</th>
<th>% de la consommation totale de l'hôtel</th>
<th>Commentaires ou actions en cours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Example of economic calculations for an eco-efficiency measure

<table>
<thead>
<tr>
<th>DESCRIPTION GENERALE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domaine</td>
<td>Énergie</td>
</tr>
<tr>
<td>Structure concernée</td>
<td>Les différents services du complexe touristique : 3 hôtels, 5 restaurants, 4 bars, 3 piscines et 19 magasins</td>
</tr>
<tr>
<td>Problématique rencontrée</td>
<td>La conservation d’énergie est un grand thème pour ce complexe touristique. Les coûts d’électricité représentent une part importante des coûts opérationnels du complexe.</td>
</tr>
<tr>
<td>Action à mettre en place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Installation d’un système de monitoring électronique pour suivre à distance la consommation énergétique et détecter les zones d’économies potentielles</td>
</tr>
<tr>
<td></td>
<td>• Installation de détecteurs de présence dans les escaliers</td>
</tr>
<tr>
<td></td>
<td>• Installation d’interrupteurs supplémentaires dans le restaurant du personnel</td>
</tr>
<tr>
<td></td>
<td>• Remplacement de 240 ampoules à incandescence traditionnelles par des ampoules à basse consommation (durée de vie 6 ans)</td>
</tr>
<tr>
<td>COMPARAISON DES COUTS</td>
<td></td>
</tr>
<tr>
<td>Coûts annuels avant l’action (Ca)</td>
<td>Coûts d’électricité par année : Ca = USD 120000</td>
</tr>
<tr>
<td>Coûts annuels après l’action (Cb)</td>
<td>Coûts d’électricité par année : Cb = USD 789524</td>
</tr>
<tr>
<td>INVESTISSEMENT</td>
<td></td>
</tr>
<tr>
<td>Investissement (Iv)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Système de monitoring électronique : Iv1 = USD 20'000</td>
</tr>
<tr>
<td></td>
<td>• DéTECTEURS DE PRÉSENCE : Iv2 = USD 3'240</td>
</tr>
<tr>
<td></td>
<td>• Interrupteurs supplémentaires : Iv3 = USD 7</td>
</tr>
<tr>
<td></td>
<td>• Ampoules à basse consommation : Iv4 = USD 4'800</td>
</tr>
<tr>
<td></td>
<td>Iv = Iv1 + Iv2 + Iv3 + Iv4 = USD 28’047</td>
</tr>
<tr>
<td>Coûts annuels d’exploitation (Ce)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• C6 = USD 1’320</td>
</tr>
<tr>
<td></td>
<td>• C7 = USD 160</td>
</tr>
<tr>
<td></td>
<td>• C8 = USD 0</td>
</tr>
<tr>
<td></td>
<td>• C9 = USD 880</td>
</tr>
<tr>
<td></td>
<td>Ce = C6 + C7 + C8 + C9 = USD 2960</td>
</tr>
<tr>
<td>BENEFICES</td>
<td></td>
</tr>
<tr>
<td>Economies annuelles brutes (Eb) Eb = Ca - Cb</td>
<td>Eb = USD 120000 - USD 789524</td>
</tr>
<tr>
<td>Economies annuelles nettes (En) En = Eb - Ce</td>
<td>En = USD 410476 - USD 2960</td>
</tr>
<tr>
<td>RENTABILITE</td>
<td></td>
</tr>
<tr>
<td>Période d’amortissement (Pa) Pa = Iv / En</td>
<td>Pa = USD 28’047 / USD 407’516 = ~0.069</td>
</tr>
<tr>
<td></td>
<td>Pa = ~ 25 jours</td>
</tr>
</tbody>
</table>

It must be noted that this tool is restricted to hotels that have already undertaken an environmental audit or diagnosis. The implementation of a detailed environmental assessment requires baseline data.

**Decision-making and corrective measures**

After having identified the actions to be implemented in the hotel, their return on investment can be calculated. The table of economic calculations given by the Guide enables the hotel to evaluate the costs of implementing corrective measures step by step, the potential savings and the expected return on investment (RoI). It is a decision-making tool that helps the hotel to assess the situation before and after the implementation of corrective measures. In other words, it estimates the return on investment of the targeted actions before they are actually implemented.

Table 3 gives an example of economic calculations for a hotel.

**Action plan**
In order to get the financial return from such corrective measures, the hotel must set an action plan for the daily management of its activities and a clear allocation of responsibilities. The development of an action plan enables the implementation of the corrective measures by specifying the means allocated (financial, technical, human, etc.) and the deadline for the actual implementation.

Testing of the BEP Guide
This section is dedicated to the first application of the BEP Guide in two hotels of the Lake Geneva Region in Switzerland, which served as testing for further improvement of the Guide’s approach and tools. Thus, a short environmental audit was conducted in each hotel using the Guide. The testing aimed at:

- Assessing the BEP Guide’s approach, methodology and structure
- Obtaining direct feedback from hotel managers on the application of the BEP Guide
- Identifying potential improvements to be brought to the Guide prior its publication

Method
In order to combine environmental management knowledge with practical experience in hotel management, SBA partnered with the International Hotel School of Lausanne (EHL). An EHL professor for sustainable tourism and one of his graduate students assessed the Guide and suggested amendments before the audits as such. Both EHL members participated in the testing within hotels and served as bridge between environmental management practitioner and hotel responsible during the audits. The BEP Guide was used as a red thread during the audits; the hotel responsible was asked to detail the situation of his hotel regarding each environmental domain and he explained the measures taken or planned.

The Beau-Rivage Palace, Lausanne
The Beau-Rivage Palace is a five star hotel that attained 62’300 nights in 2007, corresponding to a turnover of 50 million Swiss francs (35 million Euros). The environmental audit was conducted with the technical responsible of the Beau-Rivage Palace. The audit confirmed that the hotel staff is conscious of environmental problems in relation with their activities and that the management strives to tackle them through a proactive and engaged policy. In this perspective, steps have been taken to implement an environmental management system according to ISO standard 14’040. The technical responsible person made it clear that environmental action should focus on backstage activities in order to avoid cutting on customer comfort. The fields of water and energy are considered as priority areas due to their high costs. Concrete measures have been introduced such as micro-irrigation in the hotel gardens and air conditioning using lake water as cooling medium. Additionally, the hotel switched to centralized natural gas heating system after having used for decades oil boilers in each building. During the day, temperature in the rooms is set at 21°C with the limited possibility for the guest to raise or diminish it by 6°C. At night, the temperature is automatically lowered to 17°C to ensure guest comfort while sleeping. Furthermore, the hotel management confirmed its intention to purchase ‘green’ electricity as soon as the local distributor would offer it. However, the quantity of water or energy consumed in each hotel department is not known. The BEP Guide was considered a useful tool to document and monitor track records.
Aluminum, paper, pet, glass and batteries are collected for recycling. A general policy of waste minimization was introduced in the hotel and each department is responsible for its application. For example, during staff meetings, the beamer replaces paper. In such a big hotel, the purchasing policy concerns not only the technical responsible staff but also other services staff members such as the cook or the chief housemaid. The management has issued general acquisition guidelines setting a preference for biodegradable, reusable and recyclable products. Indeed, the technical responsible person is in charge of purchasing general equipment – he was the one who selected ultraviolet radiation instead of chlorine to treat pool water, with less operational risks and less health threatening substances in the water. The cook, on the other hand, strives to use local and seasonal products, guided mainly by gastronomic purposes. Concerning logistics, a Health and Security Committee sets rules for safety and work security, which must be regularly communicated to all concerned staff. Finally, it must be noted that landscape integration is one of the hotel’s main assets. Moreover, every tree cut down in the hotel gardens must be replaced according to a city decree.

The Eurotel Riviera, Montreux
The Eurotel Riviera is a four star hotel that attained 41’970 nights in 2007, corresponding to a turnover of 5’600’315 Swiss francs (3.4 million Euros). Like the Beau-Rivage Palace, the hotel management is conscious of environmental problems and wishes to push forward in the direction of better practices in this field. In this perspective, the regional electricity supplier conducted an energy diagnosis whose outcome was a list of actions with their savings and payback periods. Food waste is given to a nearby peasant for animal feeding. Glass, paper-cardboard, oil and batteries are collected for recycling or proper treatment. The supplier himself collects the packaging of his chemical products. When purchasing new equipment, water and energy consumption is carefully examined, mostly because of efficiency and profit. It must be noted that the hotel management prefers repairing than replacing equipment.

Recommendations to the hotels
The audits identified potential improvement in the hotels’ environmental policy and provided them with recommendations based on the Guide’s checklists; those recommendations were given to both hotels in order to improve their environmental performance. It was noted by the auditors that during the application of the guide, the following points should be given specific attention:

- Energy and water are goods that the hotel pays directly for, whereas waste disposal is generally paid through taxes. Therefore, energy and water are better monitored and managed than waste. The hotel responsible staff should be well informed that improvement and savings can also be realized by reducing its waste flow. Indeed, reused products avoid buying new products and recycling can provide new income.

- Hotel responsible staff should be conscious that they are part of a product chain and that putting pressure on suppliers for more sustainable products can help greening it.

- The technical responsible staff using the Guide are generally not able to conduct the self-assessment on their own. Management commitment is essential as well as communication with hotel departments and staff. This is very relevant for purchasing policy.

Conclusions of the testing
The Guide was considered by hotel responsible staff as a concrete and useful tool that enables better environmental management. Indeed, the Guide provides useful corrective measures that have ecological and economical benefits. Based on the comments and feedback provided by the hotel management team and the observations of the auditing team, several structural improvements were brought in to the Guide. In this respect, the ‘environmental assessment’ section was rewritten and moved as second tool of the Guide; the checklists were put as the first entry tool of the Guide. Indeed, the checklists were considered as the heart of the Guide, as an opening door for a first environmental approach. This restructuring of the Guide would allow a smooth and progressive approach towards smaller hotels that will not be discouraged by data collection and documentation. Additionally, each checklist was illustrated by a short self-assessment that would highlight the most urgent environmental domains to focus on.

The application of the Guide in a big luxury hotel differed from a hotel of medium category. Indeed, integrating environmental protection in a hotel depends mainly on the following aspects and factors:

- The existence of a hotel (or group) policy or charter
- The notoriety of the hotel and the importance of environment protection for its image
- Management commitment and awareness towards environmental issues
- Need of staff involvement in order to rely on them for the day-to-day environment management

Finally, further testing of the Guide in the form of case studies is requested to understand more thoroughly the needs of hotels in the field of environmental management and thus to meet best the Guide users’ expectations.

**Ensuring a Sustainable Implementation of BEP**

*Strengthening and continuous improvement*

Becoming an environmentally responsible hotel requires the adoption of a new corporate culture both within the hotel and among its stakeholders. To strengthen this commitment, changes adopted thanks to the Guide should be implemented progressively within the hotel through:

- **Organizational change**: To obtain a lasting change in the hotel, clear objectives are needed and follow-up and evaluation measures must be implemented. A systematic approach can be adopted by establishing resource management plans and by communicating factual information. Therefore, appointing a ‘task group’ made up of selected volunteers from among the staff will contribute to the implementation of concrete improvements in the BEP’s main domains.

- **Behavior change**: Influencing staff behavior in favor of more rational resource use has a direct impact on lowering the hotel’s running costs. It is important to involve staff by giving them specific duties (realistic and suited to their competences) and by providing training. It should be noted that behavior change also concerns the guests who need to be sensitized and involved.

- **Technological change**: The hotel can, when changing equipment or renovating, choose more sustainable technologies that consume less water and energy. The aim of this is to become more eco-efficient and adopt a more responsible purchasing policy.
In addition, to sustain the efforts made in applying ‘green’ measures, the hotel must institute corroborative and follow-up actions. This will support the hotel’s environmental commitment and help monitor its performance.

**Following up and sustaining the corrective measures**
Follow-up and monitoring give managers the necessary information to assess the impact and the progress of the actions taken. It can provide an evaluation of the adequacy of the measures, judged against the hotel’s environmental goals. Moreover, by using the annual follow-up results, managers can identify trends in performance (benchmarking) and, if needed, take corrective action. Using the BEP Guide each year will give the hotel the data it needs to do this, thereby conforming to the principles of continuous improvement. The goal is to strengthen the environmental and economic efficiency of the hotel departments.

**Awareness-raising and training of staff**
Just as investments are required to maintain or replace a hotel’s equipment, an investment in staff awareness-raising and training is essential to improve the human capital. Environmental commitment is an opportunity for the hotel to involve its various co-workers.
Staff training must be centered on the hotel’s environmental impacts. For the training to be adequate, training and awareness-raising must also be relevant to the target groups and be related to their daily activities. Employees should be invited and encouraged to respect the environmental measures that have been implemented. Finally, because of the high turnover rates in the hotel industry, training curricula should be revised to include the BEP principles in the introduction training provided for new employees.
Awareness-raising and training can be implemented in the different departments of the hotel. Sessions should be organized at times of less activity, and should last one to two hours. Practical demonstrations increase the effectiveness of the training. In addition, other media can be used in the departments, such as posters, information notes, brochures, bulletin boards, and films.

**Guest’s involvement and external communication**
A hotel’s position regarding environmental issues can increase its competitiveness. Information on this topic should, above all, be addressed to guests, but also to the other stakeholders.
As far as informing guests is concerned, the main objectives are to inform them about the hotel’s programme and sound environmental practices. Guests can also be informed of what they can do themselves. By communicating clearly about its efforts in the field of environmental protection, the hotel can increase the approval and loyalty of demanding guests. Nevertheless, it is important to communicate well and get the message across without being sanctimonious.
Guests can become involved in the hotel’s environmental approach if they are given key information about the hotel’s commitment. They can participate if they are informed about rational use of water and energy (measures of the checklists). The information can be distributed to guests when they arrive and/or be posted in the guest rooms. It should be noted that the hotel must have a demonstrated commitment to the protection of the environment, having implemented effective and efficient measures, before requesting the participation of guests.
Other stakeholders can be informed of the hotel’s practices by different means, among which are the annual report, the environmental charter, and the web site. Another way to show hotel commitment is to describe the improvement measures that have been implemented and to explain their economic and environmental advantages.

**Perspectives**
The efforts undertaken by the hotel in terms of the environment can lead to obtaining an eco-label. The best-known labels for hotels are the ‘European Eco-Label’ and the ‘Green Key’. Getting accreditation in this way requires meeting a number of mandatory and optional criteria. Investments may prove necessary to upgrade the hotel’s equipment in order to meet the requirements of the label. Such certification is an important competitive advantage that can be used as a marketing tool.

**Conclusion**
The BEP Guide, resulting from a concrete need of the Mediterranean tourism industry, provides on the one hand eco-efficiency measures adapted to the hotel industry and on the other means to scrutinize their economic and environmental outcomes. Indeed, the Guide allows evaluating sustainability of the measures in each hotel where it is applied. Without cutting on clients’ comfort, a lot of efforts can be made in the backstage by the hotel management industry through the application of best available practices and technological innovations. This Guide is designed to be a practical tool for daily implementation. It fills the gap between commitments to sustainable development and the undertaking of concrete measures. By suggesting eco-efficiency practices and providing easy-to-implement tools, the Guide will enable hotel management to handle the environmental aspects related to its business. Additionally, the Guide involves hotel staff as key greening actors and provides a good basis for integrated environmental management systems. These assertions are confirmed by the Guide’s testing in two hotels showing its ability to meet hotels’ team needs in the field of environmental sound practices. However, continuous improvement shall be brought to the Guide through future case studies. In a few years, it is certain that environmental protection will become a legal obligation for hotels. Hence, those who act first will be able to anticipate the law and will acquire a competitive advantage.

**Acknowledgements**
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**References**
- Bonnes pratiques environnementales dans le secteur hôtelier, Centre d'activités régionales pour la production propre, 2006
- Burnett J., Ho B., Chan A., Good Practice Guide to Waste Management for Hotels in Hong Kong, The Hong Kong Polytechnic University, 2000
- Burnett J., Kwok-tai Ch., Deng S.; Ng S., Lee R., Ho B., To D., Good Practice Guide to Energy Conservation for Hotels in Hong Kong, The Hong Kong Polytechnic University, 2000
- Burnett J., Kwok-tai Ch., Deng S.; Ng S., Lee R., Ho B., To D., Good Practice Guide to Water Conservation for Hotels in Hong Kong, The Hong Kong Polytechnic University, 2000
- Butler Ch., A messy Business, Successful Meetings, 1991
- Chan D., Burnett J., Guide to the Management of Indoor Air Quality for Hotels in Hong Kong, The Hong Kong Polytechnic University, 2000
- Charte Environnement de l'Hôtelier Guide Pratique, Direction Développement Durable du groupe Accor, Accor Hotels, 2006
- Dubois G., Dossier sur le tourisme et le développement durable en méditerranée, PNUE et PAM, 2005
- Enz C.; Siquaw J., Best hotel environmental practices, Cornell Hotel and Restaurant Administration Quarterly; 1999; p. 72
- Exemples d’actions de minimisation de déchets et d’émissions n. 62, Centre d’Activités Régionales pour la Production Propre
- Genoud H., PME et développement durable, Service Cantonal du Développement Durable, 2003
- Guide de bonne gestion d’entreprises, Sustainable Business Associates, 2005
- Hospitable Climates Helps Novotel London West Save 20% on Energy, Hospitality, 2005; p. 8
- Iwanowski k.; Rushmore C., Introducing the eco-friendly hotel, Cornell Hotel and Restaurant Administration Quarterly, 1994; P. 34
- L’art d’accommoder les restes, Service cantonal de gestion des déchets, 2002
- La gestion environnementale au quotidien, Clef Verte
- La pollution intérieure : la connaître, la reconnaître, l’éviter, Observatoire de la qualité de l’air intérieur
- Le Label écologique européen pur les hébergements touristiques, Commission européenne, 2003
- Making a difference together, Fairmont Hotels & Resorts Green Partnership, 2006
- Profitez des économies d’énergie dans les hôtels, les motels et les restaurants, Initiative des Innovateurs énergétiques, 2003

Topic 2: Energy & Water Management
Impact of Tourism on the Environment: Water, Oil, and Electricity

Munther Badriyah (1)
(1) Head of Environmental Statistics Division, Department of Statistics, Jordan

Environment Statistics in Jordan

Environment is defined as the overall outer conditions affecting life, growth and beings existence. The environmental system is distinguished in the balance among its elements (i.e. water, air and land) and it can adapt, within certain limits, with changes that may occur. But, life development, technological advancement and introduction of machines, chemicals, radio-active items, various sources of power generation, exhaustion of natural resources, occurrence of catastrophes due to human activities such as nuclear explosions in addition to the use of fertilizers and pesticides, all these lead to environmental disequilibrium and many environmental problems.

In continuation with the above mentioned, the Department of Statistics will establish the environment statistics division which is always keen to improve its work to provide comprehensive statistical data in this field. The decision makers, policy makers, planners and researchers can benefit a lot by the comprehensive environmental database available at DOS.

Tourism Statistics in Jordan

The tourism sector is considered as one of the important economic sectors of the kingdom contributes to the support of the national economy and employment. The Tourism statistics are also considered among those important statistics that have been given lately attention for developing it in comparison fields with other statistics. As a result of that accelerated growth in the size tourism activity, it was necessary to measure the impact of this activity on the national economy, natural resources supply e.g. Water, Energy, etc. while it is affected positively by the inbound tourism.

The study in Jordan is so important due to the tourism data and indicators provided on water and energy uses for tourism purposes. The results of this study will be used for estimating the tourism size with water and energy consumption according to their resources, and also will be used for planning and policy making, aiming at developing it, based on scientific basis and lead to the development of the other concerned economic activities.

Factors influencing tourism, the impact of tourism and the interrelation between supply and demand are usually tackled by intergrading data from a great number of sources followed by model type analysis.

Tourism is the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes, it is a comprehensive and extensive phenomenon, and it is demand led and influenced by many external factors. It generates physical and financial flows that have strong economic, socio-cultural and environmental impacts.
There are three elementary forms of tourism in relation to a given area (e.g. region, country, group of countries):

1 – Domestic tourism. This is defined as comprising the activities of residents of a given area traveling only within that area, but outside their usual environment.

2 – Inbound tourism. This is defined as comprising the activities of non-residents traveling in a given area that is outside their usual environment.

3 – Outbound tourism. This is defined as comprising the activities of residents of a given area traveling to and staying in places outside that area (and outside their usual environment).

In general, the person is considered as non-resident in Jordan if the main purpose of visit is for:

- Recreation or Holiday for less than one year
- Religious visit for less than one year
- Visiting relatives and friends in Jordan for less than one year
- Participating in a conference, meeting, seminar or workshop
- Non-Jordanian students coming for study (Study)
- Non-Jordanian patients coming for medication (Medical Treatment)
- Non-Jordanian diplomats and military individuals working in Jordan
- Jordanian working or running a business abroad
- Business tour
- Transit
- Other

The Inter – Relationship between Tourism and the Environment
The environment is a factor influencing tourism demand. Since demand for tourism products is partly determined by the quality of the related environment, the environment can have a positive or negative influence on tourism. Likewise tourism can have a positive and negative impact on environment

Objectives of the Study
To identify and define the tourism activities themselves, namely not only tourism accommodations, restaurants but also the leisure activities such as golf, swimming pool …etc.
To identify and collect data related to the amount of water used by tourism activities, breakdown by type of water resources (groundwater, surface water, reuse water, desalinated water) and by type of tourism activities will be assessed.
To identify and collect data related to the amount of energy (electricity and oil) used by tourism activities.

The Action to Support Tourism is a Through Knowledge of Basic Statistics
1- Analysis and evaluation of the long – terms needs of the main users.
Collection and dissemination of existing data on tourism with water and energy consumption.

The Methodology on Tourism Statistics is a Complementary Tool
Insuring a better understating of facts and figures on tourism, it will facilitates the introduction of methods of data collection by providing quid lines on the methods and definitions which should be used for elaborating harmonized and reliable statistics. This will be covering:

- Water data collection.
- Sewage data collection and the methods of disposal and treatment
- Solid waste data collection and methods of disposal
- Oil data collection.
- Electricity data collection.

Estimations of the maximum number of overnight stays within a certain region can also obtained from statistics on tourism supply. This can be of some interest to the local planning authorities, e.g. for calculations of the maximum needs for drinking water or decision concerning the construction and capacity of sewage treatment plants….etc.

Note: it is suggest to use the same definitions and classifications as described for environment

Methodology and Data Collection
Water and energy consumption by tourism sector protection must be taken seriously in order to reduce this problem. It should be given top priority by the public and private sectors because each being has the right to live in a balanced, clean and pollution-free environment.

Jordan was one of the pioneer countries to exert extensive efforts in the field of Water and energy consumption protection. Accordingly, many directorates and divisions dealing with water and energy in tourism issues were established in various governmental institutions, in addition to the establishment of the Ministry of Environment, Ministry of Energy and Ministry of Water and Irrigation. Moreover, the Government issued the Environment Protection Law, and continuously supports the non-governmental organizations interested in this subject.

The Objectives
- Provision of statistical data on various water supply and water demand data in accommodation and others in Jordan.
- Provision of statistical data on various energy type and energy demand data in accommodation and others in Jordan.
- Provision of data on number of tourists in accommodation and others.
- Provision of data on the quantities sewage, in addition to methods of disposal and treatment.
- Creating water consumption by tourist’s database.
- Provision of information on procedures used to protect the water consumption by tourism activities.
Sources of Water and Energy Consumptions and Tourism Statistical Data

In order to achieve the above mentioned objectives, the required data are collected from the following sources:

1- Ministries, Governmental Departments, and Public and Private Institutions

The statistical data is collected from various governmental institutions according to their specialty, and from public and private institutions and associations dealing with this subject. Continuous coordination with these institutions is maintained to obtain up-to-date data and information for inclusion in the environmental statistics report. After collection, data are checked and classified. In case there were any mistakes or conflicts in the data, contacts are made with concerned parties to carry out the necessary corrections.

2- Directorates and Divisions Working Within the DOS

Data is collected from various divisions (services and tourism divisions) in the DOS, whether this data is published or not. Some accommodation indicators are calculated while some other data are re-tabulated in the form of tables for inclusion in this report.

Survey and Study

For the purpose of this study, there is a survey will be carried out, it is:

Total quantity of water consumption according to the source of supply and total quantity of sewage, in addition to methods of disposal and treatment.

General Background for Survey

Water and Energy consumption and Tourism survey will implemented at the National level for the establishments, in order to collect data pertaining to year before on water and energy consumption produced by these activities.

1- Survey Coverage

The surveys covered by a comprehensive survey for accommodation and sampling for other tourists activities.

2. The Preparatory Stage of survey: Survey Main Documents:

The Survey Questionnaire:

The Accommodation questionnaire contains the following components:

- Identification information on the establishment.
- Quantity and value of water consumption in the establishment by source.
- Quantity and value of energy consumption in the establishment by type.
- Quantity and value of electricity consumption in the establishment.
- Quantity of wastes (solid and liquid) by item, type and method of disposal.
- Fixed assets of the establishment designated for the protection of water used.

The Instructions Manuals Which Includes:

Instructions Manual for completing the questionnaire and explaining the concepts and terms mentioned therein, editing rules manual for checking data consistency, logically …etc, and finally special manual for coding the different components of the questionnaire.

Data Collection Stages:

1 - Organization of Field Work: The field work was carried out by the selected interviewers under the control of the team supervisors whom in general, have a good
experience in field work. The interviewers were distributed into teams and the field
work operations were controlled by the field supervisors.

2- Field Editing: The field supervisor checks the questionnaires of his team at the end
of each working day, then hand them over to the field editor to check them again. Any
questionnaire believed to have a mistake return to the field to correct the data or to
verify any suspected data.
Remarks are discussed with the interviewer and transmitted to all interviewers.

Data Processing Stage

- Office Processing
- Editing of Questionnaires

The completed questionnaires were checked according to written editing rules which
were distributed to office editors. Questionnaires containing any suspected data were
returned to the field teams for verification.

- Coding

Upon completion of editing operation, questionnaires were coded according
to the adopted coding manuals, and then codification is also edited.

- Electronic Processing

The edited and coded questionnaires were delivered to the Data Entry Division, to be
entered using the special pre-prepared entry programs and electronic edit rules. Upon
completion of data entry and data cleaning, the programmer extracts sheets of the
preliminary results using the pre-prepared raising factors for editing and verification
of the results.

Preparation of Report and Dissemination of Results
After the editing and tabulation operations were completed, the publication’s tables
are prepared, and the results are loaded on the DOS website.

Sources of Data
1 - Ministry of Water and Irrigation (water data source, meetings, conferences,)
2 – Ministry of Environment
3 – Ministry of Tourism and Antiquities
4 – Jordan Visit Board
5 – Jordan River Foundations
6 – Royal Society for Natural Reservation
7 – Tourism and Services Divisions in DOS
8 – Surveys of Environmental Division in DOS
9 - Jordanian Society of Hotels
10 - Ministry of Energy
11 – NGO’s
The cooperation and communication between the DOS and other institution will supply the developing of producing data and information needs on water and energy consumption by tourism.

Finally
Water consumption by tourism sector protection must be taken seriously in order to reduce this problem. It should be given top priority by the public and private sectors because each being has the right to live in a balanced, clean and pollution-free environment. Jordan was one of the pioneer countries to exert extensive efforts in the field of Water and Energy consumption protection. Accordingly, many directorates and divisions dealing with water and tourism issues were established in various governmental institutions, in addition to the establishment of the Ministry of Environment and Ministry of Water and Irrigation and others.

In continuation with the above mentioned, the Department of Statistics will establish the environment and tourism statistics studies. This is providing comprehensive statistical data in this field, for helping the decision makers, policy makers, planners and researchers to find the database available at DOS. Part of this data is published in this report and more will be published in the future.

Calculation:
It showed that the quantity of consumed water in hotels sector increased from 1.10 million cubic meters in 1995 to be 3.05 million cubic meter in 2006 this mean increased by 177.2%; this as result of increasing the numbers of hotels and visitors to Jordan.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hotel No.</th>
<th>Quantity of Consumed Water (MM3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>274</td>
<td>1.10</td>
</tr>
<tr>
<td>1996</td>
<td>324</td>
<td>1.15</td>
</tr>
<tr>
<td>1997</td>
<td>336</td>
<td>1.33</td>
</tr>
<tr>
<td>1998</td>
<td>380</td>
<td>1.67</td>
</tr>
<tr>
<td>1999</td>
<td>422</td>
<td>1.90</td>
</tr>
<tr>
<td>2000</td>
<td>452</td>
<td>1.94</td>
</tr>
<tr>
<td>2001</td>
<td>442</td>
<td>1.93</td>
</tr>
<tr>
<td>2002</td>
<td>462</td>
<td>1.86</td>
</tr>
<tr>
<td>2003</td>
<td>458</td>
<td>1.92</td>
</tr>
<tr>
<td>2004</td>
<td>463</td>
<td>2.34</td>
</tr>
<tr>
<td>2005</td>
<td>468</td>
<td>2.82</td>
</tr>
<tr>
<td>2006</td>
<td>476</td>
<td>3.05</td>
</tr>
</tbody>
</table>

It showed also the consumption of this sector shaping 0.45% from the total supplied water in Jordan in 1995, and it increased to 1.05% in 2006 which indicating the increasing of tourism movement size to Jordan in the last few year.
It shows that the quantity of solid wastes in hotels sector increased from 1316.6 thousand ton in 1995 to 2246.0 thousand ton in 2004, the organic materials shaping 85%, the greater Amman municipality collect these wastes from hotels to biogases factory which convert microbial to agricultural fertilizers and biogases used in electrical energy for the nearest areas to the factory, as we see 99% from these solid wastes are disposed off through gathering up and relocating it to great Amman
municipality or the municipalities dumps while small proportion between 0.3 to 0.8 is sold.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hotels</th>
<th>Quantity .of electricity consumed (giga watt/hr)</th>
<th>Quantity .of Oil consumed (000 ton)</th>
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<tbody>
<tr>
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<td>274</td>
<td>66.52</td>
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<td>324</td>
<td>73.42</td>
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<td>1997</td>
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<td>1998</td>
<td>380</td>
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<td>1999</td>
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<td>106.96</td>
<td>5.65</td>
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<th>Year</th>
<th>Hotels</th>
<th>Quantity of solid waste (000Ton)</th>
<th>METHODS OF SOLID WASTE DISPOSALS BY HOTELS (%)</th>
<th>municipalities</th>
<th>storage</th>
<th>burning</th>
<th>selling</th>
<th>Others</th>
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<td>1316.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1996</td>
<td>324</td>
<td>1441.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>336</td>
<td>1434.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1998</td>
<td>380</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>1999</td>
<td>422</td>
<td>1632.73</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>2000</td>
<td>452</td>
<td>1866.01</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2001</td>
<td>442</td>
<td>1624.06</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.1</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>2002</td>
<td>462</td>
<td>1486.80</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.1</td>
<td>0.6</td>
<td>0.0</td>
</tr>
<tr>
<td>2003</td>
<td>458</td>
<td>1706.62</td>
<td></td>
<td></td>
<td>0.0</td>
<td>0.0</td>
<td>0.8</td>
<td>0.0</td>
</tr>
</tbody>
</table>
The next table showed the consumption of electricity in hotels sector increased from 66.52 giga watts / hr in 1995 to 180.37 giga watt/hr in 2006, and the consumption of Oil increased from 4.16 thousand ton in 1995 to 13.76 thousand ton in 2006. in this sector forming about 1.88% from total consumption of electricity in Jordan. While the percentage of the consumption of the oil in hotels sector is .19% from the total consumption in the same year.

The END
Although the quantity of consumption of water and electricity and oil in hotels sector doesn't shaping constrictive proportion from total consumption of it in Jordan, but there is really requires for future programs and plans considering the expected increase of incoming tourism to Jordan to avoid consumption crisis of the mentioned above recourses and conserving Jordanian environment.
Exploring Energy Management and Applying a Cognitive Hierarchy Derived Model: the Case of Hotels in Jordan

Mairna Mustafa\(^{(1)}\), Mousa Mohsen\(^{(2)}\), Yahya Ali\(^{(3)}\)

\(^{(1)}\) Department of Sustainable Tourism, Queen Rania Institute of Tourism and Heritage, Hashemite University, Zarqa 13115, Jordan  
\(^{(2)}\) Department of Mechanical Engineering, Faculty of Engineering, Hashemite University, Zarqa 13115, Jordan  
\(^{(3)}\) Department of Humanities and Social Sciences, Faculty of Arts, Hashemite University, Zarqa 13115, Jordan

Abstract  
This paper presents some aspects related to energy consumption in the tourist accommodation sector. The results of a survey conducted as a part of the GREEN-TAS Project (supported by EC Life Program) on environmental performance in the tourist accommodation sector in Jordan were used to evaluate energy conservation in Hotels and to measure the awareness of hotel managers about the impact of their hotels on the environment, as well as their willingness to take a positive action toward the environment. Distributing the surveys was limited to all classified hotels in Jordan. The results show that few classified hotels already installed energy saving equipments, though, it was noticed that managers of one star hotels were not really willing to make such changes in their hotels, other classified hotels (2-5 star hotels) have shown a high willingness to make changes in their hotels to reduce the consumption of different types of energy. Hotel's classification played a significant role in explaining variations in most of the results, particularly when it comes to willingness to reduce energy consumption by using energy efficient appliances, as well as for concern about environment and procedures already applied to save energy in these hotels. Five and four star hotels were the most hotels willing to use energy efficient appliances to reduce energy consumption. The paper also presents a suggested model to explain the willingness of hotels to take positive actions toward the environment. The main outcome of conducting such model was finding the weak relationship between being aware of hotel impact on environment through the overuse of energy and their attitude toward meeting the environmental requirements by their hotels, which is strongly related to lack of awareness about the different environmental aspects related to hotels operations.
Keywords: Jordanian hotels, energy consumption, environmental performance.

Introduction
Jordan has witnessed an enormous growth in its development in the last decades; such growth can be seen in different sectors including tourism; consequently, an increasing consumption of energy and its resources is still taking place. Three major sectors are considered as the biggest consumers of energy in Jordan; these are: transportation, industrial and residential sectors. The energy consumption among these sectors is shown in Fig. 1, the term "others" in this figure refers to other major types of sub sectors, such as agricultural, street lighting, and commercial, which includes hotels (Ministry of Energy and Mineral Resources (MEMR), Annual Report, Amman-Jordan, 2005).
Jordan imports most of its energy in the form of petroleum products. Therefore, energy conservation means less reliance on energy imports and, thus, less greenhouse emissions. In 2005, oil and natural gas imports cost was approximately 58% of the total domestic commodities exports and about 24% of the gross domestic product. Primary energy resources consumed in Jordan include crude oil, natural gas and solar energy. However, imported crude oil and petroleum products constitute more than 97% of the annual rate of energy consumption in 2005. A good portion of this oil is used in electric generation. The domestic natural gas resource, which is used to fuel 5x30 MW gas turbines for electricity generation, satisfies less than 3% of the annual energy demand. The annual primary energy demand in 2005 was 7028 million toe. Such facts indicate the necessity of managing energy consumption in different economic sectors.

Fig. 1: Distribution of Jordan's energy consumption in various sectors, 2005 (Ministry of Energy and Mineral Resources (MEMR), Annual Report, Amman-Jordan, 2005)

Energy Consumption and Management in Hotels
Tourism is now considered as one of the biggest industries in the world, such consideration comes from the fact that it has a great contribution to economy in any country. Tourism also is a big energy user with significant environmental impacts. The hospitality industry, which supports tourism, is comprised of hotel/motels, restaurants, attractions, condominiums, camp grounds, and cruise ships (Miller 1994). The economic health of such facilities depends largely on maintaining the quality of its primary resource: the environment. Tourism industry is known to have a broad range of impacts on environment; such impacts are depending on some factors such as tourist facility, site specifics and systems used. Moreover, tourism is a great consumer
of natural resources, mainly land, water and energy resources, as well as food and other commodities. (ESCWA, 2003)

If we look at the operating costs of different tourism facilities, we will simply find that energy accounts for the largest share of such costs (UNEP 2001). The hotel industry for example is equipped with energy intensive equipment and lighting. Air conditioning, heating, ventilation, refrigeration, motors, cooking, laundry, cleaning and office equipment are purchased and used in most hotel operations (Hammer & Townsend 1993).

Such considerable cost of energy is due to using technology and different sources of energy to provide comforts and conveniences to hotel guests. The vast majority of hotels and resorts meet their energy needs by purchasing energy produced through the burning of fossil fuels (coal, oil and natural gas), such processes are main contributors to different kinds of environmental pollution and global climate change (Sweeting & Sweeting 2002).

Electricity and thermal energy are the main energy forms used in tourism facilities for necessary services. Electricity supply in tourism facilities is usually drawn from some particular sources such as grid connection, diesel generators, gas turbines, photovoltaics, wind electric systems, hybrid systems and solar thermal. Thermal energy is usually generated from petroleum-based fuels, solar water heating, waste heat / cogeneration, hot water storage and seawater active / passive cooling (ESCWA 2003). The fact that tourism and hospitality industry are consuming great amounts of energy is well known, but the question is which area in these industries is the most energy-intensive? Answering this question requires the focus on some factors that affect the typical energy loads and consumption in tourist facilities as facility configurations, climate conditions, heating and cooling requirements, levels of occupancy and activity, the energy sources used, and the energy-efficiency of appliances (UNEP 2001). Some other factors include the size and luxury level of the hotel, location (remote / rural or urban), guest profiles (visiting or vacation guests), and types of services / activities. Other important factors are the age and condition of the energy systems, which affects their efficiency. (ESCWA 2003)

Hotels in Jordan

Jordan is one of the developing countries that perceive tourism as a main pillar of economy; according to the information given by MOTA for the year 2005, it is the Kingdom's largest export sector, its second largest private sector employer, and it's second highest producer of foreign exchange. Tourism has been clearly growing significantly in Jordan, a fact that is seen through the increase in some indicators as receipts, number of tourists' arrivals and number of tourism facilities (including hotels). Such growth with no doubt is reflecting a great positive economic impact, though, it reflects a negative side; Jordan will face some real challenges in trying to meet the growing energy needs, (more particularly electricity demands). According to the data of Department of Statistics (DOS) (2006), the number of classified hotels has reached a total of 222 hotels, these are distributed on the following categories: 21 five stars hotels, 23 four star hotels, 56 three star hotels, 53 two stars hotels and 69 one star hotel. The accommodation sector in Jordan includes also some other types of operating facilities, statistics of Ministry of Antiquities and Tourism (MOTA) (2006) shows the existence of 122 hotel apartments, 137 unclassified hotels, 2 hostels, 1 motel and 8 camping areas.
Although of the big economic contribution by these facilities, some negative environmental impacts are taking place, which is generally the case of hotels worldwide. These accommodations, particularly hotels, overuse fresh water sources for several purposes, such as: swimming pools, golf courses, irrigating green areas, and personal use of guests. They also contribute to the generation of waste water and solid waste. In some cases, they result in producing toxic waste because of overusing of chemicals, as in laundry (Sweeting & Sweeting 2002). In addition to these negative impacts, hotels use significant amounts of energy for daily operations and recreational activities (UNEP 2001). This basically can be seen in building climate control and general services in the hotel. These are composed of passive cooling, energy management and control systems (EMCS), central cooling system, ice storage, desiccant dehumidification, in addition to laundry and kitchen equipments (ESCWA 2003). In many facilities, energy costs are the second-highest operational costs after payroll. Such considerable cost of energy is due to using technology and different sources of energy to provide comforts and conveniences to hotels' guests. The vast majority of hotels and resorts meet their energy needs by purchasing energy produced through the burning of fossil fuels (coal, oil and natural gas), such processes are main contributors to different kinds of environmental problems, for example global climate change (Sweeting & Sweeting 2002).

From all these facts, this study becomes very important since it is based on using some specific indicators to explore the current situation of energy consumption and management in classified hotels in Jordan, more important, it measures the attitudes of managers toward sustainability in hotels and willingness to take some actions to enhance their energy consumption; the relation between these variables will be tested through using structure equation modeling to explain the unwillingness by some hotel managers to take such actions. Such results will help in developing a number of strategies and instruments to solve environmental problems related to the over-consumption of energy.

**Methodology**

In order to understand the environmental performance in the tourist accommodation sector in Jordan, a survey was designed and distributed to hotels' managers and departments' supervisors; moreover, some field visits were conducted to help in understanding hotels interaction regarding the environment, and to assist in interpreting the results of the survey. The study is limited to all classified (1 to 5 stars rate) hotels all over Jordan. A questionnaire was designed to gather the needed information related to energy consumption and management. The questionnaire was composed of three sections, the first section included information about the confidentiality and anonymity of the respondents in the survey. The second section documented information about the hotel classification, affiliation (chain), operation date, maximum occupancy, total area, built up area, no. of rooms, and no. of beds. The last section grouped a number of questions regarding current environmental practices, willingness to adopt environmental programs, awareness of environmental issues and initiatives, and willingness to change some current practices related to energy sources, consumption, wastewater recycling, light system, and air quality, and more important the consumption of energy sources and water, as well as waste generation. For the purposes of this study, only the information about energy aspect will be presented. The study was conducted using five field supervisors who were chosen to supervise the field work of 19 field interviewers (most of them are students from the Hashemite University), all participants were trained for one day followed by
a pilot study, and the final collection of data was conducted during 10th - 17th August 2006.

Sample
The frame of this sample is provided by Ministry of Tourism and Antiquities in Jordan. This frame contains the name, address and other information for each sampling unit (hotels). The hotels are divided into five strata by the rating of each hotel; this stratification provides homogeneity within each stratum. The frame is divided into five strata as follows:

<table>
<thead>
<tr>
<th>Hotels Rating (Stratum)</th>
<th>Number of Hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 stars</td>
<td>21</td>
</tr>
<tr>
<td>4 stars</td>
<td>24</td>
</tr>
<tr>
<td>3 stars</td>
<td>56</td>
</tr>
<tr>
<td>2 stars</td>
<td>53</td>
</tr>
<tr>
<td>1 star</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
</tr>
</tbody>
</table>

A stratified sample was drawn from all classified hotels. 90 classified hotels were selected to fill the survey, from which 80 hotels responded (83.3% as a response rate), these included 8 one-star hotels, 15 two-star hotels, 24 three-star hotels, 18 four star hotels and 15 five-star hotels, based on this, the data was weighted (Table 2).

<table>
<thead>
<tr>
<th>Hotel Rating</th>
<th>Number of Hotels</th>
<th>Sample Size</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>69</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>53</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>23</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>96</td>
<td>80</td>
</tr>
</tbody>
</table>

Results of Descriptive Analyses
As mentioned in a previous section, the consumption of energy in any hotel is to be influenced by its operating conditions and its spatial characteristics. It becomes important then to present several variables related to energy consumption in all classified hotels in Jordan. The data has been weighted; therefore we will present all the results using the weighted data. Information about utilities represents 12 months prior to the interview. These variables include: hotel classification, affiliation (chain), maximum occupancy, total area, built up area, number of rooms, number of beds,
total occupied rooms (room nights) in the hotel, total number of guests stayed in the hotel. For these general characteristics of hotels, it was found that most of the Jordanian classified hotels have an area of 2500 sq.m or above (54.9%), also, a considerable portion of them have a total built area of 3000 sq.m or above (34.2%). The results of the survey shows that most of these hotels have a yearly occupancy rate of 75% or above (59.6%), most of them are hotels of less than 50 rooms (60.8%) (Table 3).

Table 3: General characteristics of Jordanian classified hotels

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervals</th>
<th>Frequency</th>
<th>Valid Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (m²)</td>
<td>Less than 499 m²</td>
<td>11</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>500-999 m²</td>
<td>9</td>
<td>6.7</td>
</tr>
<tr>
<td></td>
<td>1000-1499 m²</td>
<td>14</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>1500-1999 m²</td>
<td>8</td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td>2000-2499 m²</td>
<td>15</td>
<td>12.1</td>
</tr>
<tr>
<td></td>
<td>2500 m² and above</td>
<td>70</td>
<td>54.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td>Built up Area (m²)</td>
<td>Less than 1000 m²</td>
<td>59</td>
<td>45.6</td>
</tr>
<tr>
<td></td>
<td>1000-1999 m²</td>
<td>13</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>2000-2999 m²</td>
<td>13</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td>3000 m² and above</td>
<td>44</td>
<td>34.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>129</td>
<td>100</td>
</tr>
<tr>
<td>Number of Rooms</td>
<td>Less than 50 rooms</td>
<td>134</td>
<td>60.8</td>
</tr>
<tr>
<td></td>
<td>50-99 rooms</td>
<td>37</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td>100-149 rooms</td>
<td>16</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>150-199 rooms</td>
<td>6</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>200-249 rooms</td>
<td>9</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>250 or more rooms</td>
<td>18</td>
<td>8.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>221</td>
<td>100</td>
</tr>
<tr>
<td>Occupancy Rate (%)</td>
<td>Less than 20%</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>20%-39%</td>
<td>13</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>40%-59%</td>
<td>39</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>60%-79%</td>
<td>35</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>80% and above</td>
<td>131</td>
<td>59.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

For the consumption of energy in hotels, the following variables were measured: total electricity cost (JD) consumed by hotel per year, total electricity consumed in the hotels' departments (engineering, laundry, housekeeping, food and beverage), total electricity consumed by hotel per year kWh / year, total energy (fuel) consumed in the hotels' departments (engineering, laundry, housekeeping, food and beverage), and total energy (fuel) consumed by the hotel per year m³ / year. For the purposes of this
In general, the following was to be found:

- 59.4% of hotels have installed equipments to reduce energy consumption of heating, ventilation and air conditioning.
- 97.1% of classified hotels in Jordan are not using any renewable energy source like photo voltaic cells for lighting.
- 93.2% of classified hotels in Jordan are maximizing their use of natural light, 41.2% of these hotels to a great extent are promoting turning off lights when ever they are not in use among their staff and guests.
- Energy consumption is one of the major concerns for all hotels particularly 5, 4 and 3 star hotels.
- It is obvious that engineering and housekeeping departments have the highest averaged percentages for consuming this type of energy (20.43% & 20.32% respectively), while laundry department was to consume only 10.57% of energy, 13.82% for food and beverage, while other departments together where to have an averaged percentage of 34.85%. It is important to mention here that few hotels in the sample could give the estimates of energy and fuel consumptions in different hotels departments, which is strongly related to the unawareness about the importance of measuring consumption in each department to know the spots of energy over-consumption in hotels, this is also related to the lack of meters required to be put for each department in the hotel.

The survey includes several questions to measure the willingness of hotels to apply environmentally friendly procedures to save energy. The following results were to be found:

- Few classified hotels already installed energy saving equipments (mainly 5, 4 and 3 stars hotels).
- Some classified hotels (2-5 star hotels) have shown a high willingness to make changes in their hotels, and so to reduce the consumption of different types of energy. Managers of one star hotels were not willing to take such step in their hotels.
- Only 8.5% of hotels in Jordan have already installed energy-saving bulbs, while 54.1% of these hotels managers were very willing to do so.
- More than 80% of hotels expressed their willingness to use energy efficient appliances. 5.8% of hotels mentioned that they are not willing to use energy efficient appliances to reduce energy consumption.
- 16.35% of Jordanian classified hotels already installed energy consumption monitoring systems, mainly characterized by 3, 4 and 5 star hotels, 30.8% of them were not at all willing to take such procedure, especially1star hotels; only 17.2% of the total number of classified hotels in Jordan were willing to take this action.
- 95.2% of the five star hotels are willing to great extent to undertake a comprehensive environmental program in their hotel.

**Explaining the Environmental Performance of Hotels: A Theoretical Framework**

The explanation of the willingness of hotels to take positive actions toward the environment was based on the "Cognitive Hierarchy". This hierarchy shows that
human cognitions range from general broad concepts (e.g. values / value orientations) to specific concepts (e.g., norms, attitudes) and behaviors.

The cognitions in this model (Fig. 1) reflect the processes used by individuals in perceiving, remembering, thinking and understanding (Homer & Kahle, 1988; Eagly & Chaiken, 1993; Fulton, Manfredo, & Lipscomb, 1996). These mental activities are important determinants of behavior and behavioral intention.

Understanding the conceptual relationships among the variables increases our potential for understanding both legal and illegal human behavior. The concepts in the cognitive hierarchy include: values, value orientations (i.e., patterns of basic beliefs), social norms, personal norms/ commitment toward antiquities and behavior.

Another model to be used in this study is the Norm Activation Model; Schwartz proposed this model to deal with discrepancies between norms and behaviors, specifically in some helping and self sacrifice situations. Schwartz (1968a, 1968b, 1970, and 1974) focused on the situation when an individual is willing to make a decision that has to do with a moral choice.

It is assumed that the relevant moral norms held by individuals are likely to be activated because of the feelings of elicit guilt, shame, fear of sanctions in anticipation of violations, or other feelings of virtue, pride or security when adhering to them; and then affect the behavior. Schwartz suggested two necessary preconditions necessary for activating a moral norm: the Awareness of Consequences (AC) and Ascription of Responsibility (AR). It was proposed by Schwartz that when the preconditions of AC and AR are fulfilled, then the person’s moral norms are activated, and then may influence his overt behavior (Schwartz 1968a, 1968b, 1970, 1974 & 1975).

**Figure 1: The Cognitive Hierarchy Model**
*(Homer & Kahle, 1988; Eagly & Chaiken, 1993; Fulton, Manfredo, & Lipscomb, 1996)*
Based on this; a model was derived from these two previous general models; this model is presented in the following figure:

![Figure 2: The Proposed Model in the Study](image)

The concepts of this model are to be defined as follows:

- **Awareness of Consequences (AC)** is defined as the tendency to become aware of the potential consequences of one’s acts for the welfare of others during the decision making process and conducting some particular actions (Schwartz 1968a; 1977).
- **Attitudes** are defined as the evaluation, either favorable or unfavorable, of an entity (e.g., person, object, or action). Attitudes are important for two critical reasons; they can predict and influence behavior (Eagly & Chaiken 1993)
- **Behavioral Intention** is the willingness to take an action.

Some particular variables in the survey were assigned to these concepts; thus, the theoretical framework is to be put as follows: for Awareness of Consequences, this concept is measured through the following observed variable: Do you agree or disagree that hotels highly contribute to the overuse of electricity; the Attitude concept was measured by this variable: In general, to what extent do you believe that your hotel's design meets the environmental requirements; and for Behavioral Intention, the following variables were selected: How willing would you be to change incandescent bulbs to energy saving compact fluorescent light bulbs in your hotel to better protect the environment, How willing would you be to install thermopane windows in your hotel to better protect the environment, and How willing would you be to install a power monitoring system in your hotel to better protect the environment.

### Table 4: Descriptive Statistics of Variables Measured in the Model

<table>
<thead>
<tr>
<th>The Item</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>How willing would you be to change incandescent bulbs to energy saving compact fluorescent light bulbs in your hotel to better protect the environment (q231)*</td>
<td>2.74</td>
<td>2.061</td>
</tr>
<tr>
<td>How willing would you be to install a power monitoring system in your hotel to better protect the environment (q233)*</td>
<td>3.81</td>
<td>1.756</td>
</tr>
<tr>
<td>How willing would you be to install thermopane windows in your hotel to better protect the environment</td>
<td>3.12</td>
<td>1.795</td>
</tr>
</tbody>
</table>
In general, to what extent do you believe that your hotel's design meets the environmental requirements (q49)**

<table>
<thead>
<tr>
<th>Environment</th>
<th>2.14</th>
<th>1.000</th>
</tr>
</thead>
</table>

Do you agree or disagree with the hotels highly contribute to the overuse of electricity (q258)***

<table>
<thead>
<tr>
<th>Environment</th>
<th>2.45</th>
<th>1.182</th>
</tr>
</thead>
</table>

N=222

* This variable was measured on a scale: (From 1= very willing to 5=not at all willing)
** This variable was measured on a scale: (From 1=great extent to 4 does not meet at all)
*** This variable was measured on a scale: (From 1=strongly disagree to 5 strongly agree)

The Analyses of the Model and Their Results

Since we assigned our variables into groups based on theoretical frameworks, it is important then to measure the internal consistency among the observed variables forming the latent constructs. The internal consistency is the estimate of reliability based on the average correlation among the items within a test. The size of the reliability coefficient is based on both the average correlation among the items (internal consistency) and the number of items (Nunnaly & Bernestein, 1994). Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the underlying construct. The alpha coefficient ranges in value from 0 to 1. It was indicated in some studies that 0.7 is to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature (Santos, 1999). Since Behavioral Intention is the only scale to include more than one variable; reliability analysis was run for this variable, the alpha coefficient for the items of this latent variable gave the values of 0.63, which is acceptable.

Structure Equation Modeling (SEM) is a technique that is used to specify and estimate models of linear relationships among variables, which could be either measured or latent variables. This technique comes as a hypothesized pattern of directional and nondirectional linear relationships among these two kinds of variables. The directional relationships are characterized by the directional influence of a variable on another; the nondirectional relation is simply the correlation among the variables (MacCallum & Austin, 2000). The SEM then captures the causal influences (regression effects) of the exogenous variables on the endogenous variables and the causal influences of the endogenous variables upon one another (Golob, 2001). This technique is a combination of factor analysis and regression or path analysis; the relationships among the factors or latent variables are represented by regression or path coefficients, the SEM implies a structure for the covariances between the observed or measured variables (Hox & Bechger, 1998).

In addition to such relations, other important measures were used in order to check the suitability of such models for explaining the relationships among the variables, and to see if such models fit the data, such measures are to be known as the Goodness of Fit Indices. One of these measures or indices is the Chi-square goodness-of-fit, which is a test that is used to assess the overall fit of a model and to compare it with other competing models; such statistics allows testing the null hypothesis that a given model provides a good or acceptable fit of the observed data (Long, 1983). There were some other statistics to be used for assessing the overall fitness of data. Such measures include: GFI (goodness-of-fit index), Tucker-Lewis Index (TLI) or what is known as the Non-Normed Fit Index (NNFI), and the
Normed Fit Index (NFI), these measures adjust for the complexity of the model (Hox & Bechger, 1998). Another measure is the CFI (Comparative Fit Index), such index compares the fit of the hypothesized model to a baseline or a null model, the aim here is to determine the amount by which the fit is improved by using the hypothesized model instead of other models (Stevens, 2002). In most of these measures, the value of at least 0.90 is required to consider the model as acceptable, while a value of at least 0.95 is required to judge the model fit as good (Hox & Bechger, 1998). Some of these measures were used in this study to measure the goodness of fit for the model.

The observed or measured variables were to have significant and high standardized regression weights above 0.50; the standardized regression weight between the latent variables of Awareness of Consequences and Attitude was 0.139, p= 0.474, and was 0.486, p=0.681 between the Attitudes and Behavioral Intentions. The measures of goodness of fit were to give acceptable values, the measure of the chi-square/df (or CMIN/DF as put by AMOS 7.0) gave a value of 0.887/ df=4, and other measures were as follows: (NFI = .916, RFI = .789, GFI = .984 and TLI = 1.035), these measures then indicate that the model fits the data in the study. (Fig.4)

Figure 4: The Model of the Study

Discussion
Hotel's classification has shown to have a strong influence on the variations in responses related to reducing energy consumption by using energy efficient appliances. Energy consumption is one of the major concerns for all hotels particularly 5, 4 and 3 star hotels.

Few classified hotels have already installed energy saving equipments (mainly 5, 4 and 3 stars hotels). The hotels of 2-5 stars rate have shown a high willingness to make changes in their hotels, and so to reduce the consumption of different types of energy. Managers of one star hotels were not willing to take such step in their hotels. 16.35% of Jordanian classified hotels already installed energy consumption monitoring systems, mainly characterized by 3, 4 and 5 star hotels, 30.8% of them were not at all willing to take such procedure, especially1 star hotels; only 17.2% of the total number of classified hotels in Jordan were willing to take this action. Moreover, 95.2% of the five star hotels are willing to great extent to undertake a comprehensive environmental program in their hotel.
Considering the fact that 59.4% of hotels have installed equipments to reduce energy consumption of heating, ventilation and air conditioning, and that 97.1% of classified hotels in Jordan are not using any renewable energy source like photo voltaic cells for lighting, besides that only 8.5% of hotels in Jordan have already installed energy-saving bulbs, and mostly important, 77.6% of hotels are not using solar water heaters; such case requires an intensive work to utilize the use of energy saving technologies and implementing environment friendly practices among the classified hotels in Jordan.

Many specific strategies will have a significant impact on reducing energy consumption. These strategies include better insulation, and enhanced insulation for the hot water reticulation system. There are several types of lighting technologies that proved to be energy saving and affordable. The followings are some of them: energy-efficient fluorescent lamps instead of "conventional" fluorescent lamps, compact fluorescent lamps (CFL’s) instead of incandescent lamps, installation of high pressure sodium vapor (HPSV) lamps for applications where color rendering is not critical, mercury vapor lamps, LED exit signs instead of incandescents, optimum usage of day-lighting in new designs, occupancy sensors which guarantee that unneeded lights do not remain on, devices that automatically detect the natural light level in a room, consequently the artificial light intensity will accordingly be adjusted. An automatic device, such as a key tag system, will improve housekeeping energy management. It will also help improving the load factor in the electrical system. Using a key-card system will make only occupied rooms consume energy; also most electrical appliances are switched off when the key-card is removed, this method is significant particularly when the guest does not stay for a long period of time in his room (Fedrizzi & Rogers, 2002).

However, the survey results gave indications that some positive environmental practices are taking place among classified hotels in Jordan. 93.2% of classified hotels in Jordan are maximizing their use of natural light, 41.2% of these hotels to a great extent are promoting turning off lights when ever they are not in use among their staff and guests.

The responses given by hotel managers and departments' supervisors gave some important indications about their environmental awareness and performances. By looking at the variable measuring their agreement that hotels highly contribute to the overuse of electricity, it was found that 26.2% of them strongly disagreed, 30.1% disagreed, 18.4% were neutral, 22.4% agreed, and only 2.8% strongly agreed about this fact. Such result shows a general unawareness among this group members about the negative impact on environment caused by the over consumption of energy be hotels. Moreover, 28.1% of these hotels consider their hotels to a great extent as meeting in their designs the environmental requirements, 37.5% to a moderate extent, 30.5% to a small extent and only 2.6% said that their hotels do not meet such requirements at all. The correlation coefficient between these values was minimal (r= -0.041) (the negative sign indicates the difference in direction for the measurement in the two variables' scales), the covariance between these variables was -0.049, which explains then the weak relationship between the two latent variables in the model represented as Awareness of Consequences and Attitudes, the standardized regression weight coefficient was only 0.139.
If we look at the variables measuring the willingness of hotels to take positive actions toward the environment, we will find that there is a clear variation in the responses given by the sample of the study. For the willingness to install a power monitoring system in the hotel to better protect the environment, it was found that only 17.2% were very willing to take such action, 8.1% were fairly willing, 17.6% were neutral, 9.3% were not very willing while 30.8% were not at all willing to take such action. Only 16.3% have already installed these systems in their hotels. It was also found that 54.1% of hotels were very willing to change incandescent bulbs to energy saving fluorescent bulbs in their hotels, 5.4% were fairly willing, 1.2% of them were neutral, 1.7% were not very willing, and 28.4% were not at all willing to do so. Only 8.5% have already installed these energy saving bulbs in their hotels. For installing thermopane windows in the hotel, 28.8% of the hotels in the sample were very willing to take this action, 15.2% were fairly willing, 11.4% were neutral, 14.6% were not very willing, 20.5% were not at all willing to install them. Only 8.8% of these hotels have already installed these thermopane windows.

These three observed variable formed the latent variable of Behavioral Intention, which was found to have a standardized regression weight of 0.486 with the variable of Attitude.

In general the model is indicating a very important issue; which is the lack of awareness among managers, departments' supervisors and staff in regard to environmental impacts of hotels, and more specifically the requirements of environmental design. This situation is also reflected by the fact that 86.0% of all hotels do not employ an environmental officer in their hotels. 61.9% of five star hotels do employ an environmental officer, 21.7% of the four star hotels while none in one star hotels. Employing environmental officer is an important indicator among others to show the level of concern of the hotels toward protecting the environment. This requires then enhancing and increasing the level of awareness among all hoteliers through a directed and well-designed campaign, such campaign should focus on measuring and monitoring environmental impacts caused by hotels; moreover, increasing awareness about environmental management systems and appropriate actions to be taken by hotels to protect the environment.

The results also show that 44.1% of all hotels provide guests with information to save energy while staying in the hotel (55.0% of the five star, 37.5% of four star, and 62.3% of one star hotels). Most of the hotels believe that their guests are to a great and a moderate extent concerned about the environment.

Facility employees, manager and guests; all should be participating in awareness programs. This is done through informing the employees, training of hotel staff and personnel is a key issue in operation and maintenance stage. Benefits from personnel involvement are based on two issues: motivation and information. For the information part, informing personnel about how to save energy and how much can be saved will make them more enthusiastic to take a part. Informing personnel can be achieved through the staff meetings, flyers and bulletin boards as well as other interpretation methods as appropriate. More can be achieved through participating in simple activities, which aim at giving awareness about the importance of regulating energy consumption; this can be reinforced by giving prizes for competitions, done
for this purpose between the different administrations in the facility. Motivation comes then through giving a sufficient and a clear feedback. Information about such progress achieved in upgrading energy efficiency can be spread by leaflets or newsletters' showing how much energy was used in each facility section compared to earlier periods. These will create a competition between different sections of the hotel, or for hotel chains. It is also important and effective to involve the facility guests and inform them of the energy management program being implemented; this can be done by carrying out simple actions that are presented in posters and flyers available throughout the facility, also brochures regarding positive behaviors to be taken, also efforts done already by the hotel. The awareness level of the guests about the vitality of energy efficiency and sustaining the environment is a basic issue that should be considered as well (ESCWA, 2003).

**Conclusion**

A clear variation can be seen among different rates of classified hotels in Jordan regarding their environmental performance and willingness to reduce energy consumption by using energy efficient appliances. Five and four star hotels were the most hotels willing to use energy efficient appliances to reduce energy consumption. Around third of the hotels are using both renewable and nonrenewable energy sources. Moreover, most of the hotels disagreed that they might contribute to the overuse of electricity and consequently affecting the environment in a negative manner. Hotels should be encouraged to implement some specific strategies that will have a significant impact on reducing energy consumption. These strategies include better insulation, and enhanced insulation for the hot water reticulation system. Moreover, enhancing and increasing the level of awareness about environmental sustainability among all hoteliers through a directed and well-designed campaign. Also offer interest free loans; and activate precise standards and specifications for new hotels.

The results show that few classified hotels already installed energy saving equipments, though, it was noticed that managers of one star hotels were not really willing to make such changes in their hotels, which was not the case for other classified hotels (2-5 star hotels), which have shown a high willingness to make changes in their hotels to reduce the consumption of different types of energy. More than 80% of hotels expressed their willingness to use energy efficient appliances. Moreover, most of the five star hotels are willing to great extent to undertake a comprehensive environmental program in their hotel while around fifty percent of one star hotels expressed their willingness to do so.

**Acknowledgement**

We would like to thank the European Commission (LIFE Program) which funded the survey on environmental performance in the tourist accommodation sector in Jordan, which is part of the GREEN-TAS project which aims at dealing with environmental problems and impacts caused by the accommodation sector in Jordan.

**References**

- **Department of Statistics. 2006. Unpublished Reports about Hotels in Jordan.**


- **Fedrizzi, R. & Rogers, J., 2002, Energy Efficiency Opportunities: The Lodging Industry, the Center for Energy and Climate Solutions and the Global Environment and Technology Foundation.**


تنظيم حملات التوعية المائية للعام 2008

المهندس زياد درويش (1) (وحدة التطوير والتدريب ، وزارة المياه والري، الأردن)

مقدمة

تعتبر حملات التوعية الوسيلة لإيصال الأهداف والرسائل الإرشادية لجمهور معين لإحداث تغيير محدد في الاتجاهات والمساريات والسلوكيات. ويتم تنظيم حملات التوعية بناء على وجود مشكلة معينة تخص أحد المجتمعات وبالتالي يتطلب دراسة المشكلة من كافة جوانبها وتحديد الحلول المقترحة والاحتياجات المطلوبة للمجتمعات وتحديداً مكونات ووسائط وآليات حملة التوعية...

وفي مجال المياه، يتم تصميم حملات التوعية بحيث توصى الرسالة المائية الإعلامية لأكثر عدد ممكن من فئات المجتمع أو الجمهور المستهدف، كما تعد حملات التوعية المائية الوسيلة الرئيسية لإيصال التكنولوجيا والتقنيات الحديثة ووسائل الترشيد إلى الفئات المستهدفة. إن الإدارة السليمة للمصادر المائية لا يمكن أن تنجح دون توعية الفئات المستهدفة والمحاولة لتغيير السلوكيات السلبية وإكسابهم السلوكيات الإيجابية المطلوبة في التعامل مع المصادر المائية.

واقع ومعوقات التوعية المائية

برزت التوعية مع ظهور المشاكل البيئية والمائية في المجتمعات الإنسانية. ساهمت المؤسسات الدولية في إطلاع عدد من برامج التوعية التي ركزت على توعية المجتمعات المحلية لإكسابهم السلوكيات والمساريات الإيجابية. وكانت الدول النامية ودول العالم العربي في مقدمة الدول التي نفذ فيها برامج توعية مائية نظراً لظروف شح المصادر المائية التي تواجه معظم هذه الدول.

وبنalog أن مختلف المشاريع الممولة من الخارج والخاصة بالعديد اعتمدت على مكون للتوعية المائية. ولم تكن التوعية البيئية تحظى بالاهتمام المطروح وبخاصة من المؤسسات الحكومية والأكاديمية. وتوالى التوعية البيئية معوقات قنية وإدارية مثل نقص الكوادر البشرية المتخصصة والمدربة حيث أن موضوع التوعية...
المناهج المتخصصة والتي تتطلب متخصصين في المياه والسلوك والوسائل الإتصال وغيرها.

يلاحظ عدم شمل برامج التوعية المائية بشكل خاص في القران المختص إلا أن الكثير من الدول حالت وضع التوعية المائية ضمن السياسات والاستراتيجيات المائية. وتعاني الكثير من المؤسسات الوطنية في العالم العربي من نقص التمويل المتوفر لتنفيذ برامج التوعية البيئية. وهذا يستدعي ضرورة أن تأخذ برنامج التوعية بشكل عام التوعية المائية بشكل خاص مكاناً مهماً في التشريعات وخطط العمل للمؤسسات الحكومية وغير الحكومية العاملة في مجال البيئة وحماية الموارد الطبيعية للمساهمة في نشر الوعي البيئي لدى أكبر عدد من فئات المجتمع. كان للجمعيات غير الحكومية دور مميز ورائد في رفع الوعي البيئي على الصعيد الوطني، حيث ساهمت في إبراز المشاكل البيئية على الصعيد الوطني وتعتبر جمهورية البيئة الأردنية والجمعية الملكية لحماية البيئة الطبيعية من الجهات التي نفذت برامج على المستوى الوطني في الأردن.

كما قامت وزارة المياه والري في الأردن، وبعد نجاح برامج التوعية المائية بتبني برامج التوعية المائية ودمجها في الخطط والاستراتيجيات الخاصة. كما عملت الوزارة على إطلاق العديد من حملات التوعية المائية ورعاية ودعم مشاريع الموارد البيئية، ومع اتسام المؤسسات الدولية في هذا الموضوع، وازدادت اهتمام المؤسسات المحلية والبحثية والمدارس، في إجراء الأبحاث والدراسات في هذا المجال، حيث ساهمت هذه المؤسسات بدور كبير في زيادة اهتمام المؤسسات الحكومية بالتنوعة المائية نظراً لتوظيفها في تطبيق برامج التوعية البيئية وتوعية المشاكل البيئية في تنفيذ المشاريع التنموية بخاصة البيئية. أما الجمعيات غير الحكومية والمؤسسات الأهلية فقد تبنته منذ فترة طويلة، وتنفيذ العديد من برامج التوعية بتمويل من المؤسسات والهيئات الدولية.

حملات التوعية

- برامج والأنشطة موجهة لفئة معينة من الجمهور  
  - تعزيز التأثير على الآراء أو الأفعال  
  - تحاول حل المشاكل المتعلقة بقطاع معين (المياه)  
  - التأثير على الإتجاهات والسلوك  
  - تحسين خدمات معينة  
  - إقناع الناس بتفسير أو رسالة معينة.

ويلاحظ أن عملية تغيير السلوك من الأنشطة الطبيعية والتي تستغرق وقتاً طويلاً.

النقاط الرئيسية في التطوير لحملات التوعية المائية

- تحليل المشكلة  
- تحديد الحلول المتاحة لل المشكلة  
- تحديد الاحتياجات  
- تحليل الجمهور المستهدف  
- تحليل سلوك الجمهور المستهدف  
- تحديد أهداف حملة التوعية المائية لإحداث التغيير المطلوب  
- تحديد وسائل الاتصال المتاحة
تحديد مجموعات الاتصال الشخصي
وضع استراتيجية وخطة الحملة
تحديد نشاطات الحملة ووسائل التوعية
تحديد الجهات المشاركة في حملة التوعية والأدوار المختلفة
تحديد خطة المتابعة والتقييم

تحديد المشكلة

من المهم في البداية تحديد المشكلة الخاصة بالمياه، هل هي شح الموارد، أو سوء التوزيع، أو خلل
في الشبكة، أو نوعية المياه، .... الخ.

تحديد المشكلة مهم لمواجهة الحملة الممكنة.

يجب أيضا تحديد أسباب المشكلة الخاصة بالمياه.

تحديد القنوات المتأثرة بالمشكلة والإجراءات الممكن عملها لمعالجة المشكلة.

تحديد الحلول المقترحة للمشكلة

بعد دراسة المشكلة وتحديد أبعادها والمتأثرين بها يتم اقتراح الحلول الممكنة للمشكلة
على سبيل المثال، مشكلة سوء توزيع مياه الري في الشبكات للمزارع، ربما يكون الحل تحسين وسائل
التوزيع ورفع كفاءتها مما يعمل على إعطاء كل مزرعة حصة من مياه الري.

ويمكن عادة وضع أكثر من حل للمشكلة المائية حيث يراقبها تنفيذ برنامج توعية مائية. بالطبع تركز
حملات التوعية على الحلول التي تتعامل مع سلوكات المزارع وزيادة معرفتها ورفع وعيه.

كما تسعى حملة التوعية لإكسب المزارع الوعي حول البدائل والحلول المقترحة لمشكلته المائية.

تحديد الحلول المقترحة للمشكلة

بعد دراسة المشكلة وتحديد أبعادها والمتأثرين بها يتم اقتراح الحلول الممكنة للمشكلة

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حملات التوعية على الحلول التي تتعامل مع سلوكات المزارع وزيادة معرفتها ورفع وعيه.

تحديد الاحتياجات

أهمية تحديد الاحتياجات تأتي من الآتي:
• تحديد الأهداف الاستراتيجيات
• التركيز على تحديد الأهداف بأقصر الطرق
• تحديد النبات المستهدفة
• تحديد البرامج والأنشطة

تساعد تحديد الاحتياجات لبرنامج التوعية على ما يلي:
• أن يكون البرنامج أكثر تأثيرا (التركيز على القضايا ذات الأولوية، فحص الافتراءات، التركيز على الفئات
المستهدفة الهامة، بحدد العقبات ويطرح الحلول).
أن يكون برنامج التوعية أكثر فاعلية (يركز المصادر المحددة على القضايا الهامة، يكمل على ما تم انجازه من الآخرين ويعيد الشراكة).

طرق تحديد الاحتياجات لبرامج التوعية المائية هي كما يلي:
- التقارير وقواعد البيانات
- الخرائط ونظام المعلومات الجغرافي
- البرامج المشابهة المنفذة في المنطقة المستهدفة
- الزوارات الميدانية
- الصور والمعلومات
- الدراسة الميدانية وجمع العينات والتحليل
- المسح الميداني
- جماعات التركيز
- المقابلات
- الاجتماعات وورش العمل
- تحليل الجمهور المستهدف

لا بد قبل تخطيط أي حملة للتوعية تحليل الجمهور المستهدف وجمع المعلومات المختلفة عنه وعن طبيعة ظروفه.
ولا بد من التعرف على خصوص المجتمع المحيط في الفئة المستهدفة والعامل الذي تؤثر على سلوكه، وبخاصة في التعامل مع مشكلة المياه، وتختلف صفات المجتمعات تبعًا لعوامل عديدة مما يؤثر بالتالي على صفات الفئات المستهدفة وطبيعتها وسلوكاتها.

تحديد أهداف حملة التوعية المائية

الهدف هو تحديد أهداف حملة التوعية المائية بحيث يترتب تحقيق التغيير المطلوب.
وضع أهداف محددة لبرنامج أو حملة التوعية
يجب أن تكون الأهداف قابلة لقياس (كما ونوعًا)
يجب أن تكون الأهداف واقعية وضمن الإمكانات المتاحة
يمكن تحديد الفئات المستهدفة والتغيرات المرغوبة في السلوك

الفوائد من تحديد الأهداف

الأهداف المحددة تساعد الكادر والمصادر في التركيز على الأولويات
تساعد على اختيار أدق الفئات المستهدفة
تزويد المنظم بلوازم الرقابة والتقييم
تعلم على ربط غايات المشروع مع نتائج التوعية والمشاركين
تعطي صورة أفضل عن كادر المشروع

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أساليب الاتصال

- عاطفي/العفوي
- الاجابي/السلافي
- الفردي/الجماعي
- مباشر/غير المباشر
- التكرار/国民经济
- المرح/الجدي (الأخلاقي)

تحديد وسائل الاتصال المتاحة

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<td>الاتصال عبر الإنترنت</td>
<td>المعارض والنشرات</td>
</tr>
<tr>
<td>الاتصال عبر الهاتف</td>
<td>المعارض الزراعية والعلمية</td>
</tr>
</tbody>
</table>

خصائص وسائل الإعلام

- الوصول إلى أكثر عدد من الجمهور بتكلفة قليلة
- إجابة الضوء على الحالة ووضوحها
- تحتاج إلى وسائل إعلامية مستقلة
- استخدام وسائل الإعلام المختلفة بمعنى نتيجة أفضل من استخدام وسيلة واحدة فقط

تحفز المشاركة الشعبية في نشاطات الاتصال الشخصي

خصائص وسائل الاتصال الشخصي

- تتميز بأثر فعال على الجمهور المستهدف في الحملة
- تساعد وسائل الإعلام للوصول إلى السلوكيات المستحقة
- ذات أثر أكبر من وسائل الإعلام في تغيير أنماط السلوك الإنساني
- تعامل مع المجتمعات المحلية والمجموعات الصغيرة والأفراد

عوامل يجب مراعاتها في الاتصال الشخصي:

117
تحديد الأشخاص المؤثرين في سلوك المجموعات المستهدفة وكيفية الحصول على دعمهم لإنجاز الحملة

تحديد المجموعات التي لديها اهتمام في الحلول المبتكرة

هل هناك قوة أو مثأ أعلى للمجموعة المستهدفة وما هي إمكانية إشراؤها في العملية

تحديد مجموعات الاتصال الشخصي (ضباط الارتباط) بهدف ما يلي:

- معرفة تصرفات وحاجات الجمهور المستهدف
- تشكيل لجنة وصل بين الجمهور المستهدف والقائمين على الحملة
- توفير مجال للمناقشة وتبادل المعلومات والأراء حول موضوع معين
- الاستعداد للفكر الجديد والتوصيات المطروحة من قبل المجموعات المستهدفة
- الوصول إلى القيادة المحلية
- وضع البرامج لنشاطات الحملة

تحديد الخبرات المطلوبة لإنجاح الحملة

يلزم لإنجاح الحملة الاستعانة ب كافة الخبرات الضرورية مثل خبراء في المياه، علم النفس، وسائل الاتصال، علم الاجتماع وغيرها. وهنا تتكون الرسالة الإعلامية. و يتطلب كتابة الرسالة الإعلامية درجة عالية من المهارة حتى تقوم بإيصال الرسالة المطلوبة وإيصال هدف الحملة. يجب في البداية تحديد موضوع الرسالة بدقة ووضوح وتقييد سياق نقل الرسالة الإعلامية ومن ثم كتابة النص وصفي الأساسي (الإطار العام، الفقرات والجمل). ومن المهم أن تكون الرسالة في قابل و مظهر جميل ولا تأتي بالانتباه حتى تكون جملة في إصال الإعلامية للفئة المستهدفة كتابة الرسالة الإعلامية. ومن الوسائل الإعلامية التي تتضمن الوسائل المختلفة حيث يوضع في الإعلان رسالة مختصرة في حين يوضع في البروشر رسالة مفصلة أكثر. من المهم أن يتم تحص الرسالة الإعلامية من قبل المختصين وإجراء التعديلات المطلوبة عليها ثم عرضها على عينة من الجمهور المستهدف وإجراء التعديلات المطلوبة وذلك بناءً على قدرتها في إصال الرسالة والهدف قبل اعتمادها بشكل نهائي لطباعتها.

وضع استراتيجية وخطة الحملة:

يتم وضع استراتيجية الحملة بناءً على معرفة الهدف العام للبرنامج والذي يتم وضعه نهائياً على شكل بحث ملائم ومن ثم توضع الأهداف الفرعية المحددة وتم تحديد الجمهور المستهدف ووسائل تحقيق الأهداف الخاصة بالحملة وبالتالي معرفة النشاطات المختلفة والجدول الزمني والموارد المطلوبة والمواد اللازمة وغيرها.

تحديد نشاطات الحملة والوسائل المناسبة

- يتم تحديد النشاطات بناءً على نوع موضوع الحملة والحفاظ المستهدفة والأهداف الخاصة بالحملة.
- تحديد الجهات المشاركة في حملة التوعية والأدوار المختلفة.
تحديد خطة المتابعة والتقييم

- يتم وضع خطة للتقييم والمتاينة لمتابعة سير الأداء للحملة.
- يجب أن تشمل خطة المتابعة والتقييم على أن تزرع متابعة وتقييم أنشطة الحملة بشكل مستمر.

وبالتالي يجب أن تشتمل خطة المتابعة والتقييم على:

- وضع أسس ما قبل التشغيل وهذا من خلال الأهداف المحددة للحملة والتي يمكن قياسها.
- تقييم الأثر المباشر لأنشطة الحملة ويمكن أن يتم ذلك بعدة أساليب مثل تعثبة استجابة بعد الانتهاء من التشغيل.
- تقييم الآثار في فترات لاحقة وذلك من خلال أنشطة تصميم لفحص الأثر المحقق والنتائج المحققة.
- نتيجة الأنشطة.
- بناء على الأنشطة التقييمية التي تنفذ خلال عمر الحملة يتم تعديل خطة الحملة وأنشطتها وكذلك وضع توصيات للحملات المستقبلية.

بالإضافة لما ذكر يتم وضع مقاييس النجاح والمخرجات التي تحققها من الحملة والتي من المناسب أن يتم استعراضها في إحدى المناسبات الخاصة مثل يوم المياه العالمي.
Topic 3: Guests and Staff/ Social and Awareness Issues
Occupational Health for Hotel Workers

Dr. Madi Jaghbir\(^{(1)}\)

\(^{(1)}\)Faculty of Medicine, Hashemite University, Zarqa 13115, Jordan

Workplace Hazards for Hotel Workers
Like any other job, working in hotels includes specific as well as general hazards. In general, work place hazards can be classified into: physical, chemical, biological, accidents, ergonomics and psychological hazards. These are:

- Physical hazards:
- Including electrical, temperature, pressure…etc
- Hazardous Energy

A hazard is for all employers who have workers who perform servicing and/or maintenance on machinery or equipment, and who are exposed to the unexpected energizing, start-up or release of hazardous energy. Energy sources include electricity, steam, hydraulic, pneumatic, mechanical, chemical, and thermal. We have to learn how to establish a Lockout/Tag out program consisting of energy control procedures, employee training, and inspection procedures in order to protect workers from serious injury and death.

Biological Hazards
Including different types of pathogens that can cause diseases among workers, such as: Blood borne Pathogens. Workers may be exposed to blood and other fluids, e.g. by helping injured coworkers, giving first aid or cleaning up after an injury, etc. Workers should learn how to create an exposure control plan, required personal protective equipment, and post-exposure procedures.

Pandemic Flu
How are dead birds in Asia threatening the health of world wide workers? What can employers do to minimize their employees’ risk? Separate fact from fiction and learn
why we should be concerned. What we can do now is to help in avoiding the effects of a predicted pandemic and limit flu transmission in the workplace.

**Molds and Fungi in Buildings**
Molds and fungi in buildings and grounds: molds, mildews, and fungi growing in and around buildings can create numerous health problems for building occupants as well as personnel working in construction, demolition, and maintenance. Workers should learn about different kinds of growths, how they look, where they can be found, how they affect health and well-being, and how they can be controlled.

**Ergonomics**
Office work, traditionally seen as “safe,” can cause painful and expensive injuries and musculoskeletal disorders. Workers should be taught how to identify risk factors and prevent injuries with common sense fixes for common problems, including computer workstation design.

**Slips/Trips/Falls, Burns/Cuts/ Electrical Shocks/ Back Injuries**
A review of many injury and illness logs often reveals a variety of slips, trips or falls that result in lost time or restricted work injuries. Understanding the nature of these incidents and some simple measures you can take help in lowering (Lost Work Day Rate) by eliminating them.

**Restaurants**
Restaurants are part of hotels. Restaurant workers are exposed to various workplace hazards including:

- **Hot Stuff**
  - Ovens and broilers, grills and stovetops, deep fryers, as well as microwave ovens and coffee makers.

- **Sharp Stuff**
  - Knives, power slicers, grinders, food processors; also broken glass, box cutters and tools.

- **Slips and falls**
  - Slippery floors clutter on floors cluttered exits, and cords climbing to reach things.

- **Ergonomic Hazards**
  - Awkward lifting, heavy lifting, awkward bending or reaching, and repetitive movements standing for long periods

- **Robberies and Assaults**
  - Working alone, working late at night handling large amounts of cash, and poor visibility from street or having no alarm systems.

- **Chemicals**
  - Including dishwashing products, cleaning products, and pesticides
Making Restaurants Safer
Many hazards exist in restaurants, but there are also steps that can be taken to improve safety dramatically. There are three main ways to protect workers. The best way to prevent injuries is to remove the hazard altogether (#1), or keep it isolated, away from workers, so it can’t hurt anyone. This way the workplace itself is safer! Removing the hazard can sometimes be the most difficult solution, or take the longest time to implement. You may need other solutions to protect you in the meantime:

- Remove or isolate the hazard
- Improve work practices
- Use protective clothing and equipment

Examples
- Many restaurant workers get burned lowering frozen food into deep fryers, or cleaning the fryers.
- What controls can a restaurant put in place to keep workers from getting burned:

1. Is there a way to remove the hazard?
Install grease pans that dump automatically for cleaning.

2. What improvement in work practices would help?
Train workers on the importance of shaking ice crystals off frozen foods before putting them into the deep fryer, to avoid splattering.

3. What protective clothing or equipment would help?
Gloves, sleeve lets, and long aprons. These need to resist heat and grease to at least 400º F for anyone working with fryers.

Hospitality and Tourism Safety
Address the hazards commonly found in the hospitality and tourism industries, such as hotels/motels, restaurants, fast-food establishments, resorts, amusement parks, wineries, etc. Employers, supervisors, workers, and teens starting their first jobs can benefit from training programs that offer information about identifying and protecting against many of the common hazards that cause injuries, e.g., slips/trips/falls, burns/cuts electrical, back injuries, chemicals, fire hazards, etc. This will help to develop and maintain a successful safety and health program. Learn the elements needed to achieve an effective program

Hazard Identification and Control

- Remove the Hazard:

- Work Practices:
  1. Protective Clothing/
  2. Equipment:
3. Remove the Hazard:
4. Work Practices:
5. Protective Clothing/
6. Equipment:
7. Remove the Hazard:
8. Work Practices:
9. Protective Clothing/
10. Equipment:

Developing an Accident Prevention Program
This will help to develop and maintain a successful safety and health program, also to learn the elements needed to achieve an effective program.

Accident Investigation
Even the best Accident Prevention Program cannot eliminate every incident or accident. However, something can be learned from each incident so it does not happen again. Programs should be designed to help to learn how to investigate all incidents in workplace and how to use that information to prevent similar events from occurring in the future.

Emergency Preparedness
Provide employees with the information they need to react in a positive manner to an emergency at your workplace. Information about proper evacuation procedures, instructions on the required standard, and how to conduct workplace evacuations. Develop and maintain a successful safety and health program. Including the elements needed to achieve an effective program.
Environmental Perceptions and Expectations of Hotel Guests in the Greater Accra Region (GAR); Implications for Environmental Management in Hotels

Ishmael Mensah (1)
(1) Department of Geography and Tourism of the University of Cape Coast

Introduction
Environmental management which used to be the preserve of the ‘smokestack’ industries has been embraced by the tourism industry to project a clean and green image. The accommodation sector especially is embarking on a number of environmental management initiatives including conservation programmes, ecolabelling and certification as well as environmental education to various degrees of success. One of the forces driving this change towards the ‘greening’ of hotels is the rise in green consumerism in general and environmental consciousness on the part of tourists. Research by MORI (cited in Martin, 1997) on tourism and the environment shows a doubling, from 14% to 28%, from 1988 to 1996 in the percentage of respondents the research describes as ‘environmental activists’ whilst the amount of ‘green consumers’ rose from 19% to 36% over the same time period. The Conde Nast Travellers’ magazine also conducted a readers’ poll in September 1996, which revealed that 95 percent of travellers are concerned with the environmental conditions of their destinations (McCool, 1994). Some writers have thus concluded that tourists are becoming more discerning, seeking activities, arrangements and experiences which depend crucially on high quality physical and cultural environments (Romeril, 1985; Tyler, 1989; Grahn, 1991).
Also, studies have revealed that hotel guests preferred to stay in a hotel that cared for the environment and are also prepared to pay more for a stay in such hotels (Gustin and Weaver, 1996; MORI, 1997; Arias et al, 2000; Hotelonline, 2000; Hotelonline, 2002).

Hotels impact on host destinations’ sources of water (Holder, 1988; Tyler, 1989); on their energy sources (Jackson 1984; Kirk 1998). They also generate waste (Chan and Lam 2001) and displace local communities (Erber, 1992; Hunter and Green 1995). The environmental impacts of hotels especially with regards to the consumption of
energy and water are more likely to be exacerbated by their guests. For instance 40% of the water used in hotels is in guestrooms (Forte, 1994). This means that for hotels to succeed with their environmental management efforts, they must involve their guests and effectively communicate their environmental policies to them. In spite of this, most studies on environmental management in hotels have centred on programmes and initiatives undertaken by management with little focus on the perceptions and attitudes of guests. A North America Hotel Guest Satisfaction Study by J.D. Power and Associates in 2007, revealed that although nearly three-fourths of hotel guests in North America willingly participate in environmentally friendly programs offered during their stay in hotels, many of them remain unaware of whether these programs are offered at the hotel property (Environmental Leader, 2007). In the opinion of Anguera et al, (2000) due to the unstable situation of personnel within the seasonal hotels, the hotel guests might even play a key role in achieving environmental targets. In view of this, this study sought to assess hotel guests’ expectations and perceptions of the environmental performance of hotels in the GAR and the implications for environmental management in hotels.

**Literature Review**

The importance of clean and attractive environments in attracting tourists has been established in the literature (Cook et al, 1992; Williams, 1992; Menning and McCool, 1993; McCool, 1994; Middleton and Hawkins, 1998; Miller, 2003). In the words of Middleton and Hawkins (1998: 12) ‘we believe there is overwhelming evidence of customer preferences for product qualities that are unambiguously concerned with environmental quality at chosen destinations’. A research by Miller (2003) revealed that consumers are already making decisions based on environmental, social and economic quality for day-to-day products and are keen to transfer these habits to the purchase of tourism products (Miller, 2003). Tourists are also concerned about the environmental impacts of tourism. A survey conducted by Co-op one of the UK’s largest independent travel agents in 1998 found that 76% of their customers were concerned about the pollution levels in the tourism resort, 73% wanted information on the effects of Tourism on the natural and societal environment of the destinations (Co-op, 1998).

Available evidence also suggests that hotels guests do not only expect their hotels to practice sound environmental management practices but are also prepared to pay extra for a stay in hotels that are environmental-conscious. (Gustin and Weaver, 1996; Hotelonline, 2000; Hotelonline, 2002). In a Market and Opinion Research International (MORI) study, consumers stated that they would be prepared to pay an extra £7.10 on the average to ensure that the tour operator with which they travelled was committed to environmental protection and £7.50 for the same commitment from an accommodation provider (MORI, 1997). In a similar study in Mexico by the Instituto Nacional de Ecología, nearly two-fifths of the tourists were willing to pay a higher rate to stay at an environmentally friendly hotel: this was composed of 40 percent of those who usually stay at 3 stars hotels, 35 percent of those who normally stay in 4 star hotels and 45 percent of those who stay at 5 star hotels (Arias et al, 2000).

Despite the importance of the environment to the guests’ satisfaction with the stay at a hotel, the issue has not been subjected to much intellectual discourse and empirical research. Research in this area has often been undertaken by research organizations
like J.D. Power and Associates as well as MORI instead of academics. There have been little attempts to look at hotel guests’ perception of the general environmental performance of hotels. According to Andereck (2008), few, studies have considered tourists’ views of environmentally responsible and innovative business practices. It has been suggested that people are becoming more aware of the perceived adverse effects of tourism on the environment (Wanhill, 1997).

Some have argued that there is a relationship between socio-demographic characteristics and environmental perception. Andereck, (2008) looked at the relationships between environmental practices perceptions, traveller characteristics, and travel behaviour and found a negative correlation between age and perceived value of green practices indicting that younger respondents value environmental practices more highly. Also, studies by Van Hoof (1995) and Baysan (2001) suggest that German tourists appear to have a greater consideration for the environmental consequences of tourism.

There are a few documented instances where some hotels are actively involving their guests in their environmental management activities. Guests to Grecotel in Greece are provided information through nature walks, brochures, and notice boards and slide presentations (Faulks, 2000). Similarly, in Canadian Pacific Hotels and Resorts, guests are provided with in-room materials about the hotel (Faulks, 2000). In the Kuloro Wildlife Reserve in the Gambia, tourists are informed they will be staying in simple accommodation with basic facilities and are advised on appropriate dress, local words of greeting and the cultural background of the area (Erber, 1992).

Methodology
The research instrument employed was a questionnaire which was designed for hotel guests and was in five modules. Module A was on environmental attitudes of respondents. Module B was on environmentally responsible behaviour on the part of the guests themselves; including whether they have been educated by the hotels on environmentally-responsible behaviour and how often they have undertaken certain sound environmental practices during their stay in hotels. Module C had questions on guests’ expectations of the environmental performance of their hotels and whether those expectations have been met. Module D was on guests’ perceptions of environmental management practices in their hotels. They were to evaluate the standard of services and practices like sanitation, recycling, water conservation and provision of information to guests. Module E was on the socioeconomic characteristics of respondents including their age, sex, income and educational background.

The target population comprised all hotels guests in the GAR as at February 2003. The GTB list of 592 licensed hotels in the GAR for 2002 served as the sample frame. The multi-stage sampling method was employed. First the stratified random sampling approach was used to select the hotels and then the accidental method was employed in the selection of the various samples of guests.

Table 1: Sample of Hotel Guests

<table>
<thead>
<tr>
<th>Category/class</th>
<th>Total</th>
<th>Sample of Hotel Guests</th>
</tr>
</thead>
</table>

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As can be seen from Table 1, a total of 592 hotels existed in the GAR according to the GTB. Since the total number of guests in all the hotels selected was not available, the sampling method was employed to select guests for the various categories of hotels to arrive at the sample size (n=80).

In order to test the research instruments, a preliminary survey was conducted in Cape Coast and Elmina on the 7th and 8th of February, 2003 ten hotel guests from the various categories of hotels in Cape Coast and Elmina were involved. During the pretesting, the common errors that came to light were that the possible responses provided for some open-ended questions were either in exhaustive or unnecessary. Some of the questions were also seen to be irrelevant or unsuitable.

A social survey method was employed in the collection of data. A set of closed and open-ended questions were used to examine and analyze the perceptions and expectations of hotel guests. Fifty-eight out of the 80 questionnaires given to hotel guests were retrieved. However, the response rate of 72.5% was deemed acceptable for making statistical analysis. During the data collection, the common problems were low response from hotel guests and uncooperative attitude of hotel managers. However, the effects of these problems were adequately minimized to ensure reliability and validity of the findings. The data collected from the field was edited, coded and processed using SPSS.

**Analysis of Findings**

**Socio-demographic Characteristics of Hotel Guests**

Table 2 shows that a total of 58 hotel guests were covered; made up of five guests from four to five-star hotels, 10 guests from three-star hotels, 10 guests from two-star hotels, nine guests from one-star hotels, 13 guests from guesthouses and 11 guests from budget hotels. In terms of the marital status of the guests, 44.8% were single, 37.9% were married while 17.2% were separated. All the respondents had some form of education as shown on Table 2, but those with tertiary education (college/university/polytechnic) dominated. They constituted 48.3%, followed by those with secondary education (36.2%). They were mostly Catholics (46.8%) and Protestants (38.3%). More than one-third (36.5%) of the guests had annual incomes between $25,000 - $34,000. Only 7.7% earned more than $65,000. Also, the majority of the respondents were Ghanaians (62.8%).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5 Star</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>3 Star</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2 Star</td>
<td>58</td>
<td>12</td>
</tr>
<tr>
<td>1 Star</td>
<td>60</td>
<td>14</td>
</tr>
<tr>
<td>Guest house</td>
<td>75</td>
<td>16</td>
</tr>
<tr>
<td>Budget</td>
<td>380</td>
<td>20</td>
</tr>
<tr>
<td>Unclass</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>592</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>
Sex
I. Male 30 51.7
II. Female 28 48.3

Age
I. Under 20 2 3.4
II. 21-29 12 20.7
III. 30-39 18 31.0
IV. 40-49 15 25.9
V. 50-59 6 10.3
VI. 60-69 3 5.2
VII. 70-79 2 3.4

Marital Status
I. Single 26 44.8
II. Married 22 37.9
III. Separated 10 17.2

Educational Background
I. Grade school/primary 2 3.4
II. High school/secondary 21 36.2
III. College/university/poly 28 48.3
IV. Technical/vocational 4 6.9
V. Postsec./Training college 3 5.2

Religion
I. Catholic 22 46.8
II. Jewish 6 12.8
III. Protestant 18 38.3
IV. Traditional 1 2.1

Annual Income
I. Under $2500 8 15.4
II. $2500-$34,000 19 36.5
III. $35,000-$44,000 9 17.3
IV. $45,000-$54,000 5 9.6
V. $55,000-$64,000 7 13.5
VI. $65,000+ 4 7.7

Nationality
I. Ghanian 62.8
II. Other 37.2

Source: Fieldwork, 2003

Influence of Hotels’ Environmental Management Practices on Guests’ Choice of Accommodation
Evidence from the study suggests that the extent to which hotels engage in certain environmental management practices has an influence on guests’ choice of accommodation. This includes recycling, energy conservation and use of local materials. As shown on Table 3, for more than half of the respondents (51.7%) their choice of accommodation was very much influenced by the hotels’ use of home or locally grown vegetables and fruits. This is probably due to the fact that the majority of the respondents was Ghanaians and was therefore being nationalistic. However, the hotels’ use of recycled paper did not influence choice for accommodation of half of the respondents.

Table 3: Importance of Some Eco-friendly Practices to Guests

<table>
<thead>
<tr>
<th>Eco-friendly practice</th>
<th>Very</th>
<th>Not very</th>
<th>Not at all</th>
<th>N</th>
</tr>
</thead>
</table>

129
Uses recycled paper 19 27.6 50 56
Conserves energy by using energy-efficient appliances 41.4 44.8 13.8 58
Is constructed with local materials 37.9 44.8 17.2 58
Is designed to reflect the surrounding architecture/Landscape 44.8 37.9 17.2 58
Contributes money towards preserving the environment 39.7 48.3 12.1 58
Uses home or locally grown vegetables and fruits 51.7 43.1 5.2 58
Reuses towels and napkins 44.8 32.8 22.4 58
Recycles waste 32.8 34.5 31.0 57
Employs staff from local communities 36.2 43.1 20.7 58
Has demonstrable environmentally-responsible practices 36.2 46.6 17.2 58
**Mean** 38.45 40.35 20.68

* N=58

On the average, more than one-thirds (38.45%) of the guests were very much influenced in their choice for accommodation by the eco-friendly practices carried out by the hotels, however, on the average (20.68%) guests who did not at all consider a hotel’s eco-friendly practices in their choice for accommodation were in the minority. This reinforces the conclusions drawn from studies conducted by the IHEI and supports Accor, 2000 and Green Suites, 2000), that a greater majority of hotel guests preferred hotels that took care of their environment. Further credence was given to the above assertion by the 60.3% of the guests who opted even to pay more for hotels that are environmentally responsible. Indeed 34% were willing to pay between $1 and $5 extra for a one week in hotels that were environmentally responsible while 40% were willing to pay between $6 and $10 extra; with only 3% willing to pay more than $20 extra (figure 1); which incidentally is far below what Americans are willing to pay.

![Figure 1: Percentage of guests willing to pay more](image_url)
According to Hotelonline (2002), 70% of American travellers were willing to pay an extra $50–$150 more for a two-week stay in a hotel with a responsible environmental attitude. This could be due to the fact that most of the respondents (62.8%) were Ghanaians.

**Environmental Management Expectations of Guests**

A greater number of the guests expected the hotels to educate both staff and guests on eco-friendly practices (78.9%). Energy conservation was also a prominent expectation of guests. Indeed 75.4% of the guests’ expectations were in favour of their hotels conserving energy (Table 4). The environmental management practices that the guests least expected were reuse and recycling of waste (35.1%) as well as serving of mainly local dishes (31.6%).

**Table 4: Guests’ Expectations of Environmental Management Practices from Hotels**

<table>
<thead>
<tr>
<th>Practice</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate staff and guests on environmental-friendly practices</td>
<td>45</td>
<td>78.9</td>
</tr>
<tr>
<td>Conserve energy by keeping lighting and air conditioning low</td>
<td>43</td>
<td>75.4</td>
</tr>
<tr>
<td>Use eco-friendly chemicals and detergents for cleaning</td>
<td>40</td>
<td>70.2</td>
</tr>
<tr>
<td>Recycle waste water to irrigate its gardens</td>
<td>36</td>
<td>63.2</td>
</tr>
<tr>
<td>Offer to reuse towels</td>
<td>35</td>
<td>61.4</td>
</tr>
<tr>
<td>Offer support to local conservation NGOs</td>
<td>26</td>
<td>47.3</td>
</tr>
<tr>
<td>Reuse and recycle waste</td>
<td>20</td>
<td>35.1</td>
</tr>
<tr>
<td>Serve mainly local dishes</td>
<td>18</td>
<td>31.6</td>
</tr>
</tbody>
</table>

*N= 52

**Perception of Environmental Management Practices of Hotels by Guests**

The reaction of the guests to certain environmental issues lent credence to the fact that the majority of them were environmentally responsible. Opinions were almost divided on the issue of tourism development leading to the destruction of the environment (Table 5). However, on tourism development contributing to environmental protection and conservation, there were fewer disagreements, in that while 48.3% agreed, 10.3% disagreed. Hotel guests therefore perceived the impact of tourism development on the environment to be generally positive but thought that it is important for hotels to actively take steps to preserve and protect the environment.

**Table 5: Hotel Guests’ Perceptions Tourism and Environment Issues**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>No Opinion</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

131
Tourism development is in danger of destroying the environment

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism development is in danger of destroying the environment</td>
<td>25.9</td>
<td>24.1</td>
</tr>
<tr>
<td>Tourism development contributes to environmental protection and conservation</td>
<td>29.3</td>
<td>48.3</td>
</tr>
<tr>
<td>It is important that hotels actively take steps to preserve and protect our natural resources</td>
<td>67.2</td>
<td>27.6</td>
</tr>
<tr>
<td>I am likely to book a hotel with a responsible environmental attitude</td>
<td>48.3</td>
<td>29.3</td>
</tr>
<tr>
<td>All hotels that claim environmental responsibility are indeed so</td>
<td>3.4</td>
<td>13.8</td>
</tr>
</tbody>
</table>

Source: Fieldwork * N=58

Observations on Table 5 reveal that majority (67.2%) of guests agreed that hotels must take active steps to preserve and protect our natural resources. Most of the respondents also claimed they are more likely to book a hotel with a responsible environmental attitude whilst there was general indifference and disagreement with the issue of hotels that claim environmental responsibility being genuine with their claims.

To determine the guests’ general perception with the environmental performance of the hotels in various areas, they were asked to rate their performance on a five-point Likert scale. From table 6, the guests, on the average, perceived the environmental management practices of the hotels as either very good or good. Sanitation and waste management had the highest average rating of 2.42 (very good) while education of guests on environmentally friendly practices had the lowest mean rating of 3.27 (good). The hotels were deemed clean by guests and therefore, sanitation and waste management received high ratings. Provision of information to guests as well as education of guests on environmentally friendly practices received one of the lowest ratings of 3 and 3.27 respectively. This falls in line with a study in North America by J.D. Power and associates in 2007 which suggested that hotels did not make conscious efforts to educate their guests on their environmental programs (Environmental Leader, 2007).

Table 6: Guests Perceptions of Hotels’ Environmental Management Performance

<table>
<thead>
<tr>
<th>Environmental management practice</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitation and waste management</td>
<td>2.42</td>
<td>1.01</td>
<td>55</td>
</tr>
<tr>
<td>Use of local facilities/materials</td>
<td>2.82</td>
<td>0.92</td>
<td>56</td>
</tr>
<tr>
<td>Recycling</td>
<td>3.22</td>
<td>1.30</td>
<td>49</td>
</tr>
</tbody>
</table>
Landscape planting, energy conservation and water conservation were all rated good on the average. This could be due to the fact that hotels were very much concerned with energy and water conservation and the guests saw them to be proactive in those areas.

However, the issue of the relationship between socio-demographics and perception of environmental management could not be fully explored due to the relatively small sample size and coupled with the fact that most of the respondents were Ghanaians. However, a chi-square test revealed a significant relationship between sex and sanitation and waste management. A significant relationship (p<0.05) was found between sex of respondents and their perception of the sanitation and waste management practices of the hotels. It is however necessary to explore this situation further.

**Conclusions and Implications**

Guests in their choice for accommodation considered the implementation of eco-friendly practices by the hotels. Consequently most of them expected hotels to educate guests and employees on environmentally responsible practices and undertake energy and water conservation practices. Nearly a third of the guests (60.3%) were even willing to pay additional amounts, mostly within the range of $1-$10 to stay in hotels that take care of their environment. Though the expectations of most guests were met, the hotels have to do a lot more since the education of guests on environmentally responsible behaviour was not a major preoccupation of the hotels.

The study suggests that hotels in the GAR were not active in responsibly marketing their products and educating guests on environmentally responsible behaviour. On the average, guests rated the environmental management practices of the hotels as either good or very good. However, sanitation and waste management had the highest rating whilst education, provision of information and recycling received the lowest ratings.

In view of the fact that the hotels were not active in communicating their environmental policies and programmes to their guests, it is recommended that environmental education of guests should be made a priority. Laudable efforts of managers would not yield dividends if guests who are major players in the hotel environment were left out. Guests should be informed about the hotel’s environmental activities and what they are expected to do whilst staying at the hotel. They could be educated through brochures, posters and orientations on efficient water and energy
conservation; respect for local cultures; and proper waste disposal. Hotel workers should also be educated on environmentally responsible management and marketing practices as part of their induction. They should also be constantly updated on current environmental management trends and best practices in the industry.

Also, most of the guests claim they are more likely to book a hotel with a responsible environmental attitude and this has implications for the ‘eco-marketing’ or environmentally responsible marketing of the hotels. Guest will not be in a position to determine how ‘green’ a hotel is unless the hotel initiates steps to build and project such an image. This can be achieved through corporate social responsibility and publicity campaigns as well as eco-labelling and certification. Hotels can embark on activities like tree planting or sponsoring research into an environmental issue, so that in the eyes of their guests, they would be seen as good corporate citizens. Ecolabels have been used to project hotels as being environmentally responsible. There are over 100 ecolabels for tourism, hospitality and ecotourism (Font, 2002), however there is not a single ecolabelling scheme developed by Ghana’s tourism industry. Whilst the claims by hotels to be environmentally-friendly could be untrue, or amount to ‘ecoexploitation’ (Wight, 1994), ecolabelling and certification provides the opportunity for a third party to verify such claims against some set criteria before the ecolabel is issued. Guests are therefore more likely to believe that hotels with ecolabels are indeed environmentally responsible.

References


Topic 4: Environmental Problems
Estimating Emissions Rates for Greenhouse Gases Emitted from On-Road Motor Vehicles

Mahmoud Abu-Allaban(1), Ma'amoun Al-Jedaih(2), Ahmad Al-malabeh(2), Aiman Suleiman(3)

(1) Department of Water Management & Environment, The Hashemite University
(2) Department of Earth Science & Environment, The Hashemite University
(3) Aqaba Special Economic Zone Authority (ASEZA), Aqaba, Jordan

Abstract
Number of motor vehicles in use in Jordan has shown a rapid increase in recent years. It has increased from 318500 vehicles in the year 1998 to 679731 vehicles in the year 2005. Regardless the increase in the number of motor vehicles in Jordan, data related to the impact of motor vehicles to ambient air pollution in Jordan is scarce. This study aimed at calculating average emission rates of gaseous pollutants from individual gasoline fueled motor vehicles and estimating total annual emissions from gasoline cars to the ambient air in Jordan. Data was obtained from the Jordanian Ministry of Environment, Department of Driving and Vehicles Licensing at Marka, and from a private smog check station in Irbid.

Our findings indicate that 61.3% of Jordanian motor vehicles were manufactured before the year 1995, 23.3% motor vehicles were manufactured between 1995 and 1999, and 15.4% motor vehicles were manufactured after the year 1999 and about 50% of the vehicles have engine capacity of more than 1500cc. Measured concentration of gaseous tailpipe pollutants are found to be within the Jordanian limits. Average concentrations of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides are 3.12, 11.21, 398.92, and 88.78, respectively. Average emission rates are found to be 25.17, 200.00, 0.65, and 0.11 gram per kilometer
traveled for carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides, respectively. Emission rates are found to be dependent on many factors including year of manufacture, engine capacity, and fuel type. Gasoline fueled motor vehicles are potential emitters of air pollutants with annual emission rates of 210618.46, 1673623.84, 947.30, 5420.72, 2561.24, and 728.02 tons for carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, sulfur dioxide, and lead, respectively.

Key Words: urban air pollution, carbon oxides, nitrogen oxides, sulfur oxides, hydrocarbons, emission rates, air to fuel ration, stoichiometric air to fuel ration, molecular weight.

Introduction
Air pollution has been an active area of research due to their adverse health impact (Dockery et al., 1994, Pobe et al., 1995, Monn et al., 1995, Pope et al., 2002). High levels of air pollution could cause severe health problems including acute respiratory diseases and allergies (Boubel et al., 1994). According to the world health organization (WHO), eighty percent of world's populations are exposed to unhealthy air (WHO, 2004). In addition to their adverse health impact, air pollutants have negative impacts on animals, vegetation, crops, materials, visibility reduction, and global climate change (Boubel et. al., 1994).

Air pollution from motor vehicles has become an important issue because of the steady increase in the number of vehicles in use due to the increase in the world population, and because of the change of life style, which became more dependent on personal motor vehicles, and the increase in distance traveled by each vehicle. Increasing the number of vehicles in use has led to getting more and more pollution over the years. Emissions from vehicles go directly into the air and may alter its composition, especially in urban areas.

Estimates indicate that there are 834 million cars (IPCR, 2005) serving 6,477,451,000 person around the world (Population Reference Bureau, 2005). Those vehicles burn millions of gallons of fossil fuel, which will end up being harmful substances carried by the air. There are extremely large numbers of substances in vehicles' tailpipes that are capable of causing health effects (Schwela and Zali, and Romieu, 1999). Motor vehicles are the largest source of greenhouse gases. About 15% of the world's emissions of carbon dioxide, the principal global warming gas, are generated by motor vehicles, which are responsible for approximately 50% of the nitrogen oxide emissions (Nagurney, 2002). Motor vehicles produce pollutants through fuel combustion, evaporation of fuel and lubricant and resuspension of road dust (Abu-Allaban et al., 2003a and Abu-Allaban et al., 2003b). Oil fuels are mixtures of hydrocarbon compounds with varying carbon to hydrogen ratio.

Motor vehicles are the only available transportation means in Jordan. Number of motor vehicles in Jordan has increased from 318500 in 1998 to 679731 in 2005 (Jordan in Figure, 2004, and Driving and Vehicles Licensing Department, 2006) and car to number of persons ratio has increased from about one car per fifteen persons in 1998 to one car per eight persons in 2005 (Table 1).

Regardless of the increase in number of motor vehicles in Jordan and their role in polluting ambient air, studies that address their impact on air quality are scarce. Al-Momani measured concentrations of gaseous pollutants inside tailpipes of some
gasoline fueled motor vehicles and found them to be in compliance with Jordanian limits (Al-Momani, 2004). Jordanian ministry of environment (JME) has performed several screenings for on-road motor vehicles to check out the compliance of their tailpipe emissions with the Jordanian standards (JME, 2004). Studies carried out near highways have shown elevated concentrations of trace metals such as cadmium, lead, copper, zinc, nickel and chromium on vegetation and soil (El-Hinnawi and Hashmi, 1987, Ndiokwere, 1984).

None of above studies has attempted to calculate emission rates from individual vehicles in Jordan. Emission rates from individual vehicles and their annual emissions are crucial for future planning. In order to provide decision makers and researchers with up to date emission rates of gaseous pollutants from individual motor vehicles and their annual emission to ambient air, this research is carried out.

Data Collection

Data were collected from three independent measurement experiments. First experiment was performed by JME staff throughout Jordan during year 2005 in order to assess compliance with published standards. Second experiment was carried out at the smog-check facilities belong to the department of motor vehicles and drivers (DMVD) in Marka-Amman. Vehicles are required to pass smog-check upon registration renewal. Because of the shortage in gas analyzers at the DMVD, only randomly selected vehicles are inspected upon registrations. Vehicle owners tend to repair their vehicles prior to registration renewal in order to avoid penalties. In the third experiment, measurements were collected at a private smog-check station in Irbid.

Three types of gas analyzers were used:
- SUN Gas Analyzer model SMP- 4000 (, UK) available at the private smog-check station in Irbid;
- AUTOCHEK 4/5 Analyzer (Nextech, Seoul, Korea) available at the Jordanian Ministry of Environment, Amman/Jordan;
- Muller BEM Analyzer Type 8690 (France) available at the department of motor vehicles and drivers at Marka, Amman, Jordan.

A special questioner was designed in order to be filled by vehicles owners’ while their vehicles are being smog-checked. The questioner contained questions about the vehicle including vehicle make, year of manufacture, engine capacity, gasoline type (regular, super, or unleaded) and fuel consumption rate (kilometer traveled per liter of fuel).

Emission Rate Calculations

Hydrocarbons described by a simple chemical formula of the form C\textsubscript{x}H\textsubscript{y} (gasoline for example) are easy to deal with in order to calculate how much carbon oxides are emitted when burning a certain amount of fuel. Their combustion is described by the following reaction (de Nevers et al., 2000):

\[
C\textsubscript{x}H\textsubscript{y} + \lambda(x +0.25y)O_2 \rightarrow zCO + (x-z)CO_2 +(0.5y)H_2O
\]  

Where

\[\lambda = \frac{(A/F)}{(A/F)_{stoichiometric}};\]  

Where \((A/F)\) is air to fuel ratio and \((A/F)_{stoichiometric}\) is the stoichiometric air to fuel ratio.
\( z \) is the number of moles of CO formed per mole of gasoline;
\[
z = [\text{CO}] = 2(1-\lambda)(x + 0.25y) \tag{3}
\]
And,
\[
x - z = [\text{CO}_2]= \text{number of moles of CO}_2 \tag{4}
\]

Jordanian oil refinery produces gasoline of the type \( \text{C}_8\text{H}_{17} \) with trace amounts of sulfur and lead compounds. Replace \( x \) and \( y \) by their values (8 and 17) equations 3 and 4 read:
\[
[\text{CO}] = 24.5(1-\lambda) \tag{5}
\]
And,
\[
[\text{CO}_2] = 8 - 24.5(1-\lambda) \tag{6}
\]

Equation 5 and equation 6 are used to calculate number of moles of carbon oxides produced when burning one mole of gasoline \( \text{C}_8\text{H}_{17} \). Emission rates are expressed as either mass of emitted pollutant per one liter of consumed gasoline (ERL) or per kilometer traveled (ERKT). ERL could be calculated based on equations 5 and 6 by introducing molecular weights of gasoline, carbon monoxide and carbon dioxide. The mass of one liter of gasoline is but the volume (liter) time the density (\( \square, \text{ g/l} \)). Gasoline \( \text{C}_8\text{H}_{17} \) molecular weight is 113. Therefore Number of moles of carbon monoxide and carbon dioxide emitted when burning one liter of gasoline is:
\[
[\text{CO}]_{\text{liter}} = 24.5(1-\lambda)\square_{\text{gasoline}}/113 \tag{7}
\]
And,
\[
[\text{CO}_2]_{\text{liter}} = (8 - 24.5(1-\lambda))\square_{\text{gasoline}}/113 \tag{8}
\]
Where \( \square_{\text{gasoline}} \) is the density of the gasoline which is 730 g/l (Jordanian oil refinery). If is replaced by its numerical value, equations 7 and 8 will read:
\[
[\text{CO}]_{\text{liter}} = 158.27(1-\lambda) \tag{9}
\]
and,
\[
[\text{CO}_2]_{\text{liter}} = 51.68 - 158.27(1-\lambda) \tag{10}
\]

Emission rates of carbon oxides per one litter of gasoline consumed (ERL(CO) and ERL(CO\(_2\))) in gram per liter are obtained by multiplying equations 9 and 10 by carbon monoxide molecular weight (28) and carbon dioxide molecular weight (44), respectively.
\[
\text{ERL(CO)} = 4431.6(1-\lambda) \tag{11}
\]
and,
\[
\text{ERL(CO}_2) = 2237.9 - 6963.9 ~ (1-\lambda) \tag{12}
\]

Emission rates of carbon oxides per kilometer traveled (ERKT(CO) and KTCO\(_2\)) in gram per kilometer are obtained by dividing equations 11 and 12 by distance traveled when consuming one liter of gasoline:
\[
\text{ERKT(CO)} = 4431.6(1-\lambda)d^{-1} \tag{13}
\]
and,
\[
\text{ERKT(CO}_2) = (2237.9 - 6963.9 ~ (1-\lambda))d^{-1} \tag{14}
\]
Where \( d \) is distance traveled when consuming one liter of gasoline.

Other emissions such as nitrogen oxides and hydrocarbons are not part of the combustion described in equation 1. Hydrocarbons are produced
either through evaporation or burning of lubricants due to engine
deformation. Nitrogen oxides are formed when atmospheric nitrogen and
oxygen reacts inside the combustion chamber under high temperatures.

In order to calculate emission rates for hydrocarbons and nitrogen
oxides, another approach is adopted. As illustrated in Figure 1, the mass
of a certain pollutant \( (i) \) emitted from the tailpipe is \( \Delta m \) such that:

\[
\Delta m = C_i \times V
\]  
(15)

Where:

- \( C_i \): concentration of pollutant \( i \)
- \( V \): tailpipe volume

\[
V = L \times A
\]  
(16)

- \( L \): tailpipe length.
- \( A \): tailpipe cross section area.

\[
L = v \times t
\]  
(17)

Where,

- \( v \): velocity of ejected gas from the tailpipe.
- \( t \): time (s).

After substituting equations 8 and 9 into equation 7, it gives:

becomes

\[
\Delta m = C_i \times v \times t \times A
\]  
(18)

The emission rate in grams per second (ER\( i \)) is obtained by dividing
equation 10 by \( \Delta t \), i.e.,

\[
ER_i = C_i \times v \times A
\]  
(19)

Emission rates of carbon dioxide, nitrogen oxides, and hydrocarbons are
calculated using the equations

\[
ER(CO_2) = C(CO_2) \times v \times A
\]  
(20)

\[
ER(NO_x) = C(NO_x) \times v \times A
\]  
(21)

\[
ER(HC) = C(HC) \times v \times A
\]  
(22)

Dividing equations 13 and 14 by equation 12, the velocity and the cross
section area will be eliminated, therefore:

\[
ER(NO_x) = \frac{C(NO_x)}{C(CO_2)} \times ER(CO_2)
\]  
(23)

\[
ER(HC) = \frac{C(HC)}{C(CO_2)} \times ER(CO_2)
\]  
(24)

Equations 23 and 24 imply that emission rates for hydrocarbons and
nitrogen oxides are calculated based on the emission rates of carbon
dioxide (or carbon monoxide) by multiplying the later with the fractional
abundance of hydrocarbons or nitrogen oxides against carbon oxides in
the tailpipe. i.e.,

\[
ERL(NO_x) = \frac{C(NO_x)}{C(CO_2)} \times ERL(CO_2)
\]  
(25)

\[
ERL(HC) = \frac{C(HC)}{C(CO_2)} \times ERL(CO_2)
\]  
(26)

\[
ERKT(NO_x) = \frac{C(NO_x)}{C(CO_2)} \times ERKT(CO_2)
\]  
(27)

\[
ERKT(HC) = \frac{C(HC)}{C(CO_2)} \times ERKT(CO_2)
\]  
(28)

Equation 11 through equation 14 are used to calculate emission rates for
carbon oxides and equation 25, equation 28 are used to calculate emission
rates for hydrocarbons and nitrogen oxides.

**Results and Discussion**
Measurements Performed at the Department of Driving and Vehicles Licensing
Due to the limitation of smog check analyzer at the Department of Driving and Vehicles Licensing (DDVL), not all vehicles are required to go through smog check upon registration renewal. As a courtesy of the DDVL staff, they have let us smog some vehicles using their Muller BEM analyzer. We were able to smog ninety nine vehicles selected randomly. A summary of number of vehicles, their years of manufacture, concentrations of CO, CO₂, and HC inside tailpipes and values of [ ] are presented in Table 2.

As could be seen in Table 2 most vehicles (about 60%) in use in Jordan were manufactured before the year 1995. From above we note that the Table 2 also shows that concentrations of tailpipe gases are within Jordanian standards of (max. 5%, min.10% and max. 600 ppm) for CO, CO2 and HC, respectively (DDVL, 2001).

Measurements Performed at Al-Azam Smog Check Station, Irbid, SUN; SMP-4000 Analyzer
Summary of the results for thirty cars smoged at Al Azam check point is given in Table 3. In comparison with Table 2, results in Table 3 indicate that motor vehicles at Al Azam station operate less efficiently. This is likely due to the fact that vehicle's owners maintain their vehicles prior to registration renewal. On other hand vehicle's owners have their vehicles smoged voluntarily only if they note increase in fuel consumptions.

Data Obtained from the Jordanian Ministry of Environment
Table 4 summarizes data from four hundred cars collected by the staff of the Jordanian Ministry of Environment during several smog check campaigns for on-road motor vehicles in Amman during the year 2005 using an AUTOCHECK analyzer. In addition to gases detected by Muller BET analyzer, the AUTOCHECK analyzer measures nitrogen oxides (NOₓ). In general gaseous emissions from on-road motor vehicles are within the Jordanian Standards (DDVL, 2001). Our findings agree with a previous study conducted by Al-Momani in Irbid directorate (Al-Momani, 2005).

Emission Rates Calculation
Average emission rates for gaseous pollutants per one liter gasoline consumed and per kilometer traveled are given in Table 5 and Table 6, respectively. Numbers in Table 6 are calculated based on the estimation that car travels 9.54 km when burning one liter of gasoline.

In addition to calculating emission rates from individual vehicles, factors that affect emission rate such as year of manufacture, engine size, and fuel type (regular, super, or unleaded gasoline) are examined. Results are illustrated in Figures 2 through 18. As we can see in Figures 2 through 8, new vehicles are cleaner than old vehicles (vehicles manufactured before year 1994), where they emit more CO₂ and less CO and HC when burning one mole of gasoline an indication of better efficiency with respect to fuel consumption. Nevertheless, new vehicles emit more NOₓ than older vehicles in agreement with a previous study conducted by Gertler and colleagues (Gertler et. al., 1999). In an attempt to explain why newer vehicles emit more NOₓ, they have argued that although new vehicles emit more NOₓ, the ratio NOₓ/CO₂ is lower in newer vehicle. Our findings do not support that argument because NOₓ/CO₂ ratio is higher for newer vehicles (Figure 19).
Figures 9 through 12 illustrate the dependence of emission rates on the fuel type. It is obvious that vehicles fueled by super gasoline are cleaner than those fueled by regular gasoline. Vehicles fueled by super gasoline have low emissions of HC and CO an indication of complete combustion. It is clear in figures 13 through 18 that vehicles with large engine sizes (>1500 cc) are potential emitter. They emit more HC, more CO and even more CO₂. They emit more pollutants because they burn more gasoline than smaller engine vehicles when traveling same distances.

From previous discussion we may conclude that gaseous emission rates from motor vehicles depend on year of manufacture: (older vehicles emit more), gasoline type, and engine capacity where vehicles with high engine capacities emit more gaseous pollutants.

**Comparison with Previous Studies**
Table 8 shows how our findings compare with previous studies conducted by Pierson et al., (1996), and Gertler et al., (1999). Overall our findings agree are close to their findings but Jordanian vehicles are emitting more carbon monoxide and hydrocarbons, which indicate that vehicles in Jordan are not properly maintained.

**Estimating Annual Emissions from Motor Vehicles in Jordan**
After calculating emission rates of air pollutants from gasoline fueled motor vehicles, estimating total mass emitted into ambient air is straightforward (Table 9). Results in Table 9 were obtained by multiplying average emission rates per liter fuel times total volume of gasoline consumed annually in Jordan. Necessary statistics were obtained from a report distributed by Jordanian Ministry of Statistics (Environment Statistics, 2003).

Results in Table 9 revealed that CO₂ and CO emitted form gasoline fueled motor vehicles constitute about fifty percent of the emissions from transportation sector in the year 2003. Motor vehicles are responsible of 14.31% and 3.5<% HC and NOₓ, respectively from transportation sector during the year 2003. Annual emissions of lead and sulfur dioxide were calculated based on their abundances in produced gasoline and annual consumption of gasoline in Jordan.

**Summary and Conclusions**
Motor vehicles are potential sources of air pollution in Jordan. Detailed information about ambient levels and the contribution of motor vehicles to them is scarce. In order to provide decision makers with up to date information of how motor vehicles are affecting air quality in Jordan both qualitatively and quantitatively this research was carried out. The research aimed at calculating average emission rates from individual gasoline fueled motor vehicles and annual emission quantities from gasoline vehicles in use in Jordan. To achieve this goal, several tasks were performed including collecting data from previous field experiments carried out by the Jordanian Ministry of Environment, measuring tailpipe concentrations of gaseous air pollutants from randomly selected motor vehicles at two stations; DDVL station at Marka, Amman and Al-Azzam smog check station at Irbid and data analysis based on combustion theory.

Specific conclusions of this research are:

1. Concentrations of tailpipe gaseous pollutants are within Jordanian standards, which agree with previous published results;
2. Average emission rates from individual vehicles are 25.17, 200.00, 0.65, and 0.11 g/km for CO, CO₂, HC, and NOₓ, respectively;
3. Calculated emission rates agree with two previously published American Results;
4. Annual emission rates from gasoline fueled motor vehicles for the year 2005 were 210618.46, 1673623.84, 947.30 5420.72, 2561.24, 728.02 ton for CO, CO₂, HC, NOₓ, SO₂, and Pb, respectively;
5. Emission rates from motor vehicles depend on different factors including year of manufacture, engine size, and type of gasoline used; and
6. Motor vehicles that use regular gasoline, old motor vehicles, and motor vehicles with high engine capacity tend to emit more air pollutants.

Acknowledgement
The authors are grateful to the Hashemite University for providing research components that were essential in order to carry out this research. We are grateful to the Department of Air Protection- Jordanian Ministry of Environment, and the staff the Department of Driving and Vehicles licensing the Department of Vehicles Technical Check for providing part of the data used in this study.

References
- Driving and Vehicles Licensing Department. 2006. Amman, Jordan. Personal contact
- Environmental Static's, (2003)).
- Jordan in Figure, 2004. Department of Statistic, Jordan.
- Miller, P. R., and Elderman, M.J. 1977. (eds.),"Photochemical Oxidant Air Pollution Effects of a Mixed Conifer System." EPA-600/3-77-104. Environmental Protection Agency,Corvallis,OR,
- Strauss, W.; Mainwaring, S.J., 1984, Air pollution, Edward Arnold, p34.
- The Economist, 1996. Living with the Car, June 22, 3-18.
- Traffic Department, 2003.
- U.S. Environmental Protection Agency, 2000. Office of Transportation and Air Quality Assessment and Standards Division. Traverwood Drive Ann Arbor, MI 48105.
- www.unfccc.org
Table 1: Numbers of operating vehicles in Jordan and percentage of annual increase. Source: (Traffic department, 2003 and Driving and Vehicles Licensing Department, 2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of vehicles</th>
<th>Annual increase %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>269472</td>
<td>5.49</td>
</tr>
<tr>
<td>1996</td>
<td>297664</td>
<td>10.46</td>
</tr>
<tr>
<td>1997</td>
<td>306911</td>
<td>3.11</td>
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<td>1998</td>
<td>318512</td>
<td>3.78</td>
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<td>321512</td>
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<td>614600</td>
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</tr>
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</tr>
<tr>
<td>Year of Manufacture</td>
<td>Number of cars</td>
<td>CO (%)</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>≥ 2004</td>
<td>7</td>
<td>0.07 – 10.3</td>
</tr>
<tr>
<td>2003 - 2001</td>
<td>5</td>
<td>0.1 - 5</td>
</tr>
<tr>
<td>2000 - 1998</td>
<td>11</td>
<td>0.9 - 7.62</td>
</tr>
<tr>
<td>1997 - 1995</td>
<td>20</td>
<td>0.5 -5.9</td>
</tr>
<tr>
<td>1994 - 1992</td>
<td>16</td>
<td>0.41 - 5.4</td>
</tr>
<tr>
<td>1991 - 1989</td>
<td>7</td>
<td>0.65 – 7.43</td>
</tr>
<tr>
<td>1998 - 1986</td>
<td>7</td>
<td>0.18 - 5</td>
</tr>
<tr>
<td>1985 -1983</td>
<td>6</td>
<td>0.11 - 11</td>
</tr>
<tr>
<td>1982 - 1980</td>
<td>4</td>
<td>0.17 – 2.6</td>
</tr>
<tr>
<td>1979- 1977</td>
<td>9</td>
<td>0.08 – 11.4</td>
</tr>
<tr>
<td>1976 - 1974</td>
<td>6</td>
<td>0.3 – 5.06</td>
</tr>
<tr>
<td>≤ 1973</td>
<td>1</td>
<td>2.4</td>
</tr>
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</table>
Table 3. Summary of raw Data measured by SUN; SMP- 4000 Analyzer
Obtained from Al Azam Smog Check Point, Irbid

<table>
<thead>
<tr>
<th>Year of Manufacture</th>
<th>Number of Cars</th>
<th>CO (%)</th>
<th>CO2 (%)</th>
<th>HC (ppm)</th>
<th>A/F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2004</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2003-2001</td>
<td>1</td>
<td>1.94</td>
<td>13.5</td>
<td>131</td>
<td>14</td>
</tr>
<tr>
<td>2000-1998</td>
<td>1</td>
<td>5.45</td>
<td>11.4</td>
<td>290</td>
<td>13.7</td>
</tr>
<tr>
<td>1997-1995</td>
<td>10</td>
<td>6.32 – 0.38</td>
<td>13.8 – 8.8</td>
<td>566 - 136</td>
<td>17.2 – 12.1</td>
</tr>
<tr>
<td>1994-1992</td>
<td>7</td>
<td>14 - 9.7</td>
<td>7.7 - 0.36</td>
<td>730 - 118</td>
<td>15.7 – 12</td>
</tr>
<tr>
<td>1991-1989</td>
<td>4</td>
<td>3.8 – 0.17</td>
<td>13.5 – 9.2</td>
<td>710 - 206</td>
<td>18.2 – 14</td>
</tr>
<tr>
<td>1988-1986</td>
<td>4</td>
<td>9.24 -0.09</td>
<td>14 – 8.3</td>
<td>777 - 60</td>
<td>11.4 -17.4</td>
</tr>
<tr>
<td>1985-1983</td>
<td>1</td>
<td>2.1</td>
<td>13.2</td>
<td>338</td>
<td>14.2</td>
</tr>
<tr>
<td>1982-1980</td>
<td>1</td>
<td>1.6</td>
<td>9.7</td>
<td>530</td>
<td>12.6</td>
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<tr>
<td>1979-1977</td>
<td>1</td>
<td>5.11</td>
<td>9.6</td>
<td>820</td>
<td>12.1</td>
</tr>
<tr>
<td>1976-1974</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≤1973</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4. Summery of raw data measured by AUTOCHEK analyzer. Courtesy of the Ministry of Environment.

<table>
<thead>
<tr>
<th>Year of Manufacture</th>
<th>Number of Cars</th>
<th>CO (%)</th>
<th>CO₂ (%)</th>
<th>HC (ppm)</th>
<th>NOₓ (ppm)</th>
<th>λ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2004</td>
<td>23</td>
<td>0 - 2.78</td>
<td>10.19 - 15.8</td>
<td>85 - 841</td>
<td>0 - 791</td>
<td>0.95 - 1.31</td>
</tr>
<tr>
<td>2003-2001</td>
<td>47</td>
<td>0 - 9.84</td>
<td>6.68 - 14.8</td>
<td>122 - 2080</td>
<td>0 - 598</td>
<td>0.73 - 2</td>
</tr>
<tr>
<td>2000-1998</td>
<td>63</td>
<td>0.04 - 10.68</td>
<td>5.78 - 18.41</td>
<td>41 - 939</td>
<td>0 - 980</td>
<td>0.34 - 1.31</td>
</tr>
<tr>
<td>1997-1995</td>
<td>53</td>
<td>0.03 - 11.05</td>
<td>5.37 - 14.75</td>
<td>32 - 3206</td>
<td>0 - 357</td>
<td>0.69 - 2.21</td>
</tr>
<tr>
<td>1994-1992</td>
<td>47</td>
<td>0.09 - 27</td>
<td>1.79 - 15.7</td>
<td>58 - 2550</td>
<td>0 - 419</td>
<td>0.67 - 3</td>
</tr>
<tr>
<td>1991-1989</td>
<td>23</td>
<td>0.19 - 12.26</td>
<td>1.24 -14.02</td>
<td>80 - 922</td>
<td>0 - 161</td>
<td>0.67 - 3</td>
</tr>
<tr>
<td>1988-1986</td>
<td>19</td>
<td>0.13 - 7.25</td>
<td>6.54 - 14.22</td>
<td>159 - 2963</td>
<td>0 - 221</td>
<td>0.5 - 2.2</td>
</tr>
<tr>
<td>1985-1983</td>
<td>37</td>
<td>0.15 - 16.7</td>
<td>1.68 - 13.67</td>
<td>60 - 2388</td>
<td>0 - 221</td>
<td>0.71 - 3</td>
</tr>
<tr>
<td>1982-1980</td>
<td>36</td>
<td>0.06 - 12.42</td>
<td>4.64 - 15.7</td>
<td>138 - 2095</td>
<td>0 - 177</td>
<td>0.25 - 2.36</td>
</tr>
<tr>
<td>1979-1977</td>
<td>29</td>
<td>0.16 - 12.23</td>
<td>6.28 -12.31</td>
<td>142 - 1189</td>
<td>0 - 176</td>
<td>0.67 - 1.8</td>
</tr>
<tr>
<td>1976-1974</td>
<td>8</td>
<td>0.37 - 11.26</td>
<td>1.93 - 10.1</td>
<td>472 - 1414</td>
<td>0 - 57</td>
<td>0.7 - 2.4</td>
</tr>
<tr>
<td>≤1973</td>
<td>9</td>
<td>1.14 - 10.53</td>
<td>13 - 5.33</td>
<td>226 - 1142</td>
<td>0 - 91</td>
<td>0.79 - 1.01</td>
</tr>
</tbody>
</table>
Table 5: Average emissions rates of gaseous pollutants from vehicle tailpipe per liter of gasoline (g/l)

<table>
<thead>
<tr>
<th>Species Analyzer</th>
<th>CO</th>
<th>CO₂</th>
<th>HC</th>
<th>NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTOCHEK</td>
<td>221.25</td>
<td>1941.41</td>
<td>5.25</td>
<td>1.08</td>
</tr>
<tr>
<td>Muller BEM</td>
<td>299.97</td>
<td>1802.61</td>
<td>10.48</td>
<td>---</td>
</tr>
<tr>
<td>SUN; SMP- 4000</td>
<td>292.49</td>
<td>1814.35</td>
<td>4.38</td>
<td>---</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>240.12</strong></td>
<td><strong>1908.05</strong></td>
<td><strong>6.18</strong></td>
<td><strong>1.08</strong></td>
</tr>
</tbody>
</table>

Table 6: Average emissions rates of gaseous pollutants from vehicle tailpipes per kilometer traveled (g/km)

<table>
<thead>
<tr>
<th>Emissions Analyzer</th>
<th>CO</th>
<th>CO₂</th>
<th>HC</th>
<th>NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muller BEM</td>
<td>32.03</td>
<td>191.54</td>
<td>1.18</td>
<td>---</td>
</tr>
<tr>
<td>SUN; SMP- 4000</td>
<td>39.89</td>
<td>220.83</td>
<td>0.57</td>
<td>---</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>33.87</strong></td>
<td><strong>198.4</strong></td>
<td><strong>1.04</strong></td>
<td><strong>0.11</strong></td>
</tr>
<tr>
<td>**Total Average **</td>
<td><strong>25.17</strong></td>
<td><strong>200.00</strong></td>
<td><strong>0.65</strong></td>
<td><strong>0.11</strong></td>
</tr>
</tbody>
</table>
Table 7 Comparison of emission rates from motor vehicles emissions: (Pierson and colleagues, 1996, Gertler and colleagues, 1999, and Current Study)

<table>
<thead>
<tr>
<th>Emissions</th>
<th>CO (g/km)</th>
<th>CO2 (g/km)</th>
<th>HC (g/km)</th>
<th>NOx (g/km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierson and colleagues, 1996</td>
<td>3.03</td>
<td>143.84</td>
<td>0.18</td>
<td>0.24</td>
</tr>
<tr>
<td>Gertler and colleagues, 1999</td>
<td>1.93</td>
<td>154.38</td>
<td>0.4</td>
<td>0.22</td>
</tr>
<tr>
<td>Current study</td>
<td>33.87</td>
<td>198.4</td>
<td>1.04</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Table 8: Annual emissions of air pollutants from motor vehicles and their ratio to transportation sector emissions in Jordan (ton/year)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>1745795.19</td>
<td>3797800</td>
<td><strong>45.97</strong></td>
<td>1750682.92</td>
<td><strong>1673623.84</strong></td>
</tr>
<tr>
<td>CO</td>
<td>219700.92</td>
<td>441900</td>
<td><strong>49.72</strong></td>
<td>220316.02</td>
<td><strong>210618.46</strong></td>
</tr>
<tr>
<td>HC</td>
<td>5654.47</td>
<td>39503.5</td>
<td><strong>14.31</strong></td>
<td>5670.30</td>
<td><strong>5420.72</strong></td>
</tr>
<tr>
<td>NOx</td>
<td>988.16</td>
<td>28300</td>
<td><strong>3.49</strong></td>
<td>990.93</td>
<td><strong>947.30</strong></td>
</tr>
<tr>
<td>SO₂*</td>
<td>2671.69</td>
<td>----</td>
<td>----</td>
<td>2679.17</td>
<td><strong>2561.24</strong></td>
</tr>
<tr>
<td>Pb **</td>
<td>759.42</td>
<td>----</td>
<td>----</td>
<td>761.54</td>
<td><strong>728.02</strong></td>
</tr>
</tbody>
</table>

* These amounts calculated based on the total sulfur content (0.2 %) in gasoline that produced at the Jordanian Refinery Petroleum Company.
** These amounts calculated based on the lead content (0.83 g/l) in gasoline that produced at the Jordanian Refinery Petroleum Company.

Figure 1: Emission of gases from the tailpipe of On –Road vehicles
Figure 2. Emission rates of CO (g/l) from the motor vehicles and their dependence on the year of manufacture (AUTOCHEK).

Figure 3. Emission rates of CO₂ (g/l) from motor vehicles and their dependence on the year of manufacture (AUTOCHEK).

Figure 4: Emission rates of HC (g/l) from motor vehicles and their dependence on the year of manufacture (AUTOCHEK).
Figure 5: Emission rates of NO\textsubscript{x} (g/l) from motor vehicles and their dependence on the year of manufacture (AUTOCHEK).

Figure 6: Emission rate of CO (g/km) from motor vehicles and their dependence on the year of manufacture (Muller BEM).

Figure 7: Emission rate of CO\textsubscript{2} (g/km) from motor vehicles and their dependence on the year of manufacture (Muller BEM).
Figure 8: Emission rate of HC (g/km) from motor vehicles and their dependence on the year of manufacture (Muller BEM).

Figure 9: Emission rate of CO (g/l) from motor vehicles and their dependence on gasoline type (AUTOCHEK).

Figure 10: Emission rate of CO₂ (g/l) from motor vehicles and their dependence on gasoline type (AUTOCHEK).
Figure 11. Emission rate of HC (g/l) from motor vehicles and their dependence on gasoline type (AUTOCHEK).

Figure 5.12: Emission rate of NOx (g/l) from motor vehicles and their dependence on gasoline type (AUTOCHEK).

Figure 13: Emission rate of CO (g/km) from motor and their dependence on engine capacity (Muller BEM).
Figure 15: Emission rate of CO\textsubscript{2} (g/km) from motor vehicles and their dependence on engine capacity (Muller BEM).

Figure 17: Emission rate of HC (g/km) from motor vehicles and their dependence on engine capacity (Muller BEM).
Figure 19: NO\textsubscript{x} to CO\textsubscript{2} ratio versus year of manufacture. NO\textsubscript{x}/CO\textsubscript{2} ratio is higher in newer cars
Topic 5: Economic Analyses
Economic Analysis of Tourism Development in Madaba

Dr. Amir Bakir

Faculty of Business, University of Jordan

Abstract
The paper adopts a cost-benefit analysis approach to evaluate development projects in Madaba governorate taking into consideration selection criteria, SWOT analysis, economic costs and benefits and the environment. The project consists of intervention areas that are related to cultural heritage development, income generation projects and improvement of degraded spaces of land, traffic, parks and water draining infrastructure. The paper shows how to select the project and highlights the areas of strengths, weaknesses, opportunities and threats. The cost of the project is fragmented between its economic, social and environmental components. The benefits of the project are difficult to quantify, hence, a descriptive analysis of benefits and environmental effects is presented. The paper shows how to analyze projects in the context of the national economic development perspective.

Description of the Project
The project focuses on four elements, heritage sites, tourism activities, income generation activities and the environment.
Heritage sites: The project aims at the reinforcement of existing heritage sites.
Tourism activities: The project encourages the creation of tourism and leisure activities such as hotels, family accommodation, Bed and Breakfast, cultural events, restaurants, handicrafts, public open spaces, picnic areas, horse riding and cycling, leisure clubs, ….etc.

Income generation activities: The project opens job opportunities and promotes income generation activities related to the tourism activities mentioned above.
Environment: the project will contribute to the enhancement of the environmental effects through the improvement of the water draining systems, the elimination of degraded land space, the provision of public gardens, open public spaces, car parking areas and pedestrian paths.

Selection Criteria, Economic and Social Methodology
The project and its components were selected based on a bottom up approach involving all stakeholders. It was based on a qualitative research approach and a household survey. The stakeholders included institutions, professionals, community organizations, and grassroots. The input of the stakeholders played a major role in the selection of the project.
The methodology of the analysis relied extensively on the field survey undertaken by the project, interviews with local stakeholders and the official statistics. A detailed cost-benefit analysis to quantify the economic benefits was not adopted. Rather, a descriptive analysis of the benefits and a cost comparison with other development projects seemed appropriate to fulfill the requirements of the project identification process.
SWOT

- **Strengths:** The region encompasses a variety of assets. It is an urban area with a population of more than 140 thousand, surrounded by agricultural and industrial amenities, religious heritage sites, panoramic view areas, water resorts and a vast space of landscape.

- **Weaknesses:** The open spaces are degraded, little green areas, poor infrastructure of roads and pedestrian paths, inadequate draining systems causing land erosion and street floods, large derelict lands that are used as waste disposal and car parking.

- **Opportunities:** The region is located in the middle of the country with easy accessibility to commuters. The population is well educated and has the momentum to contribute effectively to the development of the region. The existing activities are mixed and accordingly, the region can develop favorably to match other regions in the country.

- **Threats:** The only foreseen threat is related to the improvement of the urban areas. Land ownership laws may stand as an obstacle in the way of land acquisitions that are necessary to implement some components of the project.

**Social and Economic Analysis**

The project focuses on urban regeneration of Madaba city, the development of internal and regional tourism and improving the environment. Madaba is well known for its historical heritage and archaeological sites. The existing urban situation witnessed extensive degradation over the past years because of inappropriate management of development. The focus of development was on international tourism and huge public and private investments were allocated to build five star hotels such as the Movenpeck, Mariott and Kempenski on the Dead Sea and Ma'in Spa near Madaba. However, the expectations to receive large numbers of international tourists to the area in general did not materialize because of the political situation and the fragility of tourism activities towards safety and security. In fact, experience showed that internal and regional tourism to the Dead Sea and Main Spa far passed international tourism. The percentage of international hotel nights was less than (20%) in Main Spa and less than 31% in the Dead Sea. Those investments did not have a favorable impact on Madaba city and the population of Madaba in general in terms of increased economic activity, poverty alleviation and unemployment reduction. The situation in Madaba city deteriorated rather. It is expected that further deterioration and degradation of the situation in Madaba is highly probable. An external intervention coupled with local commitment from Madaba citizens, such as an urban regeneration project, is required to stop the decline in social and economic life of the city.

If an urban regeneration project is NOT implemented the social and economic situation in the city will deteriorate further because of the following factors:

1. The condition of the public open spaces will become poorer; impossible traffic congestions, parking on the existing streets, no green areas, no services, waste accumulation in the streets and derelict areas.
2. Increase in the presence of large derelict areas that are often used as waste disposal that affect the environment quality, cause groundwater pollution, disseminate bad odor, clog up the water drainage system, generate vectors and make the management of waste disposal almost an impossible task.

3. Erosion of vacant land on the western slopes will increase.

4. The drainage system will become inappropriate in cases of heavy rain.

5. The unavailability of entertainment facilities and parking places.

6. Many heritage sites will not be taken care of and will lay abandoned as derelict land without protection.

7. The archaeological sites will not be integrated with the urban area.

8. The private real estate around the core which is already in bad condition because of little maintenance will deteriorate further and the existing residential buildings will be abandoned.

9. The architectural heritage which is in a very poor condition will deteriorate further and might reach a state of disrepair.

10. The number of vacant or abandoned stock of residential buildings will increase.

11. The space available for pedestrians around the core of the city which is already overtaken by traffic congestions will even deteriorate further.

12. Traffic congestions in the centre of the town will render accessibility of the people to their residents and businesses impossible.

13. Citizens of Madaba will be forced to move out towards Amman.

The proposed project (urban regeneration and tourism development) will not only help in stopping the deterioration of the urban fabric of the city but it will also improve the situation. The cost of the project is estimated to reach US$ six million. It is expected that the following benefits will be realized:

1. The architectural heritage and the archaeological sites will be preserved and protected. The constraints that isolated those sites from the urban fabric will be removed. Thus, the history of Madaba will be integrated with the urban surroundings in a comprehensive manner. The archaeological sites and the archaeological park will perform the role of public places for the people of Madaba city, visitors and tourists to meet, promenade, entertain themselves and enjoy a better social life.

2. The traffic congestions in the city center will be removed and ample space for pedestrians will be made available. People will be able to access their places of residence and business easily and comfortably. This will encourage people to move in, instead of moving out of, the core of the town. The buildings will be repaired and businesses will come back. In this respect, the urban centre will be revived.

3. The existing derelict places will be removed and replaced by parking places, service buildings and green areas, thus creating a favorable environmental impact and make the city centre a viable place for living, visiting, socializing and undertaking commercial activities. For example, the large derelict slope vacant area between King Abdullah street, the upper section of King Tallal street and the Saraya building, with a steep
slope in the central part will be replaced by a new park and structures for leisure and handicraft.

4. The people of Madaba, who strongly support the urban regeneration endeavor, will be able to repair their abandoned buildings and prepare it for useful income generating activities, reopen their closed commercial entities and engage in new business activities.

5. There will be higher number of visitors to Madaba from neighboring environments (the population of Amman governorate is around 2.2 million) who are willing to enjoy better facilities, spend a good time, entertain and educate themselves with the offerings of Madaba heritage and archaeological sites. As a result, tourism related activities in the city centre such as restaurants, gift shops, hotels, photos, souvenirs, consumer services, etc., will prosper making room for an increase in income and job opportunities.

6. The municipality, the NGOs and the other administrative agents will have the enthusiasm and encouragement to work towards a better management of the development issues of Madaba. Cooperation for development among all the stakeholders will be enhanced.

7. During the project implementation, certain activities such as the construction works, will directly involve the local people in the form of labor, works contracts, material purchasing, transportation, etc., which will have multiplier effects in the form of further generation of economic activities.

**Social and Economic Benefits by Project Component**

1. The realization of new parking areas along the "ring road"(including the reorganization and upgrading of the access area to the city centre and to the Church of the Map).

   The new parking areas will be used by the citizens, business owners, visitors and tourists. The derelict areas will be removed, the environment will be improved, traffic congestions resulting from street parking and car traffic will be eliminated, and service buildings will be made available.

   The cost of this component is around US$ 618.9 thousand. The works involved will be implemented by local contractors in Madaba.

   Pedestrians will move around comfortably. Residence and business owners will have easy access to their residence and business. Stakeholders are in favor of this component because it will improve the sites from an environmental perspective, reduce traffic, offer service buildings, and provide opportunities for employment and income generation from operating the parking area.

2. The overall improvement of the streetscape and circulation pattern

   The main effect of this component is to reduce the traffic congestion that already exists in the town centre and avoid further complications of traffic congestion and street parking in the future. Also, the historic features of street fronts will be
protected. Negative environmental consideration resulting from traffic congestions such as air pollution and noise will be reduced significantly. The benefits are of a general nature that will positively affect the commuters around the city centre especially pedestrians. The existing situation does not allow pedestrians to room around at all since the streets are overtaken by traffic and street parking. In addition to pedestrians of the citizens of Madaba, visitors to the city centre will find it safer, easier and more comfortable to commute in and out. The cost of this component is around US$ 1,441.3 thousand. The works involved will be implemented by local economic agents.

3. The creation of a "Madaba Mosaic Map Information centre"
The Information centre will serve as an educational and cultural activity on the history of Madaba, especially for the visitors from the neighboring regions and tourists. The benefits of this component arise from the necessity of providing well managed activities of interest to visitors. The increased number of visitors will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiative related to the use of technology in education and presentation. The cost of the project is US$ 656.4 thousand. The works involved will be implemented by the local contractors.

4. The creation of a new cultural centre in the Saraya building
The Saraya building will be preserved as a heritage site. The conversion of the Saraya building into a cultural centre will serve to present Madaba history, origins of its communities and its past and present living to visitors. It will also include cultural activities for the population of Madaba. The benefits of this component arise from the necessity of providing well managed activities of interest to visitors. The increased number of visitors will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to culture and tourism. The cost of the project is US$ 265.7 thousand. The works involved will be implemented by the local contractors.

5. The development of the Archaeological park as a public place
The project involves the preservation of the archaeological site and protecting it from further deterioration which will improve the urban space and become a potential for tourist attraction. The benefits of this component are general. It will improve the environmental setting and enable the citizens of Madaba to enjoy a better social life. It will increase the number of visitors to Madaba which will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to culture and tourism. The cost of the project is US$ 530.8 thousand. The works involved will be implemented by the local contractors.

6. The creation of a new section of the Archaeological park
The project involves the preservation of the archaeological site and protecting it from further deterioration which will improve the urban space and become a
potential for tourist attraction, the provision of craft training program and the creation of a public park with recreational facilities.

The benefits of this component are general. It will improve the environmental setting and enable the citizens of Madaba to enjoy a better social life. It will increase the number of visitors to Madaba which will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to culture and tourism.

The cost of the project is US$ 426.1 thousand. The works involved will be implemented by the local contractors.

7. The realization of new structures for leisure and handicraft
The project component consists of creating a park for leisure activities, preserve heritage buildings and remove the negative environmental effects of the present derelict and marginal area.

The benefits of this component are general. It will improve the environmental setting and enable the citizens of Madaba to enjoy a better social life. It will increase the number of visitors to Madaba which will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to entertainment, leisure and tourism.

The cost of the project is US$ 315.7 thousand. The works involved will be implemented by the local contractors.

8. The adaptive reuse and refurbishment of heritage buildings for family accommodation and other activities
The project aims at creating opportunities for employment and income generating activities by restoring heritage buildings that can be home for BB, catering, handicraft, etc...

The benefits of the project include the pleasant improvement of the urban settings in the town centre, the involvement of the private sector in the development of the urban elements, the creation of job opportunities and income increments to the citizens involved in the scheme. It will increase the number of visitors to Madaba which will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to tourism.

The cost of the project is US$ 370.2 thousand. The works involved will be implemented by the local contractors.

9. The creation of a Traditional Vegetable and Food market
The aim of the project is to create a market for traditional agricultural produce that meets the need of Madaba population and visitors.

The benefits will be to Madaba citizens mainly in the form of marketing of traditional agricultural products that are outputs of micro projects in most cases. It will open opportunities for employment and micro projects. There is some potential for the agricultural sector to develop marketing efforts through this project.

The cost of the project is US$ 440.5 thousand. Local contractors will be employed to implement it.

10. Territorial Organization, signalization and pilot thematic Routes
The aim of the project is to facilitate the reach ability of the visitors to the interesting archaeological site.
The benefits are general and mainly visitors to the area are targeted. Postings are essential elements to highlight the various possible itineraries.
The cost of the project is US$ 545 thousand and will be implemented by the relevant responsible agents.

11. Qastal Heritage Centre
The project intends to preserve the Archaeological heritage site at Qastal and protecting it from further deterioration which will improve the urban space and become a potential for tourist attraction.
The benefits of this component are general. It will improve the environmental setting and enable the citizens of Qastal to enjoy a better social life. It will increase the number of visitors to Qastal which will have a favorable impact on social and economic activities in the city, in general. It will initiate new initiatives related to culture and tourism.
The cost of the project is US$ 196.6 thousand. Local contractors will be employed to implement it.

Most Efficient Allocation of Funds
The financing schemes of the project activities are numerous since the nature of the project components is too diversified. The components that have a public or national interest can be financed through national and/or local sources. In this context, central financing originating from the national and/or local budgets can be targeted. This could be in the form of grants, soft development loans and central and local government budgets. For example, the components of the project that are related to roads, environment, archaeology, etc. fall under the national financing scheme.

The components that have a private nature can be financed under different schemes depending on the nature of the project. The component that requires large investment can be financed on the basis of public-private partnership scheme (for example, hotels, entertainment facilities and restaurants). The components that have a micro project nature can be financed through a micro finance scheme. For example, the two projects: New Park and Structures for Leisure and Handicrafts, and Reuse of Heritage Buildings for Family Tourism Accommodation have components related to heritage, environment, tourism and the encouragement of private business initiatives as follows:

- Restoration of existing heritage buildings on the eastern side of the park
- Reuse of restored heritage buildings to create leisure facilities
- Open public space with greeneries and plantations
- Accommodation facilities for visitors/tourists, handicrafts and other tourist amenities.

In the above mentioned two projects the private sector can be involved in financing the parts that are related to the operation of the accommodation facilities, handicrafts and other tourist related enterprises. Also, entrepreneurs (male or female) will be able to operate micro projects in the park that can be financed by a micro credit scheme.

The allocation of funds to specific sub-components can be allocated according to the benefit ranking criteria. In this context, priority is given to projects that fall within the tourist, services and trade sectors.
Project Beneficiaries
The population of Madaba exceeds 140 thousand, about one third live in rural areas and the majority are involved in one way or the other with the services, trade and tourism sectors. Services, trade and tourism activities engage a substantial number of the labor force, have a higher value added and contribute significantly to the well being of the population. Agriculture and industry are weak activities and together they contribute modest value added, jobs and support of social and economic life.
In general, projects that are related to urban regeneration, heritage preservation and the environment fall under the public interest. The general public and even the future generations are considered the main beneficiaries. The action projects proposed here, as shown in the table below, are mostly within the public interest although some components are of a private interest such as the accommodation facilities, handicrafts, operation of car parking areas, and other tourist related activities. In this regard, the main beneficiaries are the agents who operate those facilities.

Table 1: Sectoral Cost Distribution of the Action Projects (Estimates)

<table>
<thead>
<tr>
<th>Components</th>
<th>Heritage</th>
<th>Environment</th>
<th>Tourism</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Parking Areas Along the Ring Road</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Street Pattern Rehabilitation</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. Mosaic Map Information Centre</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. Saraya Cultural Centre</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Development of the Archaeological Park</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>VI. New Section of the Archaeological Park</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>VII. New Park and Structures for Leisure and Handicrafts</td>
<td>30%</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>VIII. Reuse of Heritage Buildings for Family Accommodation</td>
<td>30%</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>IX. Traditional Food and Vegetable Market</td>
<td>---</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>X. Territorial Organization, Signalization and on-site signage</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XI. Qastal Heritage Centre</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The main beneficiaries of the project are the people of urban Madaba region. The individuals that are engaged in services, trade, tourist and tourist related activities are the direct beneficiaries. Those include the persons working in hotels, restaurants, guide tours, archaeology, consumer services, etc. New establishments and job opportunities will be created in this sector. In particular, the persons who are engaged in the services and trade sector will benefit significantly as a result of the increased economic and business activity. Existing establishments will benefit highly while new ventures and job opportunities will benefit to a lesser extent.

The action projects will provide numerous attractions for visitors mainly in the national context and to a lesser extent from neighboring Arabic countries and other
international visitors. Visitors to Madaba will have a direct effect on increasing demand for tourist related services such as restaurants, cafeterias, leisure services, handicrafts, etc. Also, the increased tourist activity resulting from the project will have a positive impact on trade, services, agriculture, industry, construction and other sectors in the region. The agricultural sector will benefit by providing agricultural produce to restaurants and cafeterias, the industrial sector will benefit by providing products to the handicraft enterprises and the other tourist related enterprises, and so on. Furthermore, the project’s direct positive impact on the environment will have spill over effects that will further enhance the social and economic life in the region making it more attractive in terms of regional migration. On the one hand, the population of Madaba will be tempted to stay in the region, and on the other, people from outside the region will be attracted to live in it. This will bring in more investments and business to the region. Also, it is expected that the increase in income as a result of the project will be translated into more expenditure on education, health and consumer goods. The increased economic activity will encourage the population of Madaba to venture new projects and expand their opportunities for achieving a better life. The local public sector will benefit from increased economic activities in terms of more revenues (taxes and fees).

As a result of the project the number of international and national visitors to the region will increase and consequently, investments and job opportunities in the tourist sector will escalate significantly. It is expected that more investments and job opportunities will be realized in hotels, restaurants, guides, etc. Also, existing establishments that are engaged in trade and services are expected to witness an increase in sales and business activity, which is translated into higher income, more investment and higher employment.

The spill over effects of the project on the other sectors is expected to have a moderate positive impact. The persons who are engaged in the other sectors, agriculture, industry, construction, transport, education and health will slightly benefit from the project components. In general, some of the project components such as the improvement of the parking facilities will benefit all the sectors, in particular, the industrial and the agricultural sectors. The establishments will have better access between production and market venues.

A considerable favorable environmental atmosphere will have a positive impact on all the inhabitants as a result of the environment components of the project.

The local governments should witness an improvement in their budgets as a result of the increased tax revenues that will accompany the enhanced economic activity.

The project is intended to vitalize the NGO sector and provide facilities for entertainment such as cultural activities, promenades and public places. Those activities will increase the opportunities for the population at large to enjoy a better social life, ease tensions and relax nerves.

The project will open economic opportunities for self-employment to a large extent in terms of micro projects especially in the field of handicrafts, various services and cultural activities.
Conclusion
The project cost is estimated to around US$ six million benefiting the population of Madaba which exceeds 140 thousand. The project will have benefits in terms of preserving and reinforcing the religious and cultural heritage of the region, providing job opportunities and income generation activities, and positive environmental outcomes.
Environmental and Economic Improvement through Implementation of Cleaner Production in Hospitality Sector in Jordan: Case Studies in Four Hotels

B. Hayek (1), M. Mosa (1), J. Haddad (1), N. Al-Atiyat (1), C. Buser (2), D. Mutz (2), K. Zein (3)

(1) Cleaner Production Unit, Environmental Research Center, Royal Scientific Society, Jordan
(2) University of Applied Sciences Northwestern Switzerland (FHNW), Switzerland
(3) Sustainable Business Associates (SBA), Switzerland

Abstract
Tourism constitutes an important part of the Jordanian economy, and it is to expand significantly in the near future. This will entail high demand on water and energy. Cleaner production assessment in four hotels in Aqaba and Petra (1-3 star hotel) was undertaken to improve the efficiency of raw materials, water, and energy uses, to reduce waste emissions and eventually to advance the environmental performance. The assessment followed many integrated steps that included reviewing all hotels departments, data collection, benchmarking, and cleaner production options generation, evaluation and prioritization.

The comparison of the key performance indicators for the 1-star hotel in Jordan with the EU benchmark for bed and breakfast was found to be not very well applicable. It is expected that there is still differences in the type and grade between the two cases, in addition to the difference in climatic conditions. The analysis showed no significant difference between the 1-star and 2-star hotel in terms of the KPI for electricity and water, while the 1-star hotel was more energy intensive than the 2-star hotel. However, this result still requires further confirmation through additional case studies. Many specific options were identified for each hotel that had significant environmental and economic savings. Some of these options concerned good housekeeping measures that could be implemented immediately with no or low investments such as installing water saving taps and showers, using dual flushing system for toilets, using dispensers for shampoo and soap and improving the dish washing procedures. Other options required relatively moderate to high investment such as installing sensors in the windows to shut off automatically the AC system when the windows are opened, installing moving sensors in corridors to automatically switch on/off the light and installing a central cooling system. The saving were substantial; for example, the installation of a solar water heating system in one of these hotels could save annually around 7'000 JD (11'140 liter diesel/ year). Thus the implementation of CP enhanced the efficient use of resources and further it advanced the financial position of the enterprises.

Introduction
Tourism constitutes an important part of the Jordanian economy, having positive effect on the country’s employment and investment opportunities. It is estimated that the tourism sector contributes more than US$ 800 million to the Jordanian economy and accounts for approximately 10 percent of the country’s gross domestic product (GDP) (1). It is expected that the tourism sector will be doubled in the near future and accordingly high demand on water and energy will be highlighted. Taking into
consideration that water and energy are of top priority issues for Jordan, improving the performance and the sustainability of the hospitality sector needs careful attention to be given to the efficient use of such resources. Believing in the importance of the hospitality sector (hotel industry), the Cleaner Production (CP) team from Jordan and Switzerland conducted CP assessment in four hotels in Aqaba and Petra classified as 1, 2 and 3-star hotel. The main objectives of the assessment were improving the efficiency of raw materials and energy uses, reducing the waste emissions and improving the environmental performance. Cleaner production is a tool that improves the eco-efficiency of the enterprises. The concept is based on best utilization of resources by optimizing the processes and their management in place. The impact of implementing CP is thus two folds: first it results in saving the resources and reducing the environmental damages and second, it improves the financial performance of the enterprise. The CP methodology comprises key steps which include understanding the processes and identifying the focal area, data collection, benchmarking, undertaking material and energy flow analysis, determining CP options and evaluating and prioritizing the options. However, for rather small and medium enterprises as it is the case in this paper, the methodology has been modified in the so called Quick Scan Plus (QS+) (2). This alternative method provides an easy to apply tool for small and medium enterprises where no extensive material and energy flow analysis are required as opposed to large industrial enterprises. Understanding the quantity of resources used per activity, however, remains important, and then the analysis of the status is done by cross reference to available benchmarks.

Description of the hotels included in the study

**Hotel A** was established as a family business in 1994 as a 2-star hotel and managed by its owners. It is located in Aqaba governorate. In 2000 a new section of 38 new rooms was added to the hotel capacity to become 60 rooms. The hotel has a total of 22 employees working in different departments excluding the general hotel management which is done by the owners. There are 4 employees in the reception, 8 employees in the housekeeping (including the laundry), 8 employees in food and beverage (service and kitchen), one employee in maintenance and one employee in accounting section. Most of the employees have the required experience. The employees turn over is very low. The employees of the reception, and food and beverages departments work in three shifts while the employees of housekeeping department work in two shifts and the ones of accounting and maintenance departments work in one shift. The maintenance responsible can be requested anytime as required. The working hours of each shift are 8 hours a day for 6 days a week. Each employee has one day off per week. The hotel consists of 60 rooms, one restaurant, one kitchen and one laundry. Around 60% of the hotel customers are local persons, 15% Arabians and 25% Europeans mainly from Britain and France. The needed detergents such as soap, shampoo, chemicals are obtained from local suppliers. The raw materials for the food and beverage sections are bought from the local market.

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6 In January 2004, the Cleaner Production Unit (CPU) was established at the Royal Scientific Society of Jordan. The initiative is undertaken with the support of the Swiss Secretariat for Economic Affairs (seco) and the technical support of Swiss Reference Center comprising the University of Applied Sciences Northwestern Switzerland (FHNW) and Sustainable Business Associate (SBA), Switzerland.

7 To preserve the privacy of the hotels, the hotels are given anonyms codes.
In spite that no environmental management system is established, the hotel management shows reasonable environmental responsibility through the application of good housekeeping measures.

**Hotel B** was established in 2006 as a 1-star hotel. It is family owned and managed and is located in Petra region. The hotel has a total of 3 employees working in the reception, housekeeping and food and beverages (including service and kitchen) departments. The laundry service is subcontracted to a local laundry shop. The maintenance of the hotel facilities is done by a local technician. The high season periods are from March to May and from September to October. The occupancy rate of the hotel reached up to 65% as average during the year 2006.

The employees of all departments work in two shifts. The working hours for the first shift are 10 hours a day (6:00 AM – 4:00 PM), while the working hours for the second shift are 8 hours a day (4:00 PM – 12:00 AM) for 6 days a week.

The hotel consists of 8 rooms, one restaurant and one kitchen. Around 99% of hotel customers are Europeans and Americans. The needed food, beverages and cleaning chemicals like soaps, shampoos are purchased from the local market.

There is no environmental management system in place; however, the hotel management cares about having a good housekeeping system that could also improve the environmental conditions.

**Hotel C** was established in 1994 as a 3-star hotel. In 2000 the total numbers of rooms increased to 80 rooms. It is located in Petra region. The hotel has a total of 5 employees in low season and 10 employees in the high season working in its different departments. The management is done by the owner. There are 2 employees in the reception (3 employees during high season), 1 employee in the housekeeping section including the laundry (3 employees during high season), 2 employees in food and beverage including service and kitchen (4 employees during high season), one employee for maintenance issues. The high season periods are from March to May and from September to October.

The hotel suffers from high turn over of the employees, although the employees have a benefit of full board accommodation.

The employees at the reception work in two shifts, while in other departments in one shift. The working hours of each shift are 13 hours a day (7:00 AM – 8:00 PM) for 6 days a week. Each employee has one day off per week.

The hotel consists of 80 rooms, one restaurant, one kitchen, and one laundry. Around 5% of the hotel guests are locals and Arabians and 95% are Europeans.

The hotel applies a good housekeeping system; no specific environmental management system is in place.

**Hotel D** was established as a family business in 1999 as a 1-star hotel in Aqaba and started operation in 2000 with 20 rooms. In 2007 expansion was done to a total number of 42 rooms.

The hotel employs in total 8 employees working in its different departments. The management is done by the owners with the assistance of an administration manager (employee). 2 employees work in the reception (1 employee for daytime and the other for nighttime), 4 employees in the housekeeping, 1 employee in the laundry, and 1 employee for beverages service.
The employees of the hotel do not have professional hotel management background. They attended training by the hotel former employees. The hotel suffers from a big turn over of the staff; in some cases the positions are replaced monthly. The financial issues of the hotel are carried out by a person who works 5 days per month. The employees of all departments work one shift of 8 working hours a day during 6 days a week, except the ones of the reception department, who work 12 hours a day. The hotel consists of 42 rooms, one beverage service room and one laundry. Around 50% of the hotel customers are locals, 49% Arabians and 1% Europeans. The required raw material, food and beverages and cleaning chemicals are bought from the local market. The hotel installed energy saving light bulbs in the lobby and rooms in order to reduce the energy consumption; however further work would be necessary to reduce significantly the overall energy and water consumption.

Methodology
These 1, 2, and 3-star hotels are all located in Petra and Aqaba, which are two major tourists attraction sites in Jordan. The reason for this geographic focus was the increasing number of visitors which are expected in the near future and the size of the businesses, since these small enterprises are the focus of the government to receive support within the framework of the Jordanian project to improving micro economies in order to increase and/or to enable better sustainability.

The methodology of the assessment included:
Pre-assessment: The pre-assessment comprised two detailed visits to the hotels. During the visits all units were surveyed regarding their applied practices, key environmental and productivity issues (water, waste, energy saving potentials) and a detailed description was given for each unit.

Consumption rate of resources – key performance indicators: The consumption rates of resources namely water, fuel and electricity were determined (according to availability of data) during the study period, as well as for the same period in the past year. The data were recalculated per overnight stays to unify the conditions for ease of comparison among the hotels and with benchmark figures from Europe.

– identification and evaluation of options: The identification of CP options for the hotels was done through brainstorming process of the experts’ team. This was based on the findings and observations of the surveillance in the hotels, taking into account the elaborated key performance indicators and consulting other Clenaer Production literature and case studies available. All identified options from the brainstorming process were categorized into the eight CP principles, which are:

- Good housekeeping measures
- Segregation
- Input material change
- Process / Production change (e.g. equipment modifications or changes)
- Process control and improved process conditions
On-site recycling or recovery

Production of useful by-products

Product modification

It is to be noted that normally the good housekeeping measures should have high priority for direct implementation without qualitative evaluation, since they require no or only low investment. The other categories of CP options are compared qualitatively and rated according to the expert opinion based on the criteria listed in Table 1. The environmental and economical feasibility as well as the technical and organizational viability were taken into account during the evaluation of each option.

Results and discussion

Key Performance Indicators

The results of the assessment of the water, fuel and electricity consumption are given in Figures 1, 2, 3 and 4 for 2 of the hotels (Hotel A and B). The data of Hotels C and D were not available. The data were analyzed and compared to the benchmark figures for hotels in Europe (3) as shown in Table 2.

It is noted from Figure 1 that the total energy (diesel and electricity) consumption in the 2-star hotel was much lower than the given European benchmark; the values reached only 25% of the benchmark. This is justified that hotels in Jordan consume less energy than Europe for rooms heating due to the specific climate conditions. However, the 1-star hotel data showed higher values reaching about more than the benchmark by 25%. It should be noted as shown in Figure 2, that the data for electricity consumption for the 1-star hotel and 2-star hotel were almost the same; the average rate of electricity consumption per overnight customer were 9.58 kWh and 9.53 kWh respectively. This indicates that for this case study (at least) the KPI for electricity is somehow independent of the size and grade of the hotel (among 1 and 2-star hotels).

Regarding the diesel consumption, it is revealed from Figure 3 that the average consumption per overnight customer in the 1-star hotel is about twice of the 2-star hotel. This can be attributed to the boilers capacity and heat efficiency between the two cases. It is expected that heating (by operating the boiler) for large number of rooms would be of higher efficiency than for low number of rooms, noting that Hotel A (2-star) consists of 60 rooms while Hotel B (1-star) consists of 8 rooms only, and thus would influence the specific rate (per overnight stay).

Looking at the water consumption as a key performance indicator (Figure 4), it can be seen that the average rate of water consumption for an overnight stay in the 1-star and the 2-star hotel was almost the same (198 and 203 l/overnight stay in 1-star and 2-star hotel respectively). It is also clear that the data for the 1-star hotel exceeded the European benchmark figure (that is taken for bed and breakfast hotels in Europe) by about 49%.
### Table 1: Criteria and rating scale used for the evaluation of CP options

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Scale</th>
<th>Rating (example)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic feasibility</td>
<td>✅✅</td>
<td>• short term payback (&lt; 3 month)</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• no or minor investment cost &lt; 50 JOD</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• no special operation cost</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• moderate to high payback time (3 to 24 months)</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• moderate investment cost &lt; 1’000 JOD</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• operation cost equal to present situation</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• high payback time (&gt; 2 years)</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• high investment cost &gt; 1’000 JOD</td>
</tr>
<tr>
<td></td>
<td>✅✅</td>
<td>• higher operation cost</td>
</tr>
<tr>
<td></td>
<td>❎</td>
<td>Investment not tolerable for the company</td>
</tr>
<tr>
<td>Environmental feasibility:</td>
<td>✅✅</td>
<td>reduction of environmental load high / significant</td>
</tr>
<tr>
<td>Expected reduction of solid</td>
<td>✅✅</td>
<td>reduction of environmental load moderate</td>
</tr>
<tr>
<td>waste, gaseous emissions, raw</td>
<td>✅</td>
<td>reduction of environmental load low</td>
</tr>
<tr>
<td>material or energy consumption</td>
<td>❎</td>
<td>Ecologically not recommendable, e.g. because of additional energy consumption or</td>
</tr>
<tr>
<td></td>
<td>❎</td>
<td>because of the introduction of more polluting material etc. or does not comply</td>
</tr>
<tr>
<td></td>
<td>❎</td>
<td>with legal standards</td>
</tr>
</tbody>
</table>

### Table (2): Benchmark values as indicated in European Union per overnight stay (customer) for 1-star and 2-star rated hotels

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Benchmark for 1-star hotel</th>
<th>Benchmark for 2-star hotel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>kWh/overnight stay</td>
<td>15.8</td>
<td>58.6</td>
</tr>
<tr>
<td>Water</td>
<td>liter/overnight stay</td>
<td>133</td>
<td>283</td>
</tr>
</tbody>
</table>

1) Based on benchmark for bed & breakfast hotels in the European Union
Fig. 1: Key Performance Indicators (KPI) of Energy.

Fig. 2: Key Performance Indicators (KPI) of Electricity.

Fig. 3: Key Performance Indicators (KPI) of Diesel.
Identification and evaluation of CP options

As a result of the study and based on the findings of the analysis and the brainstorming sessions between the study team, a number of CP options were identified. The options were evaluated, categorized and prioritized as mentioned in the methodology section. The exercise resulted in

- Hotel A: 37 options were generated, of which 25 were good housekeeping options.
- Hotel B: 17 options were generated, of which 10 were good housekeeping options.
- Hotel C: 31 options were generated, of which 21 were good housekeeping options.
- Hotel D: 29 options were generated, of which 18 were good housekeeping options.

Table (3) provides a list of the most feasible CP options for all the hotels. It is seen that some of the CP options were common among the hotels. This is certainly expected when studying a common sector of rather similar conditions. On the other hand, it is interesting to see that about 2/3 of the options were good housekeeping measures. This finding should be seen as an encouraging phenomenon; the good housekeeping measures are normally easy to apply (can directly be implemented) and at the same time, they result in relatively good impacts in terms of environmental and economic aspects.

Many of the workable options (those that require more investment in time and money than good housekeeping measures) have significant environmental and economic saving potentials. For example, the option of installing a solar heating system for hot water would result in the following savings:

- Hotel A: 11'143 liter of diesel annually (7'020 JD/year = 9'890 $US/year).
- Hotel B: 1'028 liter of diesel annually (648 JD/year = 912 $US/year).
- Hotel C: 4'800 liter of diesel annually (3'020 JD/year = 4'260 $US/year).
While for Hotel D insulating the cold and hot water pipes is expected to save the electricity consumption significantly.

Therefore, as illustrated above a significant amount of savings can be obtained by implementing the CP options. It is apparent that savings in energy were the most attractive and dominant options. This has certainly been influenced by the rise of oil prices. Solar heating in Jordan is quite a well developed technology, thus makes the options of solar heaters relatively easy to apply; there is no requirement to import a new technology that is not tested locally. Such factors were taken into account in the evaluation of options.
### Good Housekeeping Options

<table>
<thead>
<tr>
<th>CP Option</th>
<th>Hotel A</th>
<th>Hotel B</th>
<th>Hotel C</th>
<th>Hotel D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Change the towels and the beds sheets once or twice a week or upon customer request (should inform customers of this policy)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Record any guest suggestions or complaints</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3. Install water saving taps and showers which are key locked and regularly decalcify them</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Do frequent maintenance and cleaning procedures on the kitchen and its facilities</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Defrost freezers on a regular basis according to a fixed plan to increase efficiency of the freezers and reduce energy consumption.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Reconsider the size of food portion served; avoid wastage of food like butter, jam, humus etc.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Either relocate the freezers and the refrigerators in the kitchen and the service room or search for better ventilation system.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. There are four freezers in the store which are not completely full, it is recommended to investigate the possibility of stopping one of them.</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Dishes washing procedure could be improved (avoid washing single plate under running water).</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Install shade outside the windows of the rooms to reduce sun light inside the rooms</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. All cold and hot water pipes should be insulated</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Cover or insulate the electrical cables (wires) on the roof</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Fire exit-ways should be accessible easily in order to improve safety of the hotel guests in case of an emergency.</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>14. Close the door in the lobby and in the shops in order not to loose AC-cooled air to the environment (e.g. install forced-door-closing device)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>15. Make sure that laundry washing machines are only run at full capacity.</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>16. Dry the washed items on the sun (roof) to prolong the lifetime of the towels and sheets and to save electrical energy for the tumble dryer.</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>17. Check the microbiological quality of the well water used for showers and taps to ensure better safety of customers.</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>18. Install heat-insulating curtains in the existing rooms to improve AC efficiency.</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

### Workable Options

<table>
<thead>
<tr>
<th>Workable Options</th>
<th>Hotel A</th>
<th>Hotel B</th>
<th>Hotel C</th>
<th>Hotel D</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Study the benefit of installation of sensors in the windows to shut off automatically the AC system when the windows are opened.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>20. Install moving sensors in corridors to automatically switch on/off the light.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>21. Investigate the installation of solar heating system for hot water.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>22. Use dual flushing system for toilets.</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Investigate the installation of a central cooling system also for the old part of the Hotel (22 rooms).</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions
Quick Scan Plus was a good tool to study such type of small enterprises with processes that do not require in-depth flow analysis. The Quick Scan Plus methodology can therefore be applied as an efficient and low cost CP assessment tool for small and micro enterprises; it requires less consultancy support for the same goal to undertake the work towards sustaining and improving the performance of such enterprises.

The comparison of the key performance indicators for the 1-star hotel in Jordan with the EU benchmark for bed and breakfast was found to be not very well applicable. It is expected that there is still differences in the type and grade between the two cases in addition to the different climatic conditions. It was also concluded from the analysis that no significant difference between the 1-star and 2-star hotels in terms of the KPI for electricity and water, while the 1-star hotel was more energy intensive (mainly due to higher diesel consumption) than the 2-star hotel. However, this result can not be generalized unless a good number of studies were achieved and proved similar trend.

Energy saving options were very attractive among the identified and evaluated options; this is expected due to the rise in the fuel prices, which made energy saving and resorting to renewable resources such as solar heating a more demanded option. Continuous follow up and awareness building for business owners and authorities is recommended in order to advance more the implementation of energy efficiency and water saving options.

It is recommended to advance the environmental work in the hotel industry and to call for proper environmental management system to be in place. Hence, this issue is so important to enhance and sustain the tourism sector and to be able to optimize the use of resources particularly if the expansion in the tourism sector takes place. A way to encourage the hotel managements could be by applying and benefiting from the award and recognition systems such as the CP Excellence Award (4) in Jordan and the Eco-labeling schemes. Such involvement is expected to enhance the marketability and image of the hotels and yet offer new materialized returns.

Acknowledgement
The authors greatly acknowledge the support of the Swiss Government represented by the Swiss Secretariat for Economic Affairs (seco). Thanks are also extended to the Ministry of Planning and International Cooperation – Enhanced Productivity Centers program (IRADA) for providing support and facilitation for the study in small enterprises. The cooperation of the hotel management and technical teams is appreciated.

References


2) Ch. Buser and J. Walder, Guidelines for Cleaner Production: Conducting Quick-Scans in the Company, University of Applied Sciences Northwestern Switzerland.
Switzerland, 2007 (not published).


4) Cleaner Production Excellence Model, prepared by the Sustainable Business Associates in cooperation with the Royal Scientific Society and the University of Applied Sciences Northwestern Switzerland.

5) Quick Scan Plus (QS+) assessment reports at Hotel A, B, C and D, Cleaner Production Unit (CPU)/ Royal Scientific Society (RSS), October 2007.

Topic 6: Environmental Education
واقع التعليم الفندقي والسياحي في وزارة التربية والتعليم

الدكتور: مجد عبد الله المسعد

غلال عائلة الشوايكة

وزارة التربية والتعليم، الأردن

مقدمة

تولي وزارة التربية والتعليم اهتماما كبيرا بتطوير التعليم المهني بكافة فروعه وتهتم بشكل خاص بتطوير التعليم الفندقي والسياحي وذلك لكي تضاف إليها أهمية هذا التعليم في رفد سوق العمل المحلي والعربي بالأيدي العاملة المهنية المدربة والمتمكلة للمهارات التي تجعلها قادرة على التنافس في سوق العمل بثقة واقتدار وذلك في ضوء تزايد الاهتمام في القطاع السياحي والفنادق على مستوى الدولة بشكل عام.

وأما السياحة، فتشكل أحد الصناعات الرئيسية في الداخل القومي الأردني حيث كان الدخل السياحي لعام 2007 مثلا 1638.9 مليون دينار وحجم العمالة المباشرة في قطاع السياحة بقدر ب 3455 لعام 2007 و3548 لعام 2008 بنسبة ارتفاع 3%، وإذا ما عرفنا أن عدد العاملين من غير الأردنيين في هذا القطاع الوظيفي أسرع تطوراً في الأردن، فيمكننا أن نرى هكذا الاهتمام في تطوير هذا القطاع من خلال رفده بالكوادر البشرية المؤهلة والقادرة على التعامل مع متطلباته بفاعلية.

هذا الاهتمام يتزامن مع تطورات المجتمع يشهدها العالم، حيث ترتفع نسب البطالة، وتعمل وزارة التربية والتعليم على توسيع واختصاصات البرامج التربوية وكيفية التدريس من خلال قطاعات جديدة كالتكوين المهني، وتحرص على تقديم التجهيزات المناسبة وتحديث المدارس لمواجهة التحديات التربوية، مع تطورات عالمية في مجال التكنولوجيا والتصنيع.

بكل ذلك السياق، فإنها في التوجه نحو التدريس المتميز في هذا القطاع، وذلك بتطوير التعليم المهني في الأردن.

تطور التعليم المهني في الأردن

التعليم المهني في الأردن، وهو بدوره، يشهد التطورات والتطور منذ الفترات الأولى التي خمست البدايات، حيث تطور التعليم المهني في الأردن، فضاف إليه رسوماته من خلال التطورات الصناعية والاقتصادية، حيث تطورت البرامج التدريبية في القطاعات المختلفة، وزيادة مشاركة القطاع الخاص في التعليم المهني، مما أدى إلى زيادة نسب التوظيف في هذه القطاعات، وزيادة الرضا عن التدريب المهني.

وأخيرا، فإن السياسة الوطنية في التعليم المهني في الأردن تسعى دائماً إلى تحقيق التوازن بين التعليم والعمل، وذلك من خلال تقديم برامج تدريبية وامية تلبي متطلبات سوق العمل وتحقق التوازن بين التعليم والعمل، وذلك من خلال تقديم برامج تدريبية وامكية تلبي متطلبات سوق العمل وتحقق التوازن بين التعليم والعمل.

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ويستم الفركيز في هذه الورقة على تطور التعليم الفني كأحد فروع التعليم المهني الذي تشرف عليه وزارة التربية والتعليم.

بين الجدول التالي تطور التعليم الفني خلال العشر سنوات الماضية من حيث الخريجين والمدارس ومواقعها.

<table>
<thead>
<tr>
<th>الموقع</th>
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</table>
أهداف التعليم الفندقي

يهدف التعليم الفندقي إلى إعداد كواور مهنية تلبية حاجات المجتمع الأردني من العمال المهنيين في المجال الفندقي وفي الوقت نفسه تهيئة الطالب كاديمياً لمتابعة التعليم العالي عند توفر الشروط لذلك.

ويمكن تحقيق ذلك من خلال ما يلي:

- تزويد العامل بالمهارات النظرية والمهارات العملية بشكل يؤكد الترابط بين النظرية والتطبيق.
- إكساب الطالب المهارات العملية اللازمة لكل تخصص وفق الأصول الصحيحة والسلسة.
- تدريب الطالب على استعمال الأجهزة المستخدمة في مجال العمل الفندقي.
- إكساب الطالب الفنادق الضمانة السليمة والسلامة المهنية المتعلقة بماركة المهن الفندقية.
- تدريب الطالب على البحث والتفكير واتخاذ القرارات المناسبة في المجال الفندقي.
- التركيز على أخلاقيات مهنة الفندق ومقيم واتخاذ القرارات الموجودة بها مثل احترام العمل وتقديره والتزامي بالأخلاق المهنية والتعاون والمهمة بروح الفريق. النذرة، والكفاءة، والانتاج في الوقت المحدد.
- تدريب القدرة على الاتصال الفاعل.

مواقع التعليم الفندقي

لقد أدى زيادة عدد السياح إلى الأردن وارتفاع الدخل السياحي إلى زيادة عدد المنتجات السياحية وخاصة الفنادق والمطاعم. ومع هذا التطور أصبحت الحاجة إلى مدارس تولي إعداد الكواور المتخصصة للعمل في القطاع السياحي تدريباً، قامت وزارة التربية بفتح مراكز تعليم فندقي في المناطق التالية:

- عمان: 8 مراكز
- السلط: 1 مركز
- جرش: 1 مركز
- الأغوار الشمالية: 1 مركز
- عجلون: 1 مركز
- اربد: 2 مركز
- بني كنانة: 1 مركز
- الرمثا: 1 مركز
- الزرقاء: 1 مركز
- مادبا: 1 مركز
- البتراء: 2 مركز
- العقبة: 1 مركز
- البادية الوسطى: 1 مركز
- الكرك: 1 مركز

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المجالات عمل خريجي التعليم الفندقي

يجد خريجي التعليم الفندقي للعمل في المجالات التالية:
- الفنادق المصنفة
- المطاعم السياحية
- شركات التموين والخدمات
- المستشفى
- المخابز
- محلات الحلويات
- محلات المعجنات
- الشركات

المجالات التدريب العملي

يشمل التدريب العملي المجالات التالية:
- خدمة الطعام والشراب
- إنتاج الطعام
- الاستقبال الفندقي
- التدبير الفندقي

معلمي التعليم الفندقي

يبلغ عدد معلمي التعليم الفندقي في وزارة التربية والتعليم والموزعين على 25 موقع 110 معلما وجميعهم مهتمين للتعليم والتدريب الفندقي ويتم تدريبهم على معلم طعام وشراب ومعلم إيواء حيث يقوم معلمو الطعام والشراب بتدريس مبحثي إنتاج الطعام (المطبخ) وخدمة الطعام (المطعوم) أما معلمو الإيواء فيدرسون الاستقبال وخدمة الغرف (التدبير الفندقى)

مواقع التدريب العملي

تشمل خطة التدريب العملي على تحديد مواقع التدريب العملي وحولى المادة التدريبية حيث يتم توزيع الطلاب على الفنادق والمطاعم والمواقع السياحية المجاورة وكذلك يتم التدريب داخل المدارس نفسها أما محتوى المادة التدريبية فهو جزء من المناهج الدراسي
التدريب العملي الصيفي

يربط عملية التعليم والتدريب بالبيئة الحقيقية لعالم العمل في الفنادق والمطاعم وغيرها يتدرب الطلبة عمليا في الفنادق والاستراحات السياحية والمطاعم لمدة 24 يومًا خلال العطلة الصيفية وذلك بعد إنهاء الصف الحادي عشر بنجاح (الأول ثانوي فندقي).

متابعة خريجي التعليم الفندقي

لإيلام الوزارة بأهمية التقويم المستمر لأغراض التدريب والتحديث وتقديم الجوانب المتعلقة بمتابعة مشروعي التعليم المهني وشبكة التدريب في الدوري頻 في فنادق القطاع السياحي.globally وذلةك بدلا من النهاية الحادي عشر بنجاح (الأول ثانوي فندقي) متعمدة على الأراضي التحدي والتجديد وذلك بتمديد البرامج وتجدد برامج التدريب وقد قامت بإجراء دراسة حول احتياجات سوق العمل الأردني حتى 2012 وتستند إلى دراسات استعداد الأت ية وتعتبر إحدى الدراسات الأهم في خطة الوزارة.

التحضيرات والتسهيلات التدريبية

تعد التجهيزات في ضوء مستلزمات عنصر المناهج التدريبي وفي ضوء الدراسات التي تحدد مواصفات هذه التجهيزات بما يتلاحم مع التطور في سوق العمل. أما كيمياء فقد تحدد في ضوء حجم المتاح ومساحة الطلبة في كل مشغل وبراعة نهج محطات التدريب في تنظيم المشاغل المهنية ونظم تدريب الطلبة وذلك للاستفادة القصوى من التسهيلات التدريبية.

التعليمات

- الوصول للمدرسة المنتجة
- تحديد كافة المشاغل والأجهزة بما يتلاحم وسوق العمل
- التركيز على تعليم اللغات في التعليم الفندقي
- الشراكة مع القطاع الخاص وتدريب المعلمين وعديد خبرات عالمية.